SCIENCE, TECHNOLOGY, HEALTH

Mechanical Engineering Degree Mechatronics Composite Materials

Level of qualification:
Master's degree

ECTS
180 credits

Duration
3 years, 6 semesters

Available tracks

- Mechanical Engineering Mechatronics Composite Materials Mechanical Engineering Mechatronics Composite Materials - Work-study program

Presentation Practical

information

Campus

Annecy / Annecy-le-Vieux campus

Le Bourget-du-Lac / Savoie Technolac campus

Program

Mechanics Mechatronics Composite Materials

IGE3 - Mechatronics and Industrialization (Annecy)

Semester 5

	Nature	Lecture	Tutorial	Practical	Credits
UE501 Gateway to the professional environment	UE				8 credits
English S5 Sports	MODULE		40.5 hours		
Business Management Simulation	MODULE		21		
Skills development support Optional internship S5	MODULE		12		
Support (every Thursday afternoon)	MODULE	3 hours			
	MODULE				
	MODULE				
UE502 Engineering Sciences and Tools	UE				9 credits
Sustainable Development	MODULE	15	12		
Algorithms and Python Programming	MODULE	hours	hours	12	
		3	6		
		hours	hours		
Databases (basics of business information management) MAraTHon: Support/Refresher course	MODULE	6	4.5	12	
Mathematics Core Curriculum	MODULE				
	MODULE	16.5	37.5		
UE503 Specialized Sciences	UE				13 credits
Metallic Materials Continuum Mechanics CAD and	MODULE	14.5 hours 15	10.5 22.5	12 hours	
Prototyping	MODULE		4.5 hours	36 hours	
	MODULE				
Electricity	MODULE	13.5 hours	15	12 hours	
Thermodynamics and thermal engineering	MODULE	13.5		12 hours	

Semester 6

	Subject	Lecture	Tutorial	Practical	Credits
UE601 Gateway to the professional environment	UE				8 credits
Professional experience Financial	MODULE				
management	MODULE	10.5	9		
Introduction to law	MODULE	15 hours	4.5		
Issues in artificial intelligence	MODULE	6 hours			
Business-oriented project management techniques	MODULE		9		
English (TOEIC level not achieved) S6 Modern languages (TOEIC level achieved)	MODULE		40.5 hours		
	MODULE				
English S6	SUBJECT		15		

Modern Language 2	CHOICE				
German TD	SUBJECT		3 p.m.		
Spanish TD Italian	SUBJECT		3:00 p.m.		
TD Chinese TD	SUBJECT		3:00 p.m.		
Japanese TD	SUBJECT		3:00 p.m.		
Russian TD	SUBJECT		3:00 p.m.		
Portuguese TD	SUBJECT		3:00 p.m.		
Advanced English S6 Optional	SUBJECT		7:15 p.m.		
internship S6	SUBJECT		9:00		
Support (every Thursday afternoon when FISA staff are present)	SUBJECT				
	MODULE				
	MODULE				
UE602 Engineering Sciences and Techniques	UE				9 credits
Mathematics Electronics	MODULE	20.5 hours	19.5 9		
	MODULE	12		12	
Digital tools for engineers	MODULE	7.5 hours	7.5	20	
UE603 Specialized Sciences	UE				7 credits
Structural Design Mechanism Statics Fluid Statics and	MODULE	15 hours	15h 9h 9h	8	
Dynamics Mechanism Dynamics	MODULE	5.25 hours	16.5	hour	
	MODULE	6.75		s 8	
	MODULE	13.5		hour	
				s 4	
				hour	
				s 4	
				hour	
				s	
UE604 Mechanical Design - Mechatronics	UE				6 credits
Plastics, Composites & Ceramics Metal Processing	MODULE	12 hours	4.5	4 hours	
Mechanical design and technologies	MODULE	2.5 hours	6 hours	12 hours	
	MODULE	10.5	12 hours	16 hours	

IGE3 - Composite Materials (Chambéry)

Semester 5

	Nature	Lectures	Tutorial	TP	Credits
UE501 Gateway to the professional environment	UE				8 credits
English S5 Sports	MODULE		40.5		
Business Management Simulation	MODULE		21		
Skills development support Optional internship S5	MODULE		12		
Support (every Thursday afternoon)	MODULE	3 hours			
	MODULE				
	MODULE				
UE502 Engineering Sciences and Tools	UE				9 credits
Sustainable Development	MODULE	15 hours	12 hours		
Algorithms and Python Programming	MODULE	3 hours	6 hours	12	

Databases (basics of business information management) MAraTHon: Support/Refresher course	MODULE	6	4.5	12
Mathematics Core Curriculum	MODULE			
	MODULE	16.5	37.5	

UE503 Specialized Sciences	UE				13 credits
Metallic Materials Continuum Mechanics CAD and	MODULE	14.5 hours 15	10.5 22.5	12 hours	
Prototyping	MODULE		4.5 hours	36	
	MODULE				
Thermodynamics and thermal engineering Electricity	MODULE	13.5	15	12 hours	
	MODULE	13.5		12 hours	

Semester 6

	Subject	Lectures	Tutorial	Practical	Credits
UE601 Gateway to the professional environment	UE				8 credits
Professional experience Financial	MODULE				
management	MODULE	10.5 hours	9		
Introduction to law	MODULE	15 hours	4.5		
Issues in artificial intelligence	MODULE	6 hours			
Business-oriented project management techniques	MODULE		9		
English (TOEIC level not achieved) S6 Modern languages (TOEIC level achieved)	MODULE		40.5 hours		
	MODULE				
English S6 Modern language	SUBJECT				
2	CHOICE		15 hours		
Italian TD	Tutorial		20 hours		
German TD	Tutorial		20		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages Advanced English S6	Tutorial		8pm		
Optional internship S6	SUBJECT		9pm		
Support (every Thursday afternoon when FISA staff are present)	MODULE				
	MODULE				
UE602 Engineering Sciences and Techniques	UE				9 credits
Mathematics Electronics	MODULE	20.5	19.5		
	MODULE	12	9	12	
Digital tools for engineers	MODULE	7.5 hours	7.5	20	
UE603 Specialized Sciences	UE				7 credits
Structural Design Mechanism Statics Fluid Statics and	MODULE	15 hours	3 p.m.	8 hours	
Dynamics Mechanism Dynamics	MODULE	5.25 hours	9 a.m.	8 hours	
	MODULE	6.75	9 a.m.	4 hours	
	MODULE	13.5	16.5 hours	4 hours	
UE604 Mechanical Design - Mechatronics	UE				6 credits

Plastics, Composites & Ceramics Metal Processing	MODULE	12 hours	4.5	4 hours
Mechanical design and technologies	MODULE	2.5 hours	6 hours	12 hours
	MODULE	10.5	12 hours	16 hours

IGE4 - Mechatronics and Industrialization (Annecy)

Semester 7

	Type	Lecture	Tutorial	Practical	Credits
UE701 Gateway to the professional environment	UE				6 credits

Resources and professional dynamics Creativity and innovation
management English (TOEIC level not achieved) S7 Modern languages
(TOEIC level achieved)
English S7 Modern
Language 2
German TD Spanish
TD Italian TD
Chinese TD
Japanese TD
Russian TD
Advanced English S7 Optional
internship S7
Support (half of Thursday afternoons when FISA staff are present)

MODULE
MODULE
MODULE
MODULE
SUBJECT
CHOICE
SUBJECT
SUBJECT
SUBJECT
SUBJECT
SUBJECT
SUBJECT
SUBJECT
MODULE
MODULE

13.5 hours 3.5
25.5
40.5
15
15 15
15 15
15 15
21

	Type	Lecture	Tutorial	Practical	Credits
UE702 Engineering Science and Technology	UE				9 credits

Sensors
Electric Motorization Functional
Materials

MODULE
MODULE
MODULE

13.5 hours
3
hours
12
hours

9h
12h
12h

16h
24h
16h

	Type	Lecture	Tutorial	Practical	Credits
UE703 Mechanical Design	UE				9 credits

Design Office Tools Mechanical design
Modeling and finite elements Mechanical eco-
design

MODULE
MODULE
MODULE
MODULE

3.75 hours
15
hours
12
hours
9.5
hours

6
10.5
10.5

12
hours
12
hours
16
hours

	Type	Lecture	Tutorial	Practical	Credits
UE704 Production and Quality	UE				6 credits
Operational Safety	MODULE	9.75 hours	10		
Advanced Operational Safety	MODULE	5		12	
Introduction to Industrial Management	MODULE	13.5 hours	13.5	12	

Semester 8

	Nature	Lectures	Tutorial	Practical	Credits
UE801 Gateway to the professional environment	UE				6 credits

Integrated QSE (Quality, Safety, Environment) Management System Management Techniques
English (TOEIC level not achieved) S8 Modern Languages (TOEIC level
achieved)
English S8 Modern
Language 2
German TD

MODULE
MODULE
MODULE
MODULE
SUBJECT
CHOICE
SUBJECT

9am 10.5
6pm 7.5
40.5
3 p.m.
3 p.m.

	Nature	Lecture	Tutorial	Practical	Credits
Spanish TD Italian	SUBJECT		3 p.m.		
TD Chinese TD	SUBJECT		3 p.m.		
Japanese TD	SUBJECT		3 p.m.		
Russian TD	SUBJECT		3 p.m.		
Advanced English S8 Optional	SUBJECT		3 p.m.		
internship S8	SUBJECT		9 p.m.		
Support (half of Thursday afternoons when FISA students are present)	MODULE				
	MODULE				
UE802 Internship	EU				6 credits
Assistant Engineer Internship S8	MODULE				
UE803 Systems Management	EU				9 credits
Quality in Production	MODULE	15 hours hours	13.5	12	
Continuous systems & vibrations	MODULE	14.25 hours	12 hours	12	
Centralized automation Embedded	MODULE	6h	13.5	20	
systems	MODULE	7.5h		hours 12 hours	
UE804 Design and management of technical data	UE				9 credits
Industrial Product Life Cycle Management Design Office Project Machine Components	MODULE MODULE MODULE	9 19.5	9 18	20 40	

IGE5 - Mechatronics and Industrialization (Annecy)

Semester 9

	Nature	Lecture	Tutorial	Practical	Credits
UE901 Gateway to the professional environment	UE				10 credits
Research and Development Project English (TOEIC level not achieved) S9 Modern Languages (TOEIC level achieved)	MODULE				
English S9 Modern	MODULE		40.5 hours		
Language 2	MODULE				
German TD	SUBJECT		15		
	CHOICE				
	SUBJECT				
Spanish TD Italian	SUBJECT		3 p.m.		
TD Chinese TD	SUBJECT		3 p.m.		
Japanese TD	SUBJECT		3 p.m.		
Russian TD	SUBJECT		3 p.m.		
Advanced English S9	SUBJECT		3 p.m.		
Optional internship S9	SUBJECT		9 p.m.		
	MODULE				
UE902 Systems Management	UE				7 credits
Decentralized automation Sampled automation	MODULE			24 12	
Multiphysical systems	MODULE	13.5 hours	12	32	
	MODULE				

	Nature	Lecture	Tutorial	Practical	Credits
UE903 Geometric quality of products	UE				6 credits
Tolerancing	MODULE	6.75	7.5	8 hours	
Mechanism theory	MODULE	8.25	6 hours	4 hours	
Industrialization for machining	MODULE	19.5	18 hours		
UE904 elective	CHOICE				
UE904 Mechatronics Option	MODULE				7 credits
Embedded Systems and Concurrent Programming		3.75 hours	4.5	12	
Industrial Robotics	MODULE	26 hours	6 hours	8 hours	
Advanced Industrial Management	MODULE EU	13.5 hours	12 hours	12 hours	
UE904 Option: Industrial Engineering	MODULE				7 credits
Computer-aided manufacturing and machining	MODULE	4.5	3 hours	32 hours	
Advanced industrial management	MODULE	13.5	12 hours	12 hours	
Industrial Performance	MODULE	9	9 hours	8 hours	

Semester 10

	Nature	Lecture	Tutorial	Practical	Credits
UE001 Engineering internship	UE				30 credits
Engineering internship S10	MODULE				

IGE4 - Composite Materials (Chambéry)

Semester 7

	Nature	Lecture	Tutorial	Practical	Credits
UE701 Gateway to the professional world	UE				6 credits
Creativity and Innovation Management	MODULE		25.5		
Professional Resources and Dynamics	MODULE		13.5	3.5	
English (TOEIC level not achieved) S7	MODULE		40.5		
Modern Languages (TOEIC level achieved)	MODULE				
English S7	SUBJECT				
Modern Language 2	CHOICE TD		15		
Italian TD	Tutorial		20		
German TD	Tutorial		20		
Spanish TD	Tutorial		20		
Japanese TD	Tutorial		20		
Intercomprehension of Romance Languages TD			20		
Advanced English S7	SUBJECT		21		
Optional internship S7	MODULE				
Support (half of Thursday afternoons when FISA students are present)	MODULE				
UE702 Materials Science	UE				8 credits
Macromolecular Chemistry 1	MODULE	13.5 hours	12 12	12	
Properties of Polymer Materials 1	MODULE	22.5	10.5	8	
Rheology	MODULE	19.5			

	Nature	Lectures	Tutorial	Practical	Credits
UE703 Composite Design	UE				10 credits
Mechanics of anisotropic media Design office tools	MODULE MODULE	25.5 15	12	12	
Modeling and finite elements	MODULE	12 hours	10.5	16	
Mechanical eco-design	MODULE	9.5	10.5		
UE704 Composite Production	UE				6 credits
Introduction to Industrial Management Composite Materials Specific Composites	MODULE MODULE MODULE	13 hours 9.75 hours 9.75 hours	13.5 hours 10.5 hours 10.5 hours	12 hours	

Semester 8

	Nature	Lectures	Tutorial	Practical	Credits
UE801 Gateway to the professional environment	UE				6 credits
Integrated QSE (Quality, Safety, Environment) Management System Management Techniques English (TOEIC level not achieved) S8 Modern Languages (TOEIC level achieved) English S8 Modern Language 2 Italian TD German TD Spanish TD Japanese TD Intercomprehension of Romance Languages TD Advanced English S8 Optional internship S8 Support (half of the Thursdays when FISA is present)	MODULE MODULE MODULE MODULE SUBJECT CHOICE TD Tutorial Tutorial Tutorial Tutorial SUBJECT MODULE MODULE	9 a.m. 6 p.m.	10.5 7.5 40.5 3 p.m. 8 p.m. 8 p.m. 8 p.m. 8 p.m. 8 p.m. 9 p.m.		
UE802 Internship	UE				6 credits
Internship Assistant Engineer S8	MODULE				
UE803 Composite Design	EU				10 credits
Industrial Product Life Cycle Management Composite Structures Mechanics 1 Structural Calculation - FEM Dynamics	MODULE MODULE MODULE	9 hours 16.5 hours 16.5	9h 18h	20 20	
Design Office Project	MODULE	3	7.5 hours	24	
UE804 Composite Production	UE				8 credits
Properties of Polymer Materials 2 Composite Manufacturing 1 Production Quality	MODULE MODULE MODULE	13 hours 11.5 hours 13.5	12	24 hours 24 hours 12 hours	

IGE5 - Composite Materials (Chambéry)

Semester 9

	Nature	Lecture	Tutorial	Practical	Credits
UE901 Gateway to the professional environment	UE				10 credits
Research and Development Project English (TOEIC level not achieved) S9 Modern Languages (TOEIC level achieved)	MODULE				
English S9 Modern	MODULE		40.5		
Language 2	MODULE				
German TD	SUBJECT		15h		
	CHOICE TD				
			20h		
Spanish TD	Tutorial		20		
Japanese TD	Tutorial		8 p.m.		
Italian TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD Advanced English S9	Tutorial		8 p.m.		
Optional internship S9	SUBJECT		9 p.m.		
	MODULE				
UE902 Composite Behavior	UE				8 credits
Macromolecular Chemistry 2	MODULE	12	10.5	12	
Extreme behavior of composite structures Nonlinear behavior	MODULE	hours	3 p.m.	4 p.m.	
	MODULE	21	6		
		hours	a.m.		
		12			
		hours			
UE903 Composite Design	UE				5 credits
Mechanics of Composite Structures 2 Composite Design and	MODULE	15	13.5 hours 13.5	8	
Calculations	MODULE	hours		hours	
		7.5		16	
		hours		hours	
UE904 Composite Production	UE				7 credits
Composite Manufacturing 2 Instrumental Methods	MODULE	4.5	4.5	24 20	
Composite Design Project	MODULE	13.5		34	
	MODULE				
					3 credits

Semester 10

	Nature	Lecture	Tutorial	Practical	Credits
UE001 Engineering internship	UE				30 credits
Engineering internship S10	MODULE				

Mechanics Mechatronics Composite Materials - Work-study program

IGE3 - Industrial Engineering - Work-study program

Semester 5

	Nature	Lectures	Tutorial	Practical	Credits
UE501 SHES - Languages	UE				8 credits
Labor Law and Corporate Structure 1	MODULE	20	12		
Introduction to Sustainable Development and CSR - Cognitive Development	MODULE	hours	hours	4	

16	12
hours	hours

English Support (every Thursday afternoon)	MODULE MODULE		37 hours		
UE502 Work experience	UE				4 credits
Project 1 (Launch and follow-up) Development in the workplace	MODULE MODULE	1		4	
UE503 Scientific training	EU				9 credits
Mathematics for engineers Mechanism statics Kinematics Strength of Materials	MODULE MODULE MODULE MODULE	16 hours 10 hours 10 hours 20 hours	24h 10h 10h 20h		
UE504 Engineering Methodology	UE				9 credits
Industrialization for Machining Obtaining Machining Blanks Total Quality Introduction to Industrial Management	MODULE MODULE MODULE MODULE	28 hours 20 hours 32 hours 32 hours	4 hours 20 hours	8	

Semester 6

	Nature	Lectures	Tutorial	Practical	Credits
UE601 SHES - Languages	UE				4 credits
Introduction to sustainable development and CSR Sustainable Development - Site Approach (Environmental Management) Support (every Thursday afternoon when FISA staff are present) English (TOEIC level not achieved) English (TOEIC level achieved)	MODULE MODULE MODULE MODULE MODULE	6 hour s 4 hour s	4 hour s 6 hour s 30		
UE602 Work experience	UE				10 credits
Project 1 (Monitoring and reporting) Development in the workplace (4 areas)	MODULE MODULE			4	
UE603 Scientific training	UE				8 credits
Machine components Fundamentals of electricity and electric motors Mechanical design	MODULE MODULE MODULE	20 hours 8 hours 20 hours	20 hours 20 hours 20 hours	12	
UE604 Engineering Methodology	UE				8 credits
Statistical Process Control Artificial Intelligence Issues Design of Experiments - Methodological Tools	MODULE MODULE MODULE	12 p.m. 6 a.m. 6 a.m.	12 p.m. 8	4 4	
Case studies - Company visits	MODULE	16	24		

IGE4 - Industrial Engineering - Work-study program - opening in September 2025

Semester 7

	Nature	Lectures	Tutorial	Practical	Credits

	Nature	Lectures	Tutorial	Practical	Credits
UE701 SHES - Languages	UE				8 credits
Management	MODULE	12	32 hours		
Business Structure and Entrepreneurship 2	MODULE		12 hours		
Sustainable development - Product approach	MODULE	4	2	8	
Support (half of Thursday afternoons when FISA staff are present)	MODULE				
English (TOEIC level achieved)	MODULE		34		
English (TOEIC level not achieved)	MODULE		34		
UE702 Work experience	UE				10 credits
Project 2 (launch and follow-up)	MODULE	1		8	
Development in the workplace (progress)	MODULE				
UE703 Scientific training	UE				7 credits
Mechanism dynamics	MODULE	20 hours	20		
Modeling and finite elements	MODULE	20 hours		20	
Continuous automation	MODULE	4 p.m.	12 p.m.	12	
UE704 Engineering Methodology	UE				5 credits
Electronics	MODULE	28 hours		12	
Algorithms and Programming	MODULE	12 hours			
Industrial Logistics	MODULE	12 hours	12	12	
Design Office Tools	MODULE				

Semester 8

	Nature	Lectures	Tutorial	Practical	Credits
UE801 SHES - Languages	UE				5 credits
Management and Technical Communication	MODULE	6 hours	4	12	
Support (half of Thursday afternoons when FISA staff are present)	MODULE				
English (TOEIC level achieved)	MODULE		40		
English (TOEIC level not achieved)	MODULE		40		
UE802 Work experience	UE				7 credits
Project 2 (Monitoring and reporting)	MODULE			8	
Development in the workplace (4 areas)	MODULE				
UE803 Scientific training	UE				9 credits
Structural dynamics	MODULE	6 hours	6	8	
Fluid statics and dynamics	MODULE	12 hours			
Design office project	MODULE			40	
Algorithms and programming: generalization	MODULE	4	4	12	
Thermal	MODULE	8	8		
UE804 Engineering Methodology	UE				9 credits
Metallic Materials	MODULE	16 hours	12 hours	12	
Production Management and Improvement	MODULE	14 hours	14 hours		
Dimensional Metrology	MODULE	12	12		

hours hours

IGE5 - Industrial Engineering - Work-study program - opening in September 2026

Semester 9

	Type	Lecture	Tutorial	Practical	Credits
UE901 SHES - Languages	UE				7 credits
Legislation, labor law, occupational health, sustainable engineering, decarbonization GEPC, Humanities, management, ergonomics	MODULE	18 hours	8	8	
	MODULE	28			
English (TOEIC level achieved)	MODULE		26 hours		
English (TOEIC level not achieved)	MODULE		26		
UE902 Work experience	UE				10 credits
Project 3 (Launch and follow-up) Development in the	MODULE	1		8	
workplace (progress)	MODULE				
UE903 Scientific training	UE				7 credits
Tolerancing Industrial robotics Centralized Automation	MODULE MODULE MODULE	6.75 hours 26 hours 8 hours	7.5 6	8 hours 8 hours 20 hours	
UE904 Engineering Methodology	UE				6 credits
Ceramics & material selection Computer-aided manufacturing Flow simulation	MODULE MODULE MODULE	12	12	12 20 20	

Semester 10

	Nature	Lecture	Tutorial	Practical	Credits
UE001 Work experience	UE				22 credits
Project 3 (Monitoring and reporting) Development in the	MODULE			12	
workplace (4 areas)	MODULE				
UE002 Technical supplements	UE				8 credits
Operational safety Plastics & composites Risk prevention Project management Surface CAD Industrial performance	MODULE MODULE MODULE MODULE MODULE MODULE	8 a.m. 2 p.m. 4 p.m. 8 a.m. 10 a.m.	12 p.m. 6 p.m. 2 p.m. 10 a.m.	8 p.m.	

IGE3 - Design and Mechatronics - Work-study program

Semester 5

	Nature	Lecture	Tutorial	Practical	Credits
UE501 SHES - Languages	UE				8 credits

Labor Law and Corporate Structure 1 Introduction to Sustainable Development and CSR - Cognitive Development English Support (every Thursday afternoon)	MODULE MODULE MODULE MODULE	8 p.m. 4 p.m.	12:00 p.m. 12:00 p.m. 37:00	4	
UE502 Work experience	UE				7 credits
Project 1 (Launch and follow-up) Development in the	MODULE	1		4	
workplace	MODULE				
UE503 Scientific training	EU				9 credits
Mathematics for engineers Mechanism statics Kinematics Strength of Materials	MODULE MODULE MODULE MODULE	16 hours 10 hours 10 hours 20 hours	24 hours 10 hours 10 hours 20 hours		
UE504 Engineering Methodology	UE				9 credits
Industrialization for Machining Mechatronics Total Quality	MODULE MODULE MODULE	28 32	4	8 hours 40 hours	
Introduction to Industrial Management	MODULE	32			

Semester 6

	Nature	CM	Tutorial	Practical work	Credits
UE601 SHES - Languages	UE				4 credits
Introduction to sustainable development and CSR Sustainable Development - Site Approach (Environmental Management) Support (every Thursday afternoon when FISA staff are present) English (TOEIC level not achieved) English (TOEIC level achieved)	MODULE MODULE MODULE MODULE MODULE	6 hours 4 hours	4 hours 6 hours 30		
UE602 Work experience	UE				10 credits
Project 1 (Monitoring and reporting) Development in the	MODULE			4	
workplace (4 areas)	MODULE				
UE603 Scientific training	UE				8 credits
Machine components Fundamentals of electricity and electric motors Mechanical design	MODULE MODULE MODULE	20 hours 8 hours 20 hours	20 hours 20 hours 20 hours	12	
UE604 Engineering Methodology	UE				8 credits
Statistical Process Control Artificial Intelligence Issues Design of Experiments - Methodological Tools	MODULE MODULE MODULE	12 hours 6 hours 6 hours	12 8	4 4	

IGE4 - Design and Mechatronics - Work-study program - opening in September 2025

Semester 7

	Nature	Lecture	Tutorial	Practical	Credits
UE701 SHES - Languages	UE				8 credits
Management Business Structure and Entrepreneurship 2	MODULE MODULE	12	32 hours 12 hours		
Sustainable development - Product approach Support (half of Thursday afternoons when FISA staff are present) English (TOEIC level achieved)	MODULE MODULE MODULE	4	2 34	8	
English (TOEIC level not achieved)	MODULE		34		
UE702 Work experience	UE				10 credits
Project 2 (launch and follow-up) Development in the workplace (progress)	MODULE MODULE	1		8	
UE703 Scientific training	UE				7 credits
Mechanism dynamics Modeling and finite elements	MODULE MODULE	20 hours 20 hours	20	20	
Continuous automation	MODULE	4 p.m.	12 p.m.	12	
UE704 Engineering Methodology	UE				5 credits
Electronics Algorithms and programming Sampled automation Design office tools	MODULE MODULE MODULE MODULE	28 hours 12 hours 16 hours		12h 8h 8h 12h	

Semester 8

	Nature	Lecture	Tutorial	Practical	Credits
UE801 SHES - Languages	UE				5 credits
Management and Technical Communication Support (half of Thursday afternoons when FISA staff are present) English (TOEIC level achieved)	MODULE MODULE MODULE	6 hours	4 40	12	
English (TOEIC level not achieved)	MODULE		40		
UE802 Work experience	UE				7 credits
Project 2 (Monitoring and reporting) Development in the workplace (4 areas)	MODULE MODULE			8	
UE803 Scientific training	UE				9 credits
Structural dynamics Fluid statics and dynamics Design office project	MODULE MODULE MODULE	6 hours 12 hours	6	8 40	
Algorithms and programming: generalization Thermal	MODULE MODULE	4 8	4 8	12	
UE804 Engineering Methodology	UE				9 credits
Metallic Materials Embedded Systems	MODULE MODULE	16 hours 7.5	12	12	

hours

Advanced embedded systems	MODULE			20	
Sensors	MODULE 12 hours		12 hours	4 p.m.	

IGE5 - Design and Mechatronics - Work-study program - opening in September 2026

Semester 9

	Nature	Lecture	Tutorial	Practical	Credits
UE901 SHES - Languages	UE				7 credits
Legislation, labor law, occupational health, sustainable engineering, decarbonization GEPC, human sciences, management, ergonomics	MODULE	18 hours	8	8	
	MODULE	28			
English (TOEIC level achieved)	MODULE		26 hours		
English (TOEIC level not achieved)	MODULE		26		
UE902 Work experience	UE				10 credits
Project 3 (Launch and follow-up) Development in the	MODULE	1		8	
workplace (progress)	MODULE				
UE903 Scientific training	UE				7 credits
Tolerancing Industrial robotics Centralized Automation	MODULE MODULE MODULE	6.75 hours 26 hours 8 hours	7.5 6	8 hours 8 hours 20 hours	
UE904 Engineering Methodology	UE				6 credits
Functional Materials Multiphysical Systems	MODULE MODULE	12	12	16h 32h	

Semester 10

	Nature	Lectures	Tutorial	Practical	Credits
UE001 Work experience	UE				22 credits
Project 3 (Monitoring and reporting) Development in the	MODULE			12	
workplace (4 areas)	MODULE				
UE002 Technical supplements	UE				8 credits
Operational safety Plastics & composites Risk prevention Project management Surface CAD Industrial performance	MODULE MODULE MODULE MODULE MODULE MODULE	8 a.m. 2 p.m. 4 p.m. 8 a.m. 10 a.m.	12:00 p.m. 6:00 a.m. 2:00 a.m. 10:00 a.m.	8 p.m.	

SCIENCE, TECHNOLOGY, HEALTH

Mechanics Mechatronics Composite Materials - Work-study program

Mechanical Engineering Degree Mechatronics Composite Materials

Overview

Program

IGE3 - Industrial Engineering - Work-study program

Semester 5

	Nature	Lectures	Tutorial	Practical	Credits
UE501 SHES - Languages	UE				8 credits
Labor Law and Corporate Structure 1 Introduction to Sustainable Development and CSR - Cognitive Development English Support (every Thursday afternoon)	MODULE MODULE MODULE MODULE	20 hours 16 hours	12 hours 12 hours 37 hours	4	
UE502 Work experience	UE				4 credits
Project 1 (Launch and follow-up) Development in the workplace	MODULE MODULE	1		4	
UE503 Scientific training	EU				9 credits
Mathematics for engineers Mechanism statics Kinematics Strength of Materials	MODULE MODULE MODULE MODULE	16 hours 10 hours 10 hours 20 hours	24 hours 10 hours 10 hours 20 hours		
UE504 Engineering Methodology	UE				9 credits
Industrialization for machining Obtaining machining blanks Total quality Introduction to industrial management	MODULE MODULE MODULE MODULE	28 hours 20 hours 32 hours 32 hours	4 hours 20 hours	8	

Semester 6

	Nature	Lectures	Tutorial	Practical	Credits
UE601 SHES - Languages	UE				4 credits
Introduction to sustainable development and CSR Sustainable Development - Site Approach (Environmental Management) Support (every Thursday afternoon when FISA staff are present) English (TOEIC level not achieved) English (TOEIC level achieved)	MODULE MODULE MODULE MODULE MODULE	6 hours 4 hours	4 hours 6 hours 30		
UE602 Work experience	UE				10 credits
Project 1 (Monitoring and reporting) Development in the workplace (4 areas)	MODULE MODULE			4	
UE603 Scientific training	UE				8 credits
Elements of Machines Fundamentals of electricity and electric motors	MODULE MODULE	20 hours 8	20	12	

hours

Mechanical design	MODULE	20	20		
UE604 Engineering Methodology	UE				8 credits
Statistical process control Challenges of artificial intelligence Design of experiments - Methodological tools	MODULE MODULE MODULE	12 hour s 6 hours 6 hours	12 8	4 4	
Case studies - Company visits	MODULE	16	24		

IGE4 - Industrial Engineering - Work-study program - opening in September 2025

Semester 7

	Nature	Lectures	Tutorial	Practical	Credits
UE701 SHES - Languages	UE				8 credits
Management Business Structure and Entrepreneurship 2	MODULE MODULE	12	32 hours 12 hours		
Sustainable development - Product approach	MODULE	4	2	8	
Support (half of Thursday afternoons when FISA staff are present) English (TOEIC level achieved)	MODULE MODULE		34		
English (TOEIC level not achieved)	MODULE		34		
UE702 Work experience	UE				10 credits
Project 2 (launch and follow-up) Development in the workplace (progress)	MODULE MODULE	1		8	
UE703 Scientific training	UE				7 credits
Mechanism dynamics Modeling and finite elements	MODULE MODULE	20 hours 20 hours	20	20	
Continuous automation	MODULE	4 p.m.	12 p.m.	12	
UE704 Engineering Methodology	UE				5 credits
Electronics Algorithms and programming Industrial logistics Design office tools	MODULE MODULE MODULE MODULE	28 hours 12 hours 12 hours	12	12 12	

Semester 8

	Subject	Lecture	Tutorial	Practical	Credits
UE801 SHES - Languages	UE				5 credits
Management and Technical Communication	MODULE	6 hours	4	12	
Support (half of Thursday afternoons when FISA staff are present) English (TOEIC level achieved)	MODULE MODULE		40		
English (TOEIC level not achieved)	MODULE		40		
UE802 Work experience	UE				7 credits

Project 2 (Monitoring and reporting) Development in the	MODULE	8
workplace (4 areas)	MODULE	

UE803 Scientific training	UE				9 credits
Structural dynamics Fluid statics and dynamics Design	MODULE	6 hours	6	8	
office project	MODULE	12 hours		40	
	MODULE				
Algorithms and programming: generalization	MODULE	4	4	12	
Thermal	MODULE	8	8		
UE804 Engineering Methodology	UE				9 credits
Metallic Materials	MODULE	4 p.m.	12:00	12	
Production Management and Improvement Dimensional Metrology	MODULE	2 p.m.	p.m.	p.m.	
	MODULE	12	2:00	12	
		p.m.	p.m.	p.m. 4	
			12:00	p.m.	
			p.m.		

IGE5 - Industrial Engineering - Work-study program - opening in September 2026

Semester 9

	Type	Lecture	Tutorial	Practical	Credits
UE901 SHES - Languages	UE				7 credits
Legislation, labor law, occupational health, sustainable engineering, decarbonization GEPC, Humanities, management, ergonomics	MODULE	18 hours	8	8	
	MODULE	28			
English (TOEIC level achieved)	MODULE		26 hours		
English (TOEIC level not achieved)	MODULE		26		
UE902 Work experience	UE				10 credits
Project 3 (Launch and follow-up) Development in the	MODULE	1		8	
workplace (progress)	MODULE				
UE903 Scientific training	UE				7 credits
Tolerancing Industrial robotics Centralized Automation	MODULE	6.75 hours	7.5	8	
	MODULE	26	6	hours	
	MODULE	hours		8	
		8		hours	
		hours		20	
				hours	
UE904 Engineering Methodology	UE				6 credits
Ceramics & material selection Computer-aided manufacturing	MODULE	12	12	12 20	
Flow simulation	MODULE			20	
	MODULE				

Semester 10

	Nature	Lecture	Tutorial	Practical	Credits
UE001 Work experience	UE				22 credits
Project 3 (Monitoring and reporting) Development within the	MODULE			12 hours	
company (4 areas)	MODULE				
UE002 Technical supplements	UE				8 credits

Operational safety	MODULE	8 hours	12

Plastics & composites Risk prevention Project management Surface CAD Industrial performance	MODULE MODULE MODULE MODULE MODULE	2 p.m. 4 p.m. 8 a.m. 10	6 10	8 p.m.	

IGE3 - Design and Mechatronics - Work-study program

Semester 5

	Nature	Lecture	Tutorial	Practical	Credits
UE501 SHES - Languages	UE				8 credits
Labor Law and Corporate Structure 1 Introduction to Sustainable Development and CSR - Cognitive Development English Support (every Thursday afternoon)	MODULE MODULE MODULE MODULE	20 hours 16 hours	12 hours 12 hours 37 hours	4	
UE502 Work experience	UE				7 credits
Project 1 (Launch and follow-up) Development in the workplace	MODULE MODULE	1		4	
UE503 Scientific training	EU				9 credits
Mathematics for engineers Mechanism statics Kinematics Strength of Materials	MODULE MODULE MODULE MODULE	16 hours 10 hours 10 hours 20 hours	24 hours 10 hours 10 hours 20 hours		
UE504 Engineering Methodology	UE				9 credits
Industrialization for machining Mechatronics Total quality	MODULE MODULE MODULE	28 hours 32	4	8 hours 40 hours	
Introduction to Industrial Management	MODULE	32			

Semester 6

	Nature	Lecture	Tutorial	Practical	Credits
UE601 SHES - Languages	UE				4 credits
Introduction to sustainable development and CSR Sustainable Development - Site Approach (Environmental Management) Support (every Thursday afternoon when FISA staff are present) English (TOEIC level not achieved) English (TOEIC level achieved)	MODULE MODULE MODULE MODULE MODULE	6 hours 4 hours	4 hours 6 hours 30		
UE602 Work experience	UE				10 credits
Project 1 (Monitoring and reporting) Development in the workplace (4 areas)	MODULE MODULE			4	
UE603 Scientific training	UE				8 credits

Machine components Fundamentals of electricity and electric motors Mechanical design	MODULE MODULE MODULE	20 hours 8 hours 20	20 8 p.m.	12	
UE604 Engineering Methodology	UE				8 credits
Statistical process control Challenges of artificial intelligence Design of experiments - Methodological tools	MODULE MODULE MODULE	12 hour s 6 hours 6 hours	12 8	4 4	
Case studies - Company visits	MODULE	16	24		

IGE4 - Design and Mechatronics - Work-study program - opening in September 2025

Semester 7

	Nature	Lecture	Tutorial	Practical	Credits
UE701 SHES - Languages	UE				8 credits
Management Business Structure and Entrepreneurship 2	MODULE MODULE	12	32 hours 12 hours		
Sustainable development - Product approach Support (half of Thursday afternoons when FISA staff are present) English (TOEIC level achieved)	MODULE MODULE MODULE	4	2 34	8	
English (TOEIC level not achieved)	MODULE		34		
UE702 Work experience	UE				10 credits
Project 2 (launch and follow-up) Development in the workplace (progress)	MODULE MODULE	1		8	
UE703 Scientific training	UE				7 credits
Mechanism dynamics Modeling and finite elements	MODULE MODULE	20 hours 20 hours	20	20	
Continuous automation	MODULE	4 p.m.	12 p.m.	12	
UE704 Engineering Methodology	UE				5 credits
Electronics Algorithms and programming Sampled automation Design office tools	MODULE MODULE MODULE MODULE	28 hours 12 hours 16 hours		12 hours 8 hours 8 hours 12 hours	

Semester 8

	Nature	Lecture	Tutorial	Practical	Credits
UE801 SHES - Languages	UE				5 credits
Management and Technical Communication Support (half of Thursday afternoons when FISA staff are present) English (TOEIC level achieved)	MODULE MODULE MODULE	6 hours	4 40	12	

English (TOEIC level not achieved)	MODULE	40	
UE802 Work experience	UE		7 credits

	Nature	Lectures	Tutorial	Practical	Credits
Project 2 (Monitoring and reporting)	MODULE			8	
Development in the workplace (4 areas)	MODULE				
UE803 Scientific training	UE				9 credits
Structural dynamics Fluid statics and dynamics Design	MODULE	6 hours	6	8	
office project	MODULE	12 hours		40	
	MODULE				
Algorithms and programming: generalization	MODULE	4	4	12	
Thermal	MODULE	8	8		
UE804 Engineering Methodology	UE				9 credits
Metallic Materials Embedded Systems Advanced	MODULE	16 hours	12	12 hours	
Embedded Systems Sensors	MODULE	7.5 hours		12 hours	
	MODULE		12	20 hours	
	MODULE	12		16 hours	

IGE5 - Design and Mechatronics - Work-study program - opening in September 2026

Semester 9

	Nature	Lectures	Tutorial	Practical	Credits
UE901 SHES - Languages	UE				7 credits
Legislation, labor law, occupational health, sustainable engineering, decarbonization GEPC, Humanities, management, ergonomics	MODULE	18 hours	8	8	
	MODULE	28			
English (TOEIC level achieved)	MODULE		26 hours		
English (TOEIC level not achieved)	MODULE		26		
UE902 Work experience	UE				10 credits
Project 3 (Launch and follow-up) Development in the	MODULE	1		8	
workplace (progress)	MODULE				
UE903 Scientific training	UE				7 credits
Tolerancing Industrial robotics	MODULE	6.75	7.5	8 hours	
Centralized Automation	MODULE	26 hours	6	8 hours	
	MODULE	8 hours		20 hours	
UE904 Engineering Methodology	UE				6 credits
Functional Materials Multiphysical	MODULE	12	12	16 hours	
Systems	MODULE			32 hours	

Semester 10

	Nature	Lectures	Tutorial	Practical	Credits
UE001 Work experience	UE				22 credits

Project 3 (Monitoring and reporting) Development in the	MODULE	12
workplace (4 areas)	MODULE	

UE002 Technical supplements	UE				8 credits
Operational safety	MODULE	8 hours	12		
Plastics & composites	MODULE	2 p.m.	6		
Risk prevention	MODULE	4 p.m.			
Project management	MODULE	8	2		
Surface CAD	MODULE			20	
Industrial performance	MODULE	10 hours	10		

Presentation Practical information

Campus

Annecy / Annecy-le-Vieux campus

Le Bourget-du-Lac / Savoie Technolac campus

Program

IGE3 - Mechatronics and Industrialization (Annecy)

Semester

	Nature	Lecture	Tutorial	Practical	Credits
UE501 Gateway to the professional environment	UE				8 credits
English S5 Sports	MODULE		40.5		
Business Management Simulation			21		
Skills development support Optional internship S5	MODULE		12		
Support (every Thursday afternoon)	MODULE				
	MODULE	3 hours			
	MODULE				
	MODULE				
UE502 Engineering Sciences and Tools	UE				9 credits
Sustainable Development	MODULE	15	12		
Algorithms and Python Programming	MODULE	hours	hours	12	
		3	6		
		hours	hours		
Databases (business management information database) MAraTHon: Support/Refresher courses	MODULE	6	4.5	12	
Mathematics Core Curriculum	MODULE				
	MODULE	16.5	37.5		
UE503 Specialized Sciences	UE				13 credits
Metallic Materials Continuum Mechanics CAD and	MODULE	14.5 hours	10.5	12 hours	
		15	22.5		
Prototyping	MODULE		4.5 hours	36 hours	
	MODULE				
Electricity	MODULE	13.5 hours	15	12	
Thermodynamics and thermal engineering	MODULE	13.5		hours	
				12	
				hours	

Semester 6

	Subject	Lecture	Tutorial	Practical	Credits
UE601 Gateway to the professional environment	UE				8 credits
Professional experience Financial	MODULE				
management	MODULE	10.5	9		
Introduction to law	MODULE	15	4.5		
Issues in artificial intelligence	MODULE	hours			
Business-oriented project management techniques	MODULE	6			
		hours	9		
English (TOEIC level not achieved) S6 Modern Languages (TOEIC level	MODULE		40.5 hours		
achieved)	MODULE				
English S6 Modern	SUBJECT				
Language 2	CHOICE		15		
German TD	SUBJECT				
			hours		
			15		
			hours		

Spanish TD	SUBJECT	3 p.m.
Italian TD	SUBJECT	3 p.m.

Chinese TD	SUBJECT		3:00 p.m.		
Japanese TD	SUBJECT		3:00 p.m.		
Russian TD	SUBJECT		3:00 p.m.		
Portuguese TD	SUBJECT		7:15 p.m.		
Advanced English S6 Optional	SUBJECT		9:00		
internship S6	MODULE				
Support (every Thursday afternoon when FISA staff are present)	MODULE				
UE602 Engineering Sciences and Techniques	UE				9 credits
Mathematics Electronics	MODULE MODULE	20.5 hours 12	19.5 9	12	
Digital tools for engineers	MODULE	7.5 hours	7.5	20	
UE603 Specialized Sciences	UE				7 credits
Structural Design Mechanism Statics Fluid Statics and Dynamics Mechanism Dynamics	MODULE MODULE MODULE MODULE	15 hours 5.25 hours 6.75 13.5	15h 9h 9h 16.5	8 hours 8 hours 4 hours 4 hours	
UE604 Mechanical Design - Mechatronics	UE				6 credits
Plastics, Composites & Ceramics Metal Processing Mechanical design and technologies	MODULE MODULE MODULE	12 hours 2.5 hours 10.5	4.5 6 hours 12 hours	4 hours 12 hours 16 hours	

IGE3 - Composite Materials (Chambéry)

Semester 5

	Nature	Lecture	Tutorial	Practical	Credits
UE501 Gateway to the professional environment	UE				8 credits
English S5 Sports Business Management Simulation Skills development support Optional internship S5 Support (every Thursday afternoon)	MODULE MODULE MODULE MODULE MODULE MODULE	3 hours	40.5 21 12		
UE502 Engineering Sciences and Tools	UE				9 credits
Sustainable Development Algorithms and Python Programming	MODULE MODULE	15 hours 3 hours	12 hours 6 hours	12	
Databases (basics of business information management) MAraTHon: Support/Refresher course Mathematics Core Curriculum	MODULE MODULE MODULE	6 16.5	4.5 37.5	12	
UE503 Specialized Sciences	UE				13 credits

Metallic Materials Continuum Mechanics CAD and

Prototyping

MODULE 14.5 hours 10.5 12 hours

22.5

MODULE 15

4.5 hours

36

MODULE

Thermodynamics and thermal engineering Electricity	MODULE MODULE	13.5 13.5	15	12 hours 12 hours	

Semester 6

	Subject	Lectures	Tutorial	Practical	Credits
UE601 Gateway to the professional environment	UE				8 credits
Professional experience Financial management Introduction to law Issues in artificial intelligence Project management techniques, business-oriented	MODULE MODULE MODULE MODULE MODULE	10.5 15 hours 6 hours	9 4.5 9		
English (TOEIC level not achieved) S6 Modern languages (TOEIC level achieved) English S6 Modern language 2 Italian TD	MODULE MODULE SUBJECT CHOICE Tutorial		40.5 hours 15 hours 20 hours		
German TD	Tutorial		20		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD Advanced English S6 Optional internship S6 Support (every Thursday afternoon when FISA staff are present)	Tutorial SUBJECT MODULE MODULE		8 p.m. 9 p.m.		
UE602 Engineering Sciences and Techniques	UE				9 credits
Mathematics Electronics	MODULE MODULE	20.5 hours 12	19.5 9	12	
Digital tools for engineers	MODULE	7.5 hours	7.5	20	
UE603 Specialized Sciences	UE				7 credits
Structural Design Mechanism Statics Fluid Statics and Dynamics Mechanism Dynamics	MODULE MODULE MODULE MODULE	15 hours 5.25 hours 6.75 13.5	15h 9h 9h 16.5	8 hours 8 hours 4 hours 4 hours	
UE604 Mechanical Design - Mechatronics	UE				6 credits
Plastics, composites & ceramics Metalworking Mechanical design and technologies	MODULE MODULE MODULE	12 hours 2.5 hours 10.5	4.5 6 hours 12 hours	4 hours 12 hours 16 hours	

IGE4 - Mechatronics and Industrialization (Annecy)

Semester 7

	Type	Lecture	Tutorial	Practical	Credits
UE701 Gateway to the professional environment	UE				6 credits

Resources and professional dynamics Creativity and innovation	MODULE	13.5 hours		3.5	
management English (TOEIC level not achieved) S7 Modern languages	MODULE				
(TOEIC level achieved)	MODULE		25.5		
English S7 Modern	MODULE		40.5		
Language 2	SUBJECT				
German TD Spanish	CHOICE		15		
TD Italian TD	SUBJECT				
Chinese TD	SUBJECT				
Japanese TD	SUBJECT		15 15		
Russian TD	SUBJECT		15 15		
Advanced English S7 Optional	SUBJECT		15 15		
internship S7	SUBJECT		21		
Support (half of Thursday afternoons when FISA staff are present)	SUBJECT				
	MODULE				
	MODULE				
UE702 Engineering Science and Technology	UE				9 credits
Sensors	MODULE	13.5 hours	9h	16h	
Electric Motorization Functional	MODULE	3	12h	24h	
Materials	MODULE	hours	12h	16h	
		12			
		hours			
UE703 Mechanical Design	UE				9 credits
		3.75 hours	6	12	
Design Office Tools Mechanical design	MODULE		10.5	hours	
		15			
Modeling and finite elements Mechanical eco-	MODULE		10.5	12	
		hours		hours	
design	MODULE			16	
		12		hours	
	MODULE				
		hours			
		9.5			
		hours			
UE704 Production and Quality	UE				6 credits
Operational Safety	MODULE	9.75 hours	10		
Advanced Operational Safety		5		12	
	MODULE				
Introduction to Industrial Management	MODULE	13.5 hours	13.5	12	

Semester 8

	Nature	Lectures	Tutorial	Practical	Credits
UE801 Gateway to the professional environment	UE				6 credits
Integrated QSE (Quality, Safety, Environment) Management System Management Techniques	MODULE	9	10.5		
English (TOEIC level not achieved) S8 Modern Languages (TOEIC level		hours	7.5		
achieved)	MODULE	18	40.5		
English S8 Modern		hours			
	MODULE				
Language 2					
German TD Spanish	MODULE		3 p.m.		
TD Italian TD					
Chinese TD	SUBJECT				
Japanese TD			3 p.m.		
	CHOICE				
Russian TD			3 p.m.		
	SUBJECT				
	SUBJECT		3 p.m.		
	SUBJECT		3 p.m.		
	SUBJECT		3 p.m.		
	SUBJECT		3 p.m.		
	SUBJECT				

Advanced English S8 Optional internship S8 Support (half of Thursday afternoons when FISA staff are present)	SUBJECT MODULE MODULE		9 p.m.		
UE802 Internship	UE				6 credits
Assistant Engineer Internship S8	MODULE				
UE803 Systems Control	EU				9 credits
Quality in Production	MODULE	15 hours hours	13.5	12	
Continuous systems & vibrations	MODULE 14.25 hours 12 hours			12	
Centralized automation Embedded systems	MODULE MODULE	6h 7.5h	13.5	20 hours 12 hours	
UE804 Design and management of technical data	UE				9 credits
Industrial Product Life Cycle Management Design Office Project Machine Components	MODULE MODULE MODULE	9 19.5	9 18	20 40	

IGE5 - Mechatronics and Industrialization (Annecy)

Semester 9

	Nature	Lecture	Tutorial	Practical	Credits
UE901 Gateway to the professional environment	UE				10 credits
Research and Development Project English (TOEIC level not achieved) S9 Modern Languages (TOEIC level achieved) English S9 Modern Language 2 German TD	MODULE MODULE MODULE SUBJECT CHOICE SUBJECT		40.5 15		
Spanish TD Italian TD Chinese TD Japanese TD Russian TD Advanced English S9 Optional internship S9	SUBJECT SUBJECT SUBJECT SUBJECT SUBJECT SUBJECT MODULE		15 hours 15 hours 15 hours 15 hours 15 hours 21 hours		
UE902 Systems Management	UE				7 credits
Decentralized automation Sampled automation Multiphysical systems	MODULE MODULE MODULE	13.5 hours	12	24 12 32	
UE903 Geometric quality of products	UE				6 credits
Tolerancing Mechanism theory Industrialization for machining	MODULE MODULE MODULE	6.75 8.25 19.5	7.5 6 hours 18 hours	8 hours 4 hours	
UE904 elective	CHOICE				

UE904 Mechatronics Option	UE				7 credits
Embedded Systems and Concurrent Programming	MODULE	3.75 hours	4.5	12	
Industrial Robotics	MODULE	26	6	8	
Advanced Industrial Management UE904 Option: Industrial	MODULE EU	hours	hours	hours	
Engineering	MODULE	13.5	12	12	
Computer-aided manufacturing and machining Advanced industrial management	MODULE	hours	hours	hours	7 credits
Industrial Performance	MODULE				
		4.5	3	32	
			hours	hours	
		13.5	12	12	
		9	hours	hours	
			9	8	
			hours	hours	

Semester 10

	Type	Lecture	Tutorial	Practical	Credits
UE001 Engineering internship	UE				30 credits
Engineering internship S10	MODULE				

IGE4 - Composite Materials (Chambéry)

Semester

	Nature	CM	Tutorial	Practical work	Credits
UE701 Gateway to the professional environment	UE				6 credits
Creativity and Innovation Management Professional Resources and	MODULE		25.5		
Dynamics English (TOEIC level not achieved) S7 Modern Languages	MODULE		13.5	3.5 hours	
(TOEIC level achieved)	MODULE		40.5		
English S7 Modern	MODULE				
Language 2	SUBJECT				
Italian TD German	CHOICE TD		15		
TD Spanish TD	Tutorial				
Japanese TD					
Intercomprehension of Romance Languages TD Advanced English S7	Tutorial		20 20		
Optional internship S7			20 20		
Support (half of Thursday afternoons when FISA students are present)	Tutorial		20 21		
	Tutorial				
	SUBJECT				
	MODULE				
	MODULE				
UE702 Materials Science	UE				8 credits
Macromolecular Chemistry 1 Properties of Polymer Materials	MODULE	13.5 hours	12 12	12	
		22.5			
1 Rheology	MODULE	19.5	10.5	8	
	MODULE				
UE703 Composite Design	UE				10 credits
Mechanics of anisotropic media Design office tools	MODULE	25.5	12		
	MODULE	15		12	
Modeling and finite elements	MODULE	12 hours	10.5	16	
Mechanical eco-design	MODULE	9.5	10.5		

	Nature	Lecture	Tutorial	Practical	Credits
UE704 Composite production	EU				6 credits
Introduction to industrial management Composite materials Specific composites	MODULE MODULE MODULE	13 hours 9.75 hours 9.75	13.5 10.5 10.5	12 hours	

Semester 8

	Nature	Lecture	Tutorial	Practical	Credits
UE801 Gateway to the professional environment	UE				6 credits
Integrated QSE (Quality, Safety, Environment) Management System Management Techniques English (TOEIC level not achieved) S8 Modern Languages (TOEIC level achieved) English S8 Modern Language 2 Italian TD German TD Spanish TD Japanese TD Intercomprehension of Romance Languages TD Advanced English S8 Optional internship S8 Support (half of the Thursdays when FISA is present)	MODULE MODULE MODULE MODULE SUBJECT CHOICE TD Tutorial Tutorial Tutorial Tutorial SUBJECT MODULE MODULE	9 a.m. 6 p.m.	10.5 7.5 40.5 3 p.m. 8 p.m. 8 p.m. 8 p.m. 8 p.m. 8 p.m. 9 p.m.		
UE802 Internship	UE				6 credits
Internship Assistant Engineer S8	MODULE				
UE803 Composite Design	EU				10 credits
Industrial Product Life Cycle Management Composite Structures Mechanics 1 Structural Calculation - FEM Dynamics	MODULE MODULE MODULE	9 hours 16.5 hours 16.5	9h 18h	20 8 p.m.	
Design Office Project	MODULE	3 hours	7.5 hours	24	
UE804 Composite Production	UE				8 credits
Properties of polymer materials 2 Composite manufacturing 1 Production Quality	MODULE MODULE MODULE	13 hours 11.5 hours 13.5	12	24 hours 24 hours 12 hours	

IGE5 - Composite Materials (Chambéry)

Semester 9

	Nature	Lecture	Tutorial	Practical	Credits
UE901 Gateway to the professional environment	UE				10 credits
Research and Development Project English (TOEIC level not	MODULE				
achieved) S9	MODULE		40.5		

	Nature	Lecture	Tutorial	Practical	Credits
Modern Languages (TOEIC level achieved) English S9	MODULE				
Modern Language 2	SUBJECT				
German TD	CHOICE Tutorial		3:00 p.m. to 8:00 p.m.		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Italian TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD Advanced English S9	Tutorial		8 p.m.		
Optional internship S9	SUBJECT MODULE		9 p.m.		
UE902 Composite Behavior	UE				8 credits
Macromolecular Chemistry 2	MODULE	12 hours	10.5	12 p.m.	
Extreme behavior of composite structures Nonlinear behavior	MODULE MODULE	21 hours 12 hours	3 p.m. 6 a.m.	4 p.m.	
UE903 Composite Design	UE				5 credits
Mechanics of Composite Structures 2 Composite Design and	MODULE	15 hours	13.5	8	
Calculations	MODULE	7.5 hours	13.5		
UE904 Composite Production	UE				7 credits
Composite Manufacturing 2 Instrumental Methods	MODULE	4.5	4.5	24 20	
Composite Design Project	MODULE MODULE	13.5		34	
					3 credits

Semester 10

	Nature	Lecture	Tutorial	Practical	Credits
UE001 Engineering internship	UE				30 credits
Engineering internship S10	MODULE				

UE501 Bridge to the professional world

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lectures	Tutorial	Practical	Credits
English S5 Sports	MODULE		40.5 hours		
Business management simulation	MODULE		21 hours		
Skills development support	MODULE		1.5 hours		
	MODULE	3 hours	12		

	Nature	CM	Tutorial	Practical	Credits
Optional internship S5	MODULE				
Support (every Thursday afternoon)	MODULE				

Practical information

Locations

Annecy-le-Vieux (74)

English S5 (LANG501_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French, English
- **Teaching methods:** Hybrid **Teaching format:** Tutorials **Open to exchange students:** Yes **ERASMUS reference:** Languages

Presentation

Description

This course prepares students for the TOEIC ("Test of English for International Communication") exam, specifically to obtain a minimum score of 785 points (out of 990).

With the aim of developing all four skills, this course also serves as an introduction to public speaking through presentations given by students in groups or individually on topics illustrated by press articles or video materials (VTD: Video, Talk and Debate, as well as written work). Depending on the location (Annecy or Chambéry), some will be seen at different times during the semester, the year, or even the three years of training.

Students are assessed throughout each semester. The final assessment consists of a 1-hour, 1.5-hour, or 2-hour exam, depending on the semester, and counts for 20% of the total continuous assessment.

Objectives

Specific objectives: at the end of this course, students will be able to:

review grammar on: the correct reflexes of common structures; the verb group and tenses (except the conditional tense); the noun group and all its constituent elements; logical links (connecting words)

improve their grammatical and lexical knowledge (general English and TOEIC-specific vocabulary) in class and independently, validating their progress through regular assessment tests.

Teaching hours

Tutorials	Tutorials	40.5

Mandatory prerequisites

CEFR level B1

Course outline

1. **Oral**
    1. Elements of phonology
    2. Grammar (tenses, questions, adjectives...)
    3. Reinforcement of structures and vocabulary
    4. Interactive oral communication
    5. Introduction and training for the TOEIC (Listening section)
2. **Writing**
    1. Review of grammatical elements (tenses, questions, adjectives. ....)
    2. Translation (theme/version)
    3. Reading comprehension in authentic language
    4. Curriculum vitae (in S5, S6, or S7 at the latest)
    5. Cover letter/letter of motivation (in S5, S6, or S7 at the latest)
    6. Introduction and training for the TOEIC (reading section)

Bibliography

- Documents distributed by lecturers
- Various websites, a list of which is provided at the beginning of the year
- Global Exam

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

Annecy-le-Vieux (74)

Sport (SHES501_PACY)

Polytech Annecy-Chambéry
component

In brief

Course start date: Sept. 8, 2025 **Languages of instruction:** French
Teaching methods: In person **Teaching format:** Tutorials **Open to exchange students:** Yes
ERASMUS reference: Services to individuals

Overview

Description

This course focuses on physical and sports activities and is structured around two main areas.

On the other hand, the aim is to enable engineering students to acquire collective skills in project implementation and group management, but also to develop their individual abilities to adapt and regulate themselves. This focus will be reflected in the collective organization and implementation of a sporting event over the course of one session.

It also aims to enable students to acquire skills related to sporting activities and to highlight their interpersonal skills, which are essential for their integration and professional success. This focus will be based on the work carried out around the values conveyed by the various sporting activities and their diverse modes of practice.

Objectives

Objective 1: Work as a team to prepare, organize, and manage a sporting event within a constrained framework.

Objective 2: Engage in a new physical activity in an intense, lucid, reasoned, and critical manner

Teaching hours

Tutorial	Tutorials	21

Mandatory prerequisites

No mandatory prerequisites

Course outline

7 three-hour practical sessions.

Additional information

Classes are held at the Dassault gymnasium, Avenue des Îles, Metz-Tessy. Bus transportation (round trip) is provided from the Annecy campus.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Jean-Baptiste Evrot
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Course coordinator Vincent Daniere
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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Business Management Simulation (SHES505_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** Hybrid
- **Teaching format:** Tutorials **Open to exchange students:** Yes

Presentation

Description

Business games, also known as serious games or business management simulations, are educational tools that offer a different way of learning. They are simulations that aim to demonstrate the complexity of businesses while relying on a simplified model. In a business game, time is accelerated and participants play out several years in the life of a company over a condensed period (two days in this case). This business simulation is carried out using a computer program. The program incorporates an algorithm to calculate the performance of each competing team (each team representing a company in the market) at the end of each decision.

Objectives

1. Analyze the general context to communicate more effectively.
2. Learn about the main communication tools, media/non-media,
3. Understand the process of developing a communication strategy,
4. Provide comprehensive, practical, and effective training in business management,
5. Raise awareness of the interdependence of business functions through decision-making and results analysis.

Teaching hours

Tutorials	Tutorials	1.5
Distance	Distance learning	18

Mandatory prerequisites

None

Course outline

Focused on a cross-functional approach to business management issues, this game combines various constraints specific to different business functions (marketing, production, finance, and financial resources) and allows students to learn the basics of both oral and written communication. Through simulation, students will address person-to-person, face-to-face communication. With regard to external communication, the focus is primarily on communication for the purposes of corporate marketing: strategy development, overview of tools, etc.

Targeted skills

- Be able to design the basics of a business strategy.
- Know how to support the development and implementation of a communication plan,
- Be able to work in a team,
- Know how to communicate and make decisions as part of a team

Bibliography

- Sophie Delerm, Jean-Pierre Helfer, and Jacques Orsoni. "Les bases du marketing" (The Basics of Marketing), Vuibert, 2006 (Part 2, Chapters 1 and 2, and Part 3, Chapter 2).
- Jacques Lendrevie, Julien Levy, "Mercator, Theory and New Practices in Marketing (9th Edition)," Dunod, Paris, 2009 (Chapter 15)
- Jean Barreau, Jacqueline Delahaye, "Financial Management DECF Test 4," Dunod, 2006 (Chapters 7 and 8)
- Christian Goujet, Christian Raulet & Christiane Raulet, "Management Accounting," Dunod, Paris, 2007. (Chapters 1, 17, and 18)
- Maurice Pillet, Chantal Martin-Bonnefous, Pascal Bonnefous, Alain Courtois, "Production Management: Fundamentals and Best Practices," Eyrolles, 2011. (Read: Chapters 4, 6, and 8)

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Elodie Gardet

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Location

Annecy-le-Vieux (74)

Skills development support (ADCO501_PACY)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

As the school is committed to a skills-based approach, this course aims to introduce students to this approach, familiarize them with the skills framework for their training, and present them with the various documents and tools they will need to use throughout their training.

Teaching hours

CM	Lecture	3
Tutorial	Tutorials	12

Course outline

Content elements for all specializations

- Understanding the APC approach and its relevance to engineering education (link to professions, RNCP)
- Understanding the main concepts and learning the terminology used by the school
- Find resources related to APC (reference documents, RNCP files, cross-referenced matrices, AMS mapping, portfolio, etc.)

- Reading a training reference document (templates and examples)
- Understanding what a portfolio is
- Write a skills assessment (KAPC+ example)

Specific content elements for each specialty

- Get to grips with the reference framework for your specialty
- Link the reference guide to job characteristics
- Assessing your position in your training program
- Identify the contribution of resources to the skills in the reference framework (cross-referenced matrices)
- Identify the situational activities (AMS) in your training and the skills they involve
- Use the portfolio to self-assess the skills in your training program

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Ilham Alloui

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Locations

Annecy-le-Vieux (74)

Campus

Annecy / Annecy-le-Vieux campus

Optional internship S5 (PROJ500_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

The optional internship aims to enrich students' academic and professional experience by offering them a practical opportunity to apply their knowledge and acquire new skills. An optional internship can be completed **in France or abroad**. It must comply with the same general conditions as compulsory internships.

Objectives

- **Acquisition of** specific skills related to the specialization;
- **Refining career goals and/or** gaining confidence and independence through the completion of a project or specific tasks;
- Establish valuable professional contacts that can help in future job searches.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Head of the Polytech Business Relations course

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Support (every Thursday afternoon) (ACCO501_PACY)

Polytech Annecy-Chambéry
component

In brief

Teaching methods: In person **Teaching format:** Tutored project **Open to exchange students:** Yes

Presentation

Description

This support is open to all students at the school: students, apprentices, and Continuing Education employees. It is not mandatory, as it is primarily intended for students who need it to succeed in their training. This semester, it is scheduled into the timetable for each course, with a total of 64 hours.

Support may take the form of refresher courses, upgrading courses, or support in the main areas of the training programs.

Peer tutoring is encouraged and the educational resources of the Polytech Network are used (https://eplanet.polytech-reseau.org/).

Objectives

To promote the success of all students in their educational journey.

Teaching hours

PTUT	Tutored project	64

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Director of Training, Polytech

Locations

- Annecy-le-Vieux (74)

UE502 Engineering Sciences and Tools

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Sustainable Development	MODULE	3 p.m.	12 hours		
Algorithms and Python Programming	MODULE	3 hours	6 hours	12	
Databases (business management information database) MAraTHon: Support/Refresher course	MODULE	6 hours	4.5	12	
Mathematics Core Curriculum	MODULE				
	MODULE				
		16.5 hours	37.5		

Practical information

Locations

Annecy-le-Vieux (74)

Sustainable Development (DDRS501_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This course trains engineering students in the issues of sustainable development and its integration into businesses. The aim is to enable them to consider and integrate the challenges of ecological and energy transition into their professional work.

Objectives

Students will learn to define the various challenges of ecological and societal transition, as well as energy issues. They will be introduced to the tools available to engineers to limit the ecological impact of a product or service.

Teaching hours

Lectures	Lecture	15
Tutorial	Tutorials	12

Course outline

1. Introduction to sustainable development (3 hours of lectures)

1. 1. Planetary boundaries
    2. Concept of sustainable development and ecological and societal transition
2. Carbon footprint (3 hours of lectures)
    1. The concept of climate
    2. Climate change - Greenhouse gases
    3. Carbon footprint method (6 hours of tutorials)
3. Energy (3 hours of lectures)
    1. Concepts of power and energy
    2. Global energy situation
    3. Application exercises and case studies (3 hours of tutorials)
4. The ecological transition in business (1.5 hours lecture)
5. Product life cycle analysis, eco-design (3 hours lecture, 3 hours tutorial)

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator David Gibus

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Places

Annecy-le-Vieux (74)

Algorithms and Python Programming (INFO501_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Information and Communication Technologies (ICT)

Overview

Description

This is an introductory course on the use of programming to solve problems related to engineering. It will introduce concepts of algorithms and data representation in a computer. In practice, students will also learn to program in Python for the MM track and C for the IDU/SNI tracks.

Objectives

This course aims to provide students with basic knowledge of how information is represented in computers, while also introducing them to traditional data structures. The module also aims to teach students the basics of algorithms and programming. The goal is to enable students to use IT tools to solve problems encountered in engineering.

Teaching hours

Lectures	Lecture	3
Tutorial	Tutorials	6
Lab	Practical work	12

Mandatory prerequisites

None

Course outline

The course is divided into:

- Lectures (CMs), where concepts related to algorithms and data structures will be introduced
- Tutorials (TDs), where concrete examples will be put into practice in a programming language
- Practical work (PW) where we will explore concepts and skills in depth to solve concrete problems. The program is as follows:

1. Machine architecture and basic data representations
2. Algorithmic concepts and introduction to C programming
    1. Language basics
    2. Control structures
    3. Loops
    4. Functions and procedures
    5. Compilation
3. Data structures and implementation in C language
    1. Structs
    2. Linked lists
    3. Graphs and trees
4. Complex algorithms
    1. Sorting and selection
    2. Graph traversal
    3. Hashing
5. Concept of algorithmic complexity
6. Use of a high-level language: the case of Python

In MM courses:

1. Machine architecture, data representation
2. Introduction to Python programming
    1. The basics of the language
    2. Basics of the language
    3. Control structures

    4. Loops
    5. Functions and procedures
    6. Classic data structures
3. Algorithmic concepts and implementation in Python
    1. Calculation of mathematical functions
    2. Sorting and selection
4. Object-oriented programming
5. Problem solving using libraries

Targeted skills

At the end of this module, students should be able to:

- model a concrete problem using an appropriate data structure
- solve the problem by implementing an algorithmic approach
- program the solution on a computer

Bibliography

- Learning to Program with Python 3, Gérard Swinnen
- C Programming Language Kernighan Brian, Ritchie Dennis

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course Director Ammar Mian

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Locations

- Annecy-le-Vieux (74)

Databases (business management information database) (INFO502_PACY)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes
ERASMUS reference: Information and Communication Technologies (ICT)

Overview

Description

This course aims to provide students with the basic skills needed to model, implement, and manipulate a relational database. The course focuses on general and business-related problems.

Objectives

1. Designing a simple relational database (< 10 entities, linked only by 1-n or n-m links)
2. Implementing a simple database in a relational DBMS
3. Using a relational database with simple queries

Teaching hours

Lectures	Lecture	6
Tutorial	Tutorials	4.5
Lab	Practical work	12

Mandatory prerequisites

None

Course outline

1. Introduction to Databases (30 min CM 1)
2. Entity/Association (EA) modeling in UML standard (1 hour CM 1)
3. Relational modeling & transition from EA to relational modeling (1.5 hours, lecture 2)
    1. Tutorial 1: EA and relational models
4. Relational Algebra (1.5 hours, Lecture 2)
    1. Tutorial 2: Relational algebra
    2. Tutorial 3: Extended relational algebra
    3. Lab 1: Manipulating a database in SQL
    4. Lab 2: Modifying a database in SQL
    5. Lab 3: Database lab exam in SQL

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Flavien Vernier

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Locations

Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

MAraTHon: Support/Refresher Course (MATH500_PACY)

Polytech Annecy-Chambéry

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes
- **ERASMUS reference:** Mathematics and statistics

Presentation

Description

This course aims to strengthen students' foundations in mathematics.

Teaching hours

PTUT	Tutored project	15

Course outline

1. Plane geometry and geometry in space
2. Complex numbers, polynomials, rational fractions: decomposition into simple elements on R
3. Linear systems, matrices, determinants
4. Differential calculus of functions of a real variable, applications: Taylor's formula, limited developments, equivalents
5. Basic integral calculus (including change of variable), definition and examples of generalized integrals
6. Basic differential equations: first-order linear equations, variation of the constant, second-order linear equations with constant coefficients.

Bibliography

- J-P. Truc, Précis de Mathématiques, Nathan, 1997
- G Chauvat, A. Chollet, Y.Bouteiller, Mathématiques, Ediscience, 2005
- S Ferrigno, D Marx, A Muller-Gueudin, Mathématiques pour les sciences de l'ingénieur, Dunod, 2013

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Catherine Adloff

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Location

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Mathematics Core Curriculum (MATH501_PACY)

Polytech Annecy-Chambéry

In brief

Languages of instruction: French **Teaching methods:** In-person

Open to exchange students: Yes

ERASMUS reference: Mathematics and statistics

Presentation

Description

This course aims to provide the fundamentals of analysis necessary for engineering sciences.

Teaching hours

Lectures	Lecture	16.5
Tutorial	Tutorials	37.5

Mandatory prerequisites

MATH500: Mathematics refresher course or otherwise solid foundation in mathematics equivalent to two years of post-secondary education

Course outline

1. Differential calculus: functions of several variables, differentiation, examples of partial differential equations
2. Vector analysis (Part 1): differential operators, scalar potentials, vector potentials,
3. Curves and surfaces, point motions

4. Multiple integrals
5. Vector analysis (Part 2): line integrals, surface integrals

Bibliography

Books:

- J-P. Truc, Précis de Mathématiques, Nathan, 1997 (for MATH500)
- J. Stewart, Analysis, Concepts and Contexts, vol. 2, De Boeck, 2001
- B. Dacorogna, Advanced Analysis for Engineers, Presses polytechniques et universitaires romandes, 2002
- E. Azoulay, J. Avignant, G. Auliac. Mathematics in the Bachelor's Degree (2nd year, volume 1), Ediscience, 2003
- F. Cottet-Emard, Analysis 2, De Boeck, 2006
- P. Pilibossian, J-P. Lecoutre, Analysis, 1998
- P. Pilibossian, J-P. Lecoutre, Algebra, 1998
- P. Thuillier, J.C. Belloc, Mathematics (2 volumes), 2004 Websites:

- https://fr.wikiversity.org/wiki/Facult%C3%A9:Math%C3%A9matiques
- https://uel.unisciel.fr/uel/co/Uel.html

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Catherine Adloff

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Catherine.Adloff@univ-savoie.fr

Location

Annecy-le-Vieux (74)

Campus

> Annecy / Annecy-le-Vieux campus

UE503 Specialized Sciences

ECTS
13 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Metallic materials Mechanics of continuous media	MODULE	14.5 hours	10.5	12	
CAD and prototyping	MODULE	15 hours	22.5		
	MODULE		4.5	36	
Electricity	MODULE	13.5 hours	15	12	
Thermodynamics and thermal engineering	MODULE	13.5 hours	15	12	

Practical information

Location

> Annecy-le-Vieux (74)

Metallic Materials (MATE510_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person **Open to exchange students:** Yes **ERASMUS reference:** Physical sciences

Presentation

Description

Learn the basic concepts associated with the three main families of materials (ceramics, metals, and polymers) and introduce the concepts of composites.

Teaching hours

Lectures	Lecture	14.5
Tutorial	Tutorials	10.5
Lab	Practical work	12

Mandatory prerequisites

No specific prerequisites

Course outline

1. Presentation of different classes of materials
    1. Metallic materials (metals, alloys), polymeric materials (plastics), and inorganic non-metallic materials (ceramics, glass).
    2. Introduction to composite materials, multi-material materials, and multifunctional materials.
2. Study of mechanical properties for acceptance testing and quality testing purposes
    1. The various mechanical characterization tests: tensile, shear, bending, torsion, hardness, resilience tests, etc.
    2. The main non-destructive tests and micrographs of material implementation checks.
3. Study of mechanical behavior.
    1. Introduction to relationships (structure, microstructure, morphology) and (physical, mechanical, and chemical properties).
    2. Concepts of elasticity, plasticity, viscosity, damage, aging.
4. Phase diagrams and transformations in metals
    1. Application to heat treatment of metals (TTT and TRC).
5. Corrosion
    1. Concepts of corrosion: basic mechanisms leading to the destruction of materials

Targeted skills

Be able to:

- identify and distinguish between the main categories of materials (metals, polymers, ceramics, composites, and multifunctional materials) according to their nature, structure, and uses;
- select a material based on its mechanical properties and industrial specifications;
- describe the principles and implement the main mechanical tests (tension, bending, shear, torsion, hardness, resilience) for acceptance or quality control purposes;
- understand and apply non-destructive testing and micrography techniques to assess material compliance;
- analyze the mechanical behavior of a material based on fundamental concepts such as elasticity, plasticity, viscosity, damage, and aging;
- relate the properties of a material to its structure, microstructure, and morphology;
- interpret phase diagrams and understand the main transformations in metals.

Bibliography

- William D. Callister, Jr, Materials Science and Engineering: An Introduction
- Michael-F Ashby, Michel Colombié, Sarah Décarroux, Choix des matériaux en conception mécanique
- Michael Shackelford, James F. Sullivan, Introduction to Materials Science for Engineers (6th International Edition) Prentice Hall (2005)

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Emile Roux

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Locations

Annecy-le-Vieux (74)

Continuum Mechanics (MECA511_MIMC)

Polytech Annecy-Chambéry

In brief

Languages of instruction: French, English **Teaching methods:** In person
Open to exchange students: Yes
ERASMUS reference: Engineering and related techniques

Overview

Description

The course "Mechanics of Continuous Media" aims to

(i) acquire basic knowledge of continuum mechanics (CM),

(ii) analyze stress states (stresses, strains, plasticity criteria) in simple structures and

(iii) solve simple problems in continuum mechanics.

It covers:

- the statics of non-deformable solids: 2D application,
- stress states and deformation states,
- the law of elastic and isotropic behavior,
- general equations of continuous media and methods of resolution,
- plasticity and dimensioning criteria

Objectives

Be able to:

- model and solve simple two-dimensional static problems by applying the fundamental principles of solid equilibrium;
- represent and interpret the state of stress and the state of deformation in a solid using the associated tensors;
- relate stresses to strains using the linear elastic behavior law (generalized Hooke's law);
- use the general equations of continuum mechanics in linear elasticity to model the mechanical behavior of materials;
- identify critical situations by applying appropriate failure criteria (Von Mises, Tresca, etc.);
- verify the mechanical strength of a component by incorporating safety conditions into the design.

Teaching hours

Lectures	Lecture	15
Tutorial	Tutorials	22.5

Mandatory prerequisites

Vector calculus (scalar product, vector product), differentiation, integration, matrix operations (product, eigenvalues-eigenvectors)

Course outline

1. 2D statics: Tools for solving simple 2D statics problems
2. Mechanics of continuous media
   1. Stress state (stress tensor)
   2. Deformation state (deformation tensor)
   3. Linear elastic behavior law (stress/strain relationships)
   4. General equations of continuous media in linear elasticity
   5. Failure criteria and safety conditions

Bibliography

- Mechanics of continuous media, Lectures, exercises, and problems, Patrick Rois, PUL, 2005.
- Analysis of structures and continuous media - volume 2, François Frey. Presses Polytechniques et Universitaires Romandes, 2nd edition, 2000.
- Strength of Materials, Volume 1, J. Roux, RDM Schaum

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course Director Emile Roux

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Locations

Annecy-le-Vieux (74)

CAD and Prototyping (CMEC510_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person **Type of instruction:** Practical work **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

Tutorials and practical work will focus on describing and learning how to use computer-aided design (CAD) tools used in design offices, as well as on producing prototypes of composite parts using several technologies.

Objectives

Creation of a volumetric digital model in CAD, with the following properties:

- representing the properties of the object
- be usable (assembly, calculations, simulation, etc.) Production of tools and parts made of composite materials

Teaching hours

Tutorials	Tutorials	4.5
Lab	Practical work	36

Mandatory prerequisites

No prerequisites

Course outline

- **Tutorials: Introduction to technical drawing**
- **TP1: Introduction to Solidworks**
  - Sketch entities and sketch relationships
  - Boss and stock removal functions (extrusions, revolutions, sweeps, smooths)
  - Drawing sheets and views
- **Practical assignment 2: (Reverse) Design of parts**
  - Reference geometry (planes, axes)
  - Linear and circular repetitions
- **TP3: Creating an assembly and designing within an assembly**
  - Insertion of standard components
  - Standard constraints (coincidence, parallel, perpendicular, etc.)
- **Lab 4: Advanced CAD tools**
  - Using equations
  - Creating configurations
  - Part families
- **TP5: Reverse engineering using a 3D scanner (Handyscan)**
- **TP6, TP7, and TP8: Production of tools and parts made of composite materials**

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Hugues Favreliere

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Locations

- Annecy-le-Vieux (74)

UNIVERSITÉ SAVOIE MONT BLANC

Electricity (EASI501_PACY)

Polytech Annecy-Chambéry

Time of year Fall

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

Fundamentals of electricity, study of transient, continuous, and sinusoidal regimes

Objectives

- Calculate and measure electrical quantities such as currents and voltages in a linear circuit, in steady state, transient state, single-phase sinusoidal or three-phase sinusoidal conditions.

- Calculate and measure the power and energy consumed in a linear circuit, in continuous, transient, single-phase sinusoidal, or three-phase sinusoidal conditions.

- Explain the operating principle of a direct current motor.

- Describe the general architecture of the electricity production, distribution, and consumption network in France.

- Determine whether a simple electrical installation (domestic or small business) presents an electrical hazard.

Teaching hours

Lectures	Lecture	13.5
Tutorial	Tutorials	15
Lab	Practical work	12

Mandatory prerequisites

Scientific and technological knowledge from the first cycle of university studies

Course outline

Part 1: Continuous and transient circuits

A/ General laws of electrokinetics: Kirchhoff's laws, operating laws applied to basic dipoles
B/ Study of steady state – General theorems: Thévenin's theorem, Norton's theorem, superposition theorem, Millman's theorem C/ Study of transient states
D/ Electromechanical conversion – DC motor

Part 2: Single-phase and three-phase circuits - Electrical energy and protection

E/ Sinusoidal quantities and complex notation
F/ Linear circuits in single-phase sinusoidal mode: active, reactive, and apparent power G/ Production, transmission, and consumption of electrical energy
H/ Three-phase sinusoidal system
I/ Ground connection diagram – electrical protection

Bibliography

- Electrical Engineering Handbook, lectures and corrected exercises by Christophe Palermo, published by Dunod
- General Electricity: Circuit Analysis and Synthesis, lectures and corrected exercises by Tahar Neffati, published by Dunod
- Electricity Manual, Course Essentials and Corrected Exercises by Christophe Palermo & Jérémie Torres, published by Dunod

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Thermodynamics and Thermal Engineering (PHYS510_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

The course describes the fundamental principles governing the evolution of systems undergoing transformations involving energy exchanges in the form of work and heat. The three modes of heat transfer (convection, conduction, and radiation) will be explored in depth.

The course describes the fundamental principles that govern the evolution of systems undergoing transformations involving energy exchanges in the form of work and heat. The three modes of heat transfer (convection, conduction, and radiation) will be explored in more detail.

Objectives

- Explain the practical importance of thermodynamic cycles (turbines, internal combustion engines, refrigerators, heat pumps, etc.).
- Identify and interpret the phenomena associated with the main thermodynamic transformations
- Perform an energy balance on a thermal system and model a simple heat exchange problem

Teaching hours

Lectures	Lecture	13.5
Tutorial	Tutorials	15
Lab	Practical work	12

Mandatory prerequisites

Vector analysis, partial derivatives, differential equations

Course outline

BASIC CONCEPTS OF THERMODYNAMICS

1. General
   1. Thermodynamic systems, exchanges, and transformations
   2. Equilibrium, state variables (extensive and intensive) and state function
2. Thermodynamic quantities and relationships
3. Fundamental principles
   1. Zero principle and the concept of thermal equilibrium
   2. First principle and conservative nature of energy,
   3. Second law, concept of irreversibility and concept of entropy,
   4. Third principle and properties of matter near absolute zero.
4. Evolution of systems.
   1. Thermodynamic diagrams.
   2. Energy balance, efficiency, and coefficient of performance.

THERMAL CONCEPTS

1. Thermal conduction
   1. Fourier's law, thermal conductivity of materials
   2. Heat equation in a stationary, isotropic solid
   3. Thermal resistance and conductance
2. Convection
   1. Newton's law,
   2. Principle of convection
   3. Characteristic numbers
3. Thermal radiation
   1. Radiation quantities, Planck's law, Wien's law, Stefan-Boltzmann law, Kirchoff's law
   2. Exchanges between black bodies and exchanges between gray bodies

Bibliography

- Thermal Engineering Manual, Theory and Practice, 2nd edition, Bernard Eygluent, Hermes Ed., 1997
- Thermodynamics and Energy, Lucien BOREL, Presses Polytechniques Romandes,
- Thermodynamics, L. Couture, Ch. Chaine, R. Zitoun, Dunod Université Ed., 1989
- Introduction to Heat Transfer, J.F. Sacadura, Technique et Documentation Ed., 1980
- Heat and Thermodynamics, M.W. Zemansky, R.H. Dittman, McGraw Hill-Science 7th Ed., 1996
- http://www.sciences.univ-nantes.fr/physique/perso/blanquet/conducti/cddex.htm

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Thomas Mazingue-Desailly

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Locations

Annecy-le-Vieux (74)

UE601 Bridge to the professional world

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lectures	Tutorial	Practical	Credits
Professional experience	MODULE				
Financial management	MODULE	10.5 hours	9		
Introduction to law	MODULE	15 hours	4.5		
Issues in artificial intelligence	MODULE	6			
Business-oriented project management techniques	MODULE		9		

	Nature	Lecture	Tutorial	Practical	Credits
English (TOEIC level not achieved) S6	MODULE		40.5		
Modern languages (TOEIC level achieved)	MODULE				
English S6 Modern Language 2	SUBJECT		3 p.m.		
German TD	CHOICE				
	SUBJECT		3 p.m.		
Spanish TD Italian	SUBJECT		3:00 p.m.		
TD Chinese TD	SUBJECT		3:00 p.m.		
Japanese TD	SUBJECT		3:00 p.m.		
Russian TD	SUBJECT		3:00 p.m.		
Portuguese TD	SUBJECT		3:00 p.m.		
Advanced English S6	SUBJECT		7:15 p.m.		
	SUBJECT		9:00 p.m.		

	Nature	CM	Tutorial	Practical	Credits
Optional internship S6	MODULE				
Support (every Thursday afternoon when FISA staff are present)	MODULE				

Practical information

Locations

- Annecy-le-Vieux (74)

Professional experience (PROJ601_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

The "worker" professional experience allows students to discover the practical aspects of blue-collar work and to understand the hierarchies, methods, and techniques used in companies. This experience should preferably take place in an industrial or construction company related to the student's area of expertise and likely to hire engineers. Teleworking is not permitted.

Objectives

- Gain experience in a professional environment as an operator (worker, unskilled person, etc.);
- Integrate into and participate in a professional organization;
- Observe how the company operates;
- Identify the roles of employees (engineers, technicians, workers, etc.);
- Analyze working conditions, risks, and work organization;
- Reflect on sustainable development and social/environmental responsibility;
- Draw conclusions from the internship for your own training, career plans, and management methods.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course Director, Polytech Business Relations

Relations-Entreprises.Polytech@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Financial Management (SHES601_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In-person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Business and administration

Overview

Description

This course aims to familiarize students with the fundamental principles of financial management and corporate finance. It is structured in such a way as to facilitate understanding of the interactions between key concepts, practical tools, and key players, with a view to rapid and effective application in a professional context.

Objectives

- Understand the key concepts of entrepreneurship and business start-ups/takeovers.
- Acquire the skills necessary to develop a business strategy.
- Explore financing and growth strategies for businesses.
- Develop an understanding of the challenges and opportunities faced by entrepreneurs.

Teaching hours

Lectures	Lecture	10.5
Tutorial	Tutorials	9

Mandatory prerequisites

None

Course outline

The main topics covered are:

- The fundamentals of financial accounting
- Interpretation of financial statements (income statement, statement of changes in equity, balance sheet, cash flow statement, etc.)
- Sources of short- and long-term financing, both on and off balance sheet, as well as stakeholders, financial structures, etc.
- Key players in the financing process (banks, venture capital/private equity, etc.)
- Aspects related to valuation and exit scenarios
- The correlation between strategy and financial control, as well as the role of the business plan
- Cost and revenue analysis techniques
- Designing a performance management system (indicators, dashboard, financial and non-financial criteria, etc.)

Targeted skills

- Understanding some key points in a company's financial statements, knowing how to look at a balance sheet from a financing perspective, analyzing a company's situation
- Knowing how to build an economic performance management system.
- Understanding the different sources of financing and their impact on capital structure.
- Ability to identify and manage financial risks in a technological context.

Bibliography

Brealey, Richard A., and Stewart C. Myers. *Principles of Corporate Finance.* New York, McGraw-Hill Education, 2017.

Ross, Stephen A., Randolph W. Westerfield, and Bradford D. Jordan. *Corporate Finance.* New York, McGraw-Hill Education, 2018. Brigham, Eugene F., and Michael C. Ehrhardt. *Financial Management: Theory & Practice.* Mason, Cengage Learning, 2017.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Elodie Gardet

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Location

Annecy-le-Vieux (74)

Introduction to Law (SHES602_PACY)

Polytech Annecy-Chambéry

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes **ERASMUS reference:** Law

Presentation

Description

This introductory course in law aims to familiarize students with fundamental legal concepts. It explores the basic principles of law, with an emphasis on legal aspects related to the practice of engineering, such as contracts, civil liability, intellectual property, and industrial regulations.

Objectives

- Understand the general principles of law
- Acquire the knowledge necessary to interpret and draft contracts related to engineering projects.
- Explore the concepts of civil liability and intellectual property protection in the context of technology projects.
- Develop legal and ethical awareness in the practice of engineering.

Teaching hours

Lectures	Lecture	15
Tutorial	Tutorials	4.5

Mandatory prerequisites

none

Course outline

1. Judicial Institutions, Fundamental Principles, and Key Players in the Justice System
2. Criminal Procedure and Criminal Law
3. Contracts, Contractual Liability, and Intellectual Property Rights
4. Labor Law

Targeted skills

- Ability to understand and apply fundamental legal principles
- Ability to analyze the legal implications of decisions and actions in a professional context.
- Skills in interpreting engineering contracts.
- Knowledge of civil liability and intellectual property concepts related to engineering.

Bibliography

J.-B. Blaise and R. Desgorces, Business Law, 8th ed., LGDJ, 2015.

F. Dekeuwer-Défossez and E. Blary-Clément, Commercial Law, 11th ed., Montchrestien, 2015.

P. and Ph. Didier, Commercial Law, vol. I, Economica, coll. "Corpus droit privé," 2005.

D. Houtcieff, Commercial Law, 4th ed., Sirey, 2016.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Elodie Gardet

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Location

Annecy-le-Vieux (74)

Issues in Artificial Intelligence (DATA601_PACY)

Polytech Annecy-Chambéry
component

Presentation

Description

In the era of large language models, it is no longer enough to know how to use a chatbot: it is crucial to understand the underlying mechanisms in order to discern where AI brings real value and where it reaches its limits. As future engineers and citizens, engineering students will be called upon to observe the profound impact of these technologies on society—transforming professions, redefining social interactions, and disrupting decision-making processes. At the same time, the massive emergence of AI-dedicated computing centers raises major environmental issues: the energy consumption and carbon footprint of model training continue to grow and call for responsible technical and organizational choices. Finally, behind every AI application lie ethical challenges: copyright protection, privacy, and prevention of malicious use are all issues that require critical and informed consideration.

Objectives

By the end of the module, students will be able to:

- Describe the basic functioning of a neural network (perceptron, backpropagation) and explain the role of attention in a transformer.
- Explain what a language model is and give concrete examples of applications.
- Identify at least three types of bias in LLMs and propose a simple method for detecting them.
- Estimate the energy impact of an LLM model and list two best practices for reducing it (choice of infrastructure, work splitting).
- Write and test a clear prompt to generate useful text (summary, code, explanations).
- Recognize copyright and privacy issues related to the use of an LLM.

UNIVERSITÉ SAVOIE MONT BLANC

Teaching hours

Lectures	Lecture	6
AUTO	Independent study	4
PROJ	Project	10

Mandatory prerequisites

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course leader Ammar Mian

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Locations

- Annecy-le-Vieux (74)

UNIVERSITÉ SAVOIE MONT BLANC

Business-oriented project management techniques (PROJ602_PACY)

Polytech Annecy-Chambéry
component

Overview

Description

Project management requires methods and techniques that all engineers must know. However, depending on the profession, the stages and tools used to manage a project may differ. This course is differentiated according to the program.
With the help of the Business Relations Department and the Business Club, stakeholders from the socio-economic world come to present their daily experiences and how they evolve in project mode to control objectives, deadlines, costs, and associated resources.

Objectives

Acquire a project management methodology

Understand the necessary relationships between all project stakeholders Master the stages and tools of project management

Teaching hours

Tutorials	Tutorials	9

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Director of Training, Polytech

Locations

- Annecy-le-Vieux (74)
- Le Bourget-du-Lac (73)

English (TOEIC level not achieved) S6 (LANG601_PACY)

Polytech Annecy-Chambéry

In brief

- **Languages of instruction:** French, English **Teaching methods:** In person
- **Teaching format:** Tutorials **Open to exchange students:** Yes
- **ERASMUS reference:** Mathematics and statistics

Presentation

Description

This course prepares students for the TOEIC test ("Test of English for International Communication") and, more specifically, for obtaining a minimum score of 785 points (out of 990).

Students are assessed throughout each semester. The final assessment consists of a 1-hour, 1.5-hour, or 2-hour exam, depending on the semester, and counts for 20% of the total continuous assessment.

Objectives

Specific objectives: at the end of this course, students will be able to:

review grammar on: correct reflexes for common structures; verb groups and tenses (except for the conditional tense); noun groups and all their constituent elements; logical links (connecting words)

improve their grammatical and lexical knowledge (general English and TOEIC-specific vocabulary) in class and independently, validating their progress through regular assessment tests

Teaching hours

Tutorials	Tutorials	40.5

Mandatory prerequisites

S5 program (LANG501)

Course outline

Course outline

1. **Review of important grammar points for the TOEIC**
    1. Nouns
    2. Pronouns
    3. Linking words...
2. **Listening comprehension**
    1. Recorded dialogues in American, British, and New Zealand English...
    2. Videos in American, British, and Australian English...
3. **Reading comprehension**
    1. Press excerpts
    2. Various texts

Bibliography

Documents provided by lecturers Global Exam

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

+33 4 50 09 66 17

Muriel.Yvenat@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Modern Languages (TOEIC Level Achieved) (LANG602_PACY)

Polytech Annecy-
Chambéry

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
English S6	SUBJECT		3 p.m.		
Modern Language 2	CHOICE				
German TD Spanish	SUBJECT		3:00 p.m.		
TD Italian TD			3:00 p.m.		
Chinese TD	SUBJECT		3:00 p.m.		
Japanese TD			3:00 p.m.		
Russian TD	SUBJECT		3:00 p.m.		
Portuguese TD	SUBJECT		7:15 p.m.		
Advanced English S6			9:00 p.m.		
	SUBJECT				
	SUBJECT				
	SUBJECT				
	SUBJECT				

Practical information

Locations

Annecy-le-Vieux (74)

English S6 (LANG602_PACYM1)

Polytech Annecy-Chambéry

Time of year Spring

In brief

- **Languages of instruction:** English, French **Teaching methods:** In person
- **Teaching format:** Tutorials **Open to exchange students:** Yes **Capacity:** 25 per group

Presentation

Description

This course is an introduction to professional English.

Students will work on their fluency in the five skills (group project).

Students will develop their skills through the study of specific topics and/or develop their intercultural knowledge.

Students will be assessed throughout the semester.

Objectives

The objective is to improve students' autonomy in the English-speaking workplace by developing their reading and listening comprehension as well as their speaking and writing skills.

Teaching hours

Tutorials	Tutorials	15

Mandatory prerequisites

Minimum TOEIC score of 785 obtained at the end of semester 5 (Lang 501)

Course outline

Various presentations by professionals, mainly English-speaking teachers or external speakers

Targeted skills

Communicate independently, both orally and in writing, in all situations in an international professional setting.

Bibliography

A variety of authentic materials provided by the speakers and/or the students themselves.

Skills acquired

Macro-skill	Micro-skills

Practical

Contact

Course coordinator Muriel Yvenat

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Muriel.Yvenat@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UNIVERSITÉ SAVOIE MONT BLANC

Modern Language 2

Polytech Annecy-Chambéry

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
German TD Spanish	SUBJECT		3 p.m. 3		
TD Italian TD	SUBJECT		p.m. 3 p.m.		
Chinese TD	SUBJECT		3 p.m. 3		
Japanese TD	SUBJECT		p.m. 3 p.m.		
Russian TD	SUBJECT		7:15 p.m.		
Portuguese TD	SUBJECT		9:00 p.m.		
Advanced English S6	SUBJECT				
	SUBJECT				

Practical information

Locations

> Annecy-le-Vieux (74)

German TD (ALLE201D1_IUTA)

Annecy University Institute of Technology

In brief

Languages of instruction: French **Open to exchange students:** Yes
ERASMUS reference: Languages

Presentation

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Spanish TD (ESPA201D1_IUTA)

Annecy IUT

In brief

- **Languages of instruction:** French **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Overview

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Italian TD (ITAL201D1_IUTA)

Annecy IUT

In brief

- **Languages of instruction:** French **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Overview

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Chinese TD (CHIN201D1_IUTA)

Annecy IUT component

In brief

Languages of instruction: French **Open to exchange students:** Yes
ERASMUS reference: Languages

Presentation

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Japanese TD (JAPO201D1_IUTA)

Annecy IUT

In brief

- **Languages of instruction:** French **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Russian TD (RUSS201D1_IUTA)

Annecy University Institute of Technology

In brief

- **Languages of instruction:** French **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Overview

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Portuguese TD (PORT201D1_IUTA)

Annecy IUT

In brief

- **Languages of instruction:** French **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Overview

Teaching hours

Tutorial	Tutorials	7:15 p.m.

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Advanced English S6 (ENGL602_PACY)

Polytech Annecy-Chambéry

In brief

Languages of instruction: English, French **Teaching methods:** In person
Teaching format: Tutorials **Open to exchange students:** Yes

Presentation

Description

This course is an introduction to professional English. Students will work on their fluency in the five language skills by enriching their technical and professional vocabulary, participating in role-plays, cultural activities, and written exercises.

Activities will be carried out individually, in pairs, and/or in groups. Students will be assessed throughout the semester.

Objectives

The objective is to improve students' autonomy in the English-speaking workplace in an international context.

Teaching hours

Tutorials	Tutorials	21

Mandatory prerequisites

Minimum TOEIC score of 785 and semester 501 completed

Course outline

Various presentations by professionals, mainly English-speaking teachers or external speakers

Targeted skills

Communicate independently, both orally and in writing, in all situations in a professional setting.

Bibliography

Varied and authentic materials provided by instructors and/or students themselves.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Optional internship S6 (PROJ600_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

The optional internship aims to enrich students' academic and professional experience by offering them a practical opportunity to apply their knowledge and acquire new skills. An optional internship can be completed **in France or abroad**. It must comply with the same general conditions as compulsory internships.

Objectives

- **Acquisition of** specific skills related to the specialty;
- **Refining career goals and/or** gaining confidence and independence through the completion of a project or specific tasks;
- Establish valuable professional contacts that can help in future job searches.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course Director, Polytech Business Relations

Relations-Entreprises.Polytech@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Support (every Thursday afternoon when FISA representatives are present) (ACCO601_PACY)

Polytech Annecy-Chambéry
component

In brief

Teaching methods: In person **Teaching format:** Tutored project **Open to exchange students:** Yes

Presentation

Description

This support is open to all students at the school: students, apprentices, and Continuing Education employees. It is not mandatory, as it is primarily intended for students who need it to succeed in their training. This semester, it is scheduled into the timetable for each course, with a total of 32 hours.

Support may take the form of refresher courses, upgrading courses, or support in the main areas of training.

Peer tutoring is encouraged and the educational resources of the Polytech Network are used (https://eplanet.polytech-reseau.org/).

Objectives

To promote the success of all students in their training program

Teaching hours

PTUT	Tutored project	32

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Director of Training, Polytech

Locations

- Annecy-le-Vieux (74)

UE602 Engineering Sciences and Techniques

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Mathematics	MODULE	20.5 hours	19.5 hours		
Electronics	MODULE	12 hours	9	12	
Digital tools for engineers	MODULE	7.5 hours	7.5	8 p.m.	

Practical information

Location

Annecy-le-Vieux (74)

UNIVERSITÉ SAVOIE MONT BLANC

Mathematics (MATH620_MIMC)

Polytech Annecy-Chambéry

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes
ERASMUS reference: Mathematics and Statistics

Presentation

Description

The following concepts are taught.

- Fundamentals of linear algebra, matrix reduction
- Euclidean and Hermitian spaces
- Sequences and series of functions, different types of convergence
- Fourier transforms

In 12 lectures, 13 tutorials, 1 one-hour test, and 1 1.5-hour test

Objectives

Know how to manipulate vector spaces and vector subspaces and use the tools specific to them. Mastery Know how to use the different possible reductions of matrices. Application

Understanding Euclidean and Hermitian algebraic structures of vector spaces and their applications. Application Knowing how to use sequences and series of functions. Application

Know how to use integral transformations. Application

Teaching hours

Lectures	Lecture	20.5
Tutorial	Tutorials	19.5

Mandatory prerequisites

- MATH 501 and RAN
- Matrix resolution of systems of n equations with p unknowns.
- Function of a real variable:
  - Definition (knowing how to define a function),
  - Representation of functions defined from a function *f* as $g(x) = f(-x)$, $h(x) = f(x-a)$, $p(x) = f(a-x) = f(-(x-a)) = g(x-a)$,
  - Even and odd functions.
  - Change of variables for integrals and change of indices for discrete sums.

Course outline

1. Basics of linear algebra
   1. Vector spaces, vector subspaces, basis, and coordinates of vectors in a basis
   2. Euclidean and Hermitian spaces
      1. Euclidean and Hermitian scalar products
      2. Orthonormal bases, Gram-Schmidt method, orthogonal projections
   3. Linear applications and matrix of a linear application
   4. Eigenvalues, eigenvectors, eigenspaces.
   5. Triangularization, diagonalization over R and over C
   6. Applications to computation
      1. of integer powers of a matrix
      2. of the exponential of a matrix
      3. the solutions of systems of linear differential equations
   7. Orthogonal diagonalization over R and unitary diagonalization over C
2. Sequences and series of signals
   1. Different types of convergence
   2. Preservation of properties
   3. Cases of entire series and Fourier series
3. Integral calculus
   1. Generalized integrals depending on a parameter, convolution product.
   2. Fourier transforms

Targeted skills

The student will be able to:

- recognize a vector space, a vector subspace, determine families of free vectors, generators, bases, the dimension and coordinates of a vector in a given basis (formula for changing bases for vectors).
- identify a linear application, determine its matrix in given bases, use a change of basis for a matrix of a linear application.

- recognize diagonalizable or triangularizable matrices, find eigenvalues, and construct a basis for each of the eigenspaces
- calculate the powers and exponential of a matrix, solve systems of first-order linear differential equations
- use different scalar products (for elements of R^n, $C^{(n)}$ or functions)

- manipulate scalar products and norms, determine an orthonormal basis and use it for orthogonal projection calculations.
- recognize or determine transposed and adjoint matrices, symmetric and Hermitian matrices, orthogonal and unitary matrices
- to diagonalize orthogonally on R and unitarily on C

- recognize the different types of convergence of sequences and series of functions
- solve differential equations using entire series
- decompose a signal into Fourier series

- calculate convolution products
- use Fourier transforms

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Catherine Adloff

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Catherine.Adloff@univ-savoie.fr

Location

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Electronics (EASI611_MIMC)

Polytech Annecy-Chambéry

In brief

- **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This course aims to provide the knowledge needed to choose the "building blocks" of electronics, either in the form of components or integrated functions, after functional analysis of an electronic diagram or macro-model.

Objectives

This course aims to enable students to read and choose the appropriate circuit for their application/project.

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	9
Lab	Practical Work	12 p.m.

Course outline

1. **Amplification**

1. Transfer function of an amplifier; "basic" amplifiers (transistor and op-amp)
    2. Differential amplifiers, instrumentation amplifiers. Problems related to common modes.
    3. Power amplifiers; motor drivers; problems related to heat dissipation.
2. **Filtering**
    1. Time domain and frequency domain.
    2. Role of filtering. Filter template.
    3. Low-pass, high-pass, band-pass, and band-stop filters.
    4. Special role of the low-pass filter: anti-aliasing.
3. **Digital electronics**
    1. Components.
    2. Different functions.
4. **DA and AD converters**
    1. Principles of ladder network digital-to-analog converters; performance and limitations.
    2. Principles of analog/digital converters: - voltage comparison; - load balancing; - successive approximation; - Sigma/Delta; dynamic performance.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Madjid Boutemeur
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Madjid.Boutemeur@univ-savoie.fr

Locations

Annecy-le-Vieux (74)

Digital Tools for Engineers (DATA610_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Teaching methods:** In person
- **Type of teaching:** Personal and professional project
- **Open to exchange students:** Yes
- **ERASMUS reference:** Information and Communication Technologies (ICT)

Presentation

Description

This course aims to enable engineering students to independently select and use digital tools to solve real-world engineering problems. It focuses on developing practical skills in scientific programming, data analysis, and numerical modeling. The Python language, which is free and widely used in research and industry, is the main tool used in the course. Through case studies and projects, students learn how to structure effective code, use specialized libraries, and integrate digital methods into an engineering approach.

Objectives

The objective of this course is to train engineers to use advanced numerical tools to analyze, model, and solve concrete engineering problems, particularly in the field of **mechatronics**, where the integration of mechanics, electronics, and computer science is essential.

Upon completion of the course, students will be able to:

- **Use the Python language and its scientific libraries** to develop robust, reproducible software solutions adapted to mechatronics issues.
- **Process, visualize, and exploit data** from **sensors**, images, or simulations in contexts such as system control, embedded vision, or condition monitoring.
- **Model the dynamic behavior of mechatronic systems** using ordinary differential equations (ODEs), simulate their behavior, and interpret the results for analysis or control.
- **Apply optimization techniques** in use cases related to structural design, parameter adjustment, or performance improvement of complex systems.
- **Explore and implement machine learning methods** for processing mechatronic data, for example for image recognition, anomaly detection, or online parameter estimation.
- **Work in groups on an integrative project**, drawing on programming, modeling, and digital processing skills in the context of a mechatronic engineering problem (embedded systems, measurement chains, robotics, etc.).

This course aims to develop students' **systemic and digital approach** to mechatronic systems, preparing them for industrial environments where simulation, data analysis, and automation play a central role.

Teaching hours

Lectures	Lecture	7.5
Tutorial	Tutorials	7.5
Lab	Practical work	20

Mandatory prerequisites

None

Course outline

The course is structured around six thematic modules designed to gradually develop engineering students' skills in scientific programming, digital processing, and applied modeling:

Block 1 – Image processing:

This module introduces the fundamental concepts of raster images and the main image processing techniques. Students implement operations such as filtering, contour detection, and morphological analysis using the *SciPy*, *Scikit-Image,* and *OpenCV* libraries.

Block 2 – Data processing:

Students learn about tools for manipulating, structuring, and analyzing data using the *Pandas* library. This block enables them to efficiently process data sets from sensors, experiments, or external files for statistical analysis or visualization.

Block 3 – Ordinary differential equations (ODE):

This module covers the modeling of dynamic phenomena using ordinary differential equations. Students learn how to formulate ODE models, solve them numerically (e.g., using Runge-Kutta methods), and interpret the results in a physical or technical context.

Block 4 – Optimization:

This block explores optimization techniques, which are essential in engineering for model fitting, parameter calibration, and system design. Students learn how to pose an optimization problem and use numerical tools to solve it efficiently.

Block 5 – Machine learning:

Gradual introduction to machine learning methods, starting with classic supervised algorithms (such as *k-nearest neighbors*) and moving on to the basics of neural networks. The *Scikit-Learn* and *PyTorch* libraries are used to experiment with real data.

Block 6 – Group project:

Students form groups to design and carry out a project that integrates the skills developed throughout the course. The project is based on solving an engineering problem requiring the analysis and processing of numerical data. It is assessed based on the quality of the work, the rigor of the approach, and the final presentation.

Targeted skills

By the end of the course, students will have acquired the following skills:

Technical and scientific skills:

- **Mastery of the scientific Python environment** and its libraries (NumPy, SciPy, Pandas, Matplotlib, etc.) for the development of numerical analysis tools.
- **Design and implement data processing chains** from sensors, images, or numerical simulations.
- **Numerically solve ordinary differential equations (ODEs)** to model the dynamic behavior of physical or mechatronic systems.
- **Implement numerical optimization techniques**, particularly for model calibration, curve fitting, or computer-aided design.
- **Use supervised machine learning tools** (Scikit-Learn, PyTorch) in mechatronics-related contexts: classification, regression, pattern or anomaly detection.
- **Use specialized image processing libraries** (OpenCV, Scikit-Image) for applications such as industrial vision or defect detection.

Skills applied to mechatronics:

- **Integrate digital tools into a multidisciplinary approach**, combining mechanics, electronics, and computer science for the analysis or control of mechatronic systems.
- **Analyze and interpret experimental or simulated data** from embedded systems or test benches.
- **Develop scripts or digital prototypes** to support the design, validation, or diagnosis of mechatronic systems.

Cross-functional skills:

- **Structure clear**, reusable, and documented **algorithmic reasoning** in the context of engineering projects.
- **Work as part of a team on a digital project**, from defining requirements to technical delivery.
- **Communicate results rigorously**, using relevant graphical representations and scientific presentation tools (Jupyter Notebooks, reports, etc.).

Bibliography

All course materials are available on our website: http://https://symmehub.github.io/positron/intro.html

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

- Annecy-le-Vieux (74)

UE603 Specialized Sciences

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	CM	Tutorial	Practical	Credits
Structural design	MODULE	3:00 p.m.	3 p.m.	8	
Mechanism statics	MODULE	5, 2.5 hours	9 hours	8	
Fluid statics and dynamics	MODULE	6, 75 min	9	4	
Mechanism dynamics	MODULE	13.5 hours	16.5 hours	4	

Practical information

Location

- Annecy-le-Vieux (74)

Structural Design (MECA620_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This course is an introduction to numerical methods for the calculation of structures. The content will focus on slender structures such as trusses and beams. These structures will be analyzed analytically to introduce the RDM and then numerically to obtain finite elements.

This course is an introduction to numerical methods for the calculation of structures. The content will focus on slender structures such as trusses and beams. These structures will be analyzed analytically to introduce the RDM and then numerically to obtain finite elements.

Objectives

Be able to:

- calculate the displacements, deformations, and stresses of a slender beam-type structure subjected to a simple load
- explain the variational formulation of an elasticity problem applied to a truss structure
- explain the variational formulation of an elasticity problem applied to a portal frame structure

Teaching hours

Lectures	Lecture	3 p.m.
Tutorial	Tutorials	3 p.m.
Lab	Practical Work	8

Mandatory prerequisites

- MECA511 Mechanics of Continuous Media

Course outline

1. Modeling
2. Fundamentals of FEM
3. Energy approaches
4. Trusses
5. Porticos
6. Finite elements

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator

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Locations

- Annecy-le-Vieux (74)

Mechanism Statics (MECA610_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

Training module on modeling mechanisms and forces, and calculating forces using the fundamental principle of statics (FPF)

Objectives

Be able to calculate forces and equilibrium positions in assemblies by applying the principle of statics.

Teaching hours

Lectures	Lecture	5.25
Tutorial	Tutorials	9
Lab	Practical work	8

Mandatory prerequisites

Be able to perform vector and trigonometric calculations

Course outline

Lecture 1: Modeling assemblies (mechanisms and structures) Lecture 2: Modeling mechanical forces

CM3: Calculating forces and positions

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

- Annecy-le-Vieux (74)

Fluid Statics and Dynamics (MECA611_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French, English **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This course covers the mechanics of incompressible fluids. It is divided into three parts:

- Fluid statics

- Fluid dynamics (Bernoulli's theorem)

- Concept of real fluids and calculation of pressure loss

Objectives

Be able to:

- calculate the distribution of pressures and pressure forces exerted by a fluid at rest on walls or submerged surfaces;
- apply Bernoulli's theorem to analyze ideal fluid flows and solve common problems in fluid dynamics;
- distinguish between idealized (perfect fluid) and real (viscous fluid) behavior in the study of flows;

- calculate steady pressure losses (related to friction in pipes) and singular pressure losses (related to elbows, valves, changes in section, etc.) in a hydraulic or aerodynamic network.

Teaching hours

Lectures	Lecture	6.75
Tutorial	Tutorials	9
Lab	Practical work	4

Mandatory prerequisites

Concepts of continuum mechanics

Course outline

1. Fluid statics: calculation of pressure and pressure force
2. Dynamics of ideal fluids: Bernoulli's theorem and applications
3. Concepts of real fluid dynamics: calculation of steady and unsteady pressure losses

Bibliography

- F. FREY, Analysis of Continuous Structures and Media: Applied Statics, vol. 1, EPFL, Presses Polytechniques et Universitaires Romandes, 1990
- R. COMOLET, Experimental Fluid Mechanics, Volume I, Masson, 1985.
- W. H. GRAF, M. S. ALTINAKAR, Hydrodynamics, Presses Polytechniques et Universitaires Romandes, 1998.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Emile Roux

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Locations

- Annecy-le-Vieux (74)

Mechanism Dynamics (MECA621_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

Comprising lectures, tutorials, and practicals, this module presents the main theories of classical mechanics, i.e., the modeling of movements, the fundamental principle of dynamics, and the theorems that derive from it, with the aim of establishing the mathematical relationships between movements and forces in mechanisms.

It also introduces the use of software for simulating the dynamics of a mechanism.

Objectives

Be able to:

- model the motion of a solid or a set of solids using kinematic tools and inertial quantities;
- Establish work, power, and energy balances for a mechanical system.
- apply the fundamental principle of dynamics and associated theorems to determine equations of motion;
- solve differential equations of motion;
- use simulation software to analyze and validate the dynamic behavior of a mechanism.

Teaching hours

Lectures	Lecture	13.5
Tutorial	Tutorials	16.5
Lab	Practical work	4

Mandatory prerequisites

Solid Statics

Course outline

1. Introduction
2. Kinematics of points and solids
    1. Position, trajectory, velocity vector, and acceleration vector of a point
    2. Position and motion of a solid: Kinematic torque
    3. Composition of motion
3. Mass and inertia parameters:
    1. Center of inertia = center of gravity
    2. Inertia matrix
4. Power, work, and mechanical energy
    1. Definition of the concepts of work and power of a force
    2. Potential energy of a force
    3. Kinetic energy theorem
    4. Theorems on the conservation of mechanical energy
5. Fundamental principle of dynamics
    1. Statement of the FDP
    2. Kinetic quantities: kinetic torque and dynamic torque of a solid
6. Solving the equations of motion
    1. Equations with constant coefficients
    2. Linearization around the stable equilibrium position.

Bibliography

- Mechanics of industrial systems, 2. Forces and structures; R. Boncompain, M. Boulaton, D. Caron, E. Jeay, B. Lacage, J. Réa; Dunod 1995
- Solid Mechanics, Industrial Applications, 2nd edition, lectures and corrected exercises; P. Agati, Y. Bremont, G. Delville; Dunod 2003

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Emile Roux

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Locations

Annecy-le-Vieux (74)

UE604 Mechanical Design - Mechatronics

ECTS
6 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Plastics, composites & ceramics	MODULE	12	4.5	4	
Metalworking	MODULE	2.5 hours	6	12	
Mechanical design and technologies	MODULE	10.5 hours	12	4 p.m.	

Practical information

Locations

Annecy-le-Vieux (74)

Plastics, Composites & Ceramics (MATE610_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This module will cover the main characteristics of ceramics, plastics, and composite materials, as well as their main manufacturing processes. Particular emphasis will be placed on material selection during the product design phase.

Objectives

This course aims to enable students to:

- Apply a rigorous method for selecting materials.
- Know the main physical properties of material classes
- Know the production techniques suited to the material in question and most widely used in industry.

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	4.5
Lab	Practical work	4

Course outline

1. Introduction to material classes and their properties – Method for selecting materials and processes 2. Ceramics: history and general information, traditional ceramics and techniques, manufacturing techniques, sintering 3. Plastics: materials, main processes, process selection criteria, challenges facing the plastics industry

4. Composites: definitions, main applications by market, materials, main processes, challenges facing the composites industry

Bibliography

Trotignon, J. P., Piperaud, M., Verdu, J., & Dobraczynski, A. (2006). *Précis de matières plastiques, Structure–Propriétés, Mise en œuvre et Normalisation.* Afnor, Nathan.

Dietrich, R., Trotignon, J. P., Pompidou, M., Nugonnaud, E., & Facy, G. (2006). *Précis de construction mécanique – Tome 2: Méthodes, fabrication et normalisation*. Afnor, Nathan.

Dietrich, R., Garsaud, D., Gentillon, S., & Nicolas, M. (1984). *Summary of Machining Methods: Methodology, Production, and Standardization*. Afnor, Nathan.

Gay, D. (2005). Composite Materials, *Lavoisier, Paris.*

Ashby, MF. (2016). *Materials selection in mechanical design*. Butterworth-Heinemann.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Yann Meyer

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Locations

- Annecy-le-Vieux (74)

Metalworking (FABR610_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

Presentation and practical mastery of the main processes for working with metallic materials. Study of material removal processes (electrical discharge machining, grinding, machining, etc.).

Study of material deformation processes (stamping, forging, etc.).

Study of material fusion processes (casting, sintering, etc.).

Teaching hours

Lectures	Lecture	2.5
Tutorial	Tutorials	6
Lab	Practical work	12

Additional

The course is structured around lectures, tutorials, presentations, and practical work.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Marc Villetard

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Locations

Annecy-le-Vieux (74)

Mechanical Design and Technologies (CMEC610_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

Introductory module to mechanical design, presenting functional analysis, industrial drawing and schematization rules, as well as certain standard components and the basics of dimensioning. The use of modeling and calculation software tools for mechanical designers will also be covered.

Objectives

Learn how to model a mechanical system. Learn how to design a mechanical product.

Teaching hours

Lectures	Lecture	10.5
Tutorial	Tutorials	12
Lab	Practical work	4 p.m.

Mandatory prerequisites

General Mechanics

Strength of Materials

Course outline

1. General information (1.5 hours lecture, 1.5 hours tutorial)
    1. Production engineering professions and related services within a company.
    2. Link between products, processes, and materials
    3. Mechanical CAD software and its functionalities
2. Mechanical technology (4.5 hours of lectures, 4.5 hours of tutorials)
    1. Technical drawing
    2. Technical functions
    3. Standard components
3. Mechanical design (4.5 hours of lectures, 6 hours of tutorials)
    1. Modeling and schematization
    2. Introduction to functional analysis
    3. Introduction to functional dimensioning

Additional information

Bibliography

- A. Chevalier, Guide du dessinateur industriel (Guide for Industrial Designers), Ed. Hachette.
- J.L. Fanchon, Guide to Industrial Science and Technology, Ed. Nathan.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE501 Bridge to the professional world

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lectures	Tutorial	Practical	Credits
English S5 Sports	MODULE		40.5		
Business management simulation	MODULE		21 hours		
Skills development support	MODULE		19.5 hours		
	MODULE	3 hours	12		

	Nature	CM	Tutorial	Practical	Credits
Optional internship S5	MODULE				
Support (every Thursday afternoon)	MODULE				

Practical information

Locations

- Annecy-le-Vieux (74)
- Le Bourget-du-Lac (73)

UNIVERSITÉ SAVOIE MONT BLANC

English S5 (LANG501_PCHY)

Polytech Annecy-Chambéry

In brief

- **Languages of instruction:** French **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Description

This course prepares students for the TOEIC test ("Test of English for International Communication") and, more specifically, for obtaining a minimum score of 785 points (out of 990).

With the aim of developing all four skills, this course also serves as an introduction to public speaking through presentations given by students in groups or individually on topics illustrated by press articles or video materials (VTD: Video, Talk and Debate, as well as written work). Depending on the location (Annecy or Chambéry), some will be seen at different times during the semester, the year, or even the three years of training.

Students are assessed throughout each semester. The final assessment consists of a 1-hour, 1.5-hour, or 2-hour exam, depending on the semester, and accounts for 33% of the total continuous assessment.

Objectives

Specific objectives: at the end of this course, students will be able to:

revise grammar on: the correct reflexes of common structures; the verb group and tenses (except the conditional tense); the noun group and all its constituent elements; logical links (connecting words)

improve their grammatical and lexical knowledge (general English and TOEIC-specific vocabulary) in class and independently, validating their progress through regular assessment tests.

Teaching hours

Tutorials	Tutorials	40.5

Mandatory prerequisites

CEFR level B1

Course outline

1. Oral
   1. Elements of phonology
   2. Grammar (tenses, questions, adjectives...)
   3. Reinforcement of structures and vocabulary
   4. Interactive oral communication
   5. Introduction to and practice for the TOEIC (listening section)
2. Writing
   1. Review of grammatical elements (tenses, questioning, adjectives. ....)
   2. Review of lexical elements (TOEIC-specific vocabulary)
   3. Comprehension of authentic texts
   4. Introduction to and practice for the TOEIC (reading section)

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Christophe Lambert

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Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Sport (SHES501_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Teaching format:** Tutorials **Open to exchange students:** Yes
- **ERASMUS reference:** Services to individuals

Presentation

Description

This course focuses on physical and sports activities and is structured around two main areas.

On the other hand, the aim is to enable engineering students to acquire collective skills in project implementation and group management, but also to develop their individual abilities to adapt and regulate themselves. This focus will be reflected in the collective organization and implementation of a sporting event over the course of one session.

It also aims to enable students to acquire skills related to sporting activities and to highlight their interpersonal skills, which are essential for their integration and professional success. This focus will be based on the work carried out around the values conveyed by the various sporting activities and their diverse modes of practice.

Objectives

Objective 1: Work as a team to prepare, organize, and manage a sporting event within a constrained framework.

Objective 2: Engage in a new physical activity in an intense, lucid, reasoned, and critical manner

Teaching hours

Tutorials	Tutorials	21

Mandatory prerequisites

No mandatory prerequisites

Course outline

7 three-hour practical sessions.

Additional information

Classes are held at the Dassault gymnasium, Avenue des Îles, Metz-Tessy. Bus transportation (round trip) is provided from the Annecy campus.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Business Management Simulation (SHES505_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** Hybrid
- **Teaching format:** Tutorials **Open to exchange students:** Yes

Presentation

Description

Business games, also known as serious games or business management simulations, are educational tools that offer a different way of learning. They are simulations that aim to demonstrate the complexity of businesses while relying on a simplified model. In a business game, time is accelerated and participants play out several years in the life of a company over a condensed period (two days in this case). This business simulation is carried out using a computer program. The program incorporates an algorithm to calculate the performance of each competing team (each team representing a company in the market) at the end of each decision.

Objectives

1. Analyze the general context to communicate more effectively.
2. Learn about the main communication tools, media/non-media,
3. Understand the process of developing a communication strategy,
4. Provide comprehensive, practical, and effective training in business management,
5. Raise awareness of the interdependence of business functions through decision-making and results analysis.

Teaching hours

Tutorials	Tutorials	19.5

Mandatory prerequisites

None

Course outline

Focused on a cross-functional approach to business management issues, this game combines various constraints specific to different business functions (marketing, production, finance, and financial resources) and allows students to learn the basics of both oral and written communication. Through simulation, students will address person-to-person, face-to-face communication. External communication mainly involves communication for the purposes of corporate marketing: strategy development, overview of tools, etc.

Targeted skills

- Be able to design the basics of a business strategy.
- Know how to support the development and implementation of a communication plan,
- Be able to work in a team,
- Know how to communicate and make decisions as part of a team

Bibliography

- Sophie Delerm, Jean-Pierre Helfer, and Jacques Orsoni. "Les bases du marketing" (The Basics of Marketing), Vuibert, 2006 (Part 2, Chapters 1 and 2, and Part 3, Chapter 2).
- Jacques Lendrevie, Julien Levy, "Mercator, Theory and New Practices in Marketing (9th Edition)," Dunod, Paris, 2009 (Chapter 15)
- Jean Barreau, Jacqueline Delahaye, "Financial Management DECF Test 4," Dunod, 2006 (Chapters 7 and 8)
- Christian Goujet, Christian Raulet & Christiane Raulet, "Management Accounting," Dunod, Paris, 2007. (Chapters 1, 17, and 18)
- Maurice Pillet, Chantal Martin-Bonnefous, Pascal Bonnefous, Alain Courtois, "Production Management: Fundamentals and Best Practices," Eyrolles, 2011. (Read: Chapters 4, 6, and 8)

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Course coordinator Elodie Gardet
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Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Skills Development Support (ADCO501_PCHY)

Polytech Annecy-Chambéry
component

In brief

Teaching methods: In person

Open to exchange students: Yes

Presentation

Description

As the school is committed to a skills-based approach, this course aims to introduce students to this approach, familiarize them with the skills framework for their training, and present them with the various documents and tools they will need to use throughout their training.

Teaching hours

CM	Lecture	3
Tutorial	Tutorials	12

Course outline

Content elements for all specializations

- Understanding the APC approach and its relevance to engineering education (link to professions, RNCP)
- Understanding the main concepts and learning the terminology used by the school
- Find resources related to APC (reference documents, RNCP files, cross-referenced matrices, AMS mapping, portfolio, etc.)
- Reading a training reference document (templates and examples)
- Understanding what a portfolio is

- Write a skills assessment (KAPC+ example)

Specific content elements for each specialty

- Get to grips with the reference framework for your specialty
- Link the reference guide to job characteristics
- Assessing your position in your training program
- Identify the contribution of resources to the skills in the reference framework (cross-referenced matrices)
- Identify the situational activities (AMS) in your training and the skills they involve
- Use the portfolio to self-assess the skills in your training program

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Ilham Alloui

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Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Optional internship S5 (PROJ500_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

The optional internship aims to enrich students' academic and professional experience by offering them a practical opportunity to apply their knowledge and acquire new skills. An optional internship can be carried out **in France or abroad**. It must comply with the same general conditions as compulsory internships.

Objectives

- **Acquisition of** specific skills related to the specialization;
- **Refining career goals and/or** gaining confidence and independence through the completion of a project or specific tasks;
- Establish valuable professional contacts that can help in future job searches.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator

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Campus

Le Bourget-du-Lac / Savoie Technolac campus

Support (every Thursday afternoon) (ACCO501_PCHY)

Polytech Annecy-Chambéry
component

In brief

Teaching methods: In person **Teaching format:** Tutored project **Open to exchange students:** Yes

Presentation

Description

This support is open to all students at the school: students, apprentices, and Continuing Education employees. It is not mandatory, as it is primarily intended for students who need it to succeed in their training. This semester, it is scheduled into the timetable for each course, with a total of 64 hours.

Support may take the form of refresher courses, upgrading courses, or support in the main areas of the training programs.

Peer tutoring is encouraged and the educational resources of the Polytech Network are used (https://eplanet.polytech-reseau.org/).

Objectives

To promote the success of all students in their educational journey.

Teaching hours

PTUT	Tutored project	64

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Director of Polytech Training

Locations

- Le Bourget-du-Lac (73)

UE502 Engineering Sciences and Tools

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Sustainable Development	MODULE	3 p.m.	12 hours		
Algorithms and Python Programming	MODULE	3 hours	6 hours	12	
Databases (business information management basics) MAraTHon: Support/Refresher course	MODULE	6 hours	4.5	12	
Mathematics Core Curriculum	MODULE				
	MODULE				
		16.5 hours	37.5		

Practical information

Locations

- Annecy-le-Vieux (74)
- Le Bourget-du-Lac (73)

Sustainable Development (DDRS501_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This course trains engineering students in the issues surrounding sustainable development and its integration into businesses. The aim is to enable them to consider and integrate the challenges of ecological and energy transition into their professional work.

Objectives

Students will learn to define the various challenges of ecological and societal transition, as well as energy issues. They will be introduced to the tools available to engineers to limit the ecological impact of a product or service.

Teaching hours

Lectures	Lecture	15
Tutorial	Tutorials	12

Course outline

1. Introduction to sustainable development (3 hours of lectures)

1. 1. Planetary boundaries
    2. Concept of sustainable development and ecological and societal transition
2. Carbon footprint (3 hours of lectures)
    1. The concept of climate
    2. Climate change - Greenhouse gases
    3. Carbon footprint method (6 hours of tutorials)
3. Energy (3 hours of lectures)
    1. Concepts of power and energy
    2. Global energy situation
    3. Application exercises and case studies (3 hours of tutorials)
4. The ecological transition in business (1.5 hours lecture)
5. Product life cycle analysis, eco-design (3 hours of lectures, 3 hours of tutorials)

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Campus

Le Bourget-du-Lac / Savoie Technolac campus

Algorithms and Python Programming (INFO501_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Information and Communication Technologies (ICT)

Overview

Description

This is an introductory course on the use of programming to solve problems related to engineering. It will introduce concepts of algorithms and data representation in a computer. In practice, students will also learn how to program in Python.

Objectives

This course aims to provide students with basic knowledge of how information is represented in computers, while also introducing them to traditional data structures. The module also aims to teach students the basics of algorithms and programming. The goal is to enable students to use IT tools to solve problems encountered in engineering.

Teaching hours

Lectures	Lecture	3
Tutorial	Tutorials	6
Lab	Practical work	12

Mandatory prerequisites

None

Course outline

The course is divided into:

- Lectures (CMs), where concepts related to algorithms and data structures will be introduced
- Tutorials (TDs), where concrete examples will be put into practice in a programming language
- Practical work (PW) where we will explore concepts and skills in depth to solve concrete problems. The program is as follows:

1. Machine architecture, data representation
2. Introduction to Python programming
    1. The basics of the language
    2. Basics of the language
    3. Control structures
    4. Loops
    5. Functions and procedures
    6. Classic data structures
3. Algorithmic concepts and implementation in Python
    1. Calculation of mathematical functions
    2. Sorting and selection
4. Object-oriented programming
5. Problem solving using libraries

Targeted skills

At the end of this module, students should be able to:

- model a concrete problem using an appropriate data structure
- solve the problem by implementing an algorithmic approach
- program the solution on a computer

Bibliography

- Learning to program with Python 3, Gérard Swinnen

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course leader Ammar Mian

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Campus

Le Bourget-du-Lac / Savoie Technolac campus

Databases (business information management) (INFO502_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Information and Communication Technologies (ICT)

Overview

Description

This course aims to provide students with the basic skills needed to model, implement, and manipulate a relational database. The course focuses on general and business-related problems.

Objectives

1. Designing a simple relational database (< 10 entities, linked only by 1-n or n-m links)
2. Implementation of a simple DB in a relational DBMS
3. Use of a relational DB through simple queries

Teaching hours

Lectures	Lecture	6
Tutorial	Tutorials	4.5
Lab	Practical work	12

Mandatory prerequisites

None

Course outline

1. Introduction to Databases (30 min CM 1)
2. Entity/Association (EA) modeling in UML standard (1 hour CM 1)
3. Relational modeling & transition from EA to relational modeling (1.5 hours CM 2)
    1. Tutorial 1: EA and relational models
4. Relational algebra (1.5 hours, lecture 2)
    1. Tutorial 2: Relational algebra
    2. Tutorial 3: Extended relational algebra
    3. Lab 1: Manipulating a database in SQL
    4. Lab 2: Modifying a database in SQL
    5. Lab 3: Database lab exam in SQL

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Flavien Vernier
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Locations

Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

MAraTHon: Support/Refresher Course (MATH500_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes
- **ERASMUS reference:** Mathematics and statistics

Overview

Description

This course aims to strengthen students' foundations in mathematics.

Teaching hours

PTUT	Tutored project	15

Course outline

1. Plane geometry and geometry in space
2. Complex numbers, polynomials, rational fractions: decomposition into simple elements on R
3. Linear systems, matrices, determinants
4. Differential calculus of functions of a real variable, applications: Taylor's formula, limited developments, equivalents
5. Basic integral calculus (including change of variable), definition and examples of generalized integrals
6. Basic differential equations: linear first-order equations, variation of the constant, second-order linear equations with constant coefficients.

Bibliography

- J-P. Truc, Précis de Mathématiques, Nathan, 1997
- G Chauvat, A. Chollet, Y.Bouteiller, Mathématiques, Ediscience, 2005
- S Ferrigno, D Marx, A Muller-Gueudin, Mathématiques pour les sciences de l'ingénieur, Dunod, 2013

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Mathematics Core Curriculum (MATH501_PCHY)

Polytech Annecy-Chambéry
Component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Mathematics and Statistics

Presentation

Description

This course aims to provide the fundamentals of analysis necessary for engineering sciences.

Teaching hours

Lectures	Lecture	16.5
Tutorial	Tutorials	37.5

Mandatory prerequisites

MATH500: Mathematics refresher course or otherwise solid foundation in mathematics equivalent to two years of post-secondary education

Course outline

1. Differential calculus: functions of several variables, differentiation, examples of partial differential equations
2. Vector analysis (Part 1): differential operators, scalar potentials, vector potentials,
3. Curves and surfaces, point motions

4. Multiple integrals
5. Vector analysis (Part 2): line integrals, surface integrals

Bibliography

Books:

- J-P. Truc, Précis de Mathématiques, Nathan, 1997 (for MATH500)
- J. Stewart, Analysis, Concepts and Contexts, vol. 2, De Boeck, 2001
- B. Dacorogna, Advanced Analysis for Engineers, Presses polytechniques et universitaires romandes, 2002
- E. Azoulay, J. Avignant, G. Auliac. Mathematics in the Bachelor's Degree (2nd year, volume 1), Ediscience, 2003
- F. Cottet-Emard, Analysis 2, De Boeck, 2006
- P. Pilibossian, J-P. Lecoutre, Analysis, 1998
- P. Pilibossian, J-P. Lecoutre, Algebra, 1998
- P. Thuillier, J.C. Belloc, Mathematics (2 volumes), 2004 Websites:

- https://fr.wikiversity.org/wiki/Facult%C3%A9:Math%C3%A9matiques
- https://uel.unisciel.fr/uel/co/Uel.html

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

UE503 Specialized Sciences

ECTS
13 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Metallic materials Mechanics of continuous media	MODULE	14.5 hours	10.5	12	
CAD and prototyping	MODULE	15 hours	22.5		
	MODULE		4.5	36	
Thermodynamics and thermal engineering	MODULE	13.5 hours	15	12	
Electricity	MODULE	13.5 hours	15	12 hours	

Practical information

Location

- Annecy-le-Vieux (74)
- Le Bourget-du-Lac (73)

Metallic Materials (MATE510_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

Learn the basic concepts associated with the three main families of materials (ceramics, metals, and polymers) and introduce the concepts of composites.

Teaching hours

Lectures	Lecture	2:30 p.m.
Tutorial	Tutorials	10.5 hours
TP	Practical work	12

Mandatory prerequisites

No specific prerequisites

Course outline

1. Presentation of different classes of materials

1. Metallic materials (metals, alloys), polymeric materials (plastics), and inorganic non-metallic materials (ceramics, glass).
    2. Introduction to composite materials, multi-material materials, and multifunctional materials.
2. Study of mechanical properties for acceptance testing and quality testing purposes
    1. The different mechanical characterization tests: tensile, shear, bending, torsion, hardness, resilience tests, etc.
    2. The main non-destructive tests and micrographs of material implementation checks.
3. Study of mechanical behavior.
    1. Introduction to relationships (structure, microstructure, morphology) and (physical, mechanical, and chemical properties).
    2. Concepts of elasticity, plasticity, viscosity, damage, aging.
4. Phase diagrams and transformations in metals
    1. Application to heat treatment of metals (TTT and TRC).
5. Corrosion
    1. Concepts of corrosion: basic mechanisms leading to the destruction of materials

Targeted skills

Be able to:

- identify and distinguish between the main classes of materials (metals, polymers, ceramics, composites, and multifunctional materials) according to their nature, structure, and uses;
- choose a material based on its mechanical properties and the requirements of industrial specifications;
- describe the principles and implement the main mechanical tests (tensile, bending, shear, torsion, hardness, resilience) for acceptance or quality control purposes;
- understand and apply non-destructive testing and micrography techniques to assess material compliance;
- analyze the mechanical behavior of a material based on fundamental concepts such as elasticity, plasticity, viscosity, damage, and aging;
- relate the properties of a material to its structure, microstructure, and morphology;
- interpret phase diagrams and understand the main transformations in metals.

Bibliography

- William D. Callister, Jr, Materials Science and Engineering: An Introduction
- Michael-F Ashby, Michel Colombié, Sarah Décarroux, Choix des matériaux en conception mécanique
- Michael Shackelford, James F. Sullivan, Introduction to Materials Science for Engineers (6th International Edition) Prentice Hall (2005)

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

- Le Bourget-du-Lac (73)

Continuum Mechanics (MECA511_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French, English
- **Teaching methods:** In person
- **Open to exchange students:** Yes

Presentation

Description

The course "Continuum Mechanics" aims to

(i) acquire basic knowledge of continuum mechanics (CM),

(ii) analyze stress states (stresses, strains, plasticity criteria) in simple structures, and

(iii) solve simple problems in continuum mechanics.

It covers:

- the statics of non-deformable solids: 2D application,
- stress states and deformation states,
- the law of elastic and isotropic behavior,
- general equations of continuous media and methods of resolution,
- plasticity and dimensioning criteria

Objectives

Be able to:

- model and solve simple two-dimensional static problems by applying the fundamental principles of solid equilibrium;
- represent and interpret the state of stress and the state of strain in a solid using the associated tensors;
- relate stresses to strains using the linear elastic behavior law (generalized Hooke's law);
- use the general equations of continuum mechanics in linear elasticity to model the mechanical behavior of materials;
- identify critical situations by applying appropriate failure criteria (Von Mises criteria, Tresca criteria, etc.);
- verify the mechanical strength of a component by incorporating safety conditions into the design.

Teaching hours

Lectures	Lecture	15
Tutorial	Tutorials	22.5

Mandatory prerequisites

Vector calculus (scalar product, vector product), differentiation, integration, matrix operations (product, eigenvalues-eigenvectors)

Course outline

1. 2D statics: Tools for solving simple 2D statics problems
2. Mechanics of continuous media
   1. Stress state (stress tensor)
   2. Deformation state (deformation tensor)
   3. Linear elastic behavior law (stress/strain relationships)
   4. General equations of continuous media in linear elasticity
   5. Failure criteria and safety conditions

Bibliography

- Mechanics of continuous media, Lectures, exercises, and problems, Patrick Rois, PUL, 2005.
- Analysis of structures and continuous media - volume 2, François Frey. Presses Polytechniques et Universitaires Romandes, 2nd edition, 2000.
- Strength of Materials, Volume 1, J. Roux, RDM Schaum

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Locations

- Le Bourget-du-Lac (73)

CAD and Prototyping (CMEC510_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person **Type of instruction:** Practical work **Open to exchange students:** Yes

Presentation

Description

Tutorials and practical work will focus on describing and learning how to use computer-aided design (CAD) tools used in design offices, as well as on producing prototypes of composite parts using several technologies.

Objectives

Creation of a digital volumetric model in CAD, with the following properties:

- representing the properties of the object
- be usable (assembly, calculations, simulation, etc.) Production of tools and parts made of composite materials

Teaching hours

Tutorials	Tutorials	4.5
Lab	Practical work	36

Mandatory prerequisites

No prerequisites

Course outline

- **Tutorials: Introduction to technical drawing**
- **TP1: Introduction to Solidworks**
  - Sketch entities and sketch relationships
  - Boss and stock removal functions (extrusions, revolutions, sweeps, smooths)
  - Drawing sheets and views
- **Practical work 2: (Reverse) Design of parts**
  - Reference geometry (planes, axes)
  - Linear and circular repetitions
- **Practical work 3: Creating an assembly and designing within an assembly**
  - Insertion of standard components
  - Standard constraints (coincidence, parallel, perpendicular, etc.)
- **Lab 4: Advanced CAD tools**
  - Use of equations
  - Creating configurations
  - Part families
- **TP5: Reverse engineering using a 3D scanner (Handyscan)**
- **TP6, TP7, and TP8: Production of tools and parts made of composite materials**

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Hugues Favreliere
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Locations

- Le Bourget-du-Lac (73)

Thermodynamics and Thermal Engineering (PHYS510_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

The course describes the fundamental principles governing the evolution of systems undergoing transformations involving energy exchanges in the form of work and heat. The three modes of heat transfer (convection, conduction, and radiation) will be explored in depth.

The course describes the fundamental principles that govern the evolution of systems undergoing transformations involving energy exchanges in the form of work and heat. The three modes of heat transfer (convection, conduction, and radiation) will be explored in more detail.

Objectives

- Explain the practical importance of thermodynamic cycles (turbines, internal combustion engines, refrigerators, heat pumps, etc.).
- Identify and interpret the phenomena associated with the main thermodynamic transformations
- Perform an energy balance on a thermal system and model a simple heat exchange problem

Teaching hours

Lectures	Lecture	13.5
Tutorial	Tutorials	15
Lab	Practical work	12

Mandatory prerequisites

Vector analysis, partial derivatives, differential equations

Course outline

BASIC CONCEPTS OF THERMODYNAMICS

1. General
    1. Thermodynamic systems, exchanges, and transformations
    2. Equilibrium, state variables (extensive and intensive) and state function
2. Thermodynamic quantities and relationships
3. Fundamental principles
    1. Zero principle and the concept of thermal equilibrium
    2. First principle and conservative nature of energy,
    3. Second law, concept of irreversibility and concept of entropy,
    4. Third law and properties of matter near absolute zero.
4. Evolution of systems.
    1. Thermodynamic diagrams.
    2. Energy balance, efficiency, and coefficient of performance.

THERMAL CONCEPTS

1. Thermal conduction
    1. Fourier's law, thermal conductivity of materials
    2. Heat equation in a stationary, isotropic solid
    3. Thermal resistance and conductance
2. Convection
    1. Newton's law,
    2. Principle of convection
    3. Characteristic numbers
3. Thermal radiation
    1. Radiation quantities, Planck's law, Wien's law, Stefan-Boltzmann law, Kirchoff's law
    2. Exchanges between black bodies and exchanges between gray bodies

Bibliography

- Thermal Engineering Manual, Theory and Practice, 2nd edition, Bernard Eygluent, Hermes Ed., 1997
- Thermodynamics and Energy, Lucien BOREL, Presses Polytechniques Romandes,
- Thermodynamics, L. Couture, Ch. Chaine, R. Zitoun, Dunod Université Ed., 1989
- Introduction to Heat Transfer, J.F. Sacadura, Technique et Documentation Ed., 1980
- Heat and Thermodynamics, M.W. Zemansky, R.H. Dittman, McGraw Hill-Science 7th Ed., 1996
- http://www.sciences.univ-nantes.fr/physique/perso/blanquet/conducti/cddex.htm

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

Electricity (EASI501_PCHY)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

Fundamentals of electricity, study of transient, continuous, and sinusoidal regimes

Objectives

- Calculate and measure electrical quantities such as currents and voltages in a linear circuit, in continuous, transient, single-phase or three-phase sinusoidal modes.

- Calculate and measure the power and energy consumed in a linear circuit in continuous, transient, single-phase sinusoidal, or three-phase sinusoidal conditions.

- Explain how a direct current motor works.

- Describe the general architecture of the electricity production, distribution, and consumption network in France.

- Determine whether a simple electrical installation (domestic or small business) presents an electrical hazard.

Teaching hours

Lectures	Lecture	13.5
Tutorial	Tutorials	15
Lab	Practical work	12

Mandatory prerequisites

Scientific and technological knowledge from the first cycle of university studies

Course outline

Part 1: Continuous and transient circuits

A/ General laws of electrokinetics: Kirchhoff's laws, operating laws applied to basic dipoles
B/ Study of steady state – General theorems: Thévenin's theorem, Norton's theorem, superposition theorem, Millman's theorem C/ Study of transient states
D/ Electromechanical conversion – DC motor

Part 2: Single-phase and three-phase circuits - Electrical energy and protection

E/ Sinusoidal quantities and complex notation
F/ Linear circuits in single-phase sinusoidal mode: active, reactive, and apparent power G/ Production, transmission, and consumption of electrical energy
H/ Three-phase sinusoidal regime
I/ Grounding diagram – electrical protection

Bibliography

- Electrical Engineering Handbook, lectures and corrected exercises by Christophe Palermo, published by Dunod
- General Electricity: Circuit Analysis and Synthesis, lectures and corrected exercises by Tahar Neffati, published by Dunod
- Electricity Manual, Course Essentials and Corrected Exercises by Christophe Palermo & Jérémie Torres, published by Dunod

Skills acquired

Macro-skills	Micro-skills

Practical information

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Locations

- Le Bourget-du-Lac (73)

UE601 Bridge to the professional world

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lectures	Tutorial	Practical	Credits
Professional experience	MODULE				
Financial management	MODULE	10.5 hours	9		
Introduction to law	MODULE	15	4.5		
Issues in artificial intelligence	MODULE	6			
Business-oriented project management techniques	MODULE		9		

	Nature	Lecture	Tutorial	Practical	Credits
English (TOEIC level not achieved) S6	MODULE		40.5		
Modern languages (TOEIC level achieved)	MODULE				
English S6 Modern language 2	CHOICE		15		
Italian TD	SUBJECT TD		8 p.m.		
German TD	Tutorial		8 p.m.		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD Advanced English S6	Tutorial SUBJECT		8 p.m. 9 p.m.		

	Nature	Lecture	Tutorial	Practical	Credits
Optional internship S6	MODULE				
Support (every Thursday afternoon when FISA staff are present)	MODULE				

Practical information

Locations

- Annecy-le-Vieux (74)
- Le Bourget-du-Lac (73)

Professional experience (PROJ601_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

The "worker" professional experience allows students to discover the practical aspects of blue-collar work and to understand the hierarchies, methods, and techniques used in companies. This experience should preferably take place in an industrial or construction company related to the student's area of expertise and likely to hire engineers. Teleworking is not permitted.

Objectives

- Gain experience in a professional environment as an operator (worker, unskilled person, etc.);
- Integrate into and participate in a professional organization;
- Observe how the company operates;
- Identify the roles of employees (engineers, technicians, workers, etc.);
- Analyze working conditions, risks, and work organization;
- Reflect on sustainable development and social/environmental responsibility;
- Draw conclusions from the internship for your own training, career plans, and management methods.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator

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Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Financial Management (SHES601_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Business and Administration

Overview

Description

This course aims to familiarize students with the fundamental principles of financial management and corporate finance. It is structured in such a way as to facilitate understanding of the interactions between key concepts, practical tools, and key players, with a view to rapid and effective application in a professional context.

Objectives

- Understand the key concepts of entrepreneurship and business start-ups/takeovers.
- Acquire the skills necessary to develop a business strategy.
- Explore financing and growth strategies for businesses.
- Develop an understanding of the challenges and opportunities faced by entrepreneurs.

Teaching hours

Lectures	Lectures	10.5
Tutorial	Tutorials	9

Mandatory prerequisites

None

Course outline

The main topics covered are:

- The fundamentals of financial accounting
- Interpretation of financial statements (income statement, statement of changes in equity, balance sheet, cash flow statement, etc.)
- Sources of short- and long-term financing, both on and off balance sheet, as well as stakeholders, financial structures, etc.
- Key players in the financing process (banks, venture capital/private equity, etc.)
- Aspects related to valuation and exit scenarios
- The correlation between strategy and financial control, as well as the role of the business plan
- Cost and revenue analysis techniques
- Designing a performance management system (indicators, dashboard, financial and non-financial criteria, etc.)

Targeted skills

- Understanding key points in a company's financial statements, knowing how to look at a balance sheet from a financing perspective, analyzing a company's situation
- Knowing how to build an economic performance management system.
- Understanding of the different sources of financing and their impact on capital structure.
- Ability to identify and manage financial risks in a technological context.

Bibliography

Brealey, Richard A., and Stewart C. Myers. *Principles of Corporate Finance.* New York, McGraw-Hill Education, 2017.

Ross, Stephen A., Randolph W. Westerfield, and Bradford D. Jordan. *Corporate Finance.* New York, McGraw-Hill Education, 2018. Brigham, Eugene F., and Michael C. Ehrhardt. *Financial Management: Theory & Practice.* Mason, Cengage Learning, 2017.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Campus

Le Bourget-du-Lac / Savoie Technolac campus

Introduction to Law (SHES602_PCHY)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes **ERASMUS reference:** Law

Presentation

Description

This introductory course in law aims to familiarize students with fundamental legal concepts. It explores the basic principles of law, with an emphasis on legal aspects related to the practice of engineering, such as contracts, civil liability, intellectual property, and industrial regulations.

Objectives

- Understand the general principles of law
- Acquire the knowledge necessary to interpret and draft contracts related to engineering projects.
- Explore the concepts of civil liability and intellectual property protection in the context of technology projects.
- Develop legal and ethical awareness in engineering practice.

Teaching hours

Lectures	Lecture	15
Tutorial	Tutorials	4.5

Mandatory prerequisites

None

Course outline

1. Judicial Institutions, Fundamental Principles, and Key Players in the Justice System
2. Criminal Procedure and Criminal Law
3. Contracts, Contractual Liability, and Intellectual Property Rights
4. Labor Law

Targeted skills

- Ability to understand and apply fundamental legal principles
- Ability to analyze the legal implications of decisions and actions in a professional context.
- Skills in interpreting engineering contracts.
- Knowledge of civil liability and intellectual property concepts related to engineering.

Bibliography

J.-B. Blaise and R. Desgorces, Business Law, 8th ed., LGDJ, 2015.

F. Dekeuwer-Défossez and E. Blary-Clément, Commercial Law, 11th ed., Montchrestien, 2015.

P. and Ph. Didier, Commercial Law, vol. I, Economica, coll. "Corpus droit privé," 2005.

D. Houtcieff, Commercial Law, 4th ed., Sirey, 2016.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Campus

Le Bourget-du-Lac / Savoie Technolac campus

Issues in Artificial Intelligence (DATA601_PCHY)

Polytech Annecy-Chambéry
Component

Presentation

Description

In the era of large language models, it is no longer enough to know how to use a chatbot: it is crucial to understand the underlying mechanisms in order to discern in which areas AI brings real value and where it reaches its limits. As future engineers and citizens, engineering students will be called upon to observe the profound impact of these technologies on society—transforming professions, redefining social interactions, and disrupting decision-making processes. At the same time, the massive emergence of AI-dedicated computing centers raises major environmental issues: the energy consumption and carbon footprint of model training continue to grow and call for responsible technical and organizational choices. Finally, behind every AI application lie ethical challenges: copyright protection, privacy, and prevention of malicious use are all issues that require critical and informed consideration.

Objectives

By the end of the module, students will be able to:

- Describe the basic functioning of a neural network (perceptron, backpropagation) and explain the role of attention in a transformer.
- Explain what a language model is and give concrete examples of applications.
- Identify at least three types of bias in LLMs and propose a simple method for detecting them.
- Estimate the energy impact of an LLM model and list two best practices for reducing it (choice of infrastructure, work splitting).
- Write and test a clear prompt to generate useful text (summary, code, explanations).
- Recognize copyright and privacy issues related to the use of an LLM.

Teaching hours

Lectures	Lecture	6
AUTO	Independent study	4
PROJ	Project	10

Mandatory prerequisites

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course leader Ammar Mian

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Ammar.Mian@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Business-oriented project management techniques (PROJ602_PCHY)

Polytech Annecy-Chambéry
component

Presentation

Description

Project management requires methods and techniques that all engineers must know. However, depending on the profession, the stages and tools used to manage a project may differ. This course is differentiated according to the program.
With the help of the Corporate Relations Department and the Business Club, stakeholders from the socio-economic world come to present their daily experiences and how they evolve in project mode to control objectives, deadlines, costs, and associated resources.

Objectives

Acquire a project management methodology

Understanding the necessary relationships between all project stakeholders Mastering the stages and tools of project management

Teaching hours

Tutorials	Tutorials	9

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Director of Training, Polytech

Locations

- Le Bourget-du-Lac (73)

English (TOEIC level not achieved) S6 (LANG601_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Description

This course prepares students for the TOEIC ("Test of English for International Communication") exam, specifically to achieve a minimum score of 785 points (out of 990).

With the aim of developing all four skills, this course also serves as an introduction to public speaking through presentations given by students in groups or individually on topics illustrated by press articles or video materials (VTD: Video, Talk and Debate, as well as written work). Depending on the location (Annecy or Chambéry), some will be seen at different times during the semester, the year, or even the three years of training.

Students are assessed throughout each semester. The final assessment consists of a 1-hour, 1.5-hour, or 2-hour exam, depending on the semester, and accounts for 33% of the total continuous assessment.

Objectives

Specific objectives: at the end of this course, students will be able to:

revise grammar on: the correct reflexes of common structures; the verb group and tenses (except the conditional tense); the noun group and all its constituent elements; logical links (connecting words)

improve their grammatical and lexical knowledge (general English and TOEIC-specific vocabulary) in class and independently, validating their progress through regular assessment tests.

Teaching hours

Tutorials	Tutorials	40.5

Mandatory prerequisites

CEFR level B1

Course outline

1. Oral
   1. Elements of phonology
   2. Grammar (tenses, questions, adjectives...)
   3. Reinforcement of structures and vocabulary
   4. Interactive oral communication
   5. Introduction to and practice for the TOEIC (listening section)
2. Writing
   1. Review of grammatical elements (tenses, questioning, adjectives. ....)
   2. Translation (theme/version)
   3. Reading comprehension in authentic language
   4. Curriculum vitae (in S5, S6, or S7 at the latest)
   5. Cover letter/letter of motivation (in S5, S6, or S7 at the latest)
   6. Introduction and training for the TOEIC (reading section)

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Christophe Lambert

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Campus

Le Bourget-du-Lac / Savoie Technolac campus

Modern Languages (TOEIC Level Achieved) (LANG602_PCHY)

Polytech Annecy-Chambéry
component

In brief

Teaching methods: In person **Teaching format:** Tutorials **Open to exchange students:** Yes

Presentation

Description

This course aims to enable students to communicate authentically with linguistic and cultural autonomy.

Objectives

Communicate orally in professional situations, master business English in a professional context and in the technical fields studied during the program.

Mandatory prerequisites

Have achieved level B2 in an official TOEIC or Linguaskill certification (see study regulations for details).

Course outline

A variety of communication activities, focusing on professional English and the engineering fields covered during the training program. Emphasis is placed on oral communication activities.

Skills acquired

Macro-skills	Micro-skills

List of courses

	Nature	CM	Tutorial	Practical	Credits
English S6	SUBJECT		15		
Modern Language 2	CHOICE				
Italian TD	Tutorial		8 p.m.		
German TD	TD		8 p.m.		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD	Tutorial		8 p.m.		
Advanced English S6	SUBJECT		9 p.m.		

Practical information

Location

> Le Bourget-du-Lac (73)

English S6 (LANG602_PCHYM1)

Polytech Annecy-Chambéry

Presentation

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Locations

> Le Bourget-du-Lac (73)

Modern Language 2

Polytech Annecy-Chambéry

List of courses

	Subject	Lectures	Tutorial	Practical	Credits
Italian TD	Tutorial		20		
German TD	Tutorial		8 p.m.		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	TD		8 p.m.		
Intercomprehension of Romance Languages TD	Tutorial		8 p.m.		
Advanced English S6	SUBJECT		9 p.m.		

Practical information

Location

- Le Bourget-du-Lac (73)

Italian TD

Chambéry University Institute of Technology

In brief

- **Languages of instruction:** Italian
- **Open to exchange students:** Yes

Overview

Teaching hours

Italian TD - TD	Tutorials	20

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

German TD

Polytech Annecy-Chambéry

Overview

Teaching hours

Tutorial	Tutorials	20

Skills acquired

Macro-skills	Micro-skills

Spanish TD

Polytech Annecy-Chambéry
component

Presentation

Teaching hours

Tutorial	Tutorials	20

Skills acquired

Macro-skills	Micro-skills

Japanese TD

Polytech Annecy-Chambéry
component

Presentation

Teaching hours

Tutorial	Tutorials	20 hours

Skills acquired

Macro-skill	Micro-skills

Intercomprehension of Romance Languages TD

ACCENTS
component

Presentation

Teaching hours

Intercomprehension of Romance languages TD - TD	Tutorials	20

Skills acquired

Macro-skill	Micro-skills

Advanced English S6 (ENGL602_PCHY)

Polytech Annecy-Chambéry
component

Presentation

Teaching hours

Tutorial	Tutorials	21

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Christophe Lambert
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Locations

- Le Bourget-du-Lac (73)

Optional internship S6 (PROJ600_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

The optional internship aims to enrich students' academic and professional experience by offering them a practical opportunity to apply their knowledge and acquire new skills. An optional internship can be carried out **in France or abroad**. It must comply with the same general conditions as compulsory internships.

Objectives

- **Acquisition of** specific skills related to the specialization;
- **Refining career goals and/or** gaining confidence and independence through the completion of a project or specific tasks;
- Establish valuable professional contacts that can help in future job searches.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator

Polytech-Bourget Business Relations

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Campus

Le Bourget-du-Lac / Savoie Technolac campus

Support (every Thursday afternoon when FISA staff are present) (ACCO601_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Teaching methods:** In person **Teaching format:** Tutored project **Open to exchange students:** Yes

Presentation

Description

This support is open to all students at the school: students, apprentices, and Continuing Education employees. It is not mandatory, as it is primarily intended for students who need it to succeed in their training. This semester, it is scheduled into the timetable for each course, with a total of 32 hours.

Support may take the form of refresher courses, upgrading courses, or support in the main areas of the training programs.

Peer tutoring is encouraged and the educational resources of the Polytech Network are used (https://eplanet.polytech-reseau.org/).

Objectives

Promoting success for all students in their educational journey

Teaching hours

PTUT	Tutored project	32

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Director of Training, Polytech

Locations

- Le Bourget-du-Lac (73)

UE602 Engineering Sciences and Techniques

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Mathematics	MODULE	20.5 hours	19.5 hours		
Electronics	MODULE	12 hours	9	12	
Digital tools for engineers	MODULE	7.5 hours	7.5	8 p.m.	

Practical information

Location

- Annecy-le-Vieux (74)
- Le Bourget-du-Lac (73)

Mathematics (MATH620_MIMC)

Polytech Annecy-Chambéry

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

The following concepts are taught.

- Fundamentals of linear algebra, matrix reduction
- Euclidean and Hermitian spaces
- Sequences and series of functions, different types of convergence
- Fourier transforms

12 lectures, 13 tutorials, one 1-hour test, and one 1.5-hour test

Objectives

Know how to manipulate vector spaces and vector subspaces and use the tools specific to them. Mastery Know how to use the different possible reductions of matrices. Application

Understand the Euclidean and Hermitian algebraic structures of vector spaces and their applications. Application Know how to use sequences and series of functions. Application

Know how to use integral transformations. Application

Teaching hours

Lectures	Lecture	20.5
Tutorial	Tutorials	19.5

Mandatory prerequisites

- MATH 501 and RAN
- Matrix resolution of systems of n equations with p unknowns.
- Function of a real variable:
  - Definition (knowing how to define a function),
  - Representation of functions defined from a function *f* as *g(x) = f(-x), h(x) = f(x-a), p(x) = f(a-x) = f(-(x-a)) = g(x-a)*,
  - Even and odd functions.
  - Change of variables for integrals and change of indices for discrete sums.

Course outline

1. Basics of linear algebra
   1. Vector spaces, vector subspaces, basis, and coordinates of vectors in a basis
   2. Euclidean and Hermitian spaces
      1. Euclidean and Hermitian scalar products
      2. Orthonormal bases, Gram-Schmidt method, orthogonal projections
   3. Linear applications and matrix of a linear application
   4. Eigenvalues, eigenvectors, eigenspaces.
   5. Triangularization, diagonalization over R and over C
   6. Applications to computation
      1. of integer powers of a matrix
      2. of the exponential of a matrix
      3. the solutions of systems of linear differential equations
   7. Orthogonal diagonalization on R and unitary diagonalization on C
2. Sequences and series of signals
   1. Different types of convergence
   2. Preservation of properties
   3. Cases of entire series and Fourier series
3. Integral calculus
   1. Generalized integrals depending on a parameter, convolution product.
   2. Fourier transforms

Targeted skills

The student will be able to:

- recognize a vector space, a vector subspace, determine families of free vectors, generators, bases, the dimension and coordinates of a vector in a given basis (formula for changing bases for vectors).
- identify a linear application, determine its matrix in given bases, use a change of basis for a matrix of a linear application.

- recognize diagonalizable or triangularizable matrices, find eigenvalues, construct a basis for each of the eigenspaces
- calculate the powers and exponential of a matrix, solve systems of first-order linear differential equations
- use different scalar products (for elements of R^n, $C^{(n)}$ or functions)

- manipulate scalar products and norms, determine an orthonormal basis and use it for orthogonal projection calculations.
- recognize or determine transposed and adjoint matrices, symmetric and Hermitian matrices, orthogonal and unitary matrices
- to diagonalize orthogonally over R and unitarily over C

- recognize the different types of convergence of sequences and series of functions
- solve differential equations using entire series
- decompose a signal into Fourier series

- calculate convolution products
- use Fourier transforms

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

- Le Bourget-du-Lac (73)

Electronics (EASI611_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes

Presentation

Description

This course aims to provide the knowledge needed to choose the "building blocks" of electronics, either in the form of components or integrated functions, after functional analysis of an electronic diagram or macro-model.

Objectives

This course aims to enable students to read and choose the appropriate circuit for their application/project.

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	9
Lab	Practical Work	12 p.m.

Course outline

1. **Amplification**

1. Transfer function of an amplifier; "basic" amplifiers (transistor and op-amp)
2. Differential amplifiers, instrumentation amplifiers. Problems related to common modes.
3. Power amplifiers; motor drivers; problems related to heat dissipation.

2. **Filtering**
    1. Time domain and frequency domain.
    2. Role of filtering. Filter template.
    3. Low-pass, high-pass, band-pass, and band-stop filters.
    4. Special role of the low-pass filter: anti-aliasing.
3. **Digital electronics**
    1. Components.
    2. Different functions.
4. **DA and AD converters**
    1. Principles of ladder network digital-to-analog converters; performance and limitations.
    2. Principles of analog/digital converters: - voltage comparison; - load balancing; - successive approximation; - Sigma/Delta; dynamic performance.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

Digital Tools for Engineers (DATA610_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Teaching methods:** In person
- **Type of teaching:** Personal and professional project
- **Open to exchange students:** Yes

Presentation

Description

This course aims to enable engineering students to independently select and use digital tools to solve real-world engineering problems. It focuses on developing practical skills in scientific programming, data analysis, and numerical modeling. The Python language, which is free and widely used in research and industry, is the main tool used in the course. Through case studies and projects, students learn how to structure effective code, use specialized libraries, and integrate digital methods into an engineering approach.

Objectives

The objective of this course is to train engineers to use advanced numerical tools to analyze, model, and solve concrete engineering problems, particularly in the field of **mechatronics**, where the integration of mechanics, electronics, and computer science is essential.

Upon completion of the course, students will be able to:

- **Use the Python language and its scientific libraries** to develop robust, reproducible software solutions adapted to mechatronics issues.
- **Process, visualize, and exploit data** from **sensors**, images, or simulations in contexts such as system control, embedded vision, or condition monitoring.
- **Model the dynamic behavior of mechatronic systems** using ordinary differential equations (ODEs), simulate their behavior, and interpret the results for analysis or control.
- **Apply optimization techniques** in use cases related to structural design, parameter adjustment, or performance improvement of complex systems.
- **Explore and implement machine learning methods** for processing mechatronic data, for example for image recognition, anomaly detection, or online parameter estimation.
- **Work in groups on an integrative project**, drawing on programming, modeling, and digital processing skills in the context of a mechatronic engineering problem (embedded systems, measurement chains, robotics, etc.).

This course aims to develop students' **systemic and digital approach** to mechatronic systems, preparing them for industrial environments where simulation, data analysis, and automation play a central role.

Teaching hours

Lectures	Lecture	7.5
Tutorial	Tutorials	7.5
Lab	Practical work	20

Mandatory prerequisites

None

Course outline

The course is structured around six thematic modules designed to gradually develop engineering students' skills in scientific programming, digital processing, and applied modeling:

Block 1 – Image processing:

This module introduces the fundamental concepts of raster images and the main image processing techniques. Students implement operations such as filtering, contour detection, and morphological analysis using the *SciPy*, *Scikit-Image,* and *OpenCV* libraries.

Block 2 – Data processing:

Students learn about tools for manipulating, structuring, and analyzing data using the *Pandas* library. This block enables them to efficiently process data sets from sensors, experiments, or external files for statistical analysis or visualization.

Block 3 – Ordinary differential equations (ODE):

This module covers the modeling of dynamic phenomena using ordinary differential equations. Students learn how to formulate ODE models, solve them numerically (e.g., using Runge-Kutta methods), and interpret the results in a physical or technical context.

Block 4 – Optimization:

This block explores optimization techniques, which are essential in engineering for model fitting, parameter calibration, and system design. Students learn how to pose an optimization problem and use numerical tools to solve it efficiently.

Block 5 – Machine learning:

Gradual introduction to machine learning methods, starting with classic supervised algorithms (such as *k-nearest neighbors*) and moving on to the basics of neural networks. The *Scikit-Learn* and *PyTorch* libraries are used to experiment with real data.

Block 6 – Group project:

Students form groups to design and carry out a project that integrates the skills developed throughout the course. The project is based on solving an engineering problem requiring the analysis and processing of numerical data. It is assessed based on the quality of the work, the rigor of the approach, and the final presentation.

Targeted skills

By the end of the course, students will have acquired the following skills:

Technical and scientific skills:

- **Mastery of the scientific Python environment** and its libraries (NumPy, SciPy, Pandas, Matplotlib, etc.) for the development of numerical analysis tools.
- **Design and implement data processing chains** from sensors, images, or numerical simulations.
- **Numerically solve ordinary differential equations (ODEs)** to model the dynamic behavior of physical or mechatronic systems.
- **Implement numerical optimization techniques**, particularly for model calibration, curve fitting, or computer-aided design.
- **Use supervised machine learning tools** (Scikit-Learn, PyTorch) in mechatronics-related contexts: classification, regression, pattern or anomaly detection.
- **Use specialized image processing libraries** (OpenCV, Scikit-Image) for applications such as industrial vision or defect detection.

Skills applied to mechatronics:

- **Integrate digital tools into a multidisciplinary approach**, combining mechanics, electronics, and computer science for the analysis or control of mechatronic systems.
- **Analyze and interpret experimental or simulated data** from embedded systems or test benches.
- **Develop scripts or digital prototypes** to support the design, validation, or diagnosis of mechatronic systems.

Cross-functional skills:

- **Structure clear**, reusable, and documented **algorithmic reasoning** within the framework of engineering projects.
- **Work as part of a team on a digital project**, from defining requirements to technical delivery.
- **Communicate results rigorously**, using relevant graphical representations and scientific presentation tools (Jupyter Notebooks, reports, etc.).

Bibliography

All course materials are available on our website: http://https://symmehub.github.io/positron/intro.html

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Ludovic Charleux

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Locations

- Le Bourget-du-Lac (73)

UE603 Specialized Sciences

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	CM	Tutorial	Practical	Credits
Structural design	MODULE	3:00 p.m.	3 p.m.	8	
Mechanism statics	MODULE	5, 2.5 hours	9 hours	8	
Fluid statics and dynamics	MODULE	6, 75 min	9	4	
Mechanism dynamics	MODULE	13.5 hours	16.5 hours	4	

Practical information

Location

- Annecy-le-Vieux (74)
- Le Bourget-du-Lac (73)

Structural Design (MECA620_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

This course is an introduction to numerical methods for the calculation of structures. The content will focus on slender structures such as trusses and beams. These structures will be analyzed analytically to introduce the RDM and then numerically to obtain finite elements.

This course is an introduction to numerical methods for the calculation of structures. The content will focus on slender structures such as trusses and beams. These structures will be analyzed analytically to introduce the RDM and then numerically to obtain finite elements.

Objectives

Be able to:

- calculate the displacements, deformations, and stresses of a slender beam-type structure subjected to a simple load
- explain the variational formulation of an elasticity problem applied to a lattice structure
- explain the variational formulation of an elasticity problem applied to a portal structure

Teaching hours

Lectures	Lecture	3 p.m.
Tutorial	Tutorials	3 p.m.
Lab	Practical Work	8

Mandatory prerequisites

- MECA511 Mechanics of Continuous Media

Course outline

1. Modeling
2. Fundamentals of FEM
3. Energy approaches
4. Trusses
5. Porticos
6. Finite elements

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator

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Locations

Le Bourget-du-Lac (73)

Mechanism Statics (MECA610_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

Training module on modeling mechanisms and forces, and calculating forces using the fundamental principle of statics (FPF)

Objectives

Be able to calculate forces and equilibrium positions in assemblies by applying the principle of statics.

Teaching hours

Lectures	Lecture	5.25
Tutorial	Tutorials	9
Lab	Practical work	8

Mandatory prerequisites

Be able to perform vector and trigonometric calculations

Course outline

Lecture 1: Modeling assemblies (mechanisms and structures) Lecture 2: Modeling mechanical forces

CM3: Calculating forces and positions

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

UNIVERSITÉ SAVOIE MONT BLANC

Fluid Statics and Dynamics (MECA611_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French, English **Teaching methods:** In person
- **Open to exchange students:** Yes

Presentation

Description

This course covers the mechanics of incompressible fluids. It is divided into three parts:

- Fluid statics

- Fluid dynamics (Bernoulli's theorem)

- Concept of real fluids and calculation of pressure loss

Objectives

Be able to:

- calculate the distribution of pressures and pressure forces exerted by a fluid at rest on walls or submerged surfaces;
- apply Bernoulli's theorem to analyze ideal fluid flows and solve common problems in fluid dynamics;
- distinguish between idealized (perfect fluid) and real (viscous fluid) behavior in the study of flows;

- calculate steady pressure losses (related to friction in pipes) and singular pressure losses (related to elbows, valves, changes in section, etc.) in a hydraulic or aerodynamic network.

Teaching hours

Lectures	Lecture	6.75
Tutorial	Tutorials	9
Lab	Practical work	4

Mandatory prerequisites

Concepts of continuum mechanics

Course outline

1. Fluid statics: calculation of pressure and pressure force
2. Dynamics of ideal fluids: Bernoulli's theorem and applications
3. Concepts of real fluid dynamics: calculation of steady and unsteady pressure losses

Bibliography

- F. FREY, Analysis of Continuous Structures and Media: Applied Statics, vol. 1, EPFL, Presses Polytechniques et Universitaires Romandes, 1990
- R. COMOLET, Experimental Fluid Mechanics, Volume I, Masson, 1985.
- W. H. GRAF, M. S. ALTINAKAR, Hydrodynamics, Presses Polytechniques et Universitaires Romandes, 1998.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Emile Roux

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Locations

- Le Bourget-du-Lac (73)

Mechanism Dynamics (MECA621_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

Comprising lectures, tutorials, and practicals, this module presents the main theories of classical mechanics, i.e., the modeling of movements, the fundamental principle of dynamics, and the theorems that derive from it, with the aim of establishing the mathematical relationships between movements and forces in mechanisms.

It also introduces the use of software for simulating the dynamics of a mechanism.

Objectives

Be able to:

- model the motion of a solid or a set of solids using kinematic tools and inertial quantities;
- Establish work, power, and energy balances for a mechanical system.
- apply the fundamental principle of dynamics and associated theorems to determine equations of motion;
- solve differential equations of motion;
- use simulation software to analyze and validate the dynamic behavior of a mechanism.

Teaching hours

Lectures	Lecture	13.5
Tutorial	Tutorials	16.5
Lab	Practical work	4

Mandatory prerequisites

Solid Statics

Course outline

1. Introduction
2. Kinematics of points and solids
    1. Position, trajectory, velocity vector, and acceleration vector of a point
    2. Position and motion of a solid: Kinematic torque
    3. Composition of motion
3. Mass and inertia parameters:
    1. Center of inertia = center of gravity
    2. Inertia matrix
4. Power, work, and mechanical energy
    1. Definition of the concepts of work and power of a force
    2. Potential energy of a force
    3. Kinetic energy theorem
    4. Theorems on the conservation of mechanical energy
5. Fundamental principle of dynamics
    1. Statement of the FDP
    2. Kinetic quantities: kinetic torque and dynamic torque of a solid
6. Solving the equations of motion
    1. Equations with constant coefficients
    2. Linearization around the stable equilibrium position.

Bibliography

- Mechanics of industrial systems, 2. Forces and structures; R. Boncompain, M. Boulaton, D. Caron, E. Jeay, B. Lacage, J. Réa; Dunod 1995
- Solid Mechanics, Industrial Applications, 2nd edition, lectures and corrected exercises; P. Agati, Y. Bremont, G. Delville; Dunod 2003

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Emile Roux

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Locations

- Le Bourget-du-Lac (73)

UNIVERSITÉ SAVOIE MONT BLANC

UE604 Mechanical Design - Mechatronics

ECTS
6 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Plastics, composites & ceramics	MODULE	12	4.5	4	
Metalworking	MODULE	2.5 hours	6	12	
Mechanical design and technologies	MODULE	10.5 hours	12	4 p.m.	

Practical information

Locations

> Annecy-le-Vieux (74)

> Le Bourget-du-Lac (73)

Plastics, Composites & Ceramics (MATE610_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

This module will present the main characteristics of ceramics, plastics, and composite materials, as well as their main manufacturing processes. Particular emphasis will be placed on material selection during the product design phase.

Objectives

This course aims to enable students to:

- Apply a rigorous method for selecting materials
- Understand the main physical properties of different classes of materials
- Understand the production techniques best suited to the material in question and most commonly used in industry.

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	4.5
Lab	Practical Work	4

Course outline

1. Introduction to material classes and their properties – Method for selecting materials and processes 2. Ceramics: history and general information, traditional ceramics and techniques, manufacturing techniques, sintering 3. Plastics: materials, main processes, process selection criteria, challenges facing the plastics industry

4. Composites: definitions, main applications by market, materials, main processes, challenges facing the composites industry

Bibliography

Trotignon, J. P., Piperaud, M., Verdu, J., & Dobraczynski, A. (2006). *Précis de matières plastiques, Structure–Propriétés, Mise en œuvre et Normalisation.* Afnor, Nathan.

Dietrich, R., Trotignon, J. P., Pompidou, M., Nugonnaud, E., & Facy, G. (2006). *Précis de construction mécanique – Tome 2: Méthodes, fabrication et normalisation*. Afnor, Nathan.

Dietrich, R., Garsaud, D., Gentillon, S., & Nicolas, M. (1984). *Summary of Machining Methods: Methodology, Production, and Standardization*. Afnor, Nathan.

Gay, D. (2005). Composite Materials, *Lavoisier, Paris.*

Ashby, MF. (2016). *Materials selection in mechanical design*. Butterworth-Heinemann.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Yann Meyer

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Locations

- Le Bourget-du-Lac (73)

Metalworking (FABR610_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

Presentation and mastery through practice of the main processes for working with metallic materials. Study of material removal processes (electrical discharge machining, grinding, machining, etc.).

Study of material deformation processes (stamping, forging, etc.).

Study of material fusion processes (casting, sintering, etc.).

Teaching hours

Lectures	Lecture	2.5
Tutorial	Tutorials	6
Lab	Practical work	12

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Marc Villetard

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Marc.Villetard@univ-savoie.fr

Locations

- Le Bourget-du-Lac (73)

Mechanical Design and Technologies (CMEC610_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Overview

Description

Introductory module to mechanical design, presenting functional analysis, industrial drawing and schematization rules, as well as certain standard components and the basics of dimensioning. The use of modeling and calculation software tools for mechanical designers will also be covered.

Objectives

Learn how to model a mechanical system.

Learn how to design a mechanical product.

Teaching hours

Lectures	Lecture	10.5
Tutorial	Tutorials	12
Lab	Practical work	4 p.m.

Mandatory prerequisites

General Mechanics Strength of Materials

Course outline

1. General information (1.5 hours lecture, 1.5 hours tutorial)
    1. Production engineering professions and related services in a company.
    2. Link between products, processes, and materials
    3. Mechanical CAD software and its functionalities
2. Mechanical technology (4.5 hours of lectures, 4.5 hours of tutorials)
    1. Technical drawing
    2. Technical functions
    3. Standard components
3. Mechanical design (4.5 hours of lectures, 6 hours of tutorials)
    1. Modeling and schematization
    2. Introduction to functional analysis
    3. Introduction to functional dimensioning

Bibliography

- A. Chevalier, Guide du dessinateur industriel (Guide for Industrial Designers), Ed. Hachette.
- J.L. Fanchon, Guide to Industrial Science and Technology, Ed. Nathan.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course Director Pascal Hernandez

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Location

Le Bourget-du-Lac (73)

UE701 Bridge to the professional world

ECTS
6 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lectures	Tutorial	Practical	Credits
Resources and professional dynamics	MODULE		13.5 hours	3.5	
Creativity and innovation management	MODULE		25.5		

	Nature	Lectures	Tutorial	Practical	Credits
English (TOEIC level not achieved) S7	MODULE		40.5		
Modern languages (TOEIC level achieved)	MODULE				
English S7 Modern language 2	SUBJECT CHOICE		3 p.m.		
German TD	SUBJECT		3 p.m.		
Spanish TD Italian	SUBJECT		3 p.m.		
TD Chinese TD	SUBJECT		3 p.m.		
Japanese TD	SUBJECT		3 p.m.		
Russian TD	SUBJECT		3 p.m.		
Advanced English S7	SUBJECT		3 p.m.		
	SUBJECT		9 p.m.		

	Nature	CM	Tutorial	Practical	Credits
Optional internship S7	MODULE				
Support (half of the Thursday afternoons when FISA staff are present)	MODULE				

Practical information

Locations

Annecy-le-Vieux (74)

Resources and professional dynamics (SHES703_PACY)

Polytech Annecy-Chambéry
Component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Information and Communication Technologies (ICT)

Overview

Description

Professional integration module designed and implemented in collaboration with the Business Club and the Professional Integration Assistance Office of the University of Savoie Mont Blanc, involving a network of qualified professionals.

Objectives

The aim of the module is to help students gain a better understanding of themselves in order to define a career plan in line with their motivation and skills, develop a targeted internship and/or job search strategy, present themselves effectively in an interview, and promote their career path.

Teaching hours

Tutorials	Tutorials	13.5
TP	Practical work	0.5
TP	Practical work	3

Mandatory prerequisites

No mandatory prerequisites

Course outline

- Introduction: preparing for my future today
- Identify my professional environment, map out the possibilities
- Defining my career plan
- Boost my internship search efforts
- Create and optimize my LinkedIn profile
- Adapt my application tools, respond to a job posting
- Prepare for the interview
- Promoting my work experience - Assessment
- Mock interview with professionals - Assessment

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Carole Mislin

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Creativity and Innovation Management (SHES704_PACY)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Teaching format: Tutorials **Open to exchange students:** Yes
ERASMUS reference: Business and administration

Presentation

Description

How can creativity and innovation be leveraged to enhance an organization? How can radical innovation be initiated based on the latest technological advances? This requires a thorough understanding of the innovation process as well as the ability to manage an innovative project in a complex and uncertain environment. It also involves adopting an entrepreneurial or intrapreneurial approach to mobilize and motivate interdisciplinary teams to achieve innovation. This training module offers the opportunity to acquire the methodologies and attitudes necessary to achieve these objectives.

Objectives

- Structure, organize, and manage a highly exploratory process with a consistent approach
- Find resources or make do with available resources
- Adapt in real time to changes in context and constraints
- Manage the challenges of each phase of the project
- Act as a leader in an uncertain environment
- Mobilize stakeholders

- Master new technologies

Teaching hours

Tutorials	Tutorials	25.5

Mandatory prerequisites

None

Course outline

Part 1: Innovation management: theoretical foundations

Part 2: Creativity - Design thinking approach (different creativity tools depending on the stages of the process). Part 3: Role-playing

Targeted skills

- Recognize and seize internal and external development opportunities
- Develop and formalize opportunities to transform them into innovative projects
- Know how to lead a design thinking-type creative process
- Develop management and leadership skills for innovative projects: challenge preconceived ideas, mobilize stakeholders, lead with flexibility, and seize opportunities with agility

Bibliography

Tidd, Joe, and John Bessant. *Managing Innovation: Integrating Technological, Commercial, and Organizational Change.* Paris, Pearson, 2018.

Kim, W. Chan, and Renée Mauborgne. *Blue Ocean Strategy: How to Create New Strategic Spaces.* Paris, Pearson, 2006.

Christensen, Clayton M. *The Innovator's Dilemma: Why High-Tech Companies Miss Market Changes.* Paris, Village Mondial, 2003.

Lockwood, Thomas, and Thomas Walton. *Design Thinking: Integrating Innovation, User Experience, and Brand Value.*
Paris, Dunod, 2013.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Elodie Gardet

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Locations

- Annecy-le-Vieux (74)

English (TOEIC level not achieved) S7 (LANG701_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French, English
- **Teaching methods:** In person
- **Teaching format:** Tutorials
- **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Description

This course prepares students for the TOEIC (Test of English for International Communication) exam, specifically to obtain a minimum score of 785 points (out of 990).

With the aim of developing all four skills, this course also serves as an introduction to public speaking through presentations given by students in groups or individually on topics illustrated by press articles or video materials (VTD: Video, Talk and Debate, as well as written work). Depending on the location (Annecy or Chambéry), some will be seen at different times during the semester, the year, or even the three years of training.

Students are assessed throughout each semester. The final assessment consists of a 1-hour, 1.5-hour, or 2-hour exam.

Objectives

Specific objectives: at the end of this course, students will be able to:

work on telephone conversations (comprehension/production)

listen regularly to news on English-language news sites (CNN, BBC, Sky News, etc.) and be able to succinctly summarize the main points orally, interacting with the class

work on a variety of audio and video materials and speak spontaneously in an interactive manner with the class

to speak in a prepared manner and interact spontaneously through individual presentations (self-presentations and/or article reviews, such as "quizzes") and presentations in pairs (various topics)

practice TOEIC exercises (4 parts of listening comprehension) + entire tests

Teaching hours

Tutorials	Tutorials	40.5

Mandatory prerequisites

S5 and S6 program.

Course outline

Course outline

1. **Review of important grammar points for the TOEIC:**
   1. Review of tenses.
   2. The conditional and "should" structures (suggestion/subjunctive).
   3. Modal auxiliaries and periphrases with similar meanings.
   4. Linking words (review).
2. **Listening comprehension:**
   1. Recorded dialogues in American, British, and New Zealand English.
   2. Videos in American, British, and Australian English.
3. **Reading comprehension:**
   1. Press excerpts
   2. Various texts

Bibliography

- Documents distributed by speakers
- Various websites, a list of which is provided at the beginning of S5

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Muriel.Yvenat@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Modern Languages (TOEIC Level Achieved) (LANG702_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
English S7	SUBJECT		15		
Modern Language 2	CHOICE				
German TD Spanish	SUBJECT		3:00		
TD Italian TD					
Chinese TD	SUBJECT		p.m.		
Japanese TD					
Russian TD	SUBJECT		3:00		
Advanced English S7	SUBJECT		p.m.		
	SUBJECT		3:00		
	SUBJECT		p.m.		
	SUBJECT		3:00		
			p.m.		
			3:00		
			p.m.		
			9:00		
			p.m.		

Practical information

Contact

Course coordinator Muriel Yvenat
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Muriel.Yvenat@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

English S7 (LANG702_PACYM1)

Polytech Annecy-Chambéry

In brief

Languages of instruction: French, English **Teaching methods:** In person **Teaching format:** Tutorials **Open to exchange students:** Yes **ERASMUS reference:** Languages

Presentation

Description

This course focuses on acquiring professional English skills. Students will work on developing their fluency in the five skills (group project). Students will develop their skills through the study of specific topics and/or develop their intercultural knowledge.

Objectives

The objective is to improve students' autonomy in the English-speaking workplace in an international context.

Teaching hours

Tutorial	Tutorials	15

Mandatory prerequisites

TOEIC score of 785 or higher and completion of semester 601 or 602

Course outline

Various presentations by professionals, mainly English-speaking teachers or external speakers

Targeted skills

Communicate independently, both orally and in writing, in all situations in a professional setting.

Bibliography

A variety of authentic materials provided by the speakers and/or students themselves.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Modern language 2

Polytech Annecy-Chambéry
Component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
German TD Spanish	SUBJECT		3 p.m.		
TD Italian TD	SUBJECT		3 p.m.		
Chinese TD	SUBJECT		3 p.m.		
Japanese TD	SUBJECT		3 p.m.		
Russian TD	SUBJECT		3 p.m.		
Advanced English S7	SUBJECT		3 p.m.		
	SUBJECT		9:00 p.m.		

Practical information

Locations

- Annecy-le-Vieux (74)

German TD (ALLE101D1_IUTA)

Annecy University Institute of Technology

In brief

Languages of instruction: French **Open to exchange students:** Yes
ERASMUS reference: Languages

Presentation

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Spanish TD (ESPA101D1_IUTA)

Annecy IUT

In brief

- **Languages of instruction:** French **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Overview

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Italian TD (ITAL101D1_IUTA)

Annecy IUT

In brief

- **Languages of instruction:** French **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Chinese TD (CHIN101D1_IUTA)

Annecy IUT component

In brief

Languages of instruction: French **Open to exchange students:** Yes
ERASMUS reference: Languages

Presentation

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Japanese TD (JAPO101D1_IUTA)

Annecy IUT

In brief

- **Languages of instruction:** French **Open to exchange students:** Yes
ERASMUS reference: Languages

Presentation

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Russian TD (RUSS101D1_IUTA)

Annecy University Institute of Technology

In brief

Languages of instruction: French **Open to exchange students:** Yes
ERASMUS reference: Languages

Presentation

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Advanced English S7 (ENGL702_PACY)

Polytech Annecy-Chambéry

In brief

Languages of instruction: English, French **Teaching methods:** In person
Teaching format: Tutorials **Open to exchange students:** Yes

Presentation

Description

This course is a training program in professional English. Students will work on their fluency in the five language skills by enriching their technical and professional vocabulary, participating in role-playing exercises, learning about different cultures, and completing written exercises (different topics from 602).

Activities will be carried out individually, in pairs, and/or in groups. Students will be assessed throughout the semester.

Objectives

The objective is to improve students' autonomy in the English-speaking workplace in an international context.

Teaching hours

Tutorials	Tutorials	21

Mandatory prerequisites

Minimum TOEIC score of 785 – Semester 601 and/or 602 completed

Course outline

Various presentations by professionals, mainly English-speaking teachers or external speakers.

Targeted skills

Communicate independently, both orally and in writing, in all situations in a professional setting.

Bibliography

A variety of authentic materials provided by the speakers and/or students themselves.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Optional internship S7 (PROJ700_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

The optional internship aims to enrich students' academic and professional experience by offering them a practical opportunity to apply their knowledge and acquire new skills. An optional internship can be carried out **in France or abroad**. It must comply with the same general conditions as compulsory internships.

Objectives

- **Acquisition of** specific skills related to the specialization;
- **Refining career goals and/or** gaining confidence and independence through the completion of a project or specific tasks;
- Establish valuable professional contacts that can help in future job searches.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course Director, Polytech Business Relations
Relations-Entreprises.Polytech@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Support (half of the Thursday afternoons when FISA is present) (ACCO701_PACY)

Polytech Annecy-Chambéry
component

In brief

Teaching methods: In person **Teaching format:** Tutored project **Open to exchange students:** Yes

Presentation

Description

This support is open to all students at the school: students, apprentices, and Continuing Education employees. It is not mandatory, as it is primarily intended for students who need it to succeed in their training. This semester, it is scheduled into the timetable for each course, with a total of 16 hours.

Support may take the form of refresher courses, upgrading courses, or support in the main areas of the training programs.

Peer tutoring is encouraged and the educational resources of the Polytech Network are used (https://eplanet.polytech-reseau.org/).

Objectives

Promoting success for all students in their educational journey

Teaching hours

PTUT	Tutored project	16

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Director of Training, Polytech

Locations

- Annecy-le-Vieux (74)
- Le Bourget-du-Lac (73)

UE702 Engineering Sciences and Technology

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Sensors	MODULE	13.5 hours	9h	16	
Electric motorization	MODULE	3	12 p.m.	24	
Functional materials	MODULE	12 hours	12	4 p.m.	

Practical information

Location

Annecy-le-Vieux (74)

Sensors (EASI722_MI)

Annecy-Chambéry

Polytech component

In brief

- **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Teaching hours

Lectures	Lecture	13.5 hours
Tutorial	Tutorials	9
Lab	Practical work	4 p.m.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Madjid Boutemeur

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Locations

- Annecy-le-Vieux (74)

Electric motorization (EASI721_MI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

Whether in terms of production tools or manufactured products, electric actuators are ubiquitous in the world of technical systems.

Focusing solely on rotating electrical machines, this course aims to provide the necessary foundations for understanding how they work and how they are controlled using electronic controllers. The essential elements for selecting and sizing a motor will also be covered.

Preference will be given to motor technologies commonly found in embedded, mechanical, and mechatronic systems.

Objectives

By the end of this course, students will be able to:

* present the different components involved in an electric motor
* explain the general operating principles of a rotating electric machine
* choose between DC motor, brushless DC motor, or stepper motor technology for a given application

* to size the machine according to the needs of the application

* implement the selected equipment

Teaching hours

Lectures	Lecture	3
Tutorial	Tutorials	12
Lab	Practical work	24

Mandatory prerequisites

Scientific and technological knowledge from the first cycle of university studies. In particular, the general laws governing the study of electrical circuits and those governing the mechanics of rotating solids.

Course outline

1. Introductions, general information
   1. Benefits and structure of electric motors
   2. Brief review of electromagnetism
   3. General operating principle of a rotating machine
   4. Classifications
   5. Machine losses
2. Principles and characteristics of certain technologies
   1. Direct current machine
   2. Brushless DC motor
   3. Stepper motor
3. Dimensioning approach
   1. Conventional loads
   2. Transmission
   3. Steady state
   4. Dynamic operating conditions
   5. Thermal criteria in cyclic operation

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Michel Cuny

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Location

Annecy-le-Vieux (74)

Campus

Annecy / Annecy-le-Vieux campus

Functional Materials (MATE711_MI)

Polytech Annecy-Chambéry
component

In brief

Teaching methods: In person

Open to exchange students: Yes

Presentation

Description

This course aims to introduce functional materials used in mechatronics-related professions

- materials with specific properties used in sensors, actuators, and mechatronic devices
- explanation of the physical phenomena involved in these materials, description of the behavior models used to account for their properties, applications.

Objectives

1) understand the behavior of different classes of materials in response to electrical, magnetic, and electromagnetic stresses in relation to:

1-1) the concepts of permanent and induced electric dipole moments, which are specific to dielectric materials and are at the origin of piezoelectric, ferroelectric, and pyroelectric phenomena
1-2) the concepts of magnetic dipole and magnetization phenomena for different classes of magnetic materials

2) identify the classes of active materials used in various measurement and transduction applications by knowing how to: 2-1) manipulate the quantities and tensors of dielectric, pyroelectric, piezoelectric, and

piezoresistive properties
2-2) manipulate the magnitudes and tensors of magnetic and magnetostrictive properties

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	12
Lab	Practical Work	4 p.m.

Mandatory prerequisites

* Fundamentals of general physics
* Electromagnetism and material resistance
* Mathematical tools: integrals, derivatives, coordinate systems, operators, vector analysis

Course outline

1) Dielectric properties: polarization, dielectric strength, and concepts of pyroelectricity and ferroelectricity

2) Piezoelectric materials

3) Piezoresistive materials

4) Magnetic properties of materials: magnetization, magnetic permeability, para-, dia-, and ferromagnetism5) Magnetostrictive materials

Practical work (4 from among:)

1) Atomic force microscopy
2) Ferromagnetic cycle and equivalent electrical circuit
3) Piezoelectric ceramics, experimental studies
4) Piezoelectric ceramics, multiphysics modeling with Comsol
5) Piezoresistive gauges applied to weight measurement
6) Magnetostriction

Targeted skills

Design mechatronic systems:

- by appropriately implementing multiphysics modeling and simulation tools
- by choosing the right technological components (mechanical, electronic, IT)
- by implementing sensors and actuators.

Bibliography

David Jiles, Introduction to Magnetism and Magnetic Materials, Ed. Chapman and Hall, 1994 Yuhuan Xu, Ferroelectric Materials and Their Applications, Ed. North-Holland, Elsevier, 1991

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

- Annecy-le-Vieux (74)
- Le Bourget-du-Lac (73)

UE703 Mechanical Design

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Design Office Tools	MODULE	3.75 hours	6	12	
Mechanical Design	MODULE	15	13.5	12 hours	
Modeling and finite elements	MODULE	12 hours	10.5	4 p.m.	
Mechanical eco-design	MODULE	9.5	10.5		

Practical information

Locations

> Annecy-le-Vieux (74)

Design Office Tools (CMEC710_MI)

Polytech Annecy-Chambéry
Component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

- Project management (planning, ordering, communication)
- Introduction to industrial design and creativity
- System design
    - Parts and connections dimensioning (analytical and EF)
    - Microcontroller programming (Arduino in particular)
    - Basic mechanical technology elements
- Digital modeling (CAD)
- Selection of standard components (mechanical, sensors, and actuators)

Objectives

- System design and development
- Teamwork

Teaching hours

Lectures	Lectures	3.75
Tutorial	Tutorials	6
Lab	Practical work	12

Mandatory prerequisites

- Knowledge:
  - CAD software
- Concepts:
  - electric actuators
  - microcontrollers

Skills acquired

Macro-skills	Micro-skills

Practical information

Contacts

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Locations

- Annecy-le-Vieux (74)

Mechanical Design (CMEC720_MI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

Modeling and analysis of the functioning of mechanical products. Use of models for the dimensioning of complete connections by adhesion or obstacles. Introduction to functional tolerancing.

Objectives

Learn to analyze the functioning of existing industrial machines and mechanisms based on plans, with a view to selecting, adapting, designing, or maintaining them.

Teaching hours

Lectures	Lecture	15
Tutorial	Tutorials	13.5
Lab	Practical Work	12

Mandatory prerequisites

- Applied Mechanics
- Mechanical systems dynamics
- Mechanical design and technology

Course outline

- Modeling and analysis of mechanical systems
  1. Mechanical system modeling tools
  2. Calculation of input and output characteristics
  3. Calculation of internal link characteristics
- Design of a complete link
  1. Examples of technical solutions
  2. Selection criteria
  3. Calculation models for contact between solids
  4. Design and dimensioning of a connection with obstacles
  5. Design and dimensioning of a connection by adhesion
- Calculation of drive shafts and threaded elements
  1. Standard elements
  2. Shape accidents and stress concentrations
  3. Introduction to fatigue calculation

Additional information

Bibliography

- Michel Aublin, "Mechanical Systems," Dunod
- Pierre Agati, "Connections and Mechanisms," Dunod

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Pascal Hernandez

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Pascal.Hernandez@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Modeling and finite elements (MECA720_MI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This course will begin with a general description of the calculation problems faced by engineers, in mechanics or thermal engineering for example, as well as the essential theoretical concepts associated with them. We will then discuss modeling and the simplification operations that are commonly performed on models. The use of industrial finite element calculation software will be discussed, along with the practical concepts involved in building the model and defining the physical properties and boundary conditions. We will conclude by discussing the accuracy of calculations and the use of the results obtained.

Objectives

Know how to establish a calculation model for an engineering problem Know how to use finite element calculation

software

Know how to validate and use the results of a calculation

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	10.5
Lab	Practical Work	16

Mandatory prerequisites

- Applied Mechanics
- CAD and prototyping
- Computational Mechanics

Course outline

1. General overview of engineering problems
   1. Theoretical review
   2. Defining calculation objectives
2. Modeling
   1. Creating a model and choosing elements
   2. Simplification and consideration of symmetries
3. Use of industrial software
   1. Transferring a CAD model to a calculation model
   2. Physical properties, meshing, and boundary conditions
   3. Calculation, post-processing, and modification of a model
4. Exploitation
   1. Convergence and accuracy
   2. Writing a calculation report

Additional information

Bibliography

- Dhatt G.S. and Touzot G., "Une présentation de la méthode des éléments finis" (An introduction to the finite element method), Presses de l'Université de Laval

- Zienkiewicz O.C., Taylor R.L., Zhu J.Z., "The Finite Element Method: Its Basis and Fundamentals," Butterworth-Heinemann

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Pascal Hernandez

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Mechanical Eco-design (CMEC721_MI)

Polytech Annecy-Chambéry
component

Presentation

Description

This module will cover life cycle analysis, concrete eco-design solutions, and the regulatory aspects that govern the design of mechanical systems.

Objectives

This module aims to enable students to design mechanical systems with controlled environmental impacts through the use of methods and tools. Students will study different approaches to improving design: technological choices, changes in manufacturing processes, changes in materials, etc.

Teaching hours

Lectures	Lecture	9.5
Tutorial	Tutorials	10.5

Mandatory prerequisites

Basic knowledge of mechanical design: materials and manufacturing processes Basic knowledge of environmental issues

Course outline

- Fundamentals of eco-design
- Sessions on using life cycle analysis software

- Eco-design proposals for a real-world system

- Eco-design in business: rules and benefits

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator David Gibus

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Locations

- Annecy-le-Vieux (74)

UE704 Production and Quality

ECTS
6 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Operational reliability	MODULE	9.75 hours	10		
Advanced operational safety	MODULE	5 hours	1.5	12	
Introduction to Industrial Management	MODULE	13.5 hours	13.5	12	

Practical information

Location

> Annecy-le-Vieux (74)

Operational Safety (GIND711_MI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

The reliability of the products they manufacture and the operational safety of their equipment are two key factors in the success of manufacturing companies. It is therefore important that mechanical engineers master these two concepts and be able to implement them in the company or at service providers.

Objectives

- Choose a maintenance strategy
- Model reliability
- Assess equipment availability

Teaching hours

Lectures	Lecture	9.75
Tutorial	Tutorials	10

Mandatory prerequisites

- Mathematical laws: Normal, Poisson, Exponential
- Production management (layout, flow, inventory)

Course outline

1. Introduction to operational reliability
2. Presentation of maintenance
3. Different forms of maintenance
4. Reliability models; detailed study of the Weibull model
5. Equipment availability

Bibliography

- Operational safety of industrial systems, A. Villemeur, Ed. Eyrolles
- Feedback applied to the operational reliability of equipment in service, J. Aupied, Ed. Eyrolles
- Practical application of FMEA: Ensuring the quality and operational reliability of your products, equipment, and processes, J. Faucher, Ed. Dunod
- Reliability, maintenance, and risk, D. Smith, D. Gouadec, Ed. Dunod
- Maintenance: Mathematics and Methods, P. Lyonnet, Tec Doc Lavoisier
- Maintenance: Methods and Organizations, F. Monchy, Ed. Dunod
- Engineering Techniques, Industrial Engineering Theme, Maintenance Basics

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Hugues Favreliere

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Locations

- Annecy-le-Vieux (74)

Advanced Operational Safety (GIND721_MI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In-person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

The reliability of the products they manufacture and the operational safety of their equipment are two key factors in the success of manufacturing companies. It is therefore important that mechanical engineers master these two concepts and be able to apply them in companies or service providers.

Objectives

- Process and use reliability tests
- Model maintenance costs

Teaching hours

Lectures	Lecture	5
Tutorial	Tutorials	1.5
Lab	Practical work	12

Mandatory prerequisites

Operational Safety (GIND711)

Course outline

1. Reliability testing (review of probability and statistics)
2. Maintenance cost optimization Proposed practical work:

1. Use of Adonis software for processing reliability testing
2. Economic study (maintenance strategy)
3. Statistical study

Bibliography

- Operational safety of industrial systems, A. Villemeur, Ed. Eyrolles
- Feedback applied to the operational safety of equipment in service, J. Aupied, Ed. Eyrolles
- Practical Application of FMEA: Ensuring the Quality and Operational Safety of Your Products, Equipment, and Processes, J. Faucher, Ed. Dunod
- Reliability, maintenance, and risk, D. Smith, D. Gouadec, Ed. Dunod
- Maintenance: Mathematics and Methods, P. Lyonnet, Tec Doc Lavoisier
- Maintenance: Methods and Organizations, F. Monchy, Ed. Dunod
- Engineering Techniques, Industrial Engineering Theme, Maintenance Basics

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

> Annecy-le-Vieux (74)

Introduction to Industrial Management (GIND710_MIMC)

Polytech Annecy-Chambéry

Time of year Every year

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Teaching format:** Lecture **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

The aim of this course is to introduce students to the fundamentals of production management and quality.

The main topics covered are related, for the Production Management part, to the evolution of industrial management, from inventory management to component requirements planning, namely: the different stages of MRP and MRP II methods. The automotive sector is used to illustrate the different concepts.

The second part of the course covers the Quality Management System introduced by the ISO 9000 standard.

Objectives

Introduction to the industrial environment Calculation of

economic inventory

Critical analysis of traditional inventory management

Calculating component requirements

Teaching hours

Lectures	Lecture	13.5
Tutorial	Tutorials	13.5
Lab	Practical work	12

Mandatory prerequisites

Basic knowledge of product/process concepts.

Work experience (summer jobs, internships)

Experience in clubs and associations

Course outline

- Production management concepts
- Inventory management
- The MRP method: CBN, PDP, PIC
- The MRP II method and resource constraints
- The role of quality in business, discovering the company
- Problem-solving tools
- FMEA

- TP1: PIC PDP case study
- TP2: Introduction to CAPM: Odyssée software
- Practical work 3: Mapping and process sheet

Targeted skills

- Understanding the challenges of managing product flows within the company
- Master inventory management
- Learn about MRP and its calculation principles
- Understand the challenges and key terms related to the concept of quality in business

Bibliography

- Production Management - Editions d'Organisation, Alain COURTOIS - Chantal BONNEFOUS- Maurice PILLET

- Mastering Industrial Flows - Editions d'Organisation Raymond and Stéphanie BITEAU
- The Goal - Editions AFNOR Eliayahu GOLDRATT, Jeff COX
- Production Without Inventory - Editions d'Organisation Shigeo SHINGO
- The Shingo System: Keys to Production Improvement - Editions d'Organisation Shigeo SHINGO

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Lamia Berrah

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Locations

Annecy-le-Vieux (74)

UNIVERSITÉ SAVOIE MONT BLANC

UE801 Bridge to the professional world

ECTS
6 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Integrated QSE (Quality, Safety, Environment) Management System	MODULE	9 hours	10.5		
Management techniques	MODULE	18	7.5		

	Nature	Lecture	Tutorial	Practical	Credits
English (TOEIC level not achieved) S8	MODULE		40.5		
Modern languages (TOEIC level achieved)	MODULE				
English S8 Modern language 2	SUBJECT CHOICE		3 p.m.		
German TD	SUBJECT		3 p.m.		
Spanish TD	SUBJECT		3:00 p.m.		
Italian TD	SUBJECT		3:00 p.m.		
Chinese TD	SUBJECT		3:00 p.m.		
Japanese TD	SUBJECT		3:00 p.m.		
Russian TD	SUBJECT		3:00 p.m.		
Advanced English S8	SUBJECT		9:00 p.m.		

	Nature	CM	Tutorial	Practical	Credits
Optional internship S8	MODULE				
Support (half of Thursday afternoons when FISA staff are present)	MODULE				

Practical information

Locations

> Annecy-le-Vieux (74)

Integrated QSE (Quality, Safety, Environment) Management System (SHES802_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

Students must be aware that quality, environmental, and occupational health and safety management systems are now essential in business. They must therefore have sufficient knowledge of these systems in order to take them into account and integrate them into their engineering work.

Objectives

- Understand the concepts and requirements of quality management (ISO 9001), safety (ISO 45001), and environmental (ISO 14001) standards.
- Learn how to implement an integrated QSE management system tailored to the specific structure and needs of an organization.
- Acquire the skills necessary to identify, assess, and manage risks related to quality, safety, and the environment.
- Explore auditing and monitoring techniques to ensure compliance and continuously improve the integrated management system.

Teaching hours

CM	Lecture	9
Tutorial	Tutorials	10.5

Mandatory prerequisites

None

Course outline

Topic 1: Quality Management

1. Introduction to quality management;
2. Standards: definition and history of quality, principles of certification;
3. Continuous Improvement: Kaizen, 5S, Lean, Six Sigma;
4. Process Approach;
5. Tutorial: Computer modeling of a process, BPM, web publishing. Theme 2: Environmental Management

1. The environment, sustainable development, carbon footprint;
2. What is an EMS?
3. Standards, challenges;
4. The ISO 14001 standard;
5. The EMAS standard;
6. Implementing an EMS;
7. Tutorial: Audit of a company's EMS, proposal for eco-cards. Theme 3: Health and Safety at Work:

1. General information and challenges;
2. Stakeholders;
3. Legislation and OHS management system standards;
4. OHS and CSR

Targeted skills

- Ability to interpret and apply quality, safety, and environmental management standards.
- Ability to design and implement an integrated QSE management system within an organization.
- Skills in risk management and QSE performance assessment.
- Mastery of audit and monitoring techniques to ensure compliance and continuous improvement.

Bibliography

Charvet, Denis. *Integration of management systems: Quality, Safety, Environment.* Paris, AFNOR, 2019. Pignal, François, and Pierre-Emmanuel Bardin. *The QSE manual: Quality, Safety, Environment.* Paris, Dunod, 2020. Bourgoin, Alain. *The ISO 9001 standard version 2015 in 50 questions.* Paris, AFNOR, 2018.

Baril, Pierre. *ISO 14001:2015 - Understanding and implementing an environmental management system.* Paris, AFNOR, 2017.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Elodie Gardet

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Locations

Annecy-le-Vieux (74)

Management Techniques (SHES803_PACY)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

This component of SHES is divided into two independent courses: Management and Ethics. The aim of this module is to understand the human and communicational dimensions of management and to develop students' managerial assertiveness.

Objectives

- Develop managerial assertiveness
- Manage a team responsible for implementing a project
- Understand the tasks and professional skills involved in implementing the project
- Know how to take a step back from complex situations and arbitrate conflicting needs related to project design
- Adopt an ethical and responsible management style

Teaching hours

Lectures	Lecture	18
Tutorial	Tutorials	7.5

Mandatory prerequisites

None

Course outline

Topic 1: Team management

- Understanding - The human dimension of management
- Communicate - The relational dimension of management

Theme 2: Ethics and psychosocial risks (PSRs)

- Mental load and information overload
- Work stress and burnout
- Harassment (moral and sexual)

To supplement this topic on psychosocial risks, students also have access to an e-learning training platform provided by INRS. This leads to the award of a certificate of completion if 66% of the students' answers are correct.

Targeted skills

- Be able to express expectations and needs. Know how to communicate ideas clearly.
- Adopt active listening and establish positive professional relationships
- Ability to analyze complex situations, evaluate available options, and make informed decisions based on organizational objectives.
- Know how to recruit, train, and develop team members, mobilize them around common goals, and foster a collaborative and productive work environment.
- Be able to identify, analyze, and solve problems encountered in the workplace using appropriate methods and tools.

Bibliography

Peretti, Jean-Marie, and Patrick Gilbert. *Management Styles: Choosing, Developing, and Implementing.* Paris, Dunod, 2014. Blanchard, Kenneth H., and Spencer Johnson. *The Management of Happiness.* Paris, Éditions d'Organisation, 2019.

Goleman, Daniel. *Leadership: The Power of Emotional Intelligence.* Paris, Harvard Business Review Press, 2017.

Lecomte, Jacques. *Benevolent Management: What We Gain by Recognizing the Value of Others.* Paris, Odile Jacob, 2017.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Elodie Gardet

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Locations

- Annecy-le-Vieux (74)

English (TOEIC level not achieved) S8 (LANG801_PACY)

Polytech Annecy-Chambéry

In brief

- **Languages of instruction:** French, English
- **Teaching methods:** In person
- **Teaching format:** Tutorials
- **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Description

This course prepares students for the TOEIC ("Test of English for International Communication") exam, specifically to obtain a minimum score of 785 points (out of 990).

The TOEIC test will take place at the end of this semester at each of the sites on very similar dates. (Make-up sessions will take place in week 9).

Students are assessed throughout each semester. The final assessment consists of a 1-hour, 1.5-hour, or 2-hour exam, depending on the semester.

Objectives

Specific objectives: at the end of this course, students will be able to:

continue practicing TOEIC exercises (4 parts of listening comprehension) + entire tests

work on a variety of audio and video materials (general English, business English, and specialized English) and speak spontaneously in an interactive manner with the class

speak in a prepared manner and interact spontaneously through scientific presentations and on topics or issues related to the business world (job interviews, negotiations, discussions on technical/professional projects, wage inequality, international mobility, etc.)

Specific objectives: at the end of this course, students will be able to:

continue grammatical revision on: the conditional tense; all other tenses; expressing suggestions and modality/the passive voice; verbal structures (infinitive/ing)

improve their grammatical and lexical knowledge (general English, business English, and English specific to their scientific field), both in class and independently, validating their progress through regular tests

Teaching hours

Tutorials	Tutorials	40.5

Mandatory prerequisites

LANG 701

Course outline

Course outline

1. **Review of important grammar points for the TOEIC**
    1. Review of all tenses covered or reviewed in S5, S6, and S7.
    2. The passive voice.
    3. Causative structures.
    4. BV / BVing or to BV.
    5. Linking words.
2. **Listening comprehension**
    1. Recorded dialogues in American, British, and New Zealand English.
    2. Videos in American, British, Australian English, etc.
3. **Reading comprehension**
    1. Press excerpts
    2. Various texts

Bibliography

Documents provided by Global Exam speakers

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

Annecy-le-Vieux (74)

Campus

Annecy / Annecy-le-Vieux campus

Modern Languages (TOEIC Level Achieved) (LANG802_PACY)

Polytech Annecy-Chambéry

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
English S8	SUBJECT		15		
Modern Language 2	CHOICE				
German TD	SUBJECT		3:00 p.m.		
Spanish TD	SUBJECT		3:00 p.m.		
Italian TD	SUBJECT		3:00 p.m.		
Chinese TD	SUBJECT		3:00 p.m.		
Japanese TD	SUBJECT		3:00 p.m.		
Russian TD	SUBJECT		3:00 p.m.		
Advanced English S8	SUBJECT		9:00 p.m.		

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

Annecy-le-Vieux (74)

English S8 (LANG802_PACYM1)

Polytech Annecy-
Chambéry

In brief

Languages of instruction: French, English **Teaching methods:** In person
Teaching format: Tutorials **Open to exchange students:** Yes **ERASMUS reference:** Languages

Presentation

Description

This course focuses on acquiring professional English skills. Students will work on developing their fluency in the five skills (group project). Students will develop their skills through the study of specific topics and/or develop their intercultural knowledge.

Students will be assessed throughout the semester.

Objectives

The objective is to improve students' autonomy in the English-speaking workplace in an international context.

Teaching hours

Tutorials	Tutorials	15

Mandatory prerequisites

TOEIC score of at least 785 and Lang701 or 702

Course outline

Various presentations by professionals, mainly English-speaking teachers or external speakers

Targeted skills

Communicate independently, both orally and in writing, in all situations in a professional setting.

Bibliography

A variety of authentic materials provided by the speakers and/or students themselves.

Skills acquired

Macro-skill	**Micro-skills**

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Modern language 2

Polytech Annecy-Chambéry

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
German TD Spanish	SUBJECT		3 p.m.		
TD Italian TD	SUBJECT		3 p.m.		
Chinese TD	SUBJECT		3 p.m.		
Japanese TD	SUBJECT		3 p.m.		
Russian TD	SUBJECT		3 p.m.		
Advanced English S8	SUBJECT		3 p.m.		
	SUBJECT		9:00 p.m.		

Practical information

Locations

> Annecy-le-Vieux (74)

Advanced English S8 (ENGL802_PACY)

Polytech Annecy-Chambéry

In brief

Languages of instruction: English, French **Teaching methods:** In person
Teaching format: Tutorials **Open to exchange students:** Yes

Presentation

Description

This course is a training course in professional English. Students will work on their fluency in the five language skills by enriching their technical and professional vocabulary, through role-playing, cultural contributions, and written exercises (different topics from 602 and 702).

Activities will be carried out individually, in pairs, and/or in groups. Students will be assessed throughout the semester.

Objectives

The objective is to improve students' autonomy in the English-speaking workplace in an international context.

Teaching hours

Tutorials	Tutorials	21

Mandatory prerequisites

Minimum TOEIC score of 785 – Semester 701 and/or 702 completed

Course outline

Various presentations by professionals, mainly English-speaking teachers or external speakers.

Targeted skills

Communicate independently, both orally and in writing, in all situations in a professional setting.

Bibliography

A variety of authentic materials provided by the speakers and/or students themselves.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Optional internship S8 (PROJ800_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

The optional internship aims to enrich students' academic and professional experience by offering them a practical opportunity to apply their knowledge and acquire new skills. An optional internship can be carried out **in France or abroad**. It must comply with the same general conditions as compulsory internships.

Objectives

- **Acquisition of** specific skills related to the specialization;
- **Refining career goals and/or** gaining confidence and independence through the completion of a project or specific tasks;
- Establish valuable professional contacts that can help in future job searches.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Locations

- Annecy-le-Vieux (74)

Support (half of Thursday afternoons when FISA staff are present (ACCO801_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Teaching methods:** In person **Teaching format:** Tutored project **Open to exchange students:** Yes

Presentation

Description

This support is open to all students at the school: students, apprentices, and Continuing Education employees. It is not mandatory, as it is primarily intended for students who need it to succeed in their training. This semester, it is scheduled into the timetable for each course, with a total of 16 hours.

Support may take the form of refresher courses, upgrading courses, or support in the main areas of the training programs.

Peer tutoring is encouraged and the educational resources of the Polytech Network are used (https://eplanet.polytech-reseau.org/).

Objectives

To promote the success of all students in their educational journey.

Teaching hours

PTUT	Tutored project	16

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Director of Training, Polytech

Locations

- Annecy-le-Vieux (74)
- Le Bourget-du-Lac (73)

UE802 Internship

ECTS
6 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lecture	Tutorial	Practical	Credits
Assistant Engineer Internship S8	MODULE				

Practical

Location

- Annecy-le-Vieux (74)

S8 Assistant Engineer Internship (PROJ801_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

This is a professional internship as a technician or assistant engineer. The internship is to be carried out in a company or research organization on a topic closely related to the student's area of expertise, on a full-time basis and with a **maximum of 50% teleworking**.

Objectives

This internship, carried out within a company or organization whose activity is representative of the specialty chosen at the school, should enable students to:

- Integrate and participate in a professional organization;
- Discover professional methods and practices;
- Apply the student's theoretical and practical knowledge;
- Carry out tasks similar to those of technicians or assistant engineers.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

- Annecy-le-Vieux (74)

UE803 Systems Control

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Quality in production	MODULE	15 hours	13.5 hours	12	
Continuous systems & vibrations	MODULE	14.25 hours	12 hours	12 p.m.	
Centralized automation	MODULE	6	13.5 hours	20	
Embedded systems	MODULE	7.5 hours		12 hours	

Practical information

Location

> Annecy-le-Vieux (74)

Quality in Production (GIND811_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

Training module on three tools for manufactured product quality:

- modeling the functioning of a product or process using the technique of experimental design;
- statistical process control (SPC);
- product specification and geometric verification (GPS & geometric metrology).

Objectives

Be able to:

- model and optimize a complex system using design of experiments;
- calculate quality performance indices for mass production and establish control charts for production processes;
- decode dimensional and geometric tolerance specifications in technical drawings and choose methods for verifying them on products.

Teaching hours

Lectures	Lecture	15
Tutorial	Tutorials	13.5
Lab	Practical Work	12

Mandatory prerequisites

Be able to visualize the three-dimensional geometry of an object based on its views in a drawing (reading plans)

Course outline

Part One: Design of Experiments (DOE) (10.5 hours lectures/tutorials + 4 hours practical work)

Part Two: Statistical Process Control (SPC) (6 hours of lectures/tutorials + 4 hours of practical work) Final part: Dimensional metrology (9 hours of lectures/tutorials + 4 hours of practical work)

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

Annecy-le-Vieux (74)

UNIVERSITÉ SAVOIE MONT BLANC

Continuous Systems & Vibrations (EASI810_MI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French, English **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This course covers the dynamic behavior of continuous-time linear systems, using the concept of transfer functions. First- and second-order systems are studied in detail to illustrate the main characteristic quantities: static gain, slew rate, damping, and stability. Graphical descriptions such as Bode plots are introduced in the case of sinusoidal excitations. The vibration of discrete or continuous mechanical systems serves as the field of application for the above approaches.

Objectives

This course aims to enable students to:

- Analyze the dynamic behavior of a continuous-time system. At the end of this course, students will be able to:
  - Describe dynamic behavior using a transfer function or a state representation in the single-input single-output case.
  - Study the properties of stability, damping, and speed
  - Understand the objectives and techniques of simple control law tuning
- Study the vibratory behavior of a simple mechanical system. At the end of this course, students will be able to:
  - Study the behavior of a single-degree-of-freedom system in free and forced modes
  - Analyze the effect of damping in the vicinity of resonance

- To pose a vibration analysis problem in the case of N degrees of freedom

Teaching hours

Lectures	Lecture	14.25
Tutorial	Tutorials	12 p.m.
TP	Practical Work	12

Mandatory prerequisites

Linear differential equations, Complex numbers,

Course outline

1. Definitions
2. Linear time-invariant dynamic systems
3. Signals – Laplace transform
4. Concept of transfer function
5. First-order systems
6. Second-order systems
7. Mechanical systems with two degrees of freedom

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Adrien Badel
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Locations

- Annecy-le-Vieux (74)

Centralized automation (EASI811_MI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

From production lines to energy management in homes, automated systems are numerous and varied. This course covers the basic elements necessary for modeling, analyzing, controlling, and implementing automated systems in a centralized solution context (as opposed to a distributed solution that would rely on task distribution but be coordinated by communication networks).

Objectives

Upon completion of this course, students will be able to:

- propose an automated system architecture, highlighting the instrumentation, control, and human/machine interface components.
- to model the functional, technological, and operational specifications of an automated system's control system, based on the description of its specifications
- organize the control solution for a centralized automation system, adopting modular operating modes and process hierarchization

Teaching hours

Lectures	Lecture	6
Tutorial	Tutorials	13.5
Lab	Practical work	20

Mandatory prerequisites

Basic knowledge of Boolean algebra

Course outline

1. System operating modes (GEMMA) and human-machine interface (HMI)
2. Combinatorial issues
    1. Establishing solutions
    2. Canonical representations
    3. Simplification methods
    4. Simplified notation
3. Grafcet: a tool for specifying and modeling sequential problems
    1. General principles: concepts, graphic elements, interpretation
    2. Evolution rules
    3. Basic structures: sequence, choice, parallelism, synchronization
    4. Horizontal and vertical structuring: derived structures, resources
    5. Interpretation algorithm
4. Automation project management: an example of design methodology
    1. Hierarchization and cooperation of models
    2. Variable naming rules
    3. Application to programming with Unity-Pro

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Stephane Marteau

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Location

Annecy-le-Vieux (74)

Embedded Systems (INFO821_CMMI)

Polytech Annecy-Chambéry
Component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This course aims to present the main characteristics of an embedded computer system based on a microcontroller, a system designed to be embedded in a mechatronic system. After presenting the main characteristics of a microcontroller system and the interface circuits it can integrate, the course will address the software aspects associated with exchange management (I/O, interrupts, polling, etc.). Practical application on a real system is then proposed under
A micro-project in mechatronics focused on microcomputing aspects. This work is intended to provide mastery of the communication mechanisms between a microcontroller and peripherals. The equipment used is Arduino or Raspberry, both of which offer an environment that facilitates the implementation of such embedded applications.

Objectives

The objective of this course is to present the main characteristics of an embedded computer system based on a microcontroller, a system designed to be embedded in a mechatronic system.

Teaching hours

Lectures	Lecture	7.5
Lab	Practical work	12

Mandatory prerequisites

Fundamentals of computer architecture and algorithms

Course outline

1. General structure of a microcontroller (µC).

2. Essential peripherals and associated interface circuits

- A-D converters,

- timers,

- UART,

- ...

3. Peripheral control via I/O registers (command, status, data).

4. Implementation of I/O by polling and interrupts.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Yajing Yan

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Locations

Annecy-le-Vieux (74)

UE804 Technical Data Design and Management

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Industrial product lifecycle management Design office project	MODULE	9	9	8 p.m.	
Machine components	MODULE			40	
	MODULE			hours	
		19.5	6 p.m.		

Practical information

Locations

Annecy-le-Vieux (74)

Industrial Product Life Cycle Management (GIND810_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French, English **Teaching methods:** In person
Type of instruction: Practical work **Open to exchange students:** Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

The Product Lifecycle Management course aims to explain what Product Lifecycle Management (PLM) is and why it is necessary. It provides participants with the skills to establish technical specifications and to use, configure, and implement information system tools dedicated to lifecycle management. Four main topics are covered in this course:
the environment in which products are developed, manufactured, and supported,
PLM components, such as the product repository, processes, and organization from the user's and administrator's perspectives
the positioning of the product technical information system within the company's information system ## the implementation of PLM, showing the stages of a project and typical activities such as change management

Objectives

Identify and define a design process
Define the company's organizational model associated with product design

Define a product repository

Teaching hours

Lectures	Lecture	9
Tutorial	Tutorials	9
Lab	Practical Work	20

Mandatory prerequisites

Operating systems # Databases
Design / Computer-aided design # Specifications
Production Methods

Course outline

1. Life cycle management within companies
2. The product repository
3. Process management and role management
4. Interfacing with the company's information system
5. Deployment within the company

Targeted skills

TC-1.1 - mastering the basics of operational management

TC-1.2 - being able to choose and/or implement tools and methods for project implementation TC-1.3 - being able to identify and mobilize resources in a specific scientific and technical field TC-1.4 - integrating the economic, financial, and/or legal aspects of the project

TC-1.5 - being able to evolve in a multi-stakeholder collaborative environment

TC-2.1 - by mastering the keys to effective communication

TC-2.2 - by making professional choices and implementing an appropriate strategy to achieve objectives and developing an assertive attitude

TC-2.3 - by evaluating and developing their skills in a learning environment

TC-3.1 - integrating into the company and progressing towards a career in engineering

TC-3.2 - by taking into account industrial, economic, and professional issues TC-3.3 - by working in a multicultural and/or international context

TC-4.1 - by situating their activity in relation to the state of the art in knowledge and/or practices

MECA-1.1 - by monitoring multiple technologies and the competitive environment MECA-1.3 - by mastering functional and value analysis tools

Bibliography

PLM Collaborative Product Lifecycle Management, Denis Debaecker Hermes

Product Lifecycle Management: 21st Century Paradigm for Product Realization (Decision Engineering), John Starck Urbanizing the Company and Its Information System, Henri Chelli, Entreprendre informatique

And Suddenly the Inventor Appeared: The Ideas of TRIZ, 2nd ed., 2006, Genrich Altshuller

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Laurent Tabourot

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Locations

Annecy-le-Vieux (74)

Design Office Project (CMEC830_GICMMI)

Polytech Annecy-Chambéry
Component

In brief

Languages of instruction: French **Teaching methods:** In person **Type of instruction:** Practical work **Open to exchange students:** Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

- Project management (planning, ordering, communication)
- System design
  - Parts and connections sizing (analytical and EF)
  - Microcontroller programming (Arduino in particular)
- Digital model creation (CAD)
- Selection of standard components (mechanical, sensors, and actuators)
- Use of prototyping manufacturing resources
  - 3D printing
  - Water jet cutting
  - 5-axis CNC
  - Milling machine for electronic cards
  - Conventional manufacturing methods

Objectives

- Design, development, and production of functional prototypes

- Teamwork

Teaching hours

Practical work	Practical work	40

Mandatory prerequisites

- Knowledge:
  - basic mechanical technology
  - CAD software
- Concepts:
  - electrical actuators
  - microcontrollers

Course outline

Students' progress will be measured by assignments that allow them to make steady progress on their projects:

- Project reviews
- Presentation and demonstration

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Fabien Formosa

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Locations

- Annecy-le-Vieux (74)

Machine Elements (CMEC820_MI)

Polytech Annecy-Chambéry
Component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

We will study certain machine components that are frequently used in industrial products and machines. We will begin with rotary guides using bushings or plain bearings. We will then move on to bearing assemblies. We will extend the concepts to linear guides. We will also look at gears, pulley and belt drives, and chain drives. Finally, we will study motion transformations using cams, then planetary gear mechanisms, discussing the function of the housing, lubrication, and sealing.

Objectives

Know how to select and dimension frequently used machine components.

Teaching hours

Lectures	Lecture	19.5
Tutorial	Tutorials	18

Mandatory prerequisites

General Mechanics RDM

Concepts of mechanical technology

Course outline

1. Rotational and translational guides (7.5 hours of lectures; 7.5 hours of tutorials)
    1. Plain bearings and bushings
    2. Bearings and thrust bearings
    3. Ball bushings
2. Power transmission (7.5 hours of lectures; 7.5 hours of tutorials)
    1. Gears
    2. Pulleys and belts, sprockets and chains
    3. Ball screws and roller screws
    4. Other technologies
3. Epicyclic gear trains and cam mechanisms (4.5 hours of lectures; 3 hours of tutorials)
    1. Epicyclic trains
    2. Cam mechanisms
    3. Casing function, lubrication, and sealing

Additional information

Bibliography

- Pierre Agati, Liaisons et Mécanismes, Dunod
- Michel Aublin, Mechanical Systems, Dunod
- Industrial catalogs of bearings and gears.
- Technical documentation on industrial mechanical products

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Pascal Hernandez

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE901 Bridge to the professional world

ECTS
10 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	CM	Tutorial	Practical work	Credits
Research and Development Project	MODULE				

	Type	CM	Tutorial	Practical	Credits
English (TOEIC level not achieved) S9	MODULE		40.5		
Modern languages (TOEIC level achieved)	MODULE				
English S9 Modern language 2	SUBJECT CHOICE		3 p.m.		
German TD	SUBJECT		3 p.m.		
Spanish TD Italian	SUBJECT		3 p.m.		
TD Chinese TD	SUBJECT		3 p.m.		
Japanese TD	SUBJECT		3 p.m.		
Russian TD	SUBJECT		3 p.m.		
Advanced English S9	SUBJECT		3 p.m.		
	SUBJECT		9 p.m.		

	Nature	CM	Tutorial	Practical	Credits
Optional internship S9	MODULE				

Practical information

Locations

Annecy-le-Vieux (74)

UNIVERSITÉ SAVOIE MONT BLANC

Research and Development Project (PROJ901_PACY)

Polytech Annecy-Chambéry
Component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

The Research and Development Project (PRD) is an educational activity involving a partnership between the PAC School and a professional organization or research laboratory.
This activity allows students to acquire (or strengthen) their experience in research and development.

Objectives

The PRD aims to strengthen engineering students' R&D skills by enabling them to

- carry out and manage a research and development project in an industrial or research context,
- apply and expand the skills acquired during their training in specialized fields
- solve problems while taking into account constraints such as cost, deadlines, quality, etc.
- interact within a team,
- organize themselves to achieve set objectives by planning the various stages,
- effectively monitor progress.

Teaching hours

PTUT	Tutored project	15
PROJ	Project	125 hours

Mandatory prerequisites

First year of the engineering program (FI3) for all specializations

Course outline

The first sessions are supervised by teaching and scientific tutors.

Students carry out bibliographic research, analysis, and synthesis work, partly independently.

Supervisors agree on regular meetings to review progress and provide the best possible support for students in completing their projects.

Bibliography

Depends on the R&D topic

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Nirina Chhay

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Nirina.Chhay@univ-savoie.fr

Locations

> Annecy-le-Vieux (74)

English (TOEIC level not achieved) S9 (LANG901_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French, English
- **Teaching methods:** In person
- **Teaching format:** Tutorials
- **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Description

This course prepares students for their entry into professional life. Conducting or participating in a meeting: vocabulary and structures related to this aspect while continuing to work on the four skills, but with an emphasis on realistic scenarios (role-playing, acquisition of technical vocabulary (depending on the site) and business vocabulary, etc.). But also public speaking through presentations given by students in groups and/or individually, on topics illustrated by press articles or video materials (VTD: Video, Talk and Debate). Students are assessed throughout each semester. The final assessment consists of a 1-hour, 1.5-hour, or 2-hour exam.

Objectives

Specific objectives: at the end of this course, students will be able to:

Continue lexical and grammatical revisions focusing specifically on the areas tested in the TOEIC. Intensify training on TOEIC exercises (7 parts) / entire tests.

Specific objectives: at the end of this course, students will be able to:

listen regularly to news on English-language news sites (CNN, BBC, Sky News, etc.) and be able to succinctly summarize the main points orally, interacting with the class group

conduct research (in groups and individually) to develop an innovative (professional/cultural) project as a team, to be presented in class, after anticipating and simulating the steps involved with economic actors capable of helping the team to develop it, according to the stages of a credible business plan: writing emails, telephone interviews, recruitment, fundraising, etc.

present the collective project.

Teaching hours

Tutorials	Tutorials	40.5

Mandatory prerequisites

LV 801

Course outline

1. **Use of structures, vocabulary, concepts, and functions necessary for effective oral and written expression:**
    1. Tenses
    2. Questioning (in a professional context)
    3. Connecting words
2. **Listening comprehension:**
    1. Recorded dialogues in American, British, and New Zealand English...
    2. Videos in American, British, Australian English, etc.
3. **Reading comprehension:**
    1. Press excerpts
    2. Various texts

Bibliography

- Documents distributed by speakers
- Various websites, a list of which is provided at the beginning of S5
- Global Exam

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

![UNIVERSITÉ SAVOIE MONT BLANC]

Modern Languages (TOEIC Level Achieved) (LANG902_PACY)

Polytech Annecy-Chambéry

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
English S9	SUBJECT		15		
Modern Language 2	CHOICE				
German TD	SUBJECT		3:00 p.m.		
Spanish TD	SUBJECT		3:00 p.m.		
Italian TD	SUBJECT		3:00 p.m.		
Chinese TD	SUBJECT		3:00 p.m.		
Japanese TD	SUBJECT		3:00 p.m.		
Russian TD	SUBJECT		3:00 p.m.		
Advanced English S9	SUBJECT		9:00 p.m.		

Practical information

Contact

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Locations

Annecy-le-Vieux (74)

English S9 (LANG902_PACYM1)

Polytech Annecy-Chambéry

In brief

Languages of instruction: French, English **Teaching methods:** In person **Teaching format:** Tutorials **Open to exchange students:** Yes **ERASMUS reference:** Languages

Presentation

Description

Simulated job application followed by a job interview in English

Objectives

Become confident in face-to-face or telephone job interviews

Teaching hours

Tutorial	Tutorials	15

Mandatory prerequisites

Validated TOEIC score of at least 785 and validated semester 802

Course outline

Writing resumes and cover letters, telephone interviews, and mock job interviews

Targeted skills

Communicate independently in job interviews

Bibliography

Various documents provided by instructors and students as needed

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Modern language 2

Polytech Annecy-
Chambéry

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
German TD Spanish	SUBJECT		3:00		
TD Italian TD	SUBJECT		p.m.		
Chinese TD	SUBJECT		3:00		
Japanese TD	SUBJECT		p.m.		
Russian TD	SUBJECT		3:00		
Advanced English S9	SUBJECT		p.m.		
	SUBJECT		3:00		
			p.m.		
			3:00		
			p.m.		
			9:00 p.m.		

Practical information

Locations

> Annecy-le-Vieux (74)

Advanced English S9 (ENGL902_PACY)

Polytech Annecy-Chambéry

In brief

Languages of instruction: English, French **Teaching methods:** In person
Teaching format: Tutorials **Open to exchange students:** Yes

Presentation

Description

This course is a training course in professional English. Students will work on their fluency in the five language skills by enriching their technical and professional vocabulary, through role-playing, cultural contributions, and written exercises (different topics from 602, 702, and 802).

Activities will be carried out individually, in pairs, and/or in groups. Students will be assessed throughout the semester.

Objectives

The objective is to improve students' autonomy in the English-speaking workplace in an international context.

Teaching hours

Tutorials	Tutorials	21

Mandatory prerequisites

Minimum TOEIC score of 785 – Semester 801 and/or 802 completed

Course outline

Various presentations by professionals, mainly English-speaking teachers or external speakers.

Targeted skills

Communicate independently, both orally and in writing, in all situations in a professional setting.

Bibliography

A variety of authentic materials provided by the speakers and/or the students themselves.

Skills acquired

Macro-skill	**Micro-skills**

Practical information

Contact

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Locations

Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Optional internship S9 (PROJ900_PACY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

The optional internship aims to enrich students' academic and professional experience by offering them a practical opportunity to apply their knowledge and acquire new skills. An optional internship can be carried out **in France or abroad**. It must comply with the same general conditions as compulsory internships.

Objectives

- **Acquisition of** specific skills related to the specialty;
- **Refining career goals and/or** gaining confidence and independence through the completion of a project or specific tasks;
- Establishing valuable professional contacts that can help in future job searches.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contacts

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Locations

- Annecy-le-Vieux (74)

UE902 Systems Management

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lecture	Tutorial	Practical	Credits
Decentralized automation Automatic sampling	MODULE MODULE 13.5			24h	
Multiphysical systems	hours		12h	12h	
	MODULE			32	

Practical information

Locations

> Annecy-le-Vieux (74)

Decentralized Automation (EASI921_MI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person **Type of instruction:** Practical work **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

From production lines to energy management in homes, automated systems are numerous and varied. Since automation has been implemented using computers, their architectures have evolved significantly from centralized to decentralized.

This course covers the basic elements necessary for the implementation of automated systems in a decentralized solution context: the control part is distributed across different processing units, offering a distribution of tasks that are coordinated by communication networks.

Objectives

By the end of this course, students will be able to:

- distinguish and choose between centralized and decentralized control solutions and understand their respective advantages/disadvantages
- understand the steps involved in decentralization in the process of developing a control solution (definition of a communication architecture, distribution of functionalities, definition of flows and choice of associated cooperation modes, choice of corresponding network services)

- organize the control solution for a decentralized automation system of modest complexity, adopting a modular approach to the processing of operating modes and communications and prioritizing processing

Teaching hours

Practical Work	Practical Work	24 hours

Mandatory prerequisites

Have the necessary foundations for modeling, analyzing, controlling, and implementing automated systems in a centralized solution context:

- knowledge of the architecture of an automated system, including instrumentation, control, and human/machine interface
- ability to model the functional, technological, and operational specifications for controlling an automated system, based on the description in its specifications
- understanding of the organization of a centralized automation control solution, adopting modular operating modes and process hierarchy

Course outline

For two teams of 4 to 6 students, the 24 hours of practical work are organized around the implementation of decentralized control for an automation project:

- centralized and decentralized automation: the concept, advantages/disadvantages
- functional specifications for the control system and its decentralized hardware support (instrumentation, actuators, HMI)
- getting started with Ethernet communication between PLCs: configuration, producer/consumer and client/server network services
- analysis of specifications, for distribution of functionalities across different APIs and definition of resulting communication information, and selection of appropriate communication services
- Modular implementation of communication
- Modular and hierarchical organization of the control system
- implementation of control
- presentation and review

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Michel Cuny
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Location

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Automatic sampling (EASI920_MI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French, English **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This module covers computer control. After introducing the concept of time sampling and the description of discrete-time signals, transfer function modeling is discussed. Stability analysis and corrective control are then presented.

Objectives

By the end of this course, students will be able to:

- represent a continuous-time dynamic system using a sampled transfer function
- configure simple controllers for controlling such systems
- transform the corrector into a control algorithm
- test the expected behavior of the controlled system in simulation
- quantify the main characteristics of the dynamic behavior of the controlled system

Teaching hours

Lectures	Lecture	13.5
Tutorial	Tutorials	12
Lab	Practical work	12

Mandatory prerequisites

- Linear differential equations
- Laplace transform
- Continuous transfer function

Course outline

1. Introduction
2. Sampled signals and Z-transform
3. Sampled transfer function and recurrence equation
4. Analysis of sampled systems
5. Digital corrector synthesis
6. Advanced control methods – RST control

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

- Annecy-le-Vieux (74)

Multiphysical Systems (MCTR910_CMMI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person **Type of instruction:** Practical work **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

The course aims to enable you to model and control multiphysical systems (piezoelectric and hydraulic). The module aims to provide you with a "model" approach through the use of complex models and an "experimental" approach through the use of laboratory equipment. The module also offers you an introduction to the field of research.
You will learn about signal processing, vibrations, and piezoelectricity. You will use software such as Matlab and AMESim and will be introduced to the field of research.

Objectives

Explain the physical phenomena of piezoelectricity Use finite element simulation software

Use measurement tools and a rapid prototyping board Develop a protocol for controlling a mechatronic system

Teaching hours

Practical work	Practical work	32

Mandatory prerequisites

The study of vibrations is based on the study of transfer functions and complex notation to describe frequency behavior (automatic). Knowledge of energy methods and structural design is required.

Course outline

- Control of mechatronic systems
- Review of signal processing
- Review of piezoelectricity
- Introduction to the field of research

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator David Gibus

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Locations

- Annecy-le-Vieux (74)

UE903 Geometric Quality of Products

ECTS
6 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	CM	Tutorial	Practical	Credits
Tolerance	MODULE	6.75 hours	7.5	8	
Mechanism theory	MODULE	8.25 hours	6	4	
Industrialization for machining	MODULE	19.5 hours	18		

Practical information

Locations

> Annecy-le-Vieux (74)

Tolerancing (CMEC920_GICMMI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

Training module on geometric product specifications (ISO-GPS) based on the colored contacts method, developed by the teacher-researcher, enabling students to:

1. the identification of functional distances in mechanisms with clearances using the "colored contacts" method;

2. identify the functional dimensions of the parts making up the mechanisms using the "dimension chain" method;

4. calculate tolerance intervals (it) for functional distances and dimensions;

5. specifying these it in technical drawings (drafting) in accordance with ISO-GPS standards.

Objectives

Be able to:

- determine the functional distances between the parts of a mechanism (clearances, tightness, etc.);
- deduce the functional dimensions of the parts;
- calculate tolerances on these dimensions, ensuring compliance with tolerance intervals on distances, in the worst-case or probable case.

Teaching hours

Lectures	Lecture	6.75
TD	Tutorials	7.5
Lab	Practical Work	8

Mandatory prerequisites

Be able to:

- imagine the three-dimensional geometry of an object based on its views in a technical drawing (reading technical drawings);
- explain the meaning of most geometric tolerances indicated on technical drawings.

Course outline

CM1: Determining functional distances and dimensions in mechanisms using the "colored contact method" CM2: Calculating tolerance intervals for functional distances and dimensions

CM3: ISO specification of functional tolerances on technical drawings

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Eric Pairel

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Locations

Annecy-le-Vieux (74)

Mechanism Theory (MECA910_MI)

Polytech Annecy-Chambéry

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

We will begin by calculating the efficiency of power transmission chains and will address the consideration of friction in guides. Mechanism theory will enable us to determine the mobility and degree of hyperstatism of mechanisms.

Objectives

Know how to take friction into account in mechanical connections

Know how to determine the efficiency of a mechanical power transmission system

Know how to determine the degree of hyperstaticity in a mechanism and describe excessive forces Be able to suggest improvements to control the effects of

hyperstaticity

Teaching hours

Lectures	Lecture	8.25
Tutorial	Tutorials	6
Lab	Practical work	4

Mandatory prerequisites

- Applied Mechanics
- Mechanical systems dynamics
- Mechanical design and technology
- Mechanical construction
- Machine elements

Course outline

1. Models of mechanical connections with friction
2. Power transmission efficiency
3. Finding hyperstatic conditions by applying the PFD
4. Search for hyperstatic conditions using a kinematic approach
5. Description of excessive forces and search for constructive solutions to control the effects of hyperstatic conditions

Additional information

Bibliography

- Pierre Agati, "Liaisons et Mécanismes" (Connections and Mechanisms), Dunod
- Michel Aublin, "Mechanical Systems," Dunod
- Industrial catalogs of bearings and gears.
- Technical documentation on industrial mechanical products

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Pascal
Hernandez

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Industrialization for Machining (FABR910_MI)

Polytech Annecy-Chambéry
component

In brief

- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

The objective of this module is to study cutting with cutting tools (machining) from two perspectives:

- the process approach (parameters/forces/wear/etc.)

- the methods approach (manufacturing dimensions/scheduling/etc.).

Teaching hours

Lectures	Lecture	19.5
Tutorial	Tutorials	18

Additional

The objective of this module from a process perspective is:

- the approach to machining with cutting tools.

- to study cutting parameters.

- the various related aspects: wear, stress, optimization of cutting conditions.

- to enable students to understand manufacturing processes, establish a manufacturing range, understand machining parameters, and optimize machining conditions.

The objective of this module from a methods perspective is:

- to study the isostatism of parts in the machine environment.

- to determine the sequencing of machined surfaces in order to prepare the preliminary manufacturing study.

- to determine manufacturing dimensions

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Marc Villetard
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Marc.Villetard@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

UE904 elective

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
UE904 Mechatronics Option	UE				7 credits
Embedded Systems and Concurrent Programming Industrial Robotics Advanced Industrial Management	MODULE MODULE MODULE	3.75 hours 26 hours 13.5 hours	4.5 6 hours 12 hours	12h 8h 12h	
UE904 Product Engineering Option	UE				7 credits
Computer-aided manufacturing and machining Advanced industrial management Industrial performance	MODULE MODULE MODULE	4.5 hours 13.5 hours 9 hours	3h 12h 9h	32 hours 12 hours 8 hours	

Practical information

Locations

Annecy-le-Vieux (74)

UE904 Mechatronics Option

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Embedded systems and concurrent programming	MODULE	3.75 hours	4.5 hours	12	
Industrial robotics	MODULE	rs 26 hrs	6	8	
Advanced industrial management	MODULE	13.5 hours	12	12	

Practical information

Location

- Annecy-le-Vieux (74)
- Le Bourget-du-Lac (73)

Embedded Systems and Concurrent Programming (INFO930_MI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

This course aims to present the characteristics of embedded systems in detail. Hardware and software aspects are addressed from a systems perspective. Important concepts related to embedded systems management are discussed and put into practice in a mini-project (input/output, register-based programming, interrupts, etc.).

Objectives

Propose a technological solution for creating an embedded system

Propose and justify a solution for implementing embedded software

Specify, design, and implement a simple embedded software application using external exchanges (input/output management, interrupt implementation, shared memory, etc.).

Teaching hours

Lectures	Lecture	3.75
Tutorial	Tutorials	4.5
Lab	Practical work	12

Mandatory prerequisites

INFO501: Numbering and Algorithms

INFO821: Embedded Systems

Course outline

I. General architecture of an embedded system

1. Characteristics: technical and functional aspects
2. Constraints of embedded systems

II. Input/Output

1. Understanding the role of a device driver and being able to use it in an application
2. Understanding and implementing the management of an I/O interface circuit
3. Understanding the interrupt mechanism and knowing how to implement it

Targeted skills

Specify, analyze, design, and implement computer systems, particularly embedded systems and communication systems (application)

- by integrating interactions between the application and software and hardware architectures

- by relying on methods for designing and managing medium-sized computer projects

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

Annecy-le-Vieux (74)

Industrial Robotics (MCTR920_GICMMI)

Polytech Annecy-Chambéry
component

In brief

- **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

The class will focus on direct and inverse kinematics problems, Denavit-Hartenberg representation, Euler and RPY angles, homogeneous transformations, manipulator Jacobian, differential relationships, force and moment analysis.

Objectives

The objective of this course concerns Industrial Robotics and the ability to choose a robot according to the expected tasks and industrial context. It will also cover the various models needed to understand the operation of an industrial robot (typical architectures, characteristic quantities, modeling and model inversion), its behavior, the description of end-effector motion in space, and the minimum knowledge required to design and size the actuators that make up the robot.

Teaching hours

Lectures	Lecture	26
Tutorial	Tutorials	6
Lab	Practical Work	8

Mandatory prerequisites

MATH501_PACY MATH620_MIMC
Python programming language

Course outline

1. Historical Context, Types, Applications and Basic Concepts in Robotics
2. Structure and Components of Robot Manipulators
3. Spatial Representations of Rigid Bodies
4. Forward Kinematics of Robot Manipulators
5. Inverse Kinematics of Robot Manipulators
6. Differential Kinematics

Targeted skills

Mastering engineering methods and tools: identifying, modeling, and solving even unfamiliar and incompletely defined problems using IT tools
Mastering engineering methods to model and design robotized industrial production systems Taking into account the challenges and needs of a company
Mobilizing the resources of a scientific and technical field related to a specialty

Bibliography

[1] Siciliano B. Robotics: modeling, planning, and control. Springer 2009.
[2] Spong M, Hutchinson S, Vidyasagar M. Robot Modeling and Control. Wiley ed. 2005.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Luc Marechal

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Locations

- Annecy-le-Vieux (74)

Advanced Industrial Management (GIND920_MI)

Polytech Annecy-Chambéry

Time of year Every year

In brief

- **Teaching methods:** In person **Teaching format:** Lecture **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

In S7, students will have discovered the basics of production management. The objective is to build on these basics, discuss them, and present lean production concepts and their relevance in today's industrial context. The aspects of implementation, scheduling, flow tension, production bottlenecks, and supply chain management will be presented to reflect the diversity of approaches to production management and its global nature. Links with the modules on Quality, Production, Operational Safety, Flow Simulation, and Industrial Performance will be announced. Industry representatives will give presentations, and a visit to a pilot site in this field will be organized.

Objectives

Positioning of the concepts of inventory, work in progress, and internal and external flows within the company

Understanding the principles of different production management methods (MRP, Kanban, OPT, etc.), their conditions of application, strengths, and limitations

Representation of an existing flow

Implementation of production resources to simplify them

Understanding the Lean approach to improving performance

Mastery of PERT and Gantt tools and scheduling of production or a project in a given context Knowledge and understanding of scheduling rules and algorithms (FIFO, critical ratio, Johnson, etc.)

Teaching hours

Lectures	Lectures	13.5
Tutorial	Tutorials	12
Lab	Practical work	12

Mandatory prerequisites

Basic production management courses

Internship Introduction to the professional environment

Course outline

1. Scheduling function (concepts)
2. The scheduling function (applications to workshops and projects)
3. Lean production and lean manufacturing
4. Techniques used in lean manufacturing, the CONWIP method
5. Workshop layout
6. Constraint management (Optimized Production Technology)
7. Supply chain management
8. Summary

- Practical work 1 and 2: 8 hours, Kanban game (from a planning policy to production to order)
- Practical work 3: 4 hours, Planet game (introduction to supply chain management)

Targeted skills

Manage the flows of a company within a logistics chain Exercise analytical, synthesis, and creative skills

Bibliography

- Production Management - Editions d'Organisation, Alain COURTOIS - Chantal BONNEFOUS- Maurice PILLET
- Mastering Industrial Flows - Editions d'Organisation Raymond and Stéphanie BITEAU
- The Goal - Editions AFNOR Eliayahu GOLDRATT, Jeff COX
- Production Without Inventory - Editions d'Organisation Shigeo SHINGO
- The Shingo System: Keys to Production Improvement - Editions d'Organisation Shigeo SHINGO
- Kaizen - Editions Eyrolles Masaaki IMAI
- Production and Flow Management Editions Economica Vincent GIARD

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Lamia Berrah

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Locations

Annecy-le-Vieux (74)

UE904 Computer-Aided Manufacturing Option

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Computer-aided manufacturing and machining	MODULE	4.5 hours	3	32	
Advanced industrial management	MODULE	13.5 hours	12	12	
Industrial performance	MODULE	9 hours	9 a.m.	8 a.m.	

Practical information

Locations

- Annecy-le-Vieux (74)
- Le Bourget-du-Lac (73)

Computer-aided manufacturing and machining (FABR911_MI)

Annecy-Chambéry

Polytech
component

In brief

- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

and teaching allows students to discover:

- computer-aided manufacturing (CAM) software.

- the entire process from CAD to the finished part.

- the use of numerically controlled machines.

- associated "machine foot" control and necessary readjustments.

Teaching hours

Lectures	Lecture	4.5
Tutorial	Tutorials	3
Lab	Practical work	32

Additional information

The course outline is structured as follows:

- Structuring a numerically controlled program.
- Analysis of a turning program
- Programming a turning part
- Explanation of milling cycles
- Programming a milling part

This course enables students to use the associated machines (lathes and milling machines) to carry out the entire process, from programming to machining.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course Director Marc Villetard

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Marc.Villetard@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Industrial Performance (GIND910_MI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Type of instruction:** Lecture **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

The aim of this course is to position the respective concepts of industrial performance and improvement processes from both a conceptual and operational perspective. The issue of performance measurement, which is now multi-criteria and multi-level, is addressed through the concepts of indicators and systems. Implementation methods and tools are studied.

In light of the link between industrial performance and improvement, a definition and typology of the latter are proposed. The concept of improvement initiatives is then addressed, based on the main steps involved. The most commonly used initiatives in industrial settings are considered in particular.

Finally, considerable attention is given to industrial testimonials and discovering performance in the field through a visit to a pilot company in the sector.

Objectives

Understanding the concept of performance Deployment of objectives

Implementation of a performance indicator system

Application of two major improvement methods (Lean and 6 Sigma)

Teaching hours

Lectures	Lecture	9
Tutorial	Tutorials	9
Lab	Practical Work	8

Mandatory prerequisites

Courses on:

- Production management and quality
- Advanced production management

Course outline

1. The concept of industrial performance
2. The performance indicator
3. Performance indicators in the control loop
4. The performance indicator system
5. Performance at ADIXEN Pfeiffer (testimonial and tour)
6. The principles of an industrial improvement approach, the PETRA guide
7. A specific approach: Six Sigma

Practical work titles

- TP1 and TP2: Industrial improvement approach: CIPE game
- TP3: study of an industrial case study at a pilot site

Targeted skills

Understanding the challenges of industrial performance

Understanding the fundamentals of an industrial improvement process

Bibliography

- Performance indicators: concepts and applications, Lamia Berrah (2002), Cepadues.
- The Balanced Scorecard, Robert-S Kaplan and David-P Norton (2003), Editions d'Organisation,
- Six Sigma: How to Apply It, Maurice Pillet, (2003) Editions d'Organisation,
- Kaizen: The Key to Japanese Competitiveness, Masaaki Imai, (1988) Eyrolles
- Multiple Criteria Decision Analysis: State of the Art Surveys, Ergott, Figueira, and Greco, (2005) Springer
- Toyota Production System, Taiichi Ohno, (1988) Productivity Press
- Decision-making and decision-makers in industry, Lamia Berrah and Vincent Clivillé (2022), ISTE Publishing

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Lamia Berrah

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Locations

Annecy-le-Vieux (74)

UE001 Engineering internship

ECTS
30 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lecture	Tutorial	Practical	Credits
S10 engineering internship	MODULE				

Practical information

Location

Annecy-le-Vieux (74)

S10 Engineering Internship (PROJ001_PACY)

Polytech Annecy-Chambéry

In brief

Languages of instruction: French

Open to exchange students: Yes

Overview

Description

The internship must be carried out in a company or research organization related to the student's area of expertise, on a full-time basis and with a **maximum of 50% teleworking**.

Objectives

This is an internship carried out within a company or research laboratory, department, or organization whose activity is representative of the student's specialty. This internship should enable the student to:

- the student to apply their theoretical and practical knowledge;
- verify their aptitude for engineering functions.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Locations

- Annecy-le-Vieux (74)

UE701 Bridge to the professional world

ECTS
6 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	CM	Tutorial	Practical work	Credits
Creativity and Innovation Management	MODULE		25.5		
Professional Resources and Dynamics	MODULE		13.5 hours	3.5	

	Nature	Lecture	Tutorial	Practical	Credits
English (TOEIC level not achieved) S7	MODULE		40.5		
Modern languages (TOEIC level achieved)	MODULE				
English S7 Modern Language 2	CHOICE		15		
Italian TD	SUBJECT TD		8 p.m.		
German TD	Tutorial		8 p.m.		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD Advanced English S7	Tutorial SUBJECT		8 p.m. 9 p.m.		

	Nature	Lecture	Tutorial	Practical	Credits
Optional internship S7	MODULE				
Support (half of Thursday afternoons when FISA staff are present)	MODULE				

Practical information

Locations

> Le Bourget-du-Lac (73)

Creativity and Innovation Management (SHES704_PCHY)

Polytech Annecy-Chambéry

In brief

- **Languages of instruction:** French **Teaching methods:** In-person
- **Teaching format:** Tutorials **Open to exchange students:** Yes
- **ERASMUS reference:** Business and administration

Presentation

Description

How can innovation and creativity be leveraged to enhance an organization? How can innovation be initiated based on the latest technological advances? In both cases, this requires a thorough understanding of the creativity and innovation process, as well as the ability to manage an innovative project in a complex and uncertain environment. It also involves adopting an entrepreneurial or intrapreneurial approach to mobilize and motivate interdisciplinary teams (several specialties per team) in the implementation of innovation. This fully online program offers you the opportunity to acquire the methodologies and attitudes necessary to achieve these objectives.

Objectives

- Structure, organize, and manage a highly exploratory process with a consistent approach
- Find resources or make do with available resources
- Adapt in real time to changes in context and constraints
- Manage the challenges of each phase of the project
- Act as a leader in an uncertain environment
- Mobilizing stakeholders

- Mastering new technologies

Teaching hours

Tutorials	Tutorials	25.5

Mandatory prerequisites

None

Course outline

Part 1: Innovation management: theoretical foundations

Part 2: Creativity - Design thinking approach (different creativity tools depending on the stages of the process). Part 3: Role-playing

Targeted skills

- Recognize and seize internal and external development opportunities
- Develop and formalize opportunities to transform them into innovative projects
- Know how to lead a design thinking-type creativity process
- Develop management and leadership skills for innovative projects: challenge preconceived ideas, mobilize stakeholders, lead with flexibility, and seize opportunities with agility

Bibliography

Tidd, Joe, and John Bessant. *Managing Innovation: Integrating Technological, Commercial, and Organizational Change.* Paris, Pearson, 2018.

Kim, W. Chan, and Renée Mauborgne. *Blue Ocean Strategy: How to Create New Strategic Spaces.* Paris, Pearson, 2006.

Christensen, Clayton M. *The Innovator's Dilemma: How Technology Leaders Fail When They Don't Think Like Innovators.* Paris, Village Mondial, 2003.

Lockwood, Thomas, and Thomas Walton. *Design Thinking: Integrating Innovation, User Experience, and Brand Value.*
Paris, Dunod, 2013.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Professional Resources and Dynamics (SHES703_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Information and Communication Technologies (ICT)

Overview

Description

Professional integration module designed and implemented in collaboration with the Business Club and the Professional Integration Assistance Office of the University of Savoie Mont Blanc, involving a network of qualified professionals.

Objectives

The aim of the module is to help students gain a better understanding of themselves in order to define a career plan in line with their motivation and skills, develop a targeted internship and/or job search strategy, present themselves effectively in an interview, and promote their career path.

Teaching hours

Tutorials	Tutorials	13.5
TP	Practical work	0.5
TP	Practical work	3

Mandatory prerequisites

No mandatory prerequisites

Course outline

- Introduction: preparing for my future today

- Identify my professional environment, map out the possibilities

- Defining my career plan

- Boost my internship search efforts

- Create and optimize my LinkedIn profile

- Adapt my application tools, respond to a job posting

- Prepare for the interview

-Highlighting my work experience – Assessment

- Mock interview with professionals – Evaluation

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Location

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

English (TOEIC level not achieved) S7 (LANG701_PCHY)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Open to exchange students:** Yes
ERASMUS reference: Languages

Presentation

Description

This course prepares students for the TOEIC ("Test of English for International Communication") exam, specifically to obtain a minimum score of 785 points (out of 990).

With the aim of developing all four skills, this course also serves as an introduction to public speaking through presentations given by students in groups or individually on topics illustrated by press articles or video materials (VTD: Video, Talk and Debate, as well as written work). Depending on the location (Annecy or Chambéry), some will be seen at different times during the semester, the year, or even the three years of training.

Students are assessed throughout each semester. The final assessment consists of a 1-hour, 1.5-hour, or 2-hour exam, depending on the semester, and accounts for 33% of the total continuous assessment.

Objectives

Specific objectives: by the end of this course, students will be able to:

review grammar on: correct reflexes for common structures; verb groups and tenses (except for the conditional tense); noun groups and all their constituent elements; logical links (connecting words) improve their grammatical and lexical knowledge (general English and TOEIC-specific vocabulary) in class and independently, validating their progress through regular assessment tests

Teaching hours

Tutorials	Tutorials	40.5

Mandatory prerequisites

CEFR level B1

Course outline

1. **Oral**
   1. Elements of phonology
   2. Grammar (tenses, questions, adjectives...)
   3. Reinforcement of structures and vocabulary
   4. Interactive oral communication
   5. Introduction to and practice for the TOEIC (listening section)
2. **Writing**
   1. Review of grammatical elements (tenses, questioning, adjectives. ....)
   2. Translation (theme/version)
   3. Reading comprehension in authentic language
   4. Curriculum vitae (in S5, S6, or S7 at the latest)
   5. Cover letter/motivation letter (in S5, S6, or S7 at the latest)
   6. Introduction and training for the TOEIC (reading section)

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Christophe Lambert

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Campus

Le Bourget-du-Lac / Savoie Technolac campus

Modern Languages (TOEIC Level Achieved) (LANG702_PCHY)

Polytech Annecy-Chambéry

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Teaching format:** Tutorials **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Description

This course aims to enable students to communicate authentically with linguistic and cultural autonomy. Emphasis is placed on authentic pronunciation and the ability to interact orally on a variety of topics.

Objectives

Communicate orally in interactive situations with pronunciation close to an authentic model.

Mandatory prerequisites

Have validated level B2 in an official TOEIC or Linguaskill certification (see study regulations for details).

Course outline

Review of the basics of English pronunciation (sounds, phonemes, word stress, sentence stress, prosody, etc.), application exercises, regular exposure to communication situations.

Skills acquired

Macro-skill	Micro-skills

List of lessons

	Nature	Lectures	Tutorial	Practical	Credits
English S7	SUBJECT		15		
Modern Language 2	CHOICE				
Italian TD	Tutorial		8 p.m.		
German TD	TD		8 p.m.		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD	Tutorial		8 p.m.		
Advanced English S7	SUBJECT		9 p.m.		

Practical information

Location

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

English S7 (LANG702_PCHYM1)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Christophe Lambert
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Christophe.Lambert@univ-savoie.fr

Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Modern Language 2

Polytech Annecy-Chambéry
Component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Italian TD	Tutorial		20		
German TD	Tutorial		8 p.m.		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD	Tutorial		8 p.m.		
Advanced English S7	SUBJECT		9 p.m.		

Practical information

Venue

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

German TD

Polytech Annecy-Chambéry

Overview

Teaching hours

Tutorial	Tutorials	20

Skills acquired

Macro-skills	Micro-skills

Spanish TD

Polytech Annecy-Chambéry
component

Presentation

Teaching hours

Tutorial	Tutorials	20

Skills acquired

Macro-skills	Micro-skills

Japanese TD

Polytech Annecy-Chambéry
component

Presentation

Teaching hours

Tutorial	Tutorials	20

Skills acquired

Macro-skill	Micro-skills

Advanced English S7 (ENGL702_PCHY)

Polytech Annecy-Chambéry
component

Presentation

Teaching hours

Tutorial	Tutorials	21

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

Optional internship S7 (PROJ700_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

The optional internship aims to enrich students' academic and professional experience by offering them a practical opportunity to apply their knowledge and acquire new skills. An optional internship can be carried out **in France or abroad**. It must comply with the same general conditions as compulsory internships.

Objectives

- **Acquisition of** specific skills related to the specialization;
- **Refining career goals and/or** gaining confidence and independence through the completion of a project or specific tasks;
- Establish valuable professional contacts that can help in future job searches.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator

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Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Support (half of Thursday afternoons when FISA staff are present) (ACCO701_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Teaching methods:** In person **Teaching format:** Tutored project **Open to exchange students:** Yes

Presentation

Description

This support is open to all students at the school: students, apprentices, and Continuing Education employees. It is not mandatory, as it is primarily intended for students who need it to succeed in their training. This semester, it is scheduled into the timetable for each course, with a total of 16 hours.

Support may take the form of refresher courses, upgrading courses, or support in the main areas of training.

Peer tutoring is encouraged and the educational resources of the Polytech Network are used (https://eplanet.polytech-reseau.org/).

Objectives

Promoting success for all students in their educational journey

Teaching hours

PTUT	Tutored project	16

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Director of Polytech Training

Locations

- Le Bourget-du-Lac (73)

UE702 Materials Science

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Macromolecular Chemistry 1 Properties of Polymer Materials	MODULE	13.5 hours	12h	12	
1	MODULE	22.5 hours	12h		
Rheology	MODULE	19.5 hours	10.5		
				8	

Practical information

Locations

> Le Bourget-du-Lac (73)

Macromolecular Chemistry 1 (CHIM720_MC)

Annecy-Chambéry

Polytech component

In brief

- **Open to exchange students:** Yes
- **ERASMUS reference:** Physical sciences

Overview

Teaching hours

Lectures	Lecture	13.5
Tutorial	Tutorials	12 p.m.
Practical work	Practical work	12 hours

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Anne-Cecile Grillet

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Anne-Cecile.Grillet@univ-savoie.fr

Locations

- Le Bourget-du-Lac (73)

Properties of Polymer Materials 1 (MATE713_MC)

Polytech Annecy-Chambéry
component

In brief

- **Open to exchange students:** Yes
- **ERASMUS reference:** Physical Sciences

Overview

Teaching hours

Lectures	Lecture	22.5
Tutorial	Tutorials	12

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Anne-Cecile Grillet

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Anne-Cecile.Grillet@univ-savoie.fr

Locations

- Le Bourget-du-Lac (73)

Rheology (MATE721_MC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Open to exchange students:** Yes
ERASMUS reference: Physical Sciences

Overview

Description

This course presents and covers the fundamental concepts necessary for understanding the equations governing the flow of molten polymers. It also addresses the characterization of the viscoelastic properties of liquid polymers and solid materials.

Objectives

At the end of the course, students will be able to: 1/Formulate the local dynamic equilibrium equations of continuum mechanics in the case of Newtonian and non-Newtonian fluids. 2/Solve the system of differential equations obtained during the development of the dynamic equilibrium equations. 3/Interpret the solution and innovate by proposing an experimental protocol that allows the rheological properties of the polymer to be traced. 4/Deduce the mechanical response of a test specimen knowing its viscoelastic behavior law. 5/Find the creep and relaxation functions and interpret the viscoelastic response obtained. 6/Deduce the expressions of the complex modulus components (G' and G") for a viscoelastic material with a known behavior law.

Teaching hours

Lectures	Lecture	7:30 p.m.
Tutorial	Tutorials	10.5 hours
TP	Practical work	8

Mandatory prerequisites

Differential equations - Laplace transform - Fundamentals of continuum mechanics.

Course outline

1/Review of tensors and index notation. 2/Review of stress/strain relationships in linear elasticity. 3/Different behaviors of polymer materials. 4/Viscoelastic behavior of polymers, static tests (creep, relaxation). 5/Viscoelastic behavior of polymers, dynamic tests (complex modulus).6/Principles of operation of different rheometers. 7/Measurement protocols: definition and illustrations. 8/Importance of temperature in the viscoelastic behavior of a polymer. 9/Viscoelasticity and its role in processes/Weissenberg effect. 10/Laws of 3D viscoelastic behavior and correspondence theory. TP1/Identification of the generalized viscoelastic model based on knowledge of the measurements of the G' and G'' components of the complex modulus G.TP2/Simulation using the finite element method (Ansys) of the behavior of a structure consisting of an anisotropic viscoelastic medium subjected to dynamic stress.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Jacques Ohayon

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Jacques.Ohayon@univ-savoie.fr

Locations

- Le Bourget-du-Lac (73)

UE703 Composite Design

ECTS
10 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Mechanics of anisotropic media	MODULE	25.5 hours	12		
Design office tools	MODULE	15	12	12	
Modeling and finite elements	MODULE	12 hours	10.5	4 p.m.	
Mechanical eco-design	MODULE	9.5	10.5		

Practical information

Locations

> Le Bourget-du-Lac (73)

Mechanics of Anisotropic Media (MECA730_MC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This course presents a summary of the analysis of the mechanical behavior of homogeneous anisotropic media and applies these developments to the search for solutions to problems in linear anisotropic elasticity.

Objectives

At the end of the course, students will be able to: 1/ Correctly formulate all the equations for the isotropic elasticity problem. 2/ Explain the value of such variational formalisms. 3/ Explain the variational formulations in displacement and stress for an elasticity problem for a structure made of isotropic material. 4/ List all the elastic constants for a unidirectional composite. 5/ Analyze the variation of elastic constants as a function of fiber orientation within the composite. 6/ Simplify the generalized anisotropic behavior law based on knowledge of elastic symmetry axes or planes. 7/ Correctly formulate all the equations for the anisotropic elasticity problem. 8/ Identify acceptable approximate solutions and explain the variational formulations in displacement and stress for an elasticity problem for a structure made of an anisotropic material.

Teaching hours

Lectures	Lecture	25.5
Tutorial	Tutorials	12

Mandatory prerequisites

Matrix calculus - Fundamentals of continuum mechanics.

Course outline

1/Complement to tensor calculus; Description of the continuous medium. 2/Deformation of the continuous medium, kinematics of the continuous medium. 3/Thermoelastic behavior. 4/Classification and variational formulations of linear elasticity problems and use of these formulations. 5/Elasticity and anisotropy: Most general anisotropy, unidirectional composite, application of energy theorems to the evaluation of equivalent elasticity modules. 6/Major classes of materials and their microstructures. 7/Elastic behavior law of anisotropic materials: position of the problem of determining elastic characteristics. 8/The most common homogenization techniques for UD composites: Law of mixtures, Puck and Halpin-Tsai models, Self-consistent models.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course Director Jacques Ohayon

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Jacques.Ohayon@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Design office tools (CMEC710_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

The technical project consists of designing, developing, and prototyping a part or system made of composite materials to meet a need expressed by a company or the school. Student teams must mobilize and develop all of their knowledge, skills, and interpersonal skills to successfully manage this authentic work situation. A rigorous project management approach will be necessary.

Objectives

This course aims to enable students to:

- Apply the scientific and technical concepts of the Mechanical Engineering program and the "Composite Materials" track
- Implement appropriate project management tools
- Take into account the financial dimension of a project
- Take into account group dynamics and customer relations
- Be aware of the environmental impacts associated with design choices

Teaching hours

Lectures	Lecture	15
Tutorial	Tutorials	12 p.m.
Practical work	Practical work	12

Course outline

Students' progress will be marked by assignments that enable them to make steady progress in their project:

- L1: Formation of project groups
- L2: Project launch (LDP)
- L3: Specifications (CDC)
- L4: Technical and Economic Study 1 (ETE1 - Pre-Design-Dimensioning-Prototype-Budget)

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Yann Meyer

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Yann.Meyer@univ-savoie.fr

Locations

- Le Bourget-du-Lac (73)

Modeling and finite elements (MECA720_MIMC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This course will begin with a general description of the calculation problems faced by engineers, in mechanics or thermal engineering for example, as well as the essential theoretical concepts associated with them. We will then discuss modeling and the simplification operations that are commonly performed on models. The use of industrial finite element calculation software will be discussed, along with the practical concepts involved in building the model and defining the physical properties and boundary conditions. We will conclude by discussing the accuracy of calculations and the use of the results obtained.

Objectives

Know how to establish a calculation model for an engineering problem. Know how to use finite element calculation

software.

Know how to validate and use the calculation results obtained.

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	10.5
Lab	Practical Work	16

Mandatory prerequisites

- Applied Mechanics
- CAD and prototyping
- Computational Mechanics

Course outline

1. General overview of engineering problems
    1. Theoretical review
    2. Defining calculation objectives
2. Modeling
    1. Creating a model and choosing elements
    2. Simplification and consideration of symmetries
3. Use of industrial software
    1. Transferring a CAD model to a calculation model
    2. Physical properties, meshing, and boundary conditions
    3. Calculation, post-processing, and modification of a model
4. Exploitation
    1. Convergence and accuracy
    2. Writing a calculation report

Bibliography

- Dhatt G.S. and Touzot G., "Une présentation de la méthode des éléments finis" (An introduction to the finite element method), Presses de l'Université de Laval
- Zienkiewicz O.C., Taylor R.L., Zhu J.Z., "The Finite Element Method: Its Basis and Fundamentals," Butterworth-Heinemann

Skills acquired

Macro-skill	**Micro-skills**

Practical information

Contact

Course coordinator Philippe Saffre

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Philippe.Saffre@univ-savoie.fr

Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Mechanical Eco-design (CMEC721_MC)

Polytech Annecy-Chambéry
component

Presentation

Description

This module will cover life cycle analysis, concrete eco-design solutions, and the regulatory aspects that govern the design of mechanical systems.

Objectives

This module aims to enable students to design mechanical systems with controlled environmental impacts through the use of methods and tools. Students will study different approaches to improving design: technological choices, changes in manufacturing processes, changes in materials, etc.

Teaching hours

Lectures	Lecture	9.5
Tutorial	Tutorials	10.5

Mandatory prerequisites

Basic knowledge of mechanical design: materials and manufacturing processes Basic knowledge of environmental issues

Course outline

- Fundamentals of eco-design
- Sessions on using life cycle analysis software

- Eco-design proposals for a real-world system

- Eco-design in business: rules and benefits

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Eric Pairel
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Eric.Pairel@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

- Le Bourget-du-Lac (73)

UE704 Composite Production

ECTS
6 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Introduction to Industrial Management	MODULE	13 hours	13.5 hours	12 hours	
Composite Materials	MODULE	9.75 hours	10.5 hours		
Specific Composites	MODULE	9.75 hours	10.5 hours		

Practical information

Locations

- Le Bourget-du-Lac (73)

Introduction to Industrial Management (GIND710_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Teaching format: Lecture **Open to exchange students:** Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

The aim of this course is to introduce students to the fundamentals of production management and quality.

The main topics covered are related, for the Production Management part, to the evolution of industrial management, from inventory management to component requirements planning, namely: the different stages of MRP and MRP II methods. The automotive sector is used to illustrate the different concepts.

The second part of the course covers the Quality Management System introduced by the ISO 9000 standard.

Objectives

Introduction to the industrial environment Calculation of

economic inventory

Critical analysis of traditional inventory management

Calculating component requirements

Teaching hours

Lectures	Lecture	13
TD	Tutorials	13.5
Lab	Practical Work	12

Mandatory prerequisites

Basic knowledge of product/process concepts.

Work experience (summer jobs, internships)

Experience in clubs and associations

Course outline

- Production management concepts
- Inventory management
- The MRP method: CBN, PDP, PIC
- The MRP II method and resource constraints
- The role of quality in business, discovering the company
- Problem-solving tools
- FMEA

- TP1: PIC PDP case study
- TP2: Introduction to CAPM: Odyssée software
- Practical work 3: Mapping and process sheet

Targeted skills

- Understanding the challenges of managing product flows within the company
- Master inventory management
- Learn about MRP and its calculation principles
- Understand the challenges and key terms related to the concept of quality in business

Bibliography

- Production Management - Editions d'Organisation, Alain COURTOIS - Chantal BONNEFOUS- Maurice PILLET

- Mastering Industrial Flows - Editions d'Organisation Raymond and Stéphanie BITEAU
- The Goal - Editions AFNOR Eliayahu GOLDRATT, Jeff COX
- Production Without Inventory - Editions d'Organisation Shigeo SHINGO
- The Shingo System: Keys to Production Improvement - Editions d'Organisation Shigeo SHINGO

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Lamia Berrah

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Locations

Le Bourget-du-Lac (73)

UNIVERSITÉ SAVOIE MONT BLANC

Composite Materials (MATE712_MC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person **Open to exchange students:** Yes **ERASMUS reference:** Physical sciences

Presentation

Description

General course on composite materials: markets and industries, materials, applications

Objectives

Understand the main characteristics of composite material (CM) components. Master the entire value chain in order to fully understand how the CM industry works and the challenges it faces.

Teaching hours

Lectures	Lecture	9.75
Tutorial	Tutorials	10.5

Mandatory prerequisites

None

Course outline

1 – Definitions and general information

2 – Organization of the sector The MC value

chain Key players

Developments in the organic food markets

3 – Basic components of organic MCs

Detailed review of the main reinforcements (development, characteristics, advantages/limitations)

Detailed review of the main families of polymer resins (thermosetting (TS) and thermoplastic (TP)) Role of fillers

Core materials and sandwich structures

4 – Composite semi-finished products

BMC and SMC

TD and TP prepregs

5 – Concepts of MC aging

Bibliography

- Course handouts and presentations on Moodle
- M. F. Ashby Materials and the environment. Eco-responsible choices in design, Dunod 2011
- C. Bathias - Composite Materials - Usine Nouvelle, Dunod.
- Dunod Reference Guide - 4 volumes
- Engineering techniques - Online database of plastics and composites at www.techniques-ingenieur.fr

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Pascal Francescato

+33 4 79 75 81 24

Pascal.Francescato@univ-savoie.fr

Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Specific Composites (MATE720_MC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person **Open to exchange students:** Yes **ERASMUS reference:** Physical sciences

Presentation

Description

Presentation of specific composite materials related to the nature and morphology of reinforcing fibers Focus on the eco-properties of these materials.

Objectives

Understand the manufacturing methods and properties of several types of reinforcing fibers for composite materials, particularly organic (synthetic) fibers, natural fibers, and certain nanocomposites. Master the advantages and limitations of these materials in order to make eco-responsible choices in a simplified LCA (Life Cycle Assessment) context.

Teaching hours

Lectures	Lecture	9.75
Tutorial	Tutorials	10.5

Mandatory prerequisites

None

Course outline

1 – General information on composite materials based on

° Glass fiber

° Carbon fiber

° Basalt fiber

° Natural fibers

° Physical and eco(logical) properties of these materials compared to traditional materials

2 – Natural fiber composite materials

° Fiber varieties

° Extraction methods

° Use of composites made from these fiber families

° Properties and applications

3 – Nanocomposites

Carbon nanotubes, silica, and clay

Implementation of composites from these fiber families

4 – Life cycle management

Concept of LCA (Life Cycle Assessment)

Challenges of composite waste management: sources, waste management, recycling and reuse methods

Bibliography

- Course handouts and presentations on Moodle
- M. F. Ashby Materials and the environment. Eco-responsible design choices, Dunod 2011
- C. Bathias - Composite Materials - Usine Nouvelle, Dunod.
- Dunod Reference Guide - 4 volumes
- Engineering techniques - Online plastics and composites database at www.techniques-ingenieur.fr

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Pascal Francescato

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Pascal.Francescato@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

UE801 Bridge to the professional world

ECTS
6 Credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Integrated QSE (Quality, Safety, Environment) Management System	MODULE	9 hours	10.5		
Management techniques	MODULE	18	7.5		

	Nature	Lecture	Tutorial	Practical	Credits
English (TOEIC level not achieved) S8	MODULE		40.5		
Modern languages (TOEIC level achieved)	MODULE				
English S8 Modern language 2	CHOICE		15		
Italian TD	SUBJECT TD		8 p.m.		
German TD	Tutorial		8 p.m.		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD Advanced English S8	Tutorial SUBJECT		8 p.m. 9 p.m.		

	Nature	CM	Tutorial	Practical work	Credits
Optional internship S8	MODULE				
Support (half of the Thursdays when FISA is present)	MODULE				

Practical information

Locations

> Le Bourget-du-Lac (73)

Integrated QSE (Quality, Safety, Environment) Management System (SHES802_PCHY)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

Students must be aware that quality, environmental, and occupational health and safety management systems are now essential in business. They must therefore have sufficient knowledge of these systems in order to take them into account and integrate them into their engineering work.

Objectives

- Understand the concepts and requirements of quality management (ISO 9001), safety (ISO 45001), and environmental (ISO 14001) standards.
- Learn how to implement an integrated QSE management system tailored to the specific structure and needs of an organization.
- Acquire the skills necessary to identify, assess, and manage risks related to quality, safety, and the environment.
- Explore auditing and monitoring techniques to ensure compliance and continuously improve the integrated management system.

Teaching hours

CM	Lecture	9
Tutorial	Tutorials	10.5

Mandatory prerequisites

None

Course outline

Topic 1: Quality Management

1. Introduction to quality management;
2. Standards: definition and history of quality, principles of certification;
3. Continuous Improvement: Kaizen, 5S, Lean, Six Sigma;
4. Process Approach;
5. Tutorial: Computer modeling of a process, BPM, web publishing. Theme 2: Environmental Management

1. The environment, sustainable development, carbon footprint;
2. What is an EMS?
3. Standards, challenges;
4. The ISO 14001 standard;
5. The EMAS standard;
6. Implementing an EMS;
7. Tutorial: Audit of a company's EMS, proposal for eco-cards. Theme 3: Health and Safety at Work:

1. General information and challenges;
2. Stakeholders;
3. Legislation and OHS management system standards;
4. OHS and CSR

Targeted skills

- Ability to interpret and apply quality, safety, and environmental management standards.
- Ability to design and implement an integrated QSE management system within an organization.
- Skills in risk management and QSE performance assessment.
- Mastery of audit and monitoring techniques to ensure compliance and continuous improvement.

Bibliography

Charvet, Denis. *Integration of management systems: Quality, Safety, Environment.* Paris, AFNOR, 2019. Pignal, François, and Pierre-Emmanuel Bardin. *The QSE manual: Quality, Safety, Environment.* Paris, Dunod, 2020. Bourgoin, Alain. *The ISO 9001 standard version 2015 in 50 questions.* Paris, AFNOR, 2018.

Baril, Pierre. *ISO 14001:2015 - Understanding and implementing an environmental management system.* Paris, AFNOR, 2017.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Elodie Gardet

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Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Management Techniques (SHES803_PCHY)

Polytech Annecy-Chambéry
component

In brief

Teaching methods: In person

Open to exchange students: Yes

Presentation

Description

This component of SHES is divided into two independent courses: Management and Ethics. The aim of this module is to understand the human and communicational dimensions of management and to develop students' managerial assertiveness.

Objectives

- Develop managerial assertiveness
- Manage a team responsible for implementing a project
- Understand the tasks and professional skills involved in implementing the project
- Know how to take a step back from complex situations and arbitrate conflicting needs related to project design
- Adopt an ethical and responsible management style

Teaching hours

Lectures	Lecture	18
Tutorial	Tutorials	7.5

Mandatory prerequisites

None

Course outline

Topic 1: Team management

- Understanding - The human dimension of management
- Communicate - The relational dimension of management

Topic 2: Ethics and psychosocial risks (PSRs)

- Mental load and information overload
- Stress at work and burnout
- Harassment (psychological and sexual)

To supplement this topic on psychosocial risks, students also have access to an e-learning training platform provided by INRS. This leads to the award of a certificate of completion if 66% of the students' answers are correct.

Targeted skills

- Be able to express expectations and needs. Know how to communicate ideas clearly.
- Adopt active listening and establish positive professional relationships.
- Ability to analyze complex situations, evaluate available options, and make informed decisions based on organizational objectives.
- Know how to recruit, train, and develop team members, mobilize them around common goals, and foster a collaborative and productive work environment.
- Be able to identify, analyze, and solve problems encountered in the workplace using appropriate methods and tools.

Bibliography

Peretti, Jean-Marie, and Patrick Gilbert. *Management Styles: Choosing, Developing, and Implementing.* Paris, Dunod, 2014. Blanchard, Kenneth H., and Spencer Johnson. *The Management of Happiness.* Paris, Éditions d'Organisation, 2019.

Goleman, Daniel. *Leadership: The Power of Emotional Intelligence.* Paris, Harvard Business Review Press, 2017.

Lecomte, Jacques. *Benevolent Management: What We Gain by Recognizing the Value of Others.* Paris, Odile Jacob, 2017.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Elodie Gardet
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Places

- Le Bourget-du-Lac (73)

English (TOEIC level not achieved) S8 (LANG801_PCHY)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Open to exchange students:** Yes
ERASMUS reference: Languages

Presentation

Description

This course prepares students for the TOEIC ("Test of English for International Communication") exam, specifically to obtain a minimum score of 785 points (out of 990).

With the aim of developing all four skills, this course also serves as an introduction to public speaking through presentations given by students in groups or individually on topics illustrated by press articles or video materials (VTD: Video, Talk and Debate, as well as written work). Depending on the location (Annecy or Chambéry), some will be seen at different times during the semester, the year, or even the three years of training.

Students are assessed throughout each semester. The final assessment consists of a 1-hour, 1.5-hour, or 2-hour exam, depending on the semester, and accounts for 33% of the total continuous assessment.

Objectives

Specific objectives: at the end of this course, students will be able to:

revise grammar on: the correct reflexes of common structures; the verb group and tenses (except the conditional tense); the noun group and all its constituent elements; logical links (connecting words)

improve their grammar and vocabulary (general English and TOEIC-specific vocabulary) in class and independently, validating their progress through regular assessment tests

Teaching hours

Tutorials	Tutorials	40.5

Mandatory prerequisites

CEFR level B1

Course outline

1. **Oral**
   1. Elements of phonology
   2. Grammar (tenses, questions, adjectives...)
   3. Reinforcement of structures and vocabulary
   4. Interactive oral communication
   5. Introduction to and practice for the TOEIC (listening section)
2. **Writing**
   1. Review of grammatical elements (tenses, questioning, adjectives. ....)
   2. Translation (theme/version)
   3. Reading comprehension in authentic language
   4. Curriculum vitae (in S5, S6, or S7 at the latest)
   5. Cover letter/letter of motivation (in S5, S6, or S7 at the latest)
   6. Introduction and training for the TOEIC (reading section)

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Christophe Lambert

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Christophe.Lambert@univ-savoie.fr

Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Modern Languages (TOEIC Level Achieved) (LANG802_PCHY)

Polytech Annecy-Chambéry

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

List of courses

	Nature	Lecture	TD	Practical work	Credits
English S8	SUBJECT		15		
Modern Language 2	CHOICE				
Italian TD	Tutorial		8 p.m.		
German TD	TD		8 p.m.		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD	Tutorial		8 p.m.		
Advanced English S8	SUBJECT		9 p.m.		

Practical information

Contact

Course coordinator Christophe Lambert
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Christophe.Lambert@univ-savoie.fr

Locations

- Le Bourget-du-Lac (73)

English S8 (LANG802_PCHYM1)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course Director Christophe Lambert
+33 4 79 75 94 16
Christophe.Lambert@univ-savoie.fr

Location

> Le Bourget-du-Lac (73)

Campus

> Le Bourget-du-Lac / Savoie Technolac campus

Modern language 2

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Italian TD	Tutorial		20		
German TD	Tutorial		8 p.m.		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD	Tutorial		8 p.m.		
Advanced English S8	SUBJECT		9 p.m.		

Practical information

Location

Le Bourget-du-Lac (73)

Italian TD

Chambéry University Institute of Technology

In brief

- **Languages of instruction:** Italian
- **Open to exchange students:** Yes

Overview

Teaching hours

Italian TD - TD	Tutorials	20

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Intercomprehension of Romance Languages TD

ACCENTS
component

Presentation

Teaching hours

Intercomprehension of Romance Languages TD - TD	Tutorials	20

Skills acquired

Macro-skill	Micro-skills

Advanced English S8 (ENGL802_PCHY)

Polytech Annecy-Chambéry
component

Presentation

Teaching hours

Tutorial	Tutorials	21

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Christophe Lambert

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Locations

Le Bourget-du-Lac (73)

Optional internship S8 (PROJ800_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

The optional internship aims to enrich students' academic and professional experience by offering them a practical opportunity to apply their knowledge and acquire new skills. An optional internship can be carried out **in France or abroad**. It must comply with the same general conditions as compulsory internships.

Objectives

- **Acquisition of** specific skills related to the specialization;
- **Refining career goals and/or** gaining confidence and independence through the completion of a project or specific tasks;
- Establish valuable professional contacts that can help in future job searches.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator

Polytech-Bourget Business Relations

Relations-Entreprises.Polytech-Bourget@univ-savoie.fr

Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Support (half of the Thursdays when FISA is present) (ACCO801_PCHY)

Polytech Annecy-Chambéry
component

In brief

Teaching methods: In person **Teaching format:** Tutored project **Open to exchange students:** Yes

Presentation

Description

This support is open to all students at the school: students, apprentices, and Continuing Education employees. It is not mandatory, as it is primarily intended for students who need it to succeed in their training. This semester, it is scheduled into the timetable for each course, with a total of 16 hours.

Support may take the form of refresher courses, upgrading courses, or support in the main areas of the training programs.

Peer tutoring is encouraged and the educational resources of the Polytech Network are used (https://eplanet.polytech-reseau.org/).

Objectives

To promote the success of all students in their educational journey.

Teaching hours

PTUT	Tutored project	16

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Director of Training, Polytech

Locations

- Le Bourget-du-Lac (73)

UE802 Internship

ECTS
6 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lecture	Tutorial	Practical	Credits
Internship Assistant Engineer S8	MODULE				

Practical

Location

- Le Bourget-du-Lac (73)

UNIVERSITÉ SAVOIE MONT BLANC

S8 Assistant Engineer Internship (PROJ801_PCHY)

Polytech Annecy-Chambéry

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Presentation

Description

This is a professional internship as a technician or assistant engineer. The internship is to be carried out in a company or research organization on a topic closely related to the student's area of expertise, on a full-time basis and with a **maximum of 50% teleworking**.

Objectives

This internship, carried out within a company or organization whose activity is representative of the specialty chosen at the school, should enable students to:

- Integrate and participate in a professional organization;
- Discover professional methods and practices;
- Apply the student's theoretical and practical knowledge;
- Carry out tasks similar to those of technicians or assistant engineers.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator

Polytech-Bourget Business Relations

Relations-Entreprises.Polytech-Bourget@univ-savoie.fr

Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

UE803 Composite Design

ECTS
10 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Industrial product lifecycle management Composite structure mechanics 1	MODULE	9 hours	9	20	
Structural calculation - FEM Dynamics	MODULE 16.5 hours		hours		
	MODULE 16.5 hours		18		
			hours	8 p.m.	
Design Office Project	MODULE	3	7.5 hours	24	

Practical information

Locations

Le Bourget-du-Lac (73)

Industrial Product Life Cycle Management (GIND810_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French, English **Teaching methods:** In person
Teaching format: Lectures **Open to exchange students:** Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

The Product Lifecycle Management course aims to explain what Product Lifecycle Management (PLM) is and why it is necessary. It provides participants with the skills to establish technical specifications, use, configure, and implement information system tools dedicated to lifecycle management. Four main topics are covered in this course:
the environment in which products are developed, manufactured, and supported,
PLM components, such as the product repository, processes, and organization from the user's and administrator's perspectives
the positioning of the product's technical information system within the company's information system, ## the implementation of PLM, showing the stages of a project and typical activities such as change management

Objectives

Identify and define a design process
Define the company's organizational model associated with product design

Define a product repository

Teaching hours

Lectures	Lecture	9
Tutorial	Tutorials	9
Lab	Practical Work	20

Mandatory prerequisites

Operating systems # Databases
Design / Computer-aided design # Specifications
Production Methods

Course outline

1. Life cycle management within companies
2. The product repository
3. Process management and role management
4. Interfacing with the company's information system
5. Deployment within the company

Targeted skills

TC-1.1 - mastering the basics of operational management

TC-1.2 - being able to choose and/or implement tools and methods for project implementation TC-1.3 - being able to identify and mobilize resources in a specific scientific and technical field TC-1.4 - integrating the economic, financial, and/or legal aspects of the project

TC-1.5 - being able to evolve in a multi-stakeholder collaborative environment

TC-2.1 - by mastering the keys to effective communication

TC-2.2 - by making professional choices and implementing an appropriate strategy to achieve objectives and developing an assertive attitude

TC-2.3 - by evaluating and developing their skills in a learning environment

TC-3.1 - integrating into the company and progressing towards a career as an engineer

TC-3.2 - by taking into account industrial, economic, and professional issues TC-3.3 - by working in a multicultural and/or international context

TC-4.1 - by situating their activity in relation to the state of the art in knowledge and/or practices

MECA-1.1 - by monitoring multiple technologies and the competitive environment MECA-1.3 - by mastering functional and value analysis tools

Bibliography

PLM Collaborative Product Lifecycle Management, Denis Debaecker Hermes

Product Lifecycle Management: 21st Century Paradigm for Product Realization (Decision Engineering), John Starck Urbanizing the Company and Its Information System, Henri Chelli, Entreprendre informatique

And Suddenly the Inventor Appeared: The Ideas of TRIZ, 2nd ed., 2006, Genrich Altshuller

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Laurent Tabourot

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Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

UNIVERSITÉ SAVOIE MONT BLANC

Composite Structures Mechanics 1 (MECA820_MC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French, English **Teaching methods:** In person
Type of instruction: Lecture **Open to exchange students:** Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

Study of the mechanical behavior of basic plies, laminates, and sandwich structures: behavior laws of anisotropic plies and laminates, micromechanical laws in elasticity, and failure criteria for composites. Understanding the mathematical approach to the design of laminates and sandwich structures.

Objectives

Knowledge:

- Define a composite material from a technological and mechanical point of view for common plies and a laminated (multi-layer) structure
- Define the fundamental elastic mechanical properties of common plies using different homogenization methods (Mat, fabric, and unidirectional plies)
- Define and use the different failure criteria for unidirectional plies
- Dimension laminated and sandwich structures.

Teaching hours

Lectures	Lecture	16.5
Tutorial	Tutorials	18

Mandatory prerequisites

- Basics of statics and continuum mechanics.
- Knowledge of composite materials

Course outline

1. Introduction to composite materials: general information on laminated composites and their constituents.
    1. Composites: advantages and disadvantages
    2. Role of FEM in the design of composite structures
    3. Common properties of CM
2. Linear elastic behavior of composites
    1. Reminders about stresses and strains
    2. Behavior law of an isotropic material
    3. Behavior law of an anisotropic material
3. Methods for calculating elastic coefficients for composite folds
    1. Case of UD ply: mixing law, Halpin-Tsai relations, bounding approaches, and exact approaches
    2. Case of woven folds
    3. Case of mat ply
4. Break criteria
    1. Usual break characteristics
    2. Failure criteria adapted to UDs
    3. Damage concepts
5. Behavior law of a multilayer plate (with and without consideration of transverse shear)
    1. Presentation of laminate theory (Love-Kirchhoff)
    2. Applications to case studies
    3. Behavior law of a sandwich structure
        1. Presentation of sandwich theory
        2. Applications to case studies.

Targeted skills

Knowledge:

- Define a composite material from a technological and mechanical point of view of common folds and a laminated (multi-layer) structure

- Define the fundamental elastic mechanical properties of common plies using different homogenization methods (Mat, fabric, and unidirectional plies).
- Define and use the different failure criteria for unidirectional plies
- Dimension laminated and sandwich structures.

Bibliography

- Composite Material Structures: Finite Element Calculation, Michael Bruyneel, Jean-Charles Craveur, Philippe Jetteur. Dunod, Collection: Mechanics and Materials.
- Composite materials (6th ed.). Daniel Gay. May 2015. Publisher: Hermes Science Publications.
- Composite materials: Mechanical behavior and structural analysis. Jean-Marie Berthelot Edition Technique Et Documentation.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Manuel Lagache

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Locations

- Le Bourget-du-Lac (73)

Structural Calculation - Dynamic FEM (MECA821_MC)

Polytech Annecy-Chambéry
component

In brief

- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This course covers the fundamental concepts necessary for understanding finite element formulation in dynamics.

Objectives

By the end of this course, students will be able to: 1/Derive the expressions for the elementary stiffness, mass, and damping matrices. 2/Find the associated frequencies and natural modes. 3/Discuss the phenomenon of resonance. 4/Find the solution to the discretized problem using finite difference methods. 5/Interpret internal dynamic stress as an external load applied to the nodes of the finite element. 6/Analyze and represent the numerical results obtained.

Teaching hours

Lectures	Lecture	16.5
TP	Practical work	20

Mandatory prerequisites

Matrix Calculus - Fundamentals of Continuum Mechanics - Finite Element Method (Static).

Course outline

Elastic and viscoelastic behavior laws - Variational formulation in dynamics - Finite element dynamic analysis - Formulation of equations of motion - Evaluation of stiffness, mass, and damping matrices and assembly - Eigenvalue problem: matrix transformation methods, vector iteration methods, subspace methods - Dynamic reduction and substructuring - Finite difference method - Direct integration methods: implicit and explicit methods, stability and accuracy analysis, implementation, extension to nonlinear problems
- Numerical applications.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Jacques Ohayon

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Locations

Le Bourget-du-Lac (73)

Design Office Project (CMEC830_MC)

Polytech Annecy-Chambéry
Component

In brief

- **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

The technical project consists of designing, developing, and prototyping a part or system made of composite materials to meet a need expressed by a company or the school. Student teams must mobilize and develop all of their knowledge, skills, and interpersonal skills to successfully manage this authentic work situation. A rigorous project management approach will be necessary.

Objectives

This course aims to enable students to:

- Apply the scientific and technical concepts of the Mechanical Engineering program and the "Composite Materials" track
- Implement appropriate project management tools
- Take into account the financial dimension of a project
- Take into account group dynamics and customer relations
- Be aware of the environmental impacts of design choices

Teaching hours

Lectures	Lecture	3
Tutorial	Tutorials	7.5
Lab	Practical work	24

Course outline

Students' progress will be marked by assignments that enable them to make steady progress in their project:

- L5: Technical and Economic Study 2 (ETE2 - Consolidated Design-Dimensioning-Prototype-Budget)
- L6: Finite Element Modeling (FEM)
- L7-1: Project presentations
- L7-2: Product Qualification Validation (PQV)

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Yann Meyer
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Locations

> Le Bourget-du-Lac (73)

UE804 Composite Production

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Properties of Polymer Materials 2 Composite Manufacturing 1	MODULE 13h MODULE			24h	
Production Quality	11.5h			24h	
	MODULE 13.5 hours			12	
			12		

Practical information

Locations

Le Bourget-du-Lac (73)

Properties of Polymer Materials 2 (MATE820_MC)

Polytech Annecy-Chambéry
component

In brief

- **Open to exchange students:** Yes
- **ERASMUS reference:** Physical Sciences

Overview

Teaching hours

Lectures	Lecture	13
Lab	Practical work	24

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Location

- Le Bourget-du-Lac (73)

Composite Manufacturing 1 (FABR820_MC)

Polytech Annecy-Chambéry
Component

In brief

Languages of instruction: French **Teaching methods:** In person **Open to exchange students:** Yes **ERASMUS reference:** Physical Sciences

Presentation

Description

Presentation of the main materials used in the manufacture of composite parts and the associated transformation processes.

Objectives

Master the environment (markets and applications) and technology of composite materials through knowledge of their constituents (reinforcements and polymer matrices) and common manufacturing processes. Be able to choose a manufacturing process based on the specifications of a composite part.

Teaching hours

Lectures	Lecture	11.5
Lab	Practical work	24

Mandatory prerequisites

None

Course outline

1 – General information on composite materials (CM)

Components: resins, reinforcements, fillers Semi-finished products

Cores

2 – Standard manufacturing processes for composite material (CM) structures

3 – Testimonials and presentations from manufacturers in the CM industry

4 – Practical work

- TP1 (14 hours) Low-pressure injection molding (infusion, VARTM silicone sheet, RTM Light) and comparisons
- TP2 (7 hours) Vacuum molding of TD prepregs under aerospace conditions
- TP3 (7 hours) Molding of hollow parts on mandrels

Bibliography

- Course handouts and presentations on Moodle
- Thermosetting and thermoplastic composite solutions - JEC publication, 2006.
- Techniques for manufacturing mechanical parts from plastic or composite materials - Mechanical Engineering and Materials Guide - CETIM
- C. Bathias - Composite Materials - Usine Nouvelle, Dunod.
- Dunod Reference Guide - 4 volumes
- Engineering techniques - Plastics and Composites online database at www.techniques-ingenieur.fr

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Pascal Francescato

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Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Quality in Production (GIND811_MIMC)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

Presentation of the main quality control and monitoring procedures within a production unit or company, based on a set of specifications.

Objectives

Implement the tools necessary for product compliance by

- by modeling and optimizing a complex system using experimental designs
- using non-destructive testing devices
- applying the main quality monitoring processes in industrial production

Teaching hours

Lectures	Lecture	13.5
Tutorial	Tutorials	12
Lab	Practical work	12

Mandatory prerequisites

None

Course outline

1) Design of Experiments (DOE) (10.5 hours C/TD + 4 hours TP)

2) Presentation and experiments on some non-destructive testing methods applied to composite structures (6 hours of lectures/tutorials + 4 hours of practical work)

3) General processes in industrial quality control (10.5 hours of lectures/tutorials + 4 hours of practical work)

° Continuous improvement of PDCA (Plan-Do-Check-Act) processes

° Main methods and applications in real-life situations: Ishikawa's 5M method, Kaizen method, 5S method, Six Sigma method

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Pascal Francescato
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Locations

- Le Bourget-du-Lac (73)

UE901 Bridge to the professional world

ECTS
10 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lectures	Tutorial	Practical	Credits
Research and Development Project	MODULE				

	Type	CM	Tutorial	Practical	Credits
English (TOEIC level not achieved) S9	MODULE		40.5		
Modern languages (TOEIC level achieved)	MODULE				
English S9 Modern language 2	CHOICE		15		
German TD	SUBJECT TD		8		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Italian TD	TD		8 p.m.		
Intercomprehension of Romance Languages Advanced English Seminar S9	Tutorial SUBJECT		8 p.m. 9 p.m.		

	Nature	Lecture	Tutorial	Practical	Credits
Optional internship S9	MODULE				

Practical information

Locations

Le Bourget-du-Lac (73)

Research and Development Project (PROJ901_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

The Research and Development Project (PRD) is an educational activity involving a partnership between the PAC School and a professional organization or research laboratory.
This activity allows students to acquire (or strengthen) their experience in research and development.

Objectives

The PRD aims to strengthen engineering students' R&D skills by enabling them to

- carry out and manage a research and development project in an industrial or research context,
- apply and expand the skills acquired during their training in their specializations
- solve problems while taking into account constraints such as cost, deadlines, quality, etc.
- interact within a team,
- organize themselves to achieve set objectives by planning the various stages,
- effectively monitor progress.

Teaching hours

PTUT	Tutored project	15
PROJ	Project	125 hours

Mandatory prerequisites

The first year of the engineering program (FI3) for all specializations

Course outline

The first sessions are supervised by teaching and scientific tutors.

Students carry out bibliographic research, analysis, and synthesis work, partly independently.

Supervisors agree on regular meetings to review progress and provide the best possible support for students in completing their projects.

Bibliography

Depends on the R&D topic

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

- Le Bourget-du-Lac (73)

English (TOEIC level not achieved) S9 (LANG901_PCHY)

Polytech Annecy-Chambéry

Presentation

Description

This course prepares students for the TOEIC ("Test of English for International Communication") exam, specifically to achieve a minimum score of 785 points (out of 990).

With the aim of developing all four skills, this course also serves as an introduction to public speaking through presentations given by students in groups or individually on topics illustrated by press articles or video materials (VTD: Video, Talk and Debate, as well as written work). Depending on the location (Annecy or Chambéry), some will be seen at different times during the semester, the year, or even the three years of training.

Students are assessed throughout each semester. The final assessment consists of a 1-hour, 1.5-hour, or 2-hour exam, depending on the semester, and accounts for 33% of the total continuous assessment.

Objectives

Specific objectives: at the end of this course, students will be able to:

revise grammar on: the correct reflexes of common structures; the verb group and tenses (except the conditional tense); the noun group and all its constituent elements; logical links (connecting words)

improve their grammatical and lexical knowledge (general English and TOEIC-specific vocabulary) in class and independently, validating their progress through regular assessment tests.

Teaching hours

Tutorials	Tutorials	40.5

Mandatory prerequisites

CEFR level B1

Course outline

1. **Oral**
    1. Elements of phonology
    2. Grammar (tenses, questions, adjectives...)
    3. Reinforcement of structures and vocabulary
    4. Interactive oral communication
    5. Introduction to and practice for the TOEIC (listening section)
2. **Writing**
    1. Review of grammatical elements (tenses, questioning, adjectives. ....)
    2. Translation (theme/version)
    3. Reading comprehension in authentic language
    4. Curriculum vitae (in S5, S6, or S7 at the latest)
    5. Cover letter/letter of motivation (in S5, S6, or S7 at the latest)
    6. Introduction and training for the TOEIC (reading section)

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Christophe Lambert

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Christophe.Lambert@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Modern languages (TOEIC level achieved) (LANG902_PCHY)

Polytech Annecy-Chambéry

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
English S9	SUBJECT		15		
Modern Language 2	CHOICE				
German TD	Tutorial		8 p.m.		
Spanish TD	TD		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Italian TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD	Tutorial		8 p.m.		
Advanced English S9	SUBJECT		9 p.m.		

Practical information

Contact

Course coordinator Christophe Lambert
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Locations

Le Bourget-du-Lac (73)

English S9 (LANG902_PCHYM1)

Polytech Annecy-Chambéry
component

Presentation

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Christophe Lambert

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Locations

Le Bourget-du-Lac (73)

Modern Language 2

Polytech Annecy-Chambéry

List of courses

	Subject	Lectures	Tutorial	Practical	Credits
German TD	Tutorial		20		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Italian TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD	Tutorial		8 p.m.		
Advanced English S9	SUBJECT		9 p.m.		

Practical information

Location

- Le Bourget-du-Lac (73)

Advanced English S9 (ENGL902_PCHY)

Polytech Annecy-Chambéry

Presentation

Teaching hours

Tutorial	Tutorials	21

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Locations

> Le Bourget-du-Lac (73)

Optional internship S9 (PROJ900_PCHY)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

The optional internship aims to enrich students' academic and professional experience by offering them a practical opportunity to apply their knowledge and acquire new skills. An optional internship can be carried out **in France or abroad**. It must comply with the same general conditions as compulsory internships.

Objectives

- **Acquisition of** specific skills related to the specialization;
- **Refining career goals and/or** gaining confidence and independence through the completion of a project or specific tasks;
- Establish valuable professional contacts that can help in future job searches.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator

Polytech-Bourget Business Relations

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Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

UE902 Behavior of Composites

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Macromolecular Chemistry 2	MODULE	12	10.5	12 p.m.	
	MODULE	hours			
Extreme behaviors of composite structures Nonlinear behaviors	MODULE	21	3 p.m.		
		hours		4 p.m.	
		12	6		
			a.m.		

Practical information

Locations

Le Bourget-du-Lac (73)

Macromolecular Chemistry 2 (CHIM920_MC)

Annecy-Chambéry

Polytech component

In brief

- **Open to exchange students:** Yes
- **ERASMUS reference:** Physical sciences

Overview

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	10.5
Lab	Practical Work	12

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Locations

- Le Bourget-du-Lac (73)

Extreme behavior of composite structures (MECA923_MC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French, English **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

Study of the behavior of composite structures under damage, buckling, impact, and fatigue.

Objectives

Know how to dimension a multilayer composite structure taking damage into account, by developing dedicated professional tools. This knowledge requires:

° identifying the main causes and multi-scale damage processes in composite structures

° linking these multi-scale damage processes to real-world applications in order to assess the relevance of taking them into account in structural calculations

° knowing the criteria and multi-criteria for failure that can identify the onset of a damage mode

° knowledge of common damage models (brittle, progressive, continuous damage)

Teaching hours

Lectures	Lecture	21
Tutorial	Tutorials	3 p.m.

Mandatory prerequisites

Mechanics of composite structures in elasticity, theory of thin plates - Module MECA855_MC

Course outline

1 Damage to laminated structures Introduction - Progressive failure of laminates Failure analysis of UD-based laminates Failure modes - General principles.

Basic fracture modes Non-destructive testing techniques Principles of fracture mechanics Fracture criteria for UD folds:

° Tsai-Wu criterion

° Multi-criteria

° Multi-criteria comparisons

° Comparisons within the WWFE framework UD fold degradation models Brittle fracture models

Progressive fracture models

Implementation of these models and application to real cases

2 Fatigue, impact, and fracture of composites

Review of fatigue concepts for conventional materials. Introduction to laminate fatigue

Phenomenological description of laminate fracture Illustration with a few practical examples

3 Buckling of composite plates

Review of buckling theory

Introduction to buckling of composite beams

Bibliography

- F. Bollaert, A. Lemasçon - Failure analysis of plastic, elastomer, and composite parts - CETIM practical guide (1999).
- JM Berthelot - Composite Materials: Mechanical Behavior and Structural Analysis - 3rd Edition - Tec&Doc (1999).
- EJ Barbero - Introduction to composite material design - Taylor&Francis (1998).
- L. Daridon - Damage and fracture course - Faculty of Science, University of Montpellier II (2005).
- F. Laurin - Multiscale approach to progressive failure mechanisms in laminated materials and analysis of composite structures - Thesis UFC - ONERA (2005).
- YSN Reddy, CM Dakshina Moorthy, JN Reddy - Non-linear progressive failure analysis of laminated composite plates - Int. Jl. Non-Linear Mechanics, 30, No. 5, pp. 629-649 (1995).

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Manuel Lagache

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Locations

- Le Bourget-du-Lac (73)

Nonlinear Behaviors (MECA922_MC)

Polytech Annecy-Chambéry
component

In brief

- **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

Understand the main non-linear behaviors of structures and know how to use the associated numerical methods

Objectives

Be able to:

- understand the importance of non-linearities in an analysis
- find a nonlinear material behavior law based on experimental data
- model and use numerical tools to solve a nonlinear mechanical problem

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	6
Lab	Practical Work	16

Mandatory prerequisites

- MECA511 Mechanics of Continuous Media
- MECA652 Strength of Materials
- MECA754 Modeling, Finite Elements

Course outline

1. Presentation: importance of nonlinearity in structural behavior
2. Geometric nonlinearities
3. Material nonlinearities
4. Internal forces and tangent matrices
5. Numerical resolution of nonlinearities

Bibliography

- GA. Holzapfel, Nonlinear solid mechanics, Wiley
- WN. Findley et al., Creep and relaxation of nonlinear viscoelastic materials, Dover

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Philippe Saffre

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Philippe.Saffre@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

UE903 Composite Design

ECTS
5 credits

Polytech Annecy-Chambéry
Component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Mechanics of Composite Structures 2	MODULE	15 hours	13.5	8	
Composite design and calculations	MODULE	7.5 hours	13.5 hours	16	

Practical information

Locations

Le Bourget-du-Lac (73)

Composite Structures Mechanics 2 (MECA930_MC)

Polytech Annecy-Chambéry
component

In

Teaching methods: In person

Open to exchange students: Yes

ERASMUS reference: Engineering and related techniques

Overview

Description

This course will cover the design of composite structures using thin plate and thick plate theories under thermoelastic and hygrothermal loads.

Objectives

This course aims to enable students to:

- Dimensioning a multilayer composite structure according to thin plate theory
- dimensioning a multilayer composite structure according to thick plate theory
- take into account the effects of temperature and humidity on the dimensioning of a multilayer composite structure
- create calculation tools dedicated to the dimensioning of a multilayer composite structure
- write a calculation note analyzing the results obtained on concrete problems

Teaching hours

Lectures	Lecture	15
Tutorial	Tutorials	13.5
Lab	Practical Work	8

Course outline

1. Review of classical theory of thin laminates (Love-Kirchhoff)
2. General concepts of composite part design
3. Theory of thick laminates (Reissner-Mindlin): consideration of transverse shear
4. Study of thermal stresses and deformations
5. Behavior of composite structures in humid environments

Bibliography

Barbero E.J. - Introduction to composite materials design - Ed. Taylor & Francis, 1999.

Berthelot J.M. - Composite materials: mechanical behavior and structural analysis - 3rd edition Tec & Doc, 1999. Dessarthe A. - Design of mechanical parts in plastic and composite materials - CETIM, 1993.

Gay D. - Composite Materials - Ed. Hermès, 4th edition, 1997.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course Director Yann Meyer

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Location

> Le Bourget-du-Lac (73)

Composite design and calculations (MECA921_MC)

Polytech Annecy-Chambéry
component

In brief

- **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

Learning methods and tools for structuring the design and dimensioning process for composite structures.

Learning methods and tools for structuring the design process and design of composite structures.

Objectives

Be able to:

- model a composite structure
- determine all the results needed to dimension a composite structure
- post-process the results from a finite element method simulation

Teaching hours

Lectures	Lecture	7.5
Tutorial	Tutorials	13.5
Lab	Practical work	16

Mandatory prerequisites

- Design and dimensioning
- Mechanics of composite structures

Course outline

1. Shell theory
    1. Introduction
    2. Assumptions of shell theory
    3. Mindlin's finite elements
    4. Post-processing
2. EF modeling of composite structures
    1. Introduction
    2. Choice of element types
    3. Hooke matrix
    4. Homogenization
    5. Definition of layer stacking
    6. Modeling a laminate
    7. Modeling a sandwich
    8. Calculation and post-processing
    9. Shear stresses in shells
3. Accounting for damage
    1. Review of the different types of damage in composite structures
    2. Simple programming of a progressive analysis to failure adapted to finite elements

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Philippe Saffre

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Locations

- Le Bourget-du-Lac (73)

UE904 Composite Production

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Composite manufacturing 2 Instrumental methods	MODULE	4.5 hours	4.5	24h	
Composite Design Project	MODULE	13.5 hours		20h	
	MODULE			34	
					3 credits

Practical information

Locations

> Le Bourget-du-Lac (73)

Composite Manufacturing 2 (FABR920_MC)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In-person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

Discovery and analysis of transformation methods for manufacturing high-performance (HP) composite parts.

Objectives

Learn about the main manufacturing processes for high-performance composites, master and analyze the parameters of the associated processes, including those related to thermal and energy parameters.

Teaching hours

Lectures	Lecture	4.5
Tutorial	Tutorials	4.5
Lab	Practical work	24

Mandatory prerequisites

None

Course outline

1 - Innovative processes and materials for manufacturing high-performance composite structures

° Overview of the main manufacturing processes for thermosetting composites with continuous fibers

° Challenges in manufacturing processes for thermoplastic composites with long fibers and continuous fibers

° Innovative rapid hot/cold processes: Roctool®, QURE Manufacturing process, QSP®, others

2 - General heating principles used in the composites industry: oven, autoclave, air and oil temperature controllers, heating: IR, induction, microwave

3 - Practical work

- TP1: Molding of TDFC and TPFC prepregs using a press-clave
- TP2: Hot RTM injection
- TP3: Development and thermocompression of continuous fiber thermoplastic composites (TPFC)
- TP4: Quality control and comparison of the mechanical performance of manufactured structures with theory

Bibliography

- Course booklet by P. Francescato
- Thermosetting and thermoplastic composite solutions - JEC publication, 2006.
- Techniques for manufacturing mechanical parts from plastic or composite materials - Mechanics and Materials Guide - CETIM
- C. Bathias - Composite Materials - Usine Nouvelle, Dunod.
- Dunod Reference Guide - 4 volumes
- Engineering techniques - Online plastics and composites database at www.techniques-ingenieur.fr

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Pascal Francescato

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Locations

- Le Bourget-du-Lac (73)

Campus

- Le Bourget-du-Lac / Savoie Technolac campus

Instrumental Methods (FABR922_MC)

Polytech Annecy-Chambéry
component

In brief

Open to exchange students: Yes

ERASMUS reference: Engineering and related techniques

Overview

Teaching hours

Lectures	Lectures	13.5
Practical	Practical work	20

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Anne-Cecile Grillet

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Locations

- Le Bourget-du-Lac (73)

Composite Design Project (CMEC930_MC)

ECTS
3 credits

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French, English **Teaching methods:** In person
- **Type of instruction:** Practical work **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

Address the design and dimensioning of composite structures (laminates, sandwiches, etc.) for specific cases.

- Learn how to use finite element software specific to composite structures.
- Perform finite element dimensioning of composite structures (elastic, dynamic, and at failure).
- Produce a calculation note for a composite application.
- Create surface and volume models in CAD applied to plastic or composite structures.
- Produce all or part of a structure (composite, 3D printing, etc.).

Objectives

Address the design and dimensioning of composite structures (laminates, sandwiches, etc.) for specific cases.

- Propose a technical solution for a composite structure based on specifications and standards.
- Create surface and/or volume CAD models applied to plastic or composite structures.
- Perform finite element dimensioning of composite structures (elastic, dynamic, and rupture) in a specific case.
- Produce a calculation note for a composite application.
- Implementation of a prototype.

- Perform mechanical tests to verify the dimensioning.

Teaching hours

Practical work	Practical work	34

Mandatory prerequisites

Mastery of general mechanics concepts (stresses, deformations, behavior laws, anisotropy). Finite element basics for composite structures. Composite structure pre-dimensioning method.

Basics of composite structure implementation.

Course outline

1. Functional analysis of the structure based on specifications/standards. Production of a state-of-the-art report.
2. Proposal of a solution. Creation of a CAD drawing. Preliminary dimensioning. Development/modifications of the CAD drawing based on the preliminary dimensioning.
3. Drafting of a calculation note and verification of dimensions.
4. Proposal and technical/economic analysis of a manufacturing process suitable for series production and prototypes.
5. Production of prototypes. Mechanical testing of prototypes/samples.
6. Drafting of a report.

Targeted skills

Design and pre-dimension/dimension a composite structure. Carry out a complete process of design, dimensioning, prototype production, and mechanical testing on industrial structures (in the plastics and composites sector).

Bibliography

- Composite Material Structures: Finite Element Calculation, Michael Bruyneel, Jean-Charles Craveur, Philippe Jetteur. Dunod, Collection: Mechanics and Materials.
- Composite Materials (6th ed.). Daniel Gay. May 2015. Publisher: Hermes Science Publications.
- Composite materials: Mechanical behavior and structural analysis. Jean-Marie Berthelot. Publisher Technique Et Documentation.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Manuel Lagache
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Locations

Le Bourget-du-Lac (73)

UE001 Engineering internship

ECTS
30 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lecture	Tutorial	Practical	Credits
S10 Engineering Internship	MODULE				

Practical information

Locations

- Le Bourget-du-Lac (73)

Engineering internship S10 (PROJ001_PCHY)

Polytech Annecy-Chambéry

Presentation

Description

The internship must be carried out in a company or research organization related to the student's area of expertise, on a full-time basis and with a **maximum of 50% teleworking**.

Objectives

This is an internship carried out within a company or research laboratory, department, or organization whose activity is representative of the student's specialty. This internship should enable the student to:

- the student to apply their theoretical and practical knowledge;
- verify their aptitude for engineering functions.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator

Polytech-Bourget Business Relations

Relations-Entreprises.Polytech-Bourget@univ-savoie.fr

UE501 SHES - Languages

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Labor law and corporate structure 1	MODULE	20 hours	12 hours		
Introduction to Sustainable Development and CSR - Cognitive Development English	MODULE MODULE	16 hours	12 hours 37	4	

	Nature	CM	Tutorial	Practical work	Credits
Support (every Thursday afternoon)	MODULE				

Labor Law and Business Structure 1 (SHES510_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

Common economic concepts used to describe the economic situation of a company, their content and meaning, and understanding the distinction between economic and financial concepts.

Concepts of labor law.

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
understand the major changes in the economic world (production economy/market economy) and the elements of the business environment, their roles, and their expectations.	Master	understand the economic workings of their company and/or projects
understand the challenges facing the company and why a company must evolve.	Master	Participate in the necessary evolution of the company

both in terms of its services (adaptation to demand, innovation) and its organization (cost reduction, continuous improvement)		
be familiar with the economic terms commonly used to describe the economic situation of a company, their content and meaning, and know and understand the distinction between economics and finance	Proficiency	read an income statement and a balance sheet
		draw up a simple provisional budget and an economic approach to an improvement measure
Have a basic understanding of labor law	Know	Knowing your rights within the company

Teaching hours

Lectures	Lecture	20
Tutorial	Tutorials	12

Mandatory prerequisites

- Have completed an internship in a company
- Knowledge of basic economic vocabulary
- Knowledge of the company, its structure, and its management

Course outline

1. Knowledge of the company
    - The economic environment (customers, suppliers, shareholders, banks, government, local authorities, social organizations, competitors, social partners, etc.)
    - Changes in the economic world and their impact on fundamental economic reasoning (market economy, globalization, etc.)
    - Customer needs, the need for innovation
    - Different possible scenarios for increasing profits
    - The concept of useful value for the customer and economic waste
2. The concept of economics
    - Definition of key terms in the income statement (impact of inventory, depreciation mechanism, payroll and its components, taxes, profits, availability of earnings)
    - Definition of key terms in the balance sheet (fixed assets, receivables/payables, concept of provisions and risk, financing: share capital and loans)

- The dynamics between the income statement and the balance sheet (main mechanisms, interests of the various stakeholders: shareholders, bankers, employees, etc.)
- Company cash flow and its availability over time (VAT mechanism, depreciation, and loans)
- Implementation of economic indicators at the workshop level (types of indicators, limitations)
- Drawing up a simple provisional budget (principle)

3. Introduction to legislation

- Different types of employment contracts
- The powers of the employer
- Working conditions
- Remuneration for work
- Events affecting the employment contract
- Termination of the employment contract
- Procedures and consequences of dismissal
- Employee representation

Additional information

Bibliography

My small business day-to-day. From balance sheets to financial analysis: understanding, managing, analyzing Nadine BONHIVERS

BUSINESS solutions

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Véronique Saudrais

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Introduction to Sustainable Development and CSR - Cognitive Development (SHES511_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes

Presentation

Description

The Cognitive Development course aims to open engineering students' minds to SHEJS and provide them with useful guidelines for advancing their projects, both personally and professionally.

The Sustainable Development section lays the foundations for ethics and CSR.

Objectives

Acquire benchmarks and tools to optimize learning

Learn the basics of corporate social responsibility and sustainable development

Teaching hours

Lectures	Lecture	16
Tutorial	Tutorials	12
Lab	Practical Work	4

Mandatory prerequisites

None

Course outline

1. Introduction to Sustainable Development

- Why companies take the environment into account in their strategy (environmental issues, industrial accident prevention, environmental regulations, etc.).
- Introduce the environmental management system (as defined by ISO 14001), its principles, organization, and benefits for businesses.
- Introduce other environmental approaches and how they fit together (energy management, carbon accounting, and eco-design). Regulatory aspects are also introduced.

2. Cognitive development.

- Understanding SHEJS and their usefulness in engineering training programs.
- Finding your bearings to carry out a project in the broadest sense (neuroscience: plasticity and objectives, the importance of defining objectives, mental processes including memorization and the forgetting curve, etc.)
- Finding your bearings to optimize learning (neuroscience: 4 pillars of learning, role of attention, VAKOG model. ....)
- Finding your bearings to be effective (optimal conditions for brain use, identification of personality profiles - "Brain Preferences" model -, organization, identification of resources.)

Additional information

Bibliography

CSR and sustainable development: Labels, reporting, CSRD, ISO 26000, SDGs - Alain Jounot My Stroke of Insight: The Journey Inside the Human Brain -

Dr. Jill Bolte Taylor

Inaugural lecture at the Collège de France "Towards a science of mental life" - Stanislas Dehaene Face to face with your brain - Stanislas Dehaene

A Day in Anna's Brain - Sylvie Chokron Cognition: Theories and Applications - Reed,

Stephen K.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Sandrine Vieules-Rosset +33 4 50 09 65 05
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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

English (LANG510_PACYFISA)

Polytech Annecy-Chambéry

In brief

Languages of instruction: English, French **Teaching methods:** In person **Teaching format:** Tutorials **Open to exchange students:** Yes **ERASMUS reference:** Languages

Presentation

Description

This course prepares students for the TOEIC ("Test of English for International Communication") exam, specifically to achieve a minimum score of 785 points (out of 990).

With the aim of developing all four skills, this course also serves as an introduction to public speaking through presentations given by students in groups or individually on topics illustrated by press articles or video materials (VTD: Video, Talk and Debate, as well as written work).

Students are assessed throughout each semester.

Objectives

Specific objectives: at the end of this course, students will be able to:

listen regularly to news on English-language news sites (CNN, BBC, Sky News, etc.) and be able to succinctly summarize the main points orally, interacting with the class

work with a variety of audio and video materials and speak spontaneously in an interactive manner with the class

speak in a prepared manner and interact spontaneously through individual presentations (self-presentation and/or article summaries, such as "quizzes") and presentations in pairs (various topics)

work on telephone conversations (comprehension/production)

Practice TOEIC exercises (4 listening comprehension sections) + full tests

Teaching hours

Tutorials	Tutorials	37

Mandatory prerequisites

CEFR level B1

Course outline

Course outline

1. **Oral**
    1. Elements of phonology
    2. Grammar (tenses, questions, adjectives...)
    3. Reinforcement of structures and vocabulary
    4. Interactive oral communication
    5. Introduction to and practice for the TOEIC (listening section)
2. **Writing**
    1. Review of grammatical elements (tenses, questioning, adjectives. ....)
    2. Translation (theme/version)
    3. Reading comprehension in authentic language
    4. Curriculum vitae (in S5, S6, or S7 at the latest)
    5. Cover letter/letter of motivation (in S5, S6, or S7 at the latest)
    6. Introduction and training for the TOEIC (reading section)

Additional information

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE502 Work experience

ECTS
4 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Project 1 (Launch and follow-up)	MODULE	1		4	
Evolution in the workplace	MODULE				

Project 1 (Launch and monitoring) (PROJ501_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Teaching methods:** In person
- **Teaching format:** Learning and assessment situations
- **Open to exchange students:** Yes

Presentation

Description

Understanding the host company and the expectations of the engineering profession

Take a step back to look at the integration process and the effectiveness of the company's approach to monitoring apprentices

Objectives

Identify the essential workings of the company

Understand your place within the company and take a step back to look at it objectively Understand the

expectations of the engineering profession

Teaching hours

Lectures	Lecture	1
Lab	Practical work	4
Other	Other	2

Mandatory prerequisites

None

Course outline

Launch

Support: developing an action plan to ensure the success of your project

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Sandrine Vieules-Rosset +33 4 50 09 65 05
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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Corporate Development (STAG501_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Teaching methods:** In person
- **Teaching format:** Learning and assessment situations
- **Open to exchange students:** Yes

Presentation

Description

Analysis of the apprentice's progress during their integration into the company.

Objectives

The tasks assigned to the apprentice should enable them to discover the company.

Mandatory prerequisites

None

Course outline

An assessment carried out by the company in January.

Additional information

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Sandrine Vieules-Rosset +33 4 50 09 65 05

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE503 Scientific training

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Mathematics for Engineers	MODULE	16	24		
Mechanism statics	MODULE	10 a.m.	10		
Kinematics	MODULE	10 a.m.	10		
Strength of Materials	MODULE	8 p.m.	20		

Mathematics for Engineers (MATH510_GICM)

Polytech Annecy-Chambéry
component

Time of year Fall

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Mathematics and Statistics

Presentation

Description

Present modeling and calculation methods and tools useful to engineers.
Provide the necessary foundations for understanding the tools that will be used in other modules of the program.

Objectives

Use linear algebra, matrix calculus, and the solution of linear differential systems with constant coefficients. Use the representation of functions by series, Fourier transforms, and Laplace transforms.

Teaching hours

Lectures	Lecture	16
Tutorial	Tutorials	24

Mandatory prerequisites

Basic knowledge of analysis (function study, derivation, integration, etc.) and algebra (vectors, matrices, etc.).

Course outline

Polynomials Complex numbers

Fourier series

Laplace transform Matrices and matrix calculus

Linear equation systems Differential systems

Problem solving with Matlab

Additional information

Bibliography

Mathematics for Engineers Yves Leroyer

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Francois Leplus

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Location

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Mechanism Statics (MECA510_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

In mechanics, statics describes situations where a system of solids is in equilibrium. It provides us with the tools to describe the forces at play and how they compensate each other. It is a fundamental tool for any mechanic.

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
put into apply static solids.	Master	identify cases of application of .
		model and parameterize a static problem.
		to act on the parameters of a system to dimension it.

Teaching hours

Lectures	Lecture	1C
Tutorial	Tutorials	10 a.m.

Mandatory prerequisites

Basic vector calculus: concept of vectors, sum, scalar product, projection, vector product.

Course outline

The course is structured as follows:

1. Positioning the problem: concept of solids.
2. Concepts of force and torque.
3. Introduction to mechanical action torque.
4. Perfect mechanical connections.
5. Contact between solids and Coulomb's law.
6. Concept of inertial reference frame.
7. Fundamental principle of statics.

Each class session introduces new theoretical concepts and offers practical applications. Tutorials are conducted by students in a flipped classroom setting.

Additional information

Bibliography

Mechanics Volume 1: Modeling, Kinematics, Statics

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Ludovic Charleux

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Kinematics (MECA512_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

Kinematics is the branch of mechanics that studies the motion of rigid bodies without taking into account the forces that generate them. In practice, we want to be able to model an existing system and configure it so that we can understand how its constituent elements will move based on the parameters. It is then possible to modify the parameters to adjust its kinematics according to our needs. This course will provide you with the concepts you need to achieve these objectives.

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
model a kinematic problem in order to master its design.	Master	identify problems requiring the use of solid kinematics.
		to parameterize this problem and establish the desired kinematic relationships.

		to adjust the parameters of the problem in order to dimension it.

Teaching hours

Lectures	Lecture	10
TD	Tutorials	10

Mandatory prerequisites

1. Mathematics: vector calculus, in particular the derivation of vectors with respect to time. Torsors.
2. Mechanics: statics. Point mechanics: concepts of reference frames, velocity, and acceleration.

Course outline

In this course, we will focus exclusively on the case of non-deformable solids. In this context, the course will be structured as follows:

1. Concept of reference frame.
2. Position vector.
3. Coincident point.
4. Velocity and acceleration vectors.
5. Change of reference frame and Bour's formula.
6. Concept of solids: definition of deformability, equiprojective field, and introduction of the velocity field of a deformable solid.
7. Kinematics tensor: link with indeformability, concept of rotational velocity and velocity field, review of Varignon's relation.
8. Perfect connections, contact, rolling without slippage.
9. Contact between solids: sliding contact, rolling without slipping.

The lectures aim to introduce new concepts with a practical application. The tutorials are led by students in a flipped classroom setting.

Additional information

Bibliography

General Mechanics: Course and Applications with Exercises and Solved Problems Jean-Claude Bône

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Ludovic Charleux

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Ludovic.Charleux@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Strength of Materials (MECA520_GICM)

Polytech Annecy-Chambéry

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This course is an introduction to the mechanics of beam-type structures. It presents the behavior of these structures in response to simple stresses, as well as the main tools for conducting design studies. Hyperstatic problems are then addressed, based on elastic deformation energy.

Objectives

Know how to construct a beam calculation model

Know how to perform preliminary beam dimensioning calculations

Know how to use the results of a beam calculation

Teaching hours

Lectures	Lecture	20
Tutorial	Tutorials	20

Mandatory prerequisites

- Basic knowledge of mechanics and mathematics
- Basic industrial design concepts
- Basic concepts of statics,
- Basic knowledge of linear algebra

Course outline

Know the types of mechanical tests performed on materials and their properties

Know how to calculate internal forces in a beam and determine the associated stress diagrams Know how to deal with simple stress cases

Know how to apply mechanical strength criteria Know how to study a hyperstatic beam

problem

Additional information

Bibliography

- P. Agati, F. Lerouge, M. Rossetto, "Résistance des matériaux" (Strength of Materials), published by Dunod
- J.L. Fanchon, "Guide de mécanique" (Mechanics Guide), published by Nathan

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Pascal Hernandez

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Locations

- Annecy (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE504 Engineering Methodology

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lectures	Tutorial	Practical	Credits
Industrialization for machining	MODULE	28 hours	4 hours	8	
Obtaining raw materials for machining	MODULE	20 hours	20 hours		
Total quality	MODULE	32 hours			
Introduction to industrial management	MODULE	32			

UNIVERSITÉ SAVOIE MONT BLANC

Industrialization for Machining (FABR510_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

Know the main manufacturing processes, their characteristics, and the associated terminology. Understand and apply ISO programming for a part for a numerically controlled machine tool. Be able to define manufacturing dimensions.

Be able to participate in the design of the tools required for manufacturing.

Objectives

Know the main manufacturing processes, their characteristics, and the associated terminology. Understand and apply ISO programming of a part for a numerically controlled machine tool. Be able to define manufacturing dimensions.

Be able to participate in the design of the tools required for manufacturing.

Teaching hours

Lectures	Lecture	28
Tutorial	Tutorials	4
Lab	Practical work	8

Mandatory prerequisites

Traditional inventory management

Technical drawing and functional dimensioning,

Basic concepts in materials,

Manufacturing methods,

Performance criteria (cost, quality, lead time),

The company and its suppliers

Course outline

Machining

Machine programming

Numerically controlled tools

Analysis and determination of manufacturing dimensions

Determination of cutting conditions

Additional information

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Marc Villetard

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Locations

- Annecy (74)

Campus

- Annecy / Annecy-le-Vieux campus

Obtaining rough machined parts (FABR511_GI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

This course provides an introduction to the main processes used in the production of raw materials.

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
understand the main processes used to produce rough castings, their characteristics, and the associated terminology.	Master	define the raw material to be selected
understand customer requirements and translate them into specifications	Master	Discuss with subcontractors the choice and determination of raw materials
define crude oil pricing	Concept	of quoting a crude oil price

participate in the design of tools necessary for this development	Concept	dimensioning and participating in the design of tools

Teaching hours

Lectures	Lecture	20
Tutorial	Tutorials	20

Mandatory prerequisites

- Traditional inventory management
- Technical drawing and functional dimensioning
- Basic concepts in materials,
- Manufacturing methods,
- Performance criteria (cost, quality, lead time),
- The company and its suppliers

Course outline

1. Definition of the main manufacturing processes for raw parts:
2. Permanent and non-permanent mold casting
3. Forging, stamping, extrusion
4. Sheet metal forming (cutting, bending, stamping)
5. Electrical discharge machining
6. Ultrasonic machining
7. Plastic injection molding and mold industry
8. Part assembly (welding, bonding)

Additional information

Bibliography

- Engineering techniques
- AFNOR Nathan series
- Professional documents (Foundry Union, ADETIEF, Plastics Industry, etc.)

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Ludovic Schiff
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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Total Quality (GIND511_GICM)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes
ERASMUS reference: Engineering and related techniques

Overview

Description

The objective of this course is to:

- Understand the impact of quality management on commercial, human, economic, financial, and production aspects • Situate quality management within the company
- Position oneself in relation to quality management systems as an actor and driver of progress initiatives, in terms of quality and leverage for improvement.
- Understand the objectives and mechanisms of quality assurance

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
identify the role of "management" into the company's system and understand the evolution of quality and contemporary constraints	Application	to integrate themselves into quality and the company

place quality in the context of commercial relations and link quality management to production management	Application	Contribute to quality interactions with the company's sales and production management departments
understand the expectations of an integrated quality management system and the structure of ISO 9001	Application	participate in the implementation of the quality system within the company
integrate quality tools into continuous improvement processes, understand the breakdown and types of quality costs, and assimilate the principles related to auditing	Application	apply quality tools in company projects
understand the basics of ISO 14001	Application	Work in a context governed by ISO 14001

Teaching hours

Lectures	Lecture	32

Mandatory prerequisites

Basic understanding of how businesses operate

Course outline

1. Introduction to quality management: This section covers the different stages in the evolution of quality and positions the customer in terms of requirements relating to costs, quality, and deadlines:
    - Evolution of quality management: from corrective action to prevention
    - Positioning the company in relation to customer requirements
    - Non-quality and over-quality: two economic scourges for the company
    - The position of quality in the company's supply chain
    - Principles related to the integrated quality management system
    - Normative principles
2. Structure of ISO 9001: This section explains the requirements of the standard and the structural and documentary organization applied to the company.
    - The 5 requirements of the standard
    - The process approach, general mapping, and process mapping
    - The quality documentation structure
    - The 6 mandatory procedures of the standard
    - The different chapters

3. Continuous improvement approach and introduction to quality tools: This section sets out the concepts of tools and methodologies associated with quality improvement 3.1. Continuous improvement according to DEMING and S.TOYODA (Kaizen)

- Common tools related to continuous improvement and indicators
- The principle of the "zero defect" workstation and process: Poka Yoké
- Management of measurement resources
- Audits

4. Introduction to the environment: This section positions the environment in terms of sustainable development and outlines the requirements of the standard based on factual elements.

- Ecological findings and the company's impact on the environment
- Principles relating to industrial operating declarations and authorizations
- Types of waste, sorting, and disposal channels
- The ISO 14001 standard broken down into PDCA

Additional information

Bibliography

The Big Book of Quality - Quality Management in Industry, a Matter of Methods (2nd edition).

Roger Ernoul (Author)

Skills acquired

Macro-skills	Micro-skills

Practical information

Contacts

Course coordinator Pascale Pissard-Maillet +33 4 79 75 85 85

Pascale.Pissard-Maillet1@univ-savoie.fr

Locations

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Campus

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UNIVERSITÉ SAVOIE MONT BLANC

Introduction to Industrial Management (GIND510_GICM)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

The objective of this course is to:

- Understand the role of production management and its place within a company
- Understand the mechanisms and different tasks involved in production management
- Understand the importance and functioning of inventory management in the operation of the company
    - From an economic perspective
    - Financially
- Learn traditional workshop management methods, workshop coordination, and harmonization.
- Manage and plan a simple project
- Learn and understand the mechanisms of KANBAN workshop management
- Position yourself in relation to production management as an actor

Objectives

The objective of this course is to:

- Understand the role of production management and its place within the company
- Understand the mechanisms and different tasks involved in production management

- Understand the importance and functioning of inventory management in the operation of the company
  - From an economic perspective
  - Financially
- Learn traditional workshop management methods, workshop coordination, and harmonization.
- Manage and plan a simple project
- Learn and understand the mechanisms of KANBAN workshop management
- Position yourself in relation to production management as an actor

Teaching hours

CM	Lecture	32 hours

Mandatory prerequisites

Process concepts

Economic and financial concepts

Course outline

1. **Introduction to production management**: This section includes definitions of production management terminology and components, including the following concepts:
   1. Types of flows, supply chain, deadlines in terms of contractual data binding the supplier to its customer
   2. Positioning of production management within the company
   3. Key questions raised by production management
   4. Terminology of functions, duties, and responsibilities
   5. The concept of service rate
2. **Technical databases for production management**: This section establishes an inventory of the technical data required by production management to fulfill its mission
   1. Engineering bill of materials and manufacturing bill of materials
   2. Relationship between bill of materials and cost price
   3. Technical data contained in a range
3. **Introduction to requirements calculations and planning**: This section explains the different levels of planning and how requirements are calculated
   1. The PIC, PDP, and workshop scheduling
   2. Calculating supply requirements (CBB and CBN)
   3. Methods for calculating overall and detailed loads
   4. Concepts of load, capacity, and load rate
   5. Impact of false capacity on load rate and lead times (TRS)
   6. The basics and principles of planning (GANTT)
4. **Introduction to inventory management**: This section positions inventory in economic and financial terms, highlighting the importance of this function in the "business" system. It also aims to demonstrate that inventory reveals our professional shortcomings
   1. Impact of inventory on the company's results and cash flow

2. Functional positions, duties, and responsibilities related to inventory
3. Costs associated with inventory management, awareness of economic quantity
4. Inventory valuation (FIFO, LIFO, and PMP)

5. **Introduction to workshop management**: This section focuses on physical and information flows in the workshop, taking into account the LEAN manufacturing dimension
    1. Push flow management in the workshop, bottleneck management
    2. Workshop scheduling (planning, sequencer, etc.)
    3. Workshop management using specific KANBAN systems
    4. Generic KANBAN workshop management (KANBAN game)

Additional information

Bibliography

Industrial management practices Organization, methods, and

tools

Georges Javel

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Pascal
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Locations

- Annecy (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE601 SHES - Languages

ECTS
4 credits

Polytech Annecy-Chambéry

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Introduction to sustainable development and CSR	MODULE	6 hours	4		
Sustainable development - Site approach (Environmental management)	MODULE	4	6		

	Nature	CM	Tutorial	Practical	Credits
Support (every Thursday afternoon when FISA staff are present)	MODULE				

	Nature	CM	Tutorial	Practical	Credits
English (TOEIC level not achieved)	MODULE		30 hours		
English (TOEIC level achieved)	MODULE		30		

Introduction to sustainable development and CSR (SHES611_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

Global warming and sustainable development Responses and strategy

GEDES

Objectives

Acquire a foundation of knowledge and skills in ecological transition for sustainable development (TEDS)

Teaching hours

Lectures	Lectures	6
Tutorial	Tutorials	4

Mandatory prerequisites

Basic knowledge of the environment

Course outline

Understanding global warming: causes, consequences, global challenges, and implications for industry

- Understanding the evolution of the concept of sustainable development;
- Understand responses to the climate crisis and identify different approaches (international agreements, legislative framework, climate strategy);
- Develop a strategic vision to integrate climate issues and the need for ecological transition for an industrial company;
- Understand what a Greenhouse Gas Emissions Assessment (GHGEA) is;
- Understand the GHG inventory methodology and know how to carry out a GHG inventory for an industrial company;
- Identify concrete actions to reduce GHG emissions and develop an action plan based on the project mode.

Additional information

Bibliography

Global Warming John Houghton

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Claire Roset

Course coordinator Laure Comble

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Sustainable Development - Site Approach (Environmental Management) (SHES612_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Overview

Description

Energy production and environmental issues

Objectives

Acquire a foundation of knowledge on energy issues, energy production systems, and the methodology for implementing an energy transition strategy.

Teaching hours

Lectures	Lecture	4
Tutorial	Tutorials	6

Mandatory prerequisites

Basic knowledge of the environment

Course outline

1. Understanding the main challenges of global energy production
2. Understand the current energy situation in France, energy transition scenarios, and public policies for achieving carbon neutrality;
3. Introduction to the building sector: present the different energy systems available for powering a building and understand the advantages and disadvantages of each;
4. Understanding the challenges of building regulations;
5. Understand the methodology and tools for implementing an energy transition strategy for existing buildings;
6. Gain an understanding of the financing of the energy transition.

Additional information

Bibliography

Energy transition and climate 1st edition

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Claire Roset

Course coordinator Laure Comble

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

English (TOEIC level not achieved) (LANG610_PACYFISA)

Polytech Annecy-Chambéry

In brief

- **Languages of instruction:** English, French
- **Teaching methods:** In person
- **Teaching format:** Tutorials
- **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Description

This course prepares students for the TOEIC ("Test of English for International Communication") exam, specifically to obtain a minimum score of 785 points (out of 990).

Students are assessed throughout each semester. The final assessment consists of a 1- or 2-hour exam.

Objectives

Specific objectives: at the end of this course, students will be able to:

work on telephone conversations (comprehension/production)

listen regularly to news on English-language news sites (CNN, BBC, Sky News, etc.) and be able to succinctly summarize the main points orally, interacting with the class work on a variety of audio and video materials and speak spontaneously in an interactive manner with the class

speak in a prepared manner and spontaneously interact through individual presentations (self-presentation and/or article reports, such as "quizzes") and presentations in pairs (various topics)

practice TOEIC exercises (4 parts of listening comprehension) + entire tests

Teaching hours

Tutorials	Tutorials	30

Mandatory prerequisites

LANG510

Course outline

Course outline

1. **Review of important grammar points for the TOEIC**
    1. Nouns
    2. Pronouns
    3. Linking words...
2. **Listening comprehension**
    1. Recorded dialogues in American, British, and New Zealand English...
    2. Videos in American, British, and Australian English...
3. **Reading comprehension**
    1. Press excerpts
    2. Various texts

Additional information

Bibliography

Documents provided by speakers Global Exam

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat
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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

English (TOEIC level achieved) (LANG611_PACYFISA)

Polytech Annecy-Chambéry

In brief

Languages of instruction: English, French **Teaching methods:** In person

Teaching format: Tutorials **Open to exchange students:** Yes

Presentation

Description

This course prepares students for their entry into professional life. Conducting or participating in a meeting: vocabulary and structures related to this aspect while continuing to work on the four skills, but with an emphasis on realistic situations (role-playing, acquisition of technical vocabulary and business vocabulary, etc.). It also covers public speaking through presentations given by students in groups and/or individually. Students are assessed throughout the semester.

Objectives

To be and become as autonomous as possible in an industrial context in English.

Teaching hours

Tutorials	Tutorials	30

Mandatory prerequisites

TOEIC validated with a minimum score of 785 for apprenticeship students or 600 for continuing education students and Lang510_GICM

Course outline

Various presentations by specialists in industrial and business-related fields, mainly English speakers

Additional

Targeted skills

Greater autonomy in order to communicate in all circumstances in an international setting

Bibliography

Various documents provided by the speakers and/or the students themselves.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE602 Work experience

ECTS
10 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Project 1 (Monitoring and reporting)	MODULE			4	
Evolution in the workplace (4 areas)	MODULE				

Project 1 (Monitoring and reporting) (PROJ601_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** English
- **Teaching methods:** In person
- **Teaching format:** Learning and assessment situations
- **Open to exchange students:** Yes

Overview

Description

Prepare for active participation in business projects.

Objectives

Establish the methodological foundations for problem solving and project management:

- Identify practices related to projects within the company

- know how to define a project

- draw up initial specifications

Teaching hours

Practical work	Practical work	4
Other	Other	1

Mandatory prerequisites

First part in semester 5

Course outline

Workshop: managing an action plan (creation, modification, and monitoring) & Tools/Methods for project management/problem solving Defense

Additional

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Sandrine Vieules-Rosset +33 4 50 09 65 05
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Places

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Corporate Development (4 areas) (STAG601_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

This monitoring allows us to see the progress made by engineering students during the various assignments and projects carried out within the company. The semester 6 assessment relates to the first year of the work-study program.

Objectives

To learn about the company's departments in order to:

- be effective,

- communicate effectively,

- demonstrate pragmatism and adaptability

Mandatory prerequisites

None

Course outline

Assessments carried out by the company

Additional information

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Sandrine Vieules-Rosset +33 4 50 09 65 05
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Locations

- Annecy (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE603 Scientific training

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Machine components	MODULE	20	20		
	MODULE	hours	8 p.m.		
Fundamentals of electricity and electric motors Mechanical design		8		12	
	MODULE	hours			
		20			

Machine Elements (MECA612_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

After reviewing the concepts of kinematics of non-deformable solids, we will study commonly used machine components: gears, sprockets/chains, and pulleys/belts. Epicyclic gear mechanisms will also be studied.

Objectives

Know how to apply the concepts of solid kinematics to select and dimension machine components.

Teaching hours

Lectures	Lecture	20
Tutorial	Tutorials	20

Mandatory prerequisites

Kinematics of a point.

Basic mechanical engineering concepts.

Course outline

Review of kinematics of non-deformable solids

Mechanical transmission components: gears, sprockets/chains, pulleys/belts Graphical kinematics

Epicyclic gear mechanisms

Additional information

Bibliography

- Pierre Agati, Liaisons et Mécanismes, Dunod
- Michel Aublin, Mechanical Systems, Dunod
- Industrial catalogs of bearings and gears.
- Technical documentation on industrial mechanical products

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Pascal Hernandez

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Locations

> Annecy (74)

Campus

> Annecy / Annecy-le-Vieux campus

Fundamentals of Electricity and Electric Motorization (EASI620_GICM)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

Fundamentals of electricity:

This section covers the general fundamentals of electricity for the study of sinusoidal systems.

Motorization section:

Whether in production tools or manufactured products, electric actuators are ubiquitous in the world of technical systems.

Focusing solely on rotating electrical machines, this course aims to provide the necessary foundations for understanding how they work and how they are controlled using electronic controllers. The essential elements for selecting and sizing a motor will also be covered.

Preference will be given to motor technologies commonly found in embedded, mechanical, and mechatronic systems.

Objectives

Basics of electricity:

By the end of this course, students will be able to:

*state the current-voltage behavior laws for basic dipoles (resistance, capacitor, coil)
*apply Kirchhoff's laws in an electrical circuit
*use complex numbers to represent electrical quantities in sinusoidal mode (currents, voltages, impedances)
* calculate and measure active, reactive, and apparent power in single-phase and balanced three-phase sinusoidal systems
* know how to measure the power factor of an electrical installation

Motorization section:

At the end of this course, students will be able to:

*present the different components involved in an electric motor
*explain the general operating principles of a rotating electric machine
* choose between DC motor, brushless DC motor, or stepper motor technology for a given application
* to size the machine according to the application's requirements
* implement the selected equipment

Teaching hours

Lectures	Lecture	8
Tutorial	Tutorials	8 p.m.
Practical work	Practical work	12 p.m.

Mandatory prerequisites

Scientific and technological knowledge from the first cycle of university studies. In particular, the general laws governing the study of electrical circuits and those governing the mechanics of rotating solids.

Course outline

Basics of electricity:

1. General laws and theorems of electrokinetics
2. Sinusoidal quantities and complex notation
3. Linear circuits in single-phase sinusoidal mode
4. Production, transmission, and consumption of electrical energy
5. Three-phase sinusoidal regime

Motorization section:

1. Introductions, general information

1. Advantages and structure of an electric motor
2. Brief overview of electromagnetism
3. General operating principle of a rotating machine
4. Classifications
5. Machine losses

2. Principles and characteristics of certain technologies
    1. Direct current machine
    2. Brushless DC machine
    3. Stepper motor
3. Dimensioning approach
    1. Conventional loads
    2. Transmission
    3. Steady state
    4. Dynamic operating conditions
    5. Thermal criteria in cyclic operation

Additional information

Bibliography

Electrical Engineering Gilbert

Sybille

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Adrien Badel

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Course coordinator Michel Cuny

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Locations

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Campus

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Mechanical Design (CMEC620_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

This course is an introduction to industrial product design. It covers reading plans and modeling. The concepts of functional dimensioning and complete link dimensioning are then presented. The design and dimensioning of guides and power transmission systems complete the concepts covered.

Objectives

Understand the basics of mechanical technology and industrial components. Know how to model a mechanical system and proceed with its design or modification.

Teaching hours

Lectures	Lecture	20
Tutorial	Tutorials	20

Mandatory prerequisites

- Basic mechanical engineering concepts
- Basic industrial design concepts
- Common mechanical components,
- Basic knowledge of RdM,
- Basic knowledge of statics,
- Basic concepts of kinematics

Course outline

1. Reading plans (industrial mechanisms)
2. Connections, connection graphs, kinematic diagrams
3. Technological implementation of complete connections (by adhesion and by obstacle)
4. Functional dimensioning, dimensional and geometric tolerancing
5. Machine elements (bearings and gears)
6. Calculation of drive shafts (stress concentration, fatigue calculation)

Additional information

Bibliography

- C. Barlier, R. Bourgeois, "Mémotech Plus: Engineering & Mechanics," Castella Publishing
- A. Chevalier, "Guide du dessinateur industriel," published by Hachette

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

- Annecy (74)

Campus

- Annecy / Annecy-le-Vieux campus

UNIVERSITÉ SAVOIE MONT BLANC

UE604 Engineering Methodology

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lectures	Tutorial	Practical	Credits
Statistical process control Challenges of artificial intelligence	MODULE	12	12	4	
Design of experiments - Methodological tools	MODULE	hours			
	MODULE	6			
		hours	8	4	
		6			
Case studies - Company visits	MODULE	16	24		

Statistical Process Control (GIND610_GICM)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In-person
Open to exchange students: Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

The aim of this course is to understand statistics in order to use them as an analytical tool.

Objectives

This course aims to enable students to:	**Level**	**By the end of this course, students will be able to:**
understand the usefulness of statistics as	Mastery	use statistics to analyze a project
as an analytical tool	19	industrial problem
This course aims to enable students to:	**Level**	**By the end of this course, students will be able to:**
understand and define SPC (Statistical Process Control)	Control	to implement statistical process control in the field

Teaching hours

Lectures	Lecture	12
Lab	Practical work	4
TD	Tutorials	12

Mandatory prerequisites

Two years of mathematics

Course outline

1. Probability
    - Probability
    - Combinatorial analysis
2. Discrete random variables
    - Probability distribution
    - Expectation and variance of a random variable
    - Binomial distribution
    - Poisson distribution
3. Continuous random variables
    - Probability, parameters, and operations
    - Normal distribution
    - Central limit theorem
    - Other continuous probability distributions
4. Sampling theory
    - Continuous statistical variables
    - Probability distribution testing (chi-square test, Kolmogorov test, Shapiro test)
    - Estimation of population characteristics
5. Statistical process control
    - Process variability
    - Capability
    - X/R control charts
    - Other control charts

Practical work titles

- Creating statistics tables and MSP in Excel

Additional information

Bibliography

Statistical process control - Data processing with Excel Baillargeon Gérald

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Marc Villetard

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Marc.Villetard@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Design of Experiments - Methodological Tools (GIND611_GICM)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes
ERASMUS reference: Engineering and related techniques

Overview

Description

The objective of this course is to:

- Understand experimental designs in order to define an experimental approach
- Be able to use problem-solving methods

Objectives

Know how to set up a design of experiments to tackle an industrial problem Know how to use problem-solving methods and tools

Teaching hours

Lectures	Lecture	6
Tutorial	Tutorials	8
Lab	Practical work	4

Mandatory prerequisites

- Basic statistics

Course outline

Experimental design

1. The experimental approach
2. Why use a design of experiments?
3. Analyzing a factorial experimental design
4. Building a two-level factorial experimental design Problem-solving tools

1. Methods vs. Tools
2. Tools (5W2H, Pareto, brainstorming, 5M diagram, cause tree, etc.)
3. Methods (PDCA, QRQC, DMAIC, 8D, etc.)

Additional information

Bibliography

User manual for design of experiments - A robust methodology for empirically modeling a phenomenon Author(s): Baillet Francis

Training & Techniques 11/28/2017

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Marie-Dominique Naas
Marie-Dominique.Naas@univ-savoie.fr

Course coordinator Stéphane Binet

Locations

- Annecy (74)

Campus

- Annecy / Annecy-le-Vieux campus

Case studies - Company visits (MECA616_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

Examples of activities in companies are used to illustrate the application of technical knowledge. Visits to industrial companies are organized to introduce students to the context and practices in the field.

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
illustrate the concepts learned in class and deepen their understanding through structured observation of industrial activities	Concept	have concrete references on production practices, supplier acceptance, industrialization, and improvement of production methods, following explanations and

		observations made during visits to associated companies

Teaching hours

Lectures	Lecture	4 p.m.
Tutorial	Tutorials	24

Mandatory prerequisites

MECA modules from semester 5

Course outline

1. Case studies drawn from the practical experience of engineering apprentices in the areas of production, supplier acceptance, industrialization, and improvement of production methods.
2. Visits to companies in the metallurgy, steel, plastics, and all manufacturing and process industries.

Additional

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Marc Villetard

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE701 SHES - Languages

ECTS
8 credits

Polytech Annecy-Chambéry

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Management	MODULE		32		
Business Structure and Entrepreneurship 2	MODULE	12 hours	12		
Sustainable development - Product approach	MODULE	4	2	8	

	Nature	CM	Tutorial	Practical	Credits
Support (half of Thursday afternoons when FISA staff are present)	MODULE				

	Nature	CM	Tutorial	Practical	Credits
English (TOEIC level achieved)	MODULE		34 hours		
English (TOEIC level not achieved)	MODULE		34 hours		

Management (SHES701_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

This course will be divided into two parts:

- Business management
- Entrepreneurship

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
initiate a business creation process	Application	learn the basics of business management
		list the questions that a future entrepreneur must ask themselves
		adopt an approach that can lead to business creation
to carry out an economic project in your company	Application	have a macroeconomic vision of the company

		understand all the financial aspects of putting together a business plan
		use economic terminology

Teaching hours

Tutorials	Tutorials	32

Mandatory prerequisites

Basic understanding of how a business operates Basic understanding of

economics

Course outline

1. General accounting: the core of the accounting information system
    - Presentation of the accounting information system
    - Presentation and functioning of the balance sheet
    - Presentation and functioning of the income statement
    - Introduction to financial analysis
2. Budget management: forecasting, anticipating, and decision-making
    - Initial budgets
    - Cash flow budget
    - Provisional balance sheet and income statement
3. Cost calculation methods: analyzing data provided by general accounting
    - Full cost calculation
    - Partial cost calculation
4. Investment project analysis
    - Analysis of investment profitability
    - Financing methods and their implications
5. Entrepreneurship
    - The various stages, approaches, and steps to be taken before deciding to start a business
    - The business plan (its structure and components)
    - Existing tools

Additional information

Bibliography

Management accounting

Large Format - 08/21/2018 - GUALINO

Grandguillot F., Grandguillot B.

Entrepreneurship

Léger-Jarniou Catherine Collection:

Openbook Format: Paperback

317 pages

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Pierre Thabuis

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Business Structure and Entrepreneurship 2 (SHES702_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

The entire course is structured around

- around a scenario involving an industrial company manufacturing coffee makers and coffee machines over a period of six years.
- with practical exercises focusing on:
- Provisional financial statements, dashboards, financial analysis, cost calculation, return on investment, and business strategy.
- Management projects initiated by engineering students in companies

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
gain a practical understanding of the concepts covered in the management module	Mastery	Use management concepts in the context of business projects

Develop financial reflexes for steering the company based on the uncertainties, opportunities, and markets encountered	Master	Make decisions during projects based on available financial information

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	12

Mandatory prerequisites

- Have completed the previous course
- Have completed a management project in your company

Course outline

Formation of company groups

Simulation of company life

Review and feedback

Additional information

Bibliography

Business Strategy - Concepts, Models, Tools, Examples (2nd edition)

Dominique Jolly (Author)

Skills acquired

Macro-skill	Micro-skills

Practical information

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Sustainable Development - Product Approach (SHES711_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In-person
Open to exchange students: Yes

Presentation

Description

This course is divided into several parts:

- an introduction to environmental issues in business,
- a focus on the eco-design approach (definition, tools, and methods),
- the methodology for analyzing the life cycle of products or services,
- an overview of regulatory constraints
- insight into how companies can benefit from this approach.

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
understand the approach of eco-design and understand the	Application	to take into account the challenges environmental issues and regulations

key challenges of its application in business		when designing a product or service

Teaching hours

Lectures	Lecture	4 hours
Tutorial	Tutorials	2
TP	Practical work	8

Mandatory prerequisites

Basic environmental concepts

Product design concepts

Course outline

The course is followed by two practical sessions:

- one session on learning how to assess the environmental impacts of a product
- one session on implementing an eco-design approach in a company

Additional information

Bibliography

Life Cycle Assessment: Understanding and Performing an Ecobalance, 4th revised and expanded

edition

Myriam Saadé - Oliver Jolliet

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Timoteo Payre
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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

English (TOEIC level achieved) (LANG711_PACYFISA)

Polytech Annecy-Chambéry

In brief

- **Languages of instruction:** English
- **Teaching methods:** In person
- **Teaching format:** Tutorials
- **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Description

English at work

Continuous speaking, discussion based on business topics, project presentations, acquisition of business vocabulary and linguistic enrichment, grammar and phonetic correction.

Objectives

To be and become as autonomous as possible in an industrial context in English

Teaching hours

Tutorial	Tutorials	34

Mandatory prerequisites

TOEIC score of 785 or higher, except for continuing education students, who must have obtained a score of 600 or higher.

Course outline

Various presentations by specialists in industrial and business-related fields, mainly English speakers

Additional

Bibliography

Various documents provided by speakers and/or students themselves.

Skills

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

English (TOEIC level not achieved) (LANG710_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: English, French **Teaching methods:** In person
Teaching format: Tutorials **Open to exchange students:** Yes **ERASMUS reference:** Languages

Presentation

Description

This course prepares students for the TOEIC (Test of English for International Communication) exam, specifically to obtain a minimum score of 785 points (out of 990).

With the aim of developing all four skills, this course also serves as an introduction to public speaking through presentations given by students in groups or individually on topics illustrated by press articles or video materials (VTD: Video, Talk and Debate, as well as written work). Depending on the location (Annecy or Chambéry), some will be seen at different times during the semester, the year, or even the three years of training.

Students are assessed throughout each semester. The final assessment consists of a 1-hour, 1.5-hour, or 2-hour exam.

Objectives

Specific objectives: at the end of this course, students will be able to:

work on telephone conversations (comprehension/production)

listen regularly to news on English-language news sites (CNN, BBC, Sky News, etc.) and be able to succinctly summarize the main points orally, interacting with the class

work on a variety of audio and video materials and speak spontaneously in an interactive manner with the class

speak in a prepared manner and spontaneously interact through individual presentations (self-presentation and/or article reports, such as "quizzes") and presentations in pairs (various topics)

practice TOEIC exercises (4 parts of listening comprehension) + entire tests

Teaching hours

Tutorials	Tutorials	34

Mandatory prerequisites

S5 and S6 program.

Course outline

Course outline

1. **Review of important grammar points for the TOEIC:**
   1. Review of tenses.
   2. The conditional and "should" structures (suggestion/subjunctive).
   3. Modal auxiliaries and periphrases with similar meanings.
   4. Linking words (review).
2. **Listening comprehension:**
   1. Recorded dialogues in American, British, and New Zealand English.
   2. Videos in American, British, and Australian English.
3. **Reading comprehension:**
   1. Press excerpts
   2. Various texts

Additional information

Bibliography

- Documents distributed by speakers
- Various websites listed at the beginning of S5

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE702 Work experience

ECTS
10 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Project 2 (launch and follow-up)	MODULE	1 hour		8	
Progress in the workplace (advancement)	MODULE				

Project 2 (launch and monitoring) (PROJ701_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Teaching methods:** In person
- **Teaching format:** Learning and assessment situation
- **Open to exchange students:** Yes

Presentation

Description

In this module, engineering students will be required to carry out a mainly technical project within the company, implementing a structured and effective approach.

The technical component is considered in a broad sense (products, production processes, organization, etc.).

This project may be continued in semester 8, during which engineering students will develop its economic component. If company constraints do not allow this, it will be possible to choose a new project.

Objectives

Situate your project within the company's overall strategy and understand its challenges:

- assess the importance of your project in relation to other ongoing projects

- anticipate and take into account changes in the company to ensure the project's sustainability Broaden the range of possible solutions:

- justify choices

- systematically integrate relevant health, safety, and environmental aspects

Teaching hours

Lectures	Lecture	1
Lab	Practical work	8

Course outline

Launch

Support: framing technical assignments/projects, implementing project management/problem-solving tools/methods, taking a step back from the project—confidentiality, approach, choices, personal development, etc.

Intermediate oral presentation accompanied by a written report (project summary sheet)

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Sandrine Vieules-Rosset +33 4 50 09 65 05
Sandrine.Vieules-Rosset@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Career development (progression) (STAG701_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

This assessment allows us to see the apprentice's progress throughout the various projects and tasks carried out within the company. The semester 7 assessment relates to the Extended Technical project.

Objectives

Be a good engineer and have good relationships with others:

- get involved
- be organized

- make decisions
- solve problems
- take responsibility

Mandatory prerequisites

None

Course outline

Writing the project orientation sheet. Evaluation by the company.

Additional

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Sandrine Vieules-Rosset +33 4 50 09 65 05
Sandrine.Vieules-Rosset@univ-savoie.fr

Locations

- Annecy (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE703 Scientific training

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Mechanism dynamics	MODULE	20 hours	20		
Modeling and finite elements	MODULE	20 hours		8 p.m.	
Continuous automatic	MODULE	4 p.m.	12 p.m.	12	

Mechanism dynamics (MECA721_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS Reference Framework:** Engineering and related techniques

Overview

Description

This course will focus on modeling and solving mechanical system dynamics problems using general theorems and energy methods.

Objectives

Know how to use general theorems to study the dynamic behavior of a mechanical system. Know how to use energy methods to study the dynamic behavior of a mechanical system.

Teaching hours

Lectures	Lecture	20
Tutorial	Tutorials	20

Mandatory prerequisites

- Statics and kinematics of non-deformable solids
- Solving systems of differential equations

Course outline

1. Review of kinetics and dynamics

2. Kinetic energy, work, power, potential energy

3. First integrals, conservation of energy, and collisions

4. Concepts of virtual work and Lagrange equations

5. Equilibrium, linearization, and vibrations

Additional information

Bibliography

- J.C. Bône, J. Morel, M. Boucher, "General Mechanics: Course and Applications with Exercises and Solved Problems," Dunod Publishing
- P. Agati, Y. Brémont, "Solid Mechanics: Industrial Applications," Dunod

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Pascal Hernandez

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Pascal.Hernandez@univ-savoie.fr

Locations

- Annecy (74)

Campus

- Annecy / Annecy-le-Vieux campus

Modeling and finite elements (MECA720_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

This course enables students to master the concepts of stresses, deformations, and linear elastic behavior. It also enables them to create a structural calculation model using industrial software, solve it, and use the results obtained in a product design or development project.

Objectives

Know how to establish a calculation model for an engineering problem

Know how to use finite element calculation software

Know how to validate and use calculation results

Teaching hours

Lectures	Lecture	20
Lab	Practical work	20

Mandatory prerequisites

- Continuum Mechanics
- RdM of beams
- Solid Mechanics
- Matrix calculus

Course outline

1. Review of the linear elastic behavior of materials

2. Stresses, tensor, Mohr's triangle, diagonalization, principal stresses and directions

3. Deformations, tensors, application to extensometry

4. Hooke's law, plane stresses and strains, axisymmetry and cylindrical coordinates

5. Criteria and equivalent stresses

Additional information

Bibliography

- "Guide mécanique" (Mechanics Guide), J.L. Fanchon, published by Nathan
- "Résistance des matériaux" (Strength of Materials), P. Agati, F. Lerouge, M. Rossetto, Dunod

Skills acquired

Macro-skill	Micro-skills

Practical information

Contacts

Course Director Pascal Hernandez

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Pascal.Hernandez@univ-savoie.fr

Locations

- Annecy (74)

Campus

- Annecy / Annecy-le-Vieux campus

Continuous Automation (EASI710_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

This module covers the basic concepts essential for understanding, analyzing, and studying continuous linear systems and control systems.

Objectives

Understand and master the transfer function representation of continuous linear systems.

Be able to determine and analyze the index behavior and stability of a system modeled by a transfer function.

Understand and analyze the performance of a control system.

Teaching hours

Lectures	Lecture	16
Tutorial	Tutorials	12
Lab	Practical Work	12

Mandatory prerequisites

Basic concepts of differential equations.

Basic concepts and operations involving complex numbers. Laplace transform.

Course outline

1. Introduction

1.1. Concepts of systems and variables

1.2. Principle of causality

1.3. Different types of inputs

1.4. Concept of a model

1.5. Linearity of a system

1.6. Principle of closed-loop control

2. Transfer function

2.1. Introduction

2.2. Definition

2.3. Example

2.4. Operating point

2.5. Block diagram representation of a system

3. Time analysis of first- and second-order systems

3.1. Introduction

3.2. First-order systems

3.3. Second-order systems

4. Stability of linear systems

4.1. Definition of stability in the sense of automatic control

4.2. Necessary and sufficient condition for stability

4.3. Routh's criterion

4.4. Stability of closed-loop systems

5. Servo systems and controller synthesis

5.1. Linear servo systems

5.2. Summary of P and PI controllers

Additional information

Bibliography

"Automatique - Systèmes linéaires, non linéaires, à temps continu, à temps discret, représentation d'état" (Automation - Linear, nonlinear, continuous-time, discrete-time systems, state representation), Yves GRANJON, 4th edition, 2021, DUNOD.

"Basic Automation - Lectures and Corrected Exercises," Mohamed DAROUACH, Philippe PIERROT, Michel ZASADZINSKI, 2019, ELLIPSES.

"Behavior of Servo Systems," Christophe FRANCOIS, 2014, ELLIPSES.

"Continuous Linear Systems Control - Exercises and Methods," Yves GRANJON, 2022, DUNOD. "Control Systems - Linear and Continuous Systems," Sandrine LE BALLOIS, Pascal CODRON,

2nd edition, 2006, DUNOD. "Automation - Control and Regulation," Patrick PROUVOST, 2nd edition, 2010, DUNOD.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Pascal Mouille

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Pascal.Mouille@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE704 Engineering Methodology

ECTS
5 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lectures	Tutorial	TP	Credits
Electronics	MODULE	28 hours		12h 8h	
Algorithms and programming Industrial logistics	MODULE	12 hours			
	MODULE	12 hours			
Design office tools	MODULE		12	12	

Electronics (EASI711_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

Introduction to the basics of metrology and the main types of sensors, basics of conditioning electronics (analog and digital signals) Analog-to-digital and digital-to-analog conversion

Use of an instrumentation card

Objectives

This course aims to enable students to: Level

By the end of this course, students will be able to: understand the structure of a measurement chain Application

Select and implement sensors and their electronics on a product or machine.

Teaching hours

Lectures	Lecture	28 hours
Practical Work	Practical Work	12

Mandatory prerequisites

Basic concepts of electricity and electronics

Course outline

1. Elements of metrology
2. Major sensor families
3. Signal conditioning electronics (analog and digital signals)
4. Analog-to-digital and digital-to-analog conversion
5. Use of an instrumentation card

Additional information

Bibliography

Sensors in Industrial Instrumentation

- Asch Georges / Books Electronics Sensors

- Collection: Technology and Engineering

Skills acquired

Macro-skills	Micro-skills

Practical

Contact

Course coordinator Andre Betemps

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Andre.Betemps@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Algorithms and Programming (INFO710_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Information and Communication Technologies (ICT)

Overview

Description

This course aims to provide students with basic knowledge of how information is represented in computers and to teach them the fundamentals of algorithms and programming, including an introduction to the use of an object-oriented language. The goal is to enable students to use computer tools to solve problems encountered in engineering.

Objectives

This course aims to provide students with basic knowledge of information representation in computers and to teach them the fundamentals of algorithms and programming, including an introduction to the use of an object-oriented language. The goal is to enable students to use computer tools to solve problems encountered in engineering.

Teaching hours

Lectures	Lecture	12
Lab	Practical work	8

Mandatory prerequisites

Basic computer skills

Course outline

1. History of "computer science and engineering"
2. Data representation
3. Introduction to programming: application to the Python language

Additional information

Bibliography

Algorithms: course with 957 exercises and 158 problems

E. Leiserson

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Alexandre Benoit

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Alexandre.Benoit@univ-savoie.fr

Locations

Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Industrial Logistics (GIND712_GI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

Production logistics Industrial organization

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
use simple and practical tools to understand and implement solutions to industrial management problems encountered in the company.	Application	implement industrial management tools in the field
use industrial organization tools	Application	Implement industrial organization solutions in the company

implement these tools in the field	Application	Deploy and sustain the solutions chosen for production logistics and industrial organization

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	12

Mandatory prerequisites

- Some elements of statistics (variances, covariances, normal distribution, estimation)

Course outline

1. Production logistics
   - The context of new industrial management;
   - Production modes and types;
   - Inventory: storage facilities, physical and financial inventory tracking, different types of inventory, traditional + critical management methods, determining safety stock levels;
   - Just-in-time: the 5 S's, integration of people, tools: SMED, TPM, TQM, scheduling without work orders, simultaneous engineering, partnerships with suppliers, etc.
   - The Kanban method: specific and generic;
   - Continuous improvement dynamics: kaizen projects;
   - Towards the supply chain: integrated and extended logistics chain
2. Industrial organization
   - Lean production
   - Red/green
   - Different methods for studying labor time in industry
   - Ergonomics through a biomechanical approach and muscle stretching
   - Functional analysis and value analysis (case studies)

Additional information

Bibliography

Industrial logistics and organization, 6th edition

Nasser Mebarki

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Jean-Luc Maire

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Jean-Luc.Maire@univ-savoie.fr

Location

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Design office tools (CMEC710_GICM)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

- Project management (planning, ordering, communication)
- System design
  - Parts and connections sizing (analytical and EF)
  - Microcontroller programming (Arduino in particular)
  - Basic mechanical technology components
- Digital model creation (CAD)
- Selection of standard components (mechanical, sensors, and actuators)

Objectives

- System design and development
- Teamwork

Teaching hours

Practical work	Practical work	12

Mandatory prerequisites

- Knowledge:
  - CAD software
- Concepts:
  - electric actuators
  - microcontrollers

Course outline

Needs analysis, functional needs analysis, technical functional analysis Launching a design and prototyping project

Preliminary study

Additional information

Bibliography

The Big Book of ARDUINO Paperback - Illustrated, May 5, 2022 by Erik Bartmann

(Author)

Skills acquired

Macro-skill	Micro-skills

Practical

Locations

> Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE801 SHES - Languages

ECTS
5 credits

Polytech Annecy-Chambéry

List of courses

	Nature	CM	Tutorial	Practical	Credits
Management and technical communication	MODULE	6	4	12	

	Nature	CM	Tutorial	Practical	Credits
Support (half of Thursday afternoons when FISA staff are present)	MODULE				

	Nature	CM	Tutorial	Practical	Credits
English (TOEIC level achieved)	MODULE		40 hours		
English (TOEIC level not achieved)	MODULE		40		

Management and Technical Communication (SHES801_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

The objective of this module is:

- to provide future engineers with the key tools for self-awareness, enabling them to communicate more effectively and take on their future responsibilities in a positive manner, whether functional or hierarchical;
- to support future engineers, through progressive methodological steps, in the management and presentation of their various projects.

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
define the main tools of self-awareness to enable them to communicate better and take responsibility positively assume its future responsibility, whether functional or hierarchical	Mastery	to communicate effectively to take responsibility for the future

lead and report on its various projects	Mastery	prepare reports and presentations of projects carried out in company

Teaching hours

Lectures	Lectures	6
Tutorial	Tutorials	4
Lab	Practical work	12

Mandatory prerequisites

- Herrmann's Brain Preferences Model
- The "organization" (time management, delegation) and "problem solving" approaches covered in Cognitive Development/Intro to Management (SHES591)

Preparation/presentation of the preparatory topic "Project Management and Extended Technical Project Specifications"

Course outline

1. Inventory of the main strategic, technological, and organizational changes at work in the company and in society, and their consequences on human resource management: historical and sociological retrospective
2. In-depth study of the concept of responsibility and accountability
3. Personal development:
    - basics of responsible and assertive communication
    - Transactional Analysis approach: self-diagnosis of "ego states," conditioning messages, life positions

Practical work titles

- Acquisition of project terminology (challenges, objectives, indicators, resources, constraints, PDCA, validation, sustainability)
- Development of a "context" grid and definition of the qualities and expectations of a project manager based on Herrmann
- End of "technical" project period, "management" project led: Monitoring and support work on projects; mutual field advice
- Methodological contributions: argumentation and demonstration
- Contributions to written/oral expression

Additional information

Bibliography

The Secrets of Communication John Grinder

The Essentials of Business Management Samuel Josien

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Delphine Lacquement +33 4 79 75 85 85
Delphine.Lacquement@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

English (TOEIC level achieved) (LANG811_PACYFISA)

Polytech Annecy-Chambéry

In brief

- **Languages of instruction:** English **Teaching methods:** In person
- **Teaching format:** Tutorials **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Description

English at work

Continuous speaking, discussion based on business topics, project presentations, acquisition of business vocabulary and linguistic enrichment, grammar and phonetic correction.

Objectives

To be and become as autonomous as possible in an industrial context in English

Teaching hours

Tutorial	Tutorials	40

Mandatory prerequisites

TOEIC score of 785 or higher, except for continuing education students, who must have obtained a score of 600 or higher.

Course outline

Various presentations by specialists in industrial and business-related fields, mainly English speakers

Additional

Bibliography

Various documents provided by speakers and/or students themselves.

Skills

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

English (TOEIC level not achieved) (LANG810_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** English, French
- **Teaching methods:** In person
- **Teaching format:** Tutorials
- **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Description

This course prepares students for the TOEIC ("Test of English for International Communication") exam, specifically to obtain a minimum score of 785 points (out of 990).

The TOEIC test will take place at the end of this semester at each of the sites on very similar dates. (Make-up sessions will take place in week 9).

Students are assessed throughout each semester. The final assessment consists of a 1-hour, 1.5-hour, or 2-hour exam, depending on the semester.

Objectives

Specific objectives: at the end of this course, students will be able to:

continue practicing TOEIC exercises (4 parts of listening comprehension) + entire tests

work on a variety of audio and video materials (general English, business English, and specialized English) and speak spontaneously, interacting with the class

speak in a prepared manner and interact spontaneously through scientific presentations and on topics or issues related to the business world (job interviews, negotiations, discussions on technical/professional projects, wage inequality, international mobility, etc.)

Specific objectives: at the end of this course, students will be able to:

continue grammatical revision on: the conditional tense; all other tenses; expressing suggestions and modality/the passive voice; verbal structures (infinitive/ing)

improve their knowledge of grammar and vocabulary (general English, business English, and English specific to their scientific field) in class and independently, validating their progress through regular tests

Teaching hours

Tutorials	Tutorials	40

Mandatory prerequisites

LANG710

Course outline

Course outline

1. **Review of important grammar points for the TOEIC**
    1. Review of all tenses covered or reviewed in S5, S6, and S7.
    2. The passive voice.
    3. Causative structures.
    4. BV / BVing or to BV.
    5. Linking words.
2. **Listening comprehension**
    1. Recorded dialogues in American, British, and New Zealand English.
    2. Videos in American, British, Australian English, etc.
3. **Reading comprehension**
    1. Press excerpts
    2. Various texts

Additional information

Bibliography

Documents provided by Global Exam contributors

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Muriel.Yvenat@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE802 Work experience

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Project 2 (Monitoring and reporting)	MODULE			8 hours	
Career development (4 areas)	MODULE				

Project 2 (Monitoring and reporting) (PROJ801_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes

Overview

Description

In this module, engineering students will be required to carry out an economics-oriented project within their company (either a continuation of the project from semester 7 or a new project).

The aim of this project is for engineering students to realize the importance of economic factors in the smooth running of any industrial project and their impact on the company.

Objectives

Measure the importance of economic factors in the management of any project (decision to launch, investment strategies and decisions, management and performance indicators) and for the effective management of all or part of the company (a department, a workshop, a production line, etc.):

- Use management knowledge in the management of a company project Master the main economic and financial parameters of the

company:

- take economic and financial data into account when undertaking an industrial project

Make "the numbers speak," know how to interpret them clearly so they can be understood and used at the operational levels of the company:

- presenting and using economic and management data for an industrial project

Teaching hours

Practical work	Practical work	8
Other	Other	1

Course outline

Support: framing of economic missions/projects, implementation of project management/problem-solving tools/methods, identification and testing of economic tools/concepts useful to the project

Report & Defense of the P2 project - presentations covering the two components of Technical and Management/Economics and meeting the associated expectations -

Additional

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Sandrine Vieules-Rosset +33 4 50 09 65 05
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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Corporate Development (4 areas) (STAG801_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

This monitoring allows us to see the apprentice's progress during the various projects and work carried out in the company. The semester 8 assessment relates to the Management project.

Objectives

Be a good engineer and have good relationships with others:

- get involved
- be organized
- make decisions
- solve problems
- take responsibility

Mandatory prerequisites

None

Course outline

Writing a project orientation sheet. Assessment carried out by the company.

Additional

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Sandrine Vieules-Rosset +33 4 50 09 65 05
Sandrine.Vieules-Rosset@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE803 Scientific training

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Structural dynamics Fluid statics and dynamics	MODULE	6	6	8	
Design Office Project	MODULE	hours	hours		
	MODULE	12	12		
		hours	hours	40	
Algorithms and programming: generalization	MODULE	4	4	12	
Thermal	MODULE	8	8		

UNIVERSITÉ SAVOIE MONT BLANC

Structural Dynamics (MECA810_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

The course aims to enable you to describe and explain the vibrational behavior of systems. This involves modeling a mechanical system for dynamic analysis and understanding the issues and solutions associated with vibrations. The idea is to enable you to set up a model on simple systems and explain their vibrational behavior. The module also aims to provide you with a "practical" approach by introducing you to vibration characterization tools. This approach is useful if you have an existing system and want to describe its vibration behavior.

Objectives

- Know how to model the vibration behavior of a given system

- Explain and interpret the vocabulary specific to the field of vibrations

- Know and understand the equations used to find important results and know how to draw conclusions based on the applications

- Understand and explain the displacement behavior of a vibratory system

- Know the measurement and vibration tools and their limitations

Teaching hours

Lectures	Lecture	6
Tutorial	Tutorials	6
Lab	Practical work	8

Mandatory prerequisites

The study of vibrations is based on the study of transfer functions and the complex notation of sinusoidal behaviors. Knowledge of energy methods and structural design is required.

Course outline

- Introduction to vibrations
- Single-degree-of-freedom systems
- Systems with multiple degrees of freedom and vibrations in practice

Additional information

Bibliography

Vibration theory: application to structural dynamics Daniel Rixen and Michel Géradin

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator David Gibus

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David.Gibus@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Fluid Statics and Dynamics (MECA811_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

The fundamental concepts necessary for understanding incompressible fluid mechanics.

Introduction to local equations of fluid mechanics, dimensional analysis.

Basic tools for analyzing and dimensioning hydraulic circuits.

Objectives

Know how to study a hydrostatic problem.

Know how to study a hydraulic installation involving machines. Know how to calculate forces due to fluid flow.

Knowing how to select and size hydraulic components for an application.

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	12

Mandatory prerequisites

Mathematical tools: matrix calculus, differential equations, trigonometry, complex numbers, function analysis.

Course outline

1. General principles of fluids

2. Hydrostatics, Archimedes' principle

2. Bernoulli's theorem, pressure losses

3. Euler's theorem, jet forces

4. Hydraulic technology, functions, and components

Additional information

Bibliography

Applied fluid mechanics. (Roger Ouziaux, Jean Perrier)

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Pascal Hernandez

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Locations

- Annecy (74)

Campus

- Annecy / Annecy-le-Vieux campus

Algorithms and programming: generalization (INFO810_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

This course aims to reinforce basic knowledge of information representation in computers and to deepen students' understanding of the fundamentals of algorithms and programming with an introduction to the use of an object-oriented language. The objective is to enable students to use IT tools to solve problems encountered in engineering.

Objectives

This course aims to reinforce basic knowledge of information representation in computers and to deepen understanding of the fundamentals of algorithms and programming with an introduction to the use of an object-oriented language. The goal is to enable students to use computer tools to solve problems encountered in engineering.

Teaching hours

Lectures	Lecture	4
Tutorial	Tutorials	4
Lab	Practical work	12

Mandatory prerequisites

Info710, Introduction to Programming

Course outline

1. Data representation
2. Programming: application to Python and C languages

Two introductory practical assignments on using the C language and its parallels with Python, based on the theme of an automated stacker crane warehouse.

Additional information

Bibliography

Algorithms: fundamental programming techniques Rollet Olivier

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Alexandre Benoit

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Alexandre.Benoit@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Thermal (PHYS810_GICM)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

The objective of this module is to assimilate the fundamental principles of thermal science for industrial applications. The three modes of heat transfer (convection, conduction, and radiation) will be covered.

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
perform an energy assessment on a thermal system and model a simple heat exchange problem.	Master	propose a simplified model for a steady-state thermal system
		define the equations representing each mode of heat transfer

This course aims to enable students to:	Level	Upon completion of this course, students will be able to:
		evaluate the convective heat transfer coefficient using standard experimental correlations.
		to solve the problem of a 1D structure in steady-state thermal conditions subject to conventional conditions (convection phenomena, imposed temperature or flow).

Teaching hours

Lectures	Lecture	8
Tutorial	Tutorials	8

Mandatory prerequisites

Vector analysis, partial derivatives, differential equations

Course outline

1. Thermal conduction
    - Fourier's law, thermal conductivity of materials
    - Heat equation in a stationary and isotropic solid
    - Thermal resistances and conductances
2. Convection
    - Newton's law,
    - Principle of convection
    - Characteristic numbers
3. Thermal radiation
    - Radiation quantities, Planck's law, Wien's law, Stefan-Boltzmann law, Kirchoff's law
    - Exchanges between black bodies and exchanges between gray bodies

Additional information

Bibliography

Mechanics - Thermodynamics OBJECTIVE

Alhael Thierry

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Adrien Ameye

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Adrien.Ameye@etu.univ-savoie.fr

Locations

Annecy-le-Vieux (74)

Campus

Annecy / Annecy-le-Vieux campus

UE804 Engineering Methodology

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lectures	Tutorial	Practical	Credits
Metallic materials	MODULE	4 p.m.	12 p.m.	12 p.m.	
Production management and improvement	MODULE	2 p.m.	2 p.m.	12 p.m.	
Dimensional metrology	MODULE	12 p.m.	12	16	

Metallic Materials (MATE810_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French, English **Teaching methods:** In person
- **Teaching format:** Tutorials **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

This course explores the specific characteristics of metallic materials in depth, establishing clear links between their physical properties and macroscopic characteristics. It aims to provide a detailed understanding of how the structural properties of metals are controlled.

Objectives

The objective is to go beyond a simple "black box" approach and adopt a structured, guided method for understanding the fundamentals of metallic materials. This course is essential for understanding the selection criteria and implementation processes for metallic materials in various industrial applications.

Teaching hours

Lectures	Lecture	16
TD	Tutorials	12
Lab	Practical Work	12

Mandatory prerequisites

No specific prerequisites

Course outline

1. Introduction: overview of metallic materials from an industrial perspective

- Properties of metals to consider from an industrial perspective

2. Specific properties of metal atoms and metal bonds

3. Crystal structure and defects in metals

4. Link between microstructural parameters and macroscopic properties of metals

5. Characterization of the macroscopic properties of metallic materials

6. Control of the mechanical properties of metallic materials

Additional information

Targeted skills

- **Initial assessment**:
  - Identify the context and conditions in which the metallic material is used.
  - Gather detailed information on the current properties of the material.
  - Analyze the environmental, mechanical, and chemical stresses to which the material is subjected.
- **Definition of the problem**:
  - Clarify the specific challenges or issues to be resolved concerning the metallic material.
  - Formulate specific objectives for the analysis or improvement of the material.
  - Identify the required performance and quality criteria.
- **Methodological analysis and choice of resolution/analysis path**:

- Select appropriate methodologies for studying the material (physicochemical analyses, mechanical tests, simulations, etc.).
- Determine the tools and techniques needed to conduct the analysis.
- Evaluate different possible approaches and choose the most effective and appropriate one based on the objectives and available resources.

- **Implementation of the solution**:

- Plan and execute the steps involved in analyzing or improving the material.
- Apply the chosen techniques to modify or evaluate the properties of the material.
- Validate the results obtained through comparative tests and performance evaluations.
- Document the process and results to ensure traceability and enable future reuse of methods and conclusions.

Bibliography

Reference Works

"Materials Science and Engineering: An Introduction" by William D. Callister Jr. and David G. Rethwisch
This textbook is an essential reference for understanding the basics of materials science, including metals.
It covers the properties, structure, and applications of materials.

"Physical Metallurgy Principles" by Robert E. Reed-Hill and Reza Abbaschian
A detailed work on physical metallurgy, covering fundamental concepts as well as more advanced topics.

"Introduction to the Thermodynamics of Materials" by David R. Gaskell
This book provides an in-depth understanding of thermodynamic principles as they apply to metallic materials.

Methodology and Techniques

"Characterization of Materials" by Elton N. Kaufmann and David B. Williams
A comprehensive guide to materials characterization techniques, including microscopy, diffraction, and spectroscopy methods.

"Mechanical Behavior of Materials" by Norman E. Dowling
A textbook focused on the mechanical properties of materials, covering aspects such as fatigue, fracture, and high-temperature behavior.

Modeling and Simulation

"Computational Materials Science: An Introduction" by June Gunn Lee
A book that introduces techniques for simulating and modeling materials using modern software.

Project Management and Documentation

"Project Management for Engineering, Business and Technology" by John M. Nicholas and Herman Steyn A practical handbook for project management, tailored to technical and industrial contexts.

"Technical Writing for Engineers & Scientists" by Michelle V. Cloonan and Charles T. Brusaw

A guide to improving technical writing skills, essential for communicating and documenting results.

Safety and Regulations

"Handbook of Materials Failure Analysis: With Case Studies from the Aerospace and Automotive Industries" by Abdel Salam Hamdy Makhlouf and Mahmood Aliofkhazraei

A book providing practical case studies and advice on failure prevention and safety standards.

Journals and Specialized Publications Journal of Materials Science

An academic journal covering cutting-edge research in all aspects of materials, including metals.

Acta Materialia

A publication recognized for its advanced research articles on materials science and engineering.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Laurent Tabourot

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Locations

Annecy (74)

Campus

Annecy / Annecy-le-Vieux campus

Production Management and Improvement (GIND812_GI)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

This course will focus on:

- overall and detailed planning (MRP2) with details of the CBN, PDP, and PIC modules and workload calculations in order to understand how an ERP system works
- the study of theoretical methods for relocating a workshop with the aim of streamlining and shortening product flows in line with Lean Manufacturing principles

Practical work titles

- Workshop layout (4 hours)
- Use of educational CAPM (8 hours)

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:

understand the methods and tools of industrial planning and learn about workshop relocation techniques.	Master	of contribute to planning planning industrial planning and from participate in the relocation of a workshop

Teaching hours

Lectures	Lecture	2 p.m.
Tutorial	Tutorials	2 p.m.
Lab	Practical Work	12

Mandatory prerequisites

- Traditional inventory management

Course outline

Production planning and scheduling

Workshop implementation methods

Additional information

Bibliography

Production Management Eyrolles

Workshop Layout - Approach and Tools Collection A Savoir

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Catherine Karst

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Dimensional Metrology (GIND813_GI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

Introduction to metrology and related industrial practices.

Objectives

This course aims to enable students to:	Level	Upon completion of this course, students will be able to:
set up a measurement and control system	Application	reflect on the consistency of a system of units and the choice of standards
		define the role of metrology in the company
		choose a measurement system (direct, indirect, by comparison)
		Study the "5 Ms" in the measurement process – Qualitative approach to accuracy and reliability

		to calculate measurement uncertainties (study of GRR & GUM methods) and the capability of measurement equipment

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	12
Lab	Practical Work	4 p.m

Mandatory prerequisites

- Basic statistics (mean, standard deviation, estimation from samples)
- Partial derivatives **Description**

Course outline

1. System of units
   - History of metrology
   - Defining a consistent system of units
   - Standardization
2. The role of metrology in business
   - Management of national standards (LNE, COFRAC)
   - Management of measuring equipment in the company
   - Calibration and verification
3. Measurement system
   - Measurement principles (direct, comparison, etc.)
   - Measurement chain (sensor, filtering, processing, etc.)
4. Study of the "5 Ms" in the measurement process
   - Identification of sources of error
   - Detailed study of temperature as an example of influencing factors
5. Calculation of measurement uncertainties
   - Vocabulary and statistical presentation of measurement
   - Concept of measurement process capability
   - Study of the GRR method
   - Study of the GUM approach

Practical work titles

- Measurement of flatness (comparison of marble metrology and three-dimensional measuring machine). Reflections on automatic balancing software.

- Measurement of circularity defects (comparison between specialized machine and CMM). Reflections on an automatic balancing method based on Fourier series expansion.
- Roughness measurement (profile study, choice of filters, choice of criteria).
- Verification of a gauge block on a one-dimensional measuring machine (direct and comparative methods). Optimization to minimize uncertainties.
- Measurement of the radius of a toothed sector on a two-dimensional optical machine. Verification of repeatability.
- Verification of standards using a measuring column. Study of accuracy.
- Measurement of angles using a sine bench. Investigation of uncertainty factors.

Additional information

Bibliography

Dimensional metrology: checklist Michel Dursapt

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Loic Dapsence

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Loic.Dapsence@univ-savoie.fr

Locations

Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE901 SHES - Languages

ECTS
7 credits

Polytech Annecy-Chambéry

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Legislation, labor law, occupational health, sustainable engineering, decarbonization	MODULE	18 hours	8	8	
GEPC, humanities, management, ergonomics	MODULE	28			

	Nature	CM	Tutorial	Practical	Credits
English (TOEIC level achieved)	MODULE		26 hours		
English (TOEIC level not achieved)	MODULE		26		

Legislation, labor law, occupational health, sustainable engineering, decarbonization (SHES901_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In-person
Open to exchange students: Yes

Presentation

Description

Legislation and labor law Occupational health

Sustainable engineering and decarbonization

Objectives

This course aims to enable students to:	**Level**	**By the end of this course, students will be able to:**
define the scope of human resources and labor legislation	Application	use their knowledge of human resources and labor legislation in their company
analyze and deal with a situation	Application	apply legal concepts to a situation in the workplace

Know the main concepts of ergonomics	Application	apply the concepts of ergonomics in an industrial context
take into account the ergonomic dimension in their sectors of activity and responsibility	Application	apply knowledge of ergonomics to projects within the company

Teaching hours

Lectures	Lecture	18
Tutorial	Tutorials	8
Lab	Practical Work	8

Mandatory prerequisites

Legal concepts covered in semester 5

Sustainable development modules in semesters 5, 6, and 7

Course outline

1. Legislation
   - Sources of labor law and judicial organization
   - Key elements of the employment contract
   - Working hours/salaries/paid leave
   - Employee representation
   - Elements of civil and criminal liability of managers and their employees
2. Ergonomics
   - Ergonomics (origin, definition, scope)
   - Workstation design
   - Physical fatigue
   - Mental fatigue
   - Thermal comfort
   - Visual comfort
   - Auditory comfort
   - Workstation analysis method and ergonomic approach
   - Contribution of ergonomics to the prevention of hardship
3. Sustainable engineering

Additional information

Bibliography

Ergonomics at work, principles and practices Pascal Reytier

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Véronique Saudrais

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

GEPC, Humanities, Management, Ergonomics (SHES902_PACYFISA)

Polytech Annecy-Chambéry

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Overview

Description

Project management and leadership Skills management

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
acquire an understanding of the collective dimension of day-to-day activity management and change management	Master	define skills management
		understand the challenges of job and skills management
		understand the philosophy of GPEC (forward-looking management of jobs and skills) and its direct link to company strategy

		understand common HR vocabulary: skills, qualifications, performance, jobs, etc.
		identify and understand the role of the engineer in the GPEC process
identify and understand the use of the main job and skills management tools (job map, job descriptions, skills frameworks, appraisal interviews, etc.)	Proficiency	understand the principles behind the creation of these tools
		create a simple user manual
		to recruit
		understand the recruitment process and its main stages
		identify pitfalls to avoid
understand the contingency of the recruitment process (depending on the profile, time available, budget, etc.)	Master	understand the legal framework for recruitment (basic concepts)
		understand the main stages of the recruitment interview
		understand judgment biases and be able to avoid them
		understand the basic principles of assessment tools (tests)

Teaching hours

Lectures	Lecture	28

Mandatory prerequisites

- The entire second-year module: personal development
- Definition of the "team management/leadership" project
- Knowledge of the company

Course outline

1. Leading and managing a project
    - Leading a team: taking on the role of leader or manager; status, roles, performance indicators, and team monitoring; adaptive management

- The group: its personality, its evolution, the role of the leader, group phenomena (application to meeting facilitation)
- Leading a "sensitive" project: lateralizing it, identifying and developing stakeholder roles, adapting to each type
- Leading change: crisis or change, individual and collective emotional cost, qualities of the leader, successive stages and support
- Managing conflict: preventive, curative, interindividual, and collective approaches, from conflict to negotiation: prerequisites for negotiation, range of tactics and strategies used

2. Skills management

- Theoretical aspects

2.1.1.The history of skills management (career management, job management, etc.) 2.1.2.The conventional and legal aspects of GPEC

2.1.3.Key definitions (distinction between job and position, skill and performance, etc.)

- The link between job and compensation (collective bargaining agreement, classification/rating, etc.)
- GPEC tools
- Creating a job map

2.2.2.Methodology for creating a job description

2.2.3.Skills frameworks

- Skills assessment
- GPEC as a strategic approach
- Developing a comprehensive action plan

2.3.2.Different ways of implementing GPEC

2.3.3.GPEC stakeholders

1. Recruitment

- The recruitment process

3.1.1. Recruitment: a strategic business tool

3.1.2. The stages of recruitment

- The cost of recruitment
- The recruitment interview
- Interview conditions

3.2.2.Interview support

3.2.3.Conducting a recruitment interview

- Judgment biases to avoid
- Tests
- Types of tests

3.3.2.Methods for the statistical construction of a test

3.3.3.Test validity

Practical work titles

- Simulations of difficult communication situations: listening, criticism, conflicts
- Formation of "project management" working groups
- Managerial insights in response to various "management/team leadership" projects
- Preparation for the presentation of projects in the workplace

Additional information

Bibliography

- CADIN Loïc, GUERIN Francis, and PIGEYRE Frédérique (Eds.). – Human resource management: practice and theory. – 2nd ed. – Paris: Dunod, 2004
- DEFELIX Christian, DUBOIS Michel and RETOUR Didier. - GPEC: forward planning in crisis? – In: HRM in the face of crisis: HRM in crisis? – edited by Tremblay M. and Sire B. – Montreal: Presses des l'école des HEC, 1997
- DENIMAL Philippe. – Classification, qualification, skills: for action on organization and social dialogue. – 1st ed. – Paris: Editions Liaisons, 2004
- FLÜCK Claude. – Skills and Performance: a successful alliance. – 1st ed. – Paris: DEMOS, 2001
- LUSSATO Ariane – Recruitment tests – Que Sais-Je – Presses Universitaire de FranceMINTZBERG Henry. – Structure and dynamics of organizations. – 12th ed. – Paris: Editions d'Organisation, 1982
- PERETTI Jean-Marc (Dir.). – Tous DRH. – 2nd ed. – Paris: Editions d'Organisation, 2006
- PERMATIN Daniel. – Managing by Skills or How to Succeed Differently? – 1st ed. – Caen: Editions Management Société, 1999

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Delphine Lacquement +33 4 79 75 85 85
Delphine.Lacquement@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

English (TOEIC level achieved) (LANG911_PACYFISA)

Polytech Annecy-Chambéry

In brief

- **Languages of instruction:** English **Teaching methods:** In person
- **Teaching format:** Tutorials **Open to exchange students:** Yes
- **ERASMUS reference:** Languages

Presentation

Description

This course prepares students for their entry into professional life. Conducting or participating in a meeting: vocabulary and structures related to this aspect while continuing to work on the four skills, but with an emphasis on realistic scenarios (role-playing, acquisition of technical vocabulary and business vocabulary, etc.). It also covers public speaking through presentations given by students in groups and/or individually. Students are assessed throughout the semester. Preparation for the engineering theme (English section compulsory) Mock interview in front of two members of the jury and half the class.

Objectives

Become as independent as possible for their future profession

Teaching hours

Tutorials	Tutorials	26

Mandatory prerequisites

LANG811 and valid TOEIC score

Course outline

Labels (country culture for international exchange) Preparation of CVs and self-presentations and business

projects

Additional information

Bibliography

Various documents provided by speakers and students themselves

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Muriel.Yvenat@univ-savoie.fr

Locations

Annecy-le-Vieux (74)

Campus

> Annecy / Annecy-le-Vieux campus

English (TOEIC level not achieved) (LANG910_PACYFISA)

Polytech Annecy-Chambéry

In brief

Languages of instruction: English, French **Teaching methods:** In person
Teaching format: Tutorials **Open to exchange students:** Yes

Presentation

Description

This course prepares students (who have not yet validated their score) for the TOEIC ("Test of English for International Communication") exam, and more specifically for obtaining a minimum score of 785 points (out of 990).

Objectives

To develop a number of reflexes and autonomy in relation to the TOEIC or Linguaskill test at the end of S8 in order to achieve the score required for the engineering degree.

Teaching hours

Tutorials	Tutorials	26

Mandatory prerequisites

LANG 810

Course outline

1. **Review of important grammar points for the TOEIC**
   1. Review of all tenses covered or reviewed in S5, S6, S7, and S8
   2. The passive voice.
   3. Causative structures.
   4. BV / BVing or to BV.
   5. Linking words.
2. **Listening comprehension**
   1. Recorded dialogues in American, British, and New Zealand English.
   2. Videos in American, British, Australian English, etc.
3. **Reading comprehension**
   1. Press excerpts
   2. Various texts

Additional information

Bibliography

Various documents distributed by speakers Global Exam

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Muriel Yvenat

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE902 Work experience

ECTS
10 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Project 3 (Launch and follow-up)	MODULE	1 hour		8	
Progress in the workplace (advancement)	MODULE				

Project 3 (Launch and monitoring) (PROJ901_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Teaching methods:** In person
- **Teaching format:** Learning and assessment situations
- **Open to exchange students:** Yes

Presentation

Description

In this module, engineering students will be required to carry out a management-oriented project within a company, implementing a structured and effective approach.

The managerial component is considered in a broad sense (hierarchical or cross-functional management, communication, team leadership, training, change management, conflict management, etc.).

The aim of this project is for engineering students to realize the importance and impact of the human factor on the smooth running of any industrial project.

This project may be continued in semester 10 and become the Engineering Project, expanding it to meet the end-of-program expectations.

Objectives

Develop an effective human approach to project management:

- anticipate the humanly sensitive stages of the project

- define the principles adopted for project management

- identify obstacles encountered and actions taken in response

- monitor and define the validation stages with a view to sustainability

Use human resources tools that are appropriate for the company, whether they are already in use or whether this project is an opportunity to propose new ones (skills, training, procedures, coordination, etc.):

- implement human resources tools in projects carried out within the company

- if necessary, select new dedicated tools

Teaching hours

Lectures	Lecture	1 hour
Practical	Practical Work	8

Mandatory prerequisites

Projects from semesters 5, 6, 7, and 8.

Modules from semesters 5, 6, 7, and 8: SHES511_PACYFISA, SHES801_PACFISA, and SHES902_PACFYSA

Course outline

Launch

Support: framing of human-centered projects, implementation of project management/problem-solving tools/methods, identification and testing of human resources tools/approaches useful to the project, critical analysis and areas for improvement

Interim defense in the company, with an active visit organized and led by the engineering student.

Additional information

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Sandrine Vieules-Rosset +33 4 50 09 65 05
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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Career development (progression) (STAG901_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes

Presentation

Description

This monitoring allows us to see the apprentice's progress throughout the various projects and tasks carried out within the company. The midterm review for semester 9 relates to the Management project.

Objectives

Be a good engineer and have good relationships with others:

- get involved
- be organized
- make decisions
- solve problems
- take responsibility

Mandatory prerequisites

None

Course outline

Writing the project orientation sheet. Assessment carried out by the company.

Additional

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Sandrine Vieules-Rosset +33 4 50 09 65 05
Sandrine.Vieules-Rosset@univ-savoie.fr

Locations

- Annecy (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE903 Scientific training

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Tolerancing	MODULE	6.75 hours	7.5 hours	8 hours	
Industrial robotics	MODULE	26 hours	6	8	
Centralized automation	MODULE	8	12 p.m.	20	

Centralized automation (EASI911_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

From production lines to energy management in homes, automated systems are numerous and varied. This course covers the basic elements required for modeling, analyzing, controlling, and implementing automated systems in a centralized solution context (as opposed to a distributed solution, which would rely on task distribution but be coordinated by communication networks).

Objectives

Upon completion of this course, students will be able to:

- propose an automated system architecture, highlighting the instrumentation, control, and human/machine interface
- model the functional, technological, and operational specifications for controlling an automated system, based on the description of its specifications
- organize the control solution for a centralized automation system, adopting modular operating modes and process hierarchy

Teaching hours

Lectures	Lecture	8
Tutorial	Tutorials	12
Lab	Practical Work	20

Mandatory prerequisites

Basic knowledge of Boolean algebra

Course outline

1. System operating modes (GEMMA) and human-machine interface (HMI)
2. Combinatorial issues
    1. Establishing solutions
    2. Canonical representations
    3. Simplification methods
    4. Simplified notation
3. Grafcet: a tool for specifying and modeling sequential problems
    1. General principles: concepts, graphic elements, interpretation
    2. Evolution rules
    3. Basic structures: sequence, choice, parallelism, synchronization
    4. Horizontal and vertical structuring: derived structures, resources
    5. Interpretation algorithm
4. Automation project management: an example of design methodology
    1. Hierarchization and cooperation of models
    2. Variable naming rules
    3. Application to programming with Unity-Pro

Additional information

Bibliography

Industrial automation in 20 fact sheets Gérard Boujat

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Michel Cuny
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Location

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE904 Engineering Methodology

ECTS
6 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lectures	Tutorial	Practical	Credits
Ceramics & material selection Computer-aided manufacturing	MODULE	12	12	12 hours	
Flow simulation	MODULE			20 hours	
	MODULE			8 p.m.	

Ceramics & Material Selection (MATE911_GI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

Use of ceramics in industry

Choice of materials for industrial applications

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
acquire an -technological culture broad concerning the ceramic materials used in mechanical In particular, of knowledge that can be integrated into a design/manufacturing project (structural aspects of ceramic materials ceramic materials, physical properties physical and thermomechanical properties, mechanical behavior	Master	characterize a ceramic classify ceramics in relation to other materials

, manufacturing procedures and applications)		

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	12
Lab	Practical Work	12

Mandatory prerequisites

Materials testing

Mechanics of continuous media

Course outline

Ceramics:

1. Definition of the term "ceramic"
2. Ceramic compounds
3. Major characteristics and specific features
4. Powder preparation
5. Manufacturing processes (casting, pressing, extrusion, injection)
6. Examples
7. Company visit and case study Materials learning:

Learn about the characteristics of materials in order to choose them based on economic, mechanical, resistance, eco-design criteria, etc.

Additional information

Bibliography

Industrial ceramics - Properties, shaping, and applications

L'Usine Nouvelle

Choice of Materials in Mechanical Design Dunod

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Pascale Balland

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Pascale.Balland@univ-savoie.fr

Location

Annecy-le-Vieux (74)

Campus

Annecy / Annecy-le-Vieux campus

Computer-aided manufacturing (FABR921_GI)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This course introduces students to CAM and, through a project, to the use of the digital chain from CAD to the production of the part.

Objectives

This course aims to enable students to:	Level	At the end of this course, students will be able to:
structure a CNC program	Concept	read a CNC program
		modify a CNC program
		create a CNC program
		organizing industrial production

Teaching hours

Practical work	Practical work	20

Mandatory prerequisites

CAD practice

Course outline

1. Structuring a CNC program
2. Analysis of a turning program
3. Programming a turning part
4. Explanation of milling cycles
5. Programming a milling part

Practical work titles

- Learning CAM (4 hours)
- Determining the production of a part using CAM (8 hours)
- Production of the part studied on a CNC machine (8 hours)

Additional information

Bibliography

Computer-Aided Manufacturing ALain Bernard

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Marc Villetard

+33 4 79 75 85 85

Marc.Villetard@univ-savoie.fr

Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Flow Simulation (GIND913_GI)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person **Teaching format:** Practical work **Open to exchange students:** Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

The design and operation of manufacturing production systems, for example, require information-rich models for analysis, simulation, and control purposes. This course covers the basic elements needed to ultimately obtain performance evaluations or dynamic system dimensioning.

Objectives

Upon completion of this course, students will be able to:

- model the behavior of a dynamic system (graphical model and algebraic model)
- calculate the performance of a system with established resources
- calculate the resources required to achieve the targeted performance

Teaching hours

Practical work	Practical work	20

Mandatory prerequisites

Matrix Calculus

Course outline

1. Creating a Petri net model
2. Model validation (enumerative, algebraic, and structural analysis)
3. Time-based model
4. Performance evaluation/dimensioning
5. Calculation of an admissible control

Additional information

Bibliography

Business flow management, modeling, and simulation Jean-François Claver

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Stephane Marteau

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE001 Work experience

ECTS
22 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lectures	Tutorial	Practical	Credits
Project 3 (Monitoring and reporting)	MODULE			12	
Corporate development (4 areas)	MODULE				

Project 3 (Monitoring and reporting) (PROJ001_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French
- **Teaching methods:** In person
- **Teaching format:** Learning and assessment situations
- **Open to exchange students:** Yes

Presentation

Description

In this module, engineering students will be required to carry out an engineering project within a company, involving technical, economic, and human aspects.

Objectives

Methodically manage an industrial project in a balanced and effective manner according to its three complementary components: technical, economic, and human.

- Define and use project management tools covering technical, economic, and human aspects. Anticipate and promote the smooth running of the project:
- analyze and predict potential risks in order to anticipate how to manage them
- define and monitor the action plan (associated countermeasures).

Use or implement relevant indicators and ensure the project's sustainability:

- define and use project management indicators covering technical, economic, and human aspects (monitoring and performance indicators)

- identify the means and resources

- ensure the sustainability of results

- draw lessons that can be extrapolated for the future.

Teaching hours

Practical work	Practical work	12
Other	Other	2

Mandatory prerequisites

Projects and modules from semesters 5, 6, 7, 8, and 9 related to SHEJS and PROJ.

Course outline

Launch

Support: project scoping, advanced implementation of project management/problem-solving tools/methods, identification and management of the three essential components of the engineering project (technical, economic, and human), optimization of the approach and sustainability, taking a step back to consider the skills of an engineer, etc.

Thesis & Defense of the P3 project, including a section in English

Additional information

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Sandrine Vieules-Rosset +33 4 50 09 65 05
Sandrine.Vieules-Rosset@univ-savoie.fr

Places

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Corporate Development (4 areas) (STAG001_PACYFISA)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes

Presentation

Description

This assessment allows us to see the apprentice's progress throughout the various projects and tasks carried out within the company. The semester 10 assessment relates to the Engineering project.

Objectives

Be a good engineer and have good relationships with others:

- get involved
- be organized
- make decisions
- solve problems
- take responsibility

Mandatory prerequisites

None

Course outline

Drafting of the project orientation sheet. Evaluation carried out by the company.

Additional information

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Sandrine Vieules-Rosset +33 4 50 09 65 05
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Locations

- Annecy (74)

Campus

> Annecy / Annecy-le-Vieux campus

UE002 Technical supplements

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Operational safety	MODULE	8	12		
Plastics & composites	MODULE	2 p.m.	6		
Risk prevention	MODULE	4 p.m.			
Project management	MODULE	8	2		
Surface CAD	MODULE			20	
Industrial performance	MODULE	10 hours	10		

Operational Safety (GIND011_GICM)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes
ERASMUS reference: Engineering and related techniques

Overview

Description

The reliability of the products they manufacture and the operational safety of their equipment are two key factors in the success of manufacturing companies. It is therefore important that mechanical engineers master these two concepts and be able to apply them in companies or service providers.

Objectives

- Choose a maintenance strategy
- Model reliability
- Assess equipment availability

Teaching hours

Lectures	Lecture	8
Tutorial	Tutorials	12

Mandatory prerequisites

- Mathematical laws: Normal, Poisson, Exponential
- Production management (layout, flow, inventory)

Course outline

1. Introduction to operational reliability
2. Presentation of maintenance
3. Different forms of maintenance
4. Reliability models; detailed study of the Weibull model
5. Equipment availability

Additional information

Bibliography

- Operational safety of industrial systems, A. Villemeur, Ed. Eyrolles
- Feedback applied to the operational reliability of equipment in service, J. Aupied, Ed. Eyrolles
- Practical FMEA: Ensuring the quality and operational safety of your products, equipment, and processes, J. Faucher, Ed. Dunod
- Reliability, maintenance, and risk, D. Smith, D. Gouadec, Ed. Dunod
- Maintenance: Mathematics and Methods, P. Lyonnet, Tec Doc Lavoisier
- Maintenance: Methods and Organizations, F. Monchy, Ed. Dunod
- Engineering Techniques, Industrial Engineering Theme, Maintenance Basics

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course director Hugues Favreliere

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Locations

- Annecy (74)

Campus

- Annecy / Annecy-le-Vieux campus

Plastics & Composites (MATE010_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

- Plastic materials:
  - Polymer materials
  - Characteristics of use and implementation
  - Processes and means of transformation (machines and tools)
  - Design rules for plastic parts
- Composite materials:
  - Reinforcements and matrices used in industry
  - Composite implementation processes and basic calculation concepts

Objectives

The objective of this course is:

- For plastic materials:
  - To understand the structure of polymer materials
  - Learn about the characteristics of use and implementation
  - Understand all the means of transformation (machines and tools)
  - Identify the key points in the design of plastic parts

- For composite materials:
  - Provide an overview of composites by defining some reinforcements and matrices used in industry, composite manufacturing processes, and some simple calculation concepts.

Teaching hours

Lectures	Lecture	2 p.m
TD	Tutorials	6

Mandatory prerequisites

Basic knowledge of materials

Process concepts

Basic knowledge of RDM

Course outline

1. Plastics
    1. Polymers and polymerization
    2. Main plastics used and their properties
    3. Implementation
    4. Tools
    5. Design
    6. Introduction to rheology
    7. Marking technologies
2. Composite Materials
    1. Introduction, definition, and advantages of composites
        1. Various types of composites
        2. Synergies and improvements achieved with composites
    2. Main families of composites
        1. Definition – presentation
        2. Components (fiber reinforcements, matrix, fillers)
        3. Organic composites
        4. Metal composites
        5. Transparent and glass-based composites
        6. Elastomer-based composites
    3. Composite structures
        1. Sandwich panels
        2. Sheet composites
    4. Composite implementation

5. Concepts of composite part calculations (micro-macro relationship: mixing law)

Additional information

Targeted skills

Knowing how to choose plastic materials

Know how to choose a process for plastic materials Know how to apply the rules for designing plastic

parts Be familiar with the different types of composite materials

Have some knowledge of design, dimensioning, and process selection for composite parts

Bibliography

Guide du dessinateur industriel (Industrial Designer's Guide), André Chevalier

Design of Mechanical Parts in Plastic and Composite Materials, Alain Dessarthe

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Marc Villetard

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Risk Prevention (GIND012_GICM)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes **ERASMUS reference:** Law

Presentation

Description

Presentation of risks in business and ways to manage them.

Objectives

Understand the various challenges of risk prevention in the workplace, learn about general safety principles and the obligations of the company.

Teaching hours

Lectures	Lecture	16

Mandatory prerequisites

Basic knowledge of legislation and ergonomics

Course outline

1. Accidents and occupational illnesses, accident rate indicators
2. Temporary, partial, and permanent disability
3. Compensation, lump-sum compensation, annuity
4. Employer account, AT/MP contribution rate
5. Risks, hazards: definition, principles of risk exposure
6. Labor code: employer obligations
7. Labor code: employee obligations
8. The 9 general principles of prevention
9. Workplace accidents, commuting accidents, occupational illnesses: definition and identification; study of occupational illness tables 10.Risk management: the Safety Management System
11. Prevention stakeholders (internal and external to the company) 12. Analysis of workplace accidents using the
cause tree method
13. Specific risks: chemical risks, psychosocial risks
14. Work machinery and equipment: compliance principles.
15. Risk assessment and the single document: regulations, methodology, assessment tools

Additional information

Bibliography

Risk management in business: identifying, understanding, controlling Jean Darsa

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Hugues Favreliere

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Locations

- Annecy (74)

Campus

- Annecy / Annecy-le-Vieux campus

Project Management (SHES012_GICM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Business and Administration

Overview

Description

Project management course Project management support

Objectives

Master project management, apply project management by integrating the human factor:

- manage a project within a company using a rigorous approach

- manage a project within a company according to human factors

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Teaching hours

Lectures	Lecture	8
Tutorial	Tutorials	2

Mandatory prerequisites

Humanities tools from semesters 5, 6, 7, 8, and 9 (in progress)

Course outline

Project framework

Rigorous management: planning, monitoring and results indicators (deliverables), etc.

Integration of the human component: objective, dedicated tools/approaches...

Additional information

Bibliography

The Neuro-Manager - Laurence Sautivet

Project Management, 3rd edition - Thierry Hougron

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Surface CAD (CMEC010_GICM)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person **Type of instruction:** Practical work **Open to exchange students:** Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

This training module covers surface modeling in CAD.

Objectives

Creation of a digital surface model in CAD, with the following properties:

- representing the properties of the object
- be usable (calculations, simulation, etc.)

Teaching hours

Practical work	Practical work	20

Mandatory prerequisites

CAD volume modeling

Course outline

- Spline curves
- Surfaces: concepts of smoothing and sweeping
- Use in reverse engineering (3D scanner)

Additional information

Bibliography

Solidworks: the reference manual CREO: reference

documentation

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Industrial Performance (GIND010_GICM)

Polytech Annecy-Chambéry

Time of year Every year

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Teaching format:** Lecture **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

The aim of this course is to position the respective concepts of industrial performance and improvement initiatives from both a conceptual and operational perspective. The issue of performance measurement, which today involves multiple criteria and multiple levels, is addressed through the concepts of indicators and systems. Implementation methods and tools are studied.

In light of the link between industrial performance and improvement, a definition and typology of the latter are proposed. The concept of improvement processes is then addressed, based on the main steps involved. The processes most commonly used in industrial settings are considered in particular.

Finally, considerable attention is given to industrial testimonials and discovering performance in the field through a visit to a pilot company in the sector.

Objectives

Understanding the concept of performance Deployment of objectives

Implementation of a performance indicator system

Application of two major improvement methods (Lean and 6 Sigma)

Teaching hours

Lectures	Lecture	10
Tutorial	Tutorials	10

Mandatory prerequisites

Courses on:

- Production Management and Quality
- Advanced production management

Course outline

1. The concept of industrial performance
2. The performance indicator
3. Performance indicators in the control loop
4. The performance indicator system
5. Performance at ADIXEN Pfeiffer (testimonial and visit)
6. The principles of an industrial improvement approach, the PETRA guide
7. A specific approach: Six Sigma

Practical work titles

- TP1 and TP2: Industrial improvement approach: CIPE game
- TP3: study of an industrial case study at a pilot site

Additional information

Targeted skills

Understanding the challenges of industrial performance

Understanding the fundamentals of an industrial improvement process

Bibliography

- Performance indicators: concepts and applications, Lamia Berrah (2002), Cepadues.
- The Balanced Scorecard, Robert Kaplan and David Norton (2003), Editions d'Organisation
- Six Sigma: How to Apply It, Maurice Pillet, (2003) Editions d'Organisation,
- Kaizen: The Key to Japanese Competitiveness, Masaaki Imai, (1988) Eyrolles
- Multiple Criteria Decision Analysis: State of the Art Surveys, Ergott, Figueira, and Greco, (2005) Springer
- Toyota Production System, Taiichi Ohno, (1988) Productivity Press
- Decision-making and decision-makers in industry, Lamia Berrah and Vincent Clivillé (2022), ISTE editions

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Lamia Berrah

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Locations

- Annecy (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE501 SHES - Languages

ECTS
8 credits

Polytech Annecy-Chambéry

List of courses

	Type	Lectures	Tutorial	Practical	Credits
Labor law and corporate structure 1	MODULE	8 p.m.	12:00		
	MODULE	4 p.m.	p.m.		
Introduction to Sustainable Development and CSR - Cognitive Development English	MODULE		12:00	4	
			p.m.		
			37		

	Nature	CM	Tutorial	Practical work	Credits
Support (every Thursday afternoon)	MODULE				

UE502 Work in a company

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lecture	Tutorial	Practical	Credits
Project 1 (Launch and follow-up)	MODULE	1		4	
Evolution in the workplace	MODULE				

UE503 Scientific training

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Mathematics for Engineers	MODULE	16	24		
Mechanism statics	MODULE	10	10		
Kinematics	MODULE	10 a.m.	10		
Strength of Materials	MODULE	8 p.m.	20		

UE504 Engineering Methodology

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Industrialization for Machining Mechatronics	MODULE	28	4	8	
Total quality	MODULE			hours	
	MODULE			40	
		32		hours	
Introduction to Industrial Management	MODULE	32			

Mechatronics (MCTR510_CM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

Multi-physical systems representative of mechatronics will be analyzed using experimental observations and based on their schematization into subsets. These analyses may be supplemented by technological research and the implementation of simple behavior models based on the input-output behaviors of systems or subsystems.

Objectives

This course aims to enable students to:	Level	By the end of this course, students will be able to:
acquire an analytical approach	Master	analyze a multi-physical system
develop skills capabilities modeling by analogy	Master	of model a system multi-physics system by analogy

expand your technological knowledge	Concept	search for the information needed to master multiple technologies

Teaching hours

Practical	Practical work	40

Mandatory prerequisites

Basic knowledge of mechanics, instrumentation, electronics, automation, and computer science

Course outline

- Analysis of a given mechatronic system. Control of a line-following mobile robot.
- Implementation, analysis, and control of an instrumented hydraulic cylinder. Study and implementation of an associated system model (AMESim software).
- Implementation and analysis of an active structural damping system based on the use of piezoelectric actuators.
- Experimental characterization and nonlinear model of a piezoelectric actuator. Study of a range of piezoelectric actuators, comparison with other actuator technologies.

Additional information

Bibliography

None

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Luc Marechal

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE601 SHES - Languages

ECTS
4 credits

Polytech Annecy-Chambéry
Component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Introduction to sustainable development and CSR	MODULE	6 hours	4		
Sustainable development - Site approach (Environmental management)	MODULE	4	6		

	Nature	CM	Tutorial	Practical	Credits
Support (every Thursday afternoon when FISA staff are present)	MODULE				

	Nature	CM	Tutorial	Practical	Credits
English (TOEIC level not achieved)	MODULE		30 hours		
English (TOEIC level achieved)	MODULE		30		

UE602 Work Experience

ECTS
10 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Project 1 (Monitoring and reporting)	MODULE			4	
Evolution in the workplace (4 areas)	MODULE				

UE603 Scientific training

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lecture	Tutorial	Practical	Credits
Machine components	MODULE MODULE	20 hours	8:00 p.m.		
Fundamentals of electricity and electric motors Mechanical design	MODULE	8 hours 20	8:00 p.m. 8:00 p.m.	12 p.m.	

UE604 Engineering Methodology

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Statistical process control Challenges of artificial intelligence	MODULE	12	12	4	
Design of experiments - Methodological tools	MODULE	hours			
	MODULE	6			
		hours	8	4	
		6			
Case studies - Company visits	MODULE	16	24		

UE701 SHES - Languages

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Management	MODULE		32		
Business Structure and Entrepreneurship 2	MODULE	12 hours	12		
Sustainable development - Product approach	MODULE	4	2	8	

	Nature	CM	Tutorial	Practical	Credits
Support (half of Thursday afternoons when FISA staff are present)	MODULE				

	Nature	CM	Tutorial	Practical	Credits
English (TOEIC level achieved)	MODULE		34 hours		
English (TOEIC level not achieved)	MODULE		34		

UE702 Work in a company

ECTS
10 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Project 2 (launch and follow-up)	MODULE	1 hour		8	
Career development (progression)	MODULE				

UE703 Scientific training

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Mechanism dynamics	MODULE	20 hours	20		
Modeling and finite elements	MODULE	20 hours		8 p.m.	
Continuous automatic	MODULE	4 p.m.	12 p.m.	12 hours	

UE704 Engineering Methodology

ECTS
5 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Electronics	MODULE	28		12h	
	MODULE	hours		8h 8h	
Algorithms and programming Sampled automation	MODULE	12		12	
		hours			
Design office tools	MODULE	16			
		hours			

Automatic sampling (EASI720_CM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This module covers digital control systems. After introducing the concept of time sampling and the description of discrete-time signals, modeling using discrete transfer functions is discussed. Stability analysis and closed-loop control using simple controllers (P, PI) are then presented.

Objectives

Understand the basic concepts and tools associated with sampling a continuous signal (sampling, Z-transform).

Know how to represent a sampled continuous system using a discrete transfer function.

Be able to study the stability of a sampled system and synthesize conventional digital control systems (P and PI controllers).

Teaching hours

Lectures	Lecture	16
Lab	Practical work	8

Mandatory prerequisites

EASI710 (Continuous Control)

Course outline

1. Introduction

2. Sampled signals and Z-transform

2.1. Sampling of continuous signals

2.2. Choice of sampling period Te

2.3. Z-transform

3. Sampled transfer function

3.1. Discrete-time linear systems

3.2. Modeling of sampled continuous systems

4. Analysis of sampled systems

4.1 Stability

4.2. Static gain

4.3. Correspondence between continuous poles and sampled poles

5. Synthesis of digital correctors

5.1. Introduction

5.2. Closed-loop accuracy

5.3. P and PI controllers

Additional information

Bibliography

"Automatique - Systèmes linéaires, non linéaires, à temps continu, à temps discret, représentation d'état" (Automation - Linear, nonlinear, continuous-time, discrete-time systems, state representation), Yves GRANJON, 4th edition, 2021, DUNOD.

"Digital Control of Systems," Emmanuel GODOY, Eric OSTERTAG, 2003, ELLIPSES.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Pascal Mouille

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE801 SHES - Languages

ECTS
5 credits

Polytech Annecy-Chambéry

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Management and technical communication	MODULE	6	4	12	

	Nature	CM	Tutorial	Practical	Credits
Support (half of Thursday afternoons when FISA staff are present)	MODULE				

	Nature	CM	Tutorial	Practical	Credits
English (TOEIC level achieved)	MODULE		40 hours		
English (TOEIC level not achieved)	MODULE		40		

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UE802 Work Experience

ECTS
7 credits

Polytech Annecy-Chambéry
Component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Project 2 (Monitoring and reporting)	MODULE			8	
Evolution in the workplace (4 areas)	MODULE				

UE803 Scientific training

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lecture	Tutorial	Practical	Credits
Structural dynamics Fluid statics and dynamics	MODULE	6	6	8	
Design Office Project	MODULE	hours	hours		
	MODULE	12	12		
		hours	hours	40	
Algorithms and programming: generalization	MODULE	4	4	12	
Thermal	MODULE	8	8		

UE804 Engineering Methodology

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Metallic materials Embedded systems Advanced	MODULE	16	12h	12	
embedded systems	MODULE	hours		hours	
	MODULE	7.5		12	
Sensors		hours		hours	
	MODULE			20	
			12	hours	
		12		4 p.m.	

Advanced Embedded Systems (INFO830_CM)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In-person
Teaching format: Tutored project **Open to exchange students:** Yes
ERASMUS reference: Engineering and related techniques

Presentation

Description

This course aims to present the main characteristics of an embedded computer system based on a microcontroller, a system designed to be embedded in a mechatronic system. After presenting the main characteristics of a microcontroller system and the interface circuits it can integrate, the course will address the software aspects associated with exchange management (I/O, interrupts, polling, etc.). Practical application on a real system is then proposed under
A micro-project in mechatronics focused on microcomputing aspects. This work is intended to provide mastery of the communication mechanisms between a microcontroller and peripherals. The equipment used is Arduino or Raspberry, both of which offer an environment that facilitates the implementation of such embedded applications.

Objectives

The objective of this course is to present the main characteristics of an embedded computer system based on a microcontroller, a system designed to be embedded in a mechatronic system.

Teaching hours

Practical	Practical work	20

Mandatory prerequisites

Fundamentals of computer architecture and algorithms

Course outline

1. Peripheral control via I/O registers (command, status, data).

2. Implementation of I/O by polling and interrupts.

Additional information

Bibliography

Embedded real-time systems - Specification, design, implementation, and temporal validation Francis Cottet

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Yajing Yan

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Locations

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

Sensors (EASI821_CM)

Polytech Annecy-Chambéry

Time of year Spring

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Presentation

Description

Statistical analysis of measurements, measurement chain from sensor to digitization

Objectives

- Evaluate the performance of the measurement device, including the sensor
- Specify the main characteristics of a sensor (measurement range, sensitivity, etc.)
- Dimension a measuring bridge
- Dimension an instrumentation amplifier
- List the basic functions of the digital electronics required for the digital acquisition of an analog signal

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	12
Lab	Practical Work	4 p.m.

Mandatory prerequisites

- Math: First- and second-order differential equations
- Electricity: Node law, mesh law

Course outline

1. Elements of metrology
    1. Measurements and quality
    2. Calibrations
2. Sensors and conditioning electronics
    1. Sensor characteristics
    2. Measurement errors
    3. Signal conditioning electronics
3. Acquisition system
    1. Digitization of an analog signal
    2. Performance of an acquisition system
    3. Measurement analysis
    4. Accessible representative quantities

Additional information

Bibliography

- G. Asch: Sensors in industrial instrumentation
- F. Baudoin- M. Lavabre: Sensors: principles and uses

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Location

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE901 SHES - Languages

ECTS
7 credits

Polytech Annecy-Chambéry

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Legislation, labor law, occupational health, sustainable engineering, decarbonization	MODULE	18 hours	8	8	
GEPC, humanities, management, ergonomics	MODULE	28			

	Nature	CM	Tutorial	Practical	Credits
English (TOEIC level achieved)	MODULE		26 hours		
English (TOEIC level not achieved)	MODULE		26		

UE902 Work in a company

ECTS
10 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Project 3 (Launch and follow-up)	MODULE	1 hour		8	
Progress in the workplace (advancement)	MODULE				

UE903 Scientific training

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Tolerance	MODULE	6.75 hours	7.5 hours	8	
Industrial robotics	MODULE	26h	6	8	
Centralized automation	MODULE	8	12 p.m.	20	

UE904 Engineering Methodology

ECTS
6 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Functional materials	MODULE	12 hours	12	16	
Multiphysical systems	MODULE			32	

Functional Materials (MATE910_CM)

Polytech Annecy-Chambéry
component

In brief

- **Languages of instruction:** French **Teaching methods:** In person
- **Open to exchange students:** Yes
- **ERASMUS reference:** Engineering and related techniques

Overview

Description

This course aims to introduce functional materials used in professions related to mechatronics:

- materials with specific properties used in sensors, actuators, and mechatronic devices.

- explanation of the physical phenomena involved in these materials, description of the behavioral models used to account for their properties, applications.

Objectives

1) understand the behavior of different classes of materials in response to electrical, magnetic, and electromagnetic stresses in relation to:

1-1) the concepts of permanent and induced electric dipole moments, which are specific to dielectric materials and are at the origin of piezoelectric, ferroelectric, and pyroelectric phenomena

1-2) the concepts of magnetic dipole and magnetization phenomena for different classes of magnetic materials

2) identify the classes of active materials used in various measurement and transduction applications, knowing:

2-1) manipulate the quantities and tensors of dielectric, pyroelectric, piezoelectric, and piezoresistive properties 2-2) manipulate the quantities and tensors of magnetic and magnetostrictive properties

Teaching hours

Lectures	Lecture	12
TD	Tutorials	12
Lab	Practical Work	4 p.m.

Mandatory prerequisites

* Fundamentals of general physics

* Electromagnetism and material resistance

* Mathematical tools: integrals, derivatives, coordinate systems, operators, vector analysis

Course outline

1) Dielectric properties: polarization, dielectric strength, and concepts of pyroelectricity and ferroelectricity

2) Piezoelectric materials

3) Piezoresistive materials

4) Magnetic properties of materials: magnetization, magnetic permeability, para-, dia-, and ferromagnetism

5) Magnetostrictive materials

Practical work

1) Atomic force microscopy

2) Ferromagnetic cycle and equivalent electrical circuit

3) Piezoelectric ceramics, experimental studies and multiphysics modeling

4) Piezo-resistive gauges applied to weight measurement

Additional information

Bibliography

David Jiles, Introduction to Magnetism and Magnetic Materials, Ed. Chapman and Hall, 1994 Yuhuan Xu, Ferroelectric Materials and Their Applications, Ed.

North-Holland, Elsevier, 1991

Skills acquired

Macro-skills	Micro-skills

Practical

Contact

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Places

- Annecy-le-Vieux (74)

Campus

- Annecy / Annecy-le-Vieux campus

UE001 Work experience

ECTS
22 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lectures	Tutorial	Practical	Credits
Project 3 (Monitoring and reporting)	MODULE			12	
Corporate development (4 areas)	MODULE				

UE002 Technical supplements

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Operational safety	MODULE	8	12		
Plastics & composites	MODULE	2 p.m.	6		
Risk prevention	MODULE	4 p.m.			
Project management	MODULE	8	2		
Surface CAD	MODULE			20	
Industrial performance	MODULE	10 hours	10 a.m.		