SCIENCE, TECHNOLOGY, HEALTH

Engineering Degree in Eco-Construction and Energy

Level of qualification:
Master's degree

ECTS
180 credits

Duration
3 years, 6 semesters

Courses offered

Building Eco-construction Energy

Building Eco-construction Energy - Work-study program

The Ecoconstruction Energy Building Engineering program is based on a common core of skills that enable students to carry out multidisciplinary and cross-functional assignments in the building sector. This involves designing, dimensioning, constructing, and operating buildings using a multi-technical (structure, thermal, etc.) and multi-stakeholder (architect, project owner, design offices, companies) approach.

Objectives

The objective of this program is to train generalist engineers in the field of construction, enabling them to carry out engineering tasks inherent to the various phases of a construction project, from project management assistance to design and control tasks, and from construction management to the operation/maintenance of structures in the following areas:

- construction systems engineering (reinforced concrete, metal, wood, and mixed construction);
- reducing and controlling the environmental footprint of buildings throughout their life cycle (eco-construction, energy management, and integration of renewable energies);
- construction project management, with a particular focus on processes related to building information modeling (BIM).

International dimension

100% of students go abroad

- either by spending a semester studying at a foreign university under inter-institutional agreements (student status)
- or by doing an internship (or a stay) abroad, in a company or laboratory, thanks to the School's network of partners (training as a student or apprentice)

https://www.polytech.univ-smb.fr/international/ mobilite.html

The advantages of the program

This training program responds to a strong need for renewal among engineers in the construction sector and site managers, as well as to the profound changes in this sector, which requires managers with increased responsibilities and broader skills in

the combined effect of technical, digital, regulatory, social, and market developments.

Organization

Expected enrollment

72 places for students 24 places for apprentices

Study accommodations

The Disability Support Unit and the High-Level Sports (SHN) / High-Level Artist (AHN) program offer study accommodations.

Learn more

Admission

Who is the training aimed at?

Student status:

- Integrated preparatory class
- CPGE students,
- Undergraduate students (L2, DUT, or equivalent)

http://www.polytech-reseau.org/postuler-a-polytech/cycle-ingenieur/

Apprentice status:

- DUT
- BTS
- Other two-year post-secondary programs (L2, CPGE, integrated preparatory class)

http://www.itii-2savoies.com/formations/batiment-ecoconstruction-energie/

Apply and register

Apply / Register

And after

Further studies at USMB

- Master's in Business Management and Administration
- Doctorate

Targeted professions and career opportunities

- Project management engineer; project implementation engineer, design engineer (structure, energy efficiency, renewable energy); research and development engineer
- Site engineer; production engineer; project engineer · Building control and technical diagnostics engineer
- Heritage and real estate engineer; operations engineer

Practical information

Contact

Admission to Polytech Annecy-Chambéry

admission@polytech-annecy-chambery.fr

Partner laboratories

Laboratory for Design Optimization and Environmental Engineering (LOCIE)

https://www.locie.univ-smb.fr/

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Learn more

Become an engineer in Eco-construction and Energy

https://www.polytech.univ-smb.fr/formation/batiment-ecoconstruction-energie/ingenieur-batiment.html

Program

Building Eco-construction Energy

IGE3 - Building Eco-construction Energy

Semester 5

	Nature	Lectures	Tutorial	Practical	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				
	MODULE	3 hours			
	MODULE				
	MODULE				
UE502 Engineering Sciences and Tools	UE				9 credits
Sustainable Development	MODULE	15 hours	12 hours	12	
Algorithms and Python Programming	MODULE	3 hours	6 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 Engineering Sciences	UE				13 credits
Heat Transfer	MODULE	22.5 hours	18		
APP: Building Functions and Technologies	MODULE CM TD TP				
APP: Building Functions and Technologies CM APP: Building Functions and Technologies TD APP: Building Functions and Technologies TP	MODULE	13.5 hours			
Fluid Mechanics			3 p.m.		
		10.5 hours		12	
			28.5 hours		
Applied Mechanics Electricity	MODULE	16.5 hours	21 hours	4 hours	
	MODULE	13.5	15 hours	12 hours	

Semester 6

	Type	Lectures	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				
Business-oriented project management techniques	MODULE	6 hours	9		

English (TOEIC level not achieved) S6 Modern languages (TOEIC level achieved)	MODULE MODULE		40.5 hours		
English S6 Modern language 2	SUBJECT CHOICE				
Italian TD	Tutorial		15 hours		
German TD	Tutorial		20 hours		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD Advanced English S6	Tutorial		8 p.m.		
Optional internship S6	SUBJECT		9 p.m.		
Support (every Thursday afternoon when FISA staff are present)	MODULE MODULE				
UE602 Engineering Sciences	UE				8 credits
Energy and fluids Building materials Data and decision support	MODULE MODULE MODULE	7.5 hours 13.5 13.5	9 hours 10.5 hours 12	32	
UE603 Construction Engineering and Organization	UE				7 credits
APP: Introduction to digital building modeling Structural mechanics APP: Building Industry Stakeholders	MODULE MODULE MODULE	15	13.5	24 12	
UE604 Energy and Environmental Quality of Buildings	UE				7 credits
Climate engineering Acoustics and lighting	MODULE MODULE	12 hours 18 hours	28.5 30	12	

IGE4 - Building Eco-construction Energy

Semester 7

	Nature	Lecture	Tutorial	Practical	Credits
UE701 Gateway to the professional environment	UE				6 credits
Professional resources and dynamics Creativity and innovation management English (TOEIC level not achieved) S7 Modern languages (TOEIC level achieved)	MODULE MODULE MODULE		13.5 25.5 40.5	3.5 hours	
English S7 Modern Language 2	MODULE SUBJECT				
Italian TD German TD Spanish TD Japanese TD	CHOICE TD Tutorial		15		
Intercomprehension of Romance Languages TD Advanced English S7	Tutorial		20 20		
Optional internship S7	Tutorial		20 20		
Support (half of Thursday afternoons when FISA staff are present)	Tutorial Tutorial SUBJECT MODULE MODULE		20 21		

UE702 Construction Engineering	UE				10 credits
Reinforced concrete 1	MODULE	18 hours	15 hours	6 hours	
Structural Design and Modeling Geotechnics 1	MODULE	9 hours	21 hours	12 hours	
Structural Mechanics	MODULE	7.5 hours	9 hours	12 hours	
	MODULE	6 hours	21 hours	8 hours	
UE703 Building Energy Efficiency	UE				10 credits
Building Thermal Engineering Climate	MODULE	18 hours	22.5 hours	32	
Engineering	MODULE	9 hours	18 hours		
Thermal and environmental regulations	MODULE	10.5 hours	7.5 hours	20 hours	
UE704 BIM	UE				4 credits
APP: BIM	MODULE			36 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	MODULE	9 a.m.	10.5 hours		
English (TOEIC level not achieved) S8 Modern Languages (TOEIC level achieved)	MODULE	6 p.m.	7.5 hours		
English S8 Modern	MODULE		40.5 hours		
Language 2	SUBJECT				
Italian TD German	CHOICE TD		3 p.m.		
TD Spanish TD	Tutorial				
Japanese TD					
Intercomprehension of Romance Languages TD Advanced English S8	Tutorial		8 p.m.		
Optional Internship S8			8 p.m.		
Support (half of the Thursdays when FISA is present)	Tutorial		8 p.m.		
			8 p.m.		
	Tutorial		8 p.m.		
			9 p.m.		
	SUBJECT				
	MODULE				
	MODULE				
UE802 Internship	UE				6 credits
Internship Assistant Engineer S8	MODULE				
UE803 elective	CHOICE				
UE803 Energy Systems Thermodynamics	UE				7 credits
	MODULE	16.5 hours	28.5 hours		
Fluid Network Design UE803 Construction Engineering	MODULE	12 hours	10.5 hours	32 hours	
Reinforced Concrete 2	MODULE				7 credits
		21 hours	30 hours	6 hours	
Metal construction	MODULE	12 hours	19.5 hours		
UE804 elective	CHOICE				
UE804 Renewable Energy and the Environment Renewable Energy	MODULE				7 credits
		19.5 hours	31.5 hours		

Energy, economic, and environmental issues MODULE 25.5 hours 16.5 hours

UE804 Construction Engineering-3	UE				7 credits
Geotechnics 2 and Eco-Construction with Earth	MODULE	13.5 hours	19.5	12	
Site management	MODULE	27	33		
UE805 Design & Studies	UE				4 credits
APP: Design and Studies in Wood Construction	MODULE			36	
Wood Construction CM Wood Construction TD	MODULE CM Tutorial	3 p.m.	6 p.m.		

IGE5 - Building Eco-construction Energy

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				
Italian TD	SUBJECT		15h		
	CHOICE TD		20h		
German TD	Tutorial		20		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD Advanced English S9	Tutorial		20 hours		
Optional internship S9	SUBJECT MODULE		21 hours		
UE902 Design & Studies	UE				8 credits
Building Renovation	MODULE				
Building renovation CM	CM	9 a.m.			
Building renovation TD	TD MODULE		25.5		
Structural dynamics and earthquake engineering Structural dynamics and earthquake engineering	CM Tutorial				
CM Structural dynamics and earthquake engineering TD Structural dynamics and earthquake engineering TP	Practical	13.5	13.5		
				4	
APP Multitechnical project - Design and studies	MODULE			60	
UE903 Process of organizing a construction operation	UE				5 credits
Life cycle of a construction project Legislative context of the building industry	MODULE	18	9		
Legislative context of construction CM	MODULE CM	9 p.m.			
Legislative context of building CM (common)	CM	12 p.m.			
UE904 Renewable energies and eco-construction	UE				7 credits
Solar Thermal Energy Solar Photovoltaic Energy	MODULE MODULE	12 hours	12 hours	12 hours	
		13.5 hours	15 hours	8 hours	

Building and Energy Systems Modeling Building & Energy Systems Modeling CM	LECTURE			
Building & Energy Systems Modeling TD	MODULE			
	Tutorial	12 hours		
			18	
Numerical methods	MODULE	3	13.5 hours	

Semester 10

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

Building Eco-construction Energy - Work-study program

IGE3 - Eco-construction Energy Building - Work-study program

Semester 5

	Nature	Lectures	Tutorial	Practical	Credits
UE501 SHES - Languages	UE				8 credits
Support (every Thursday afternoon) Labor law and corporate structure 1	MODULE				
	MODULE	20 hours	12		
Introduction to sustainable development and CSR - Cognitive development	MODULE	4 p.m.	12 hours	4	
English	MODULE		37 hours		
UE502 Work experience	UE				4 credits
Project 1 (Launch and follow-up) Development	MODULE	1		4	
in the workplace	MODULE				0 credits
UE503 Engineering Sciences	UE				11 credits
Computer Science Refresher	MODULE			24	
Course	MODULE		18		
Mathematics Applied Mechanics Fluid	MODULE	12 hours	18h		
Mechanics	MODULE	13.5 hours	21h		
Electricity	MODULE	10.5	24h	4	
	MODULE	6	6		
				hour	
				s 3	
				hour	
				s	
UE504 Building Sciences	UE				7 credits
Heat transfer Building materials	MODULE	18	18		
APP: Building Functions and Technologies	MODULE	hours	hours		
APP: Building Functions and Technologies CM APP: Building Functions and	MODULE CM	13.5	10.5		
	TD	hours	hours		
Technologies TD APP: Building Functions and Technologies TP	TP				
		13.5			
			15		
				12 hours	

Semester 6

	Subject	Lectures	Tutorial	Practical	Credits
UE601 SHES - Languages	UE				4 credits
Support (every Thursday afternoon when FISA staff are present) Introduction to sustainable development and CSR	MODULE				
Sustainable development - Site approach (Environmental management) English (TOEIC level not achieved) English (TOEIC level achieved)	MODULE MODULE MODULE MODULE	6 4	4 6 hours 3 hours 30		
UE602 Work experience	UE				10 credits
Project 1 (Monitoring and reporting) Development in the workplace (4 areas)	MODULE MODULE			4	
UE603 Engineering Sciences	UE				6 credits
Mathematics	MODULE	13.5 hours	22		
APP: Introduction to digital building modeling Challenges of artificial intelligence	MODULE MODULE	6		24	
UE604 Building Sciences	UE				10 credits
Building Thermodynamics Soil Mechanics	MODULE MODULE	13.5 hours 9	15	12	
Structural design Structural mechanics	MODULE MODULE	10.5 10.5	18 hours 16.5 hours	12	

IGE4 - Building Eco-construction Energy - Work-study program

Semester 7

	Nature	Lectures	Tutorial	Practical	Credits
UE701 SHES - Languages	UE				8 credits
Support (half of Thursday afternoons when FISA staff are present) Management	MODULE MODULE		32		
Business structure and entrepreneurship 2 Sustainable development - Product approach English (TOEIC level not achieved) English (TOEIC level achieved)	MODULE MODULE MODULE MODULE	12 hours 4 hours	12 hours 2 hours 34 hours 34	8	
UE702 Work experience	UE				10 credits
Project 2 (launch and follow-up) Career development (progression)	MODULE MODULE	1 hour		8	
UE703 Building Energy Efficiency	UE				7 credits
Climate Engineering Energy Building Physics	MODULE MODULE MODULE	13.5 15	28.5 21 hours 22.5 hours	32	
UE704 Construction Engineering	UE				5 credits
Geotechnics Reinforced Concrete	MODULE MODULE	12 hours 18 hours	16.5 6 p.m.	8	

Semester 8

	Nature	Lecture	Tutorial	Practical	Credits
UE801 SHES - Languages	UE				5 credits
Support (half of the Thursdays when FISA staff are present) Management and technical communication	MODULE				
	MODULE	6	4	12	
English (TOEIC level not achieved)	MODULE		40 hours		
English (TOEIC level achieved)	MODULE		40		
UE802 Work experience	UE				7 credits
Project 2 (Monitoring and reporting) Development in the	MODULE			8	
workplace (4 areas)	MODULE				
UE803 Eco-construction and BIM	UE				4 credits
APP: Design/Studies and BIM Wood construction	MODULE			8 p.m.	
Wood construction CM	MODULE CM	3 p.m.			
Wood construction TD	TD		6 p.m.		
UE804 Building Energy Efficiency	UE				7 credits
Climate engineering Building acoustics	MODULE	9 hours	6 p.m.	4 p.m.	
Thermal and Environmental Regulations	MODULE	12 hours	6 p.m.	12	
	MODULE	10.5 hours	7.5 hours	p.m. 8 p.m.	
UE805 Construction Engineering	UE				7 credits
Construction Management Reinforced Concrete	MODULE	27 hours	27 hours	42	
Structural Mechanics II	MODULE	21 hours	16.5 hours	8	
	MODULE	9 hours			

IGE5 - Building Eco-construction Energy - Work-study program

Semester 9

	Nature	Lectures	Tutorial	Practical	Credits
UE901 SHES - Languages	UE				7 credits
Legislation, labor law, occupational health, sustainable engineering, decarbonization	MODULE	18 hours	8	8	
GEPC, Humanities, management, ergonomics	MODULE	28			
English (TOEIC level not achieved)	MODULE		26 hours		
English (TOEIC level 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 Construction Engineering	UE				4 credits
Building renovation Building renovation CM	CM MODULE	9 a.m.			

Building renovation TD	TD CM MODULE		25.5		
Structural dynamics and earthquake engineering Structural dynamics and earthquake engineering	TD				
CM Structural dynamics and earthquake engineering TD Structural dynamics and earthquake	Practical	13.5			
engineering TP			13.5		
				4	
UE904 Building Energy Efficiency	UE				9 credits
Solar Thermal Energy Solar Photovoltaic Energy	MODULE	12	12h	12	
Renewable Energy II	MODULE	hours	15h	hours	
Building & Energy Systems Modeling Building & Energy Systems Modeling CM Building & Energy	MODULE	13.5	36h	8	
Systems Modeling TD	MODULE CM	hours		hours	
Photovoltaic Solar Energy	Tutorial	24			
	MODULE				
		hours	18		
			hours		
		12	15		
			hours		
		hours		8	
		13.5			

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 Economics - Innovation - Construction	UE				8 credits
Energy Economics	MODULE	3 p.m.	12		
Innovation, Entrepreneurship, Research & Development Metal Construction	MODULE	12	p.m.		
	MODULE	p.m.	12		
		12	p.m.	3	
		p.m.	p.m.		

SCIENCE, TECHNOLOGY, HEALTH

Building Eco-construction Energy

Engineering Degree in Building, Eco-construction, Energy

Degree level:
Master's

ECTS
180 credits

Duration
3 years, 6 semesters

Presentation Practical

Information

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Program

IGE3 - Building, Eco-construction, Energy

Semester

	Nature	Lecture	Tutorial	Practical	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				
	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 Engineering Sciences	UE				13 credits
Heat Transfer	MODULE	22.5 hours	18		
APP: Building Functions and Technologies	MODULE CM TD TP				
APP: Building Functions and Technologies CM APP: Building Functions and Technologies TD APP: Building Functions and Technologies TP	MODULE	13.5			
Fluid Mechanics			15 28.5		
				12	
		10.5			
Applied Mechanics Electricity	MODULE	16.5 hours	21	4	
	MODULE	13.5	hours	hours	
			15	12	
			hours	hours	

Semester 6

	Type	Lectures	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 achieved)	MODULE		40.5 hours		
	MODULE				
English S6	SUBJECT				
Modern Language 2	CHOICE		15		

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 Advanced English S6	Tutorial		8 p.m.		
Optional internship S6	SUBJECT		9 p.m.		
Support (every Thursday afternoon when FISA staff are present)	MODULE MODULE				
UE602 Engineering Sciences	UE				8 credits
Energy and Fluids Construction Materials Data and	MODULE	7.5 hours	9 hours	32	
Decision Support	MODULE	13.5 13.5	10.5 hours		
	MODULE		12		
UE603 Construction Engineering and Organization	UE				7 credits
APP: Introduction to digital building modeling Structural mechanics	MODULE			24 12	
APP: Building Industry Stakeholders	MODULE	15	13.5		
	MODULE				
UE604 Energy and Environmental Quality of Buildings	UE				7 credits
Climate engineering Acoustics and lighting	MODULE MODULE	12 hours 18 hours	28.5 30	12	

IGE4 - Building Eco-construction Energy

Semester 7

	Nature	CM	Tutorial	Practical work	Credits
UE701 Gateway to the professional environment	UE				6 credits
Professional resources and dynamics Creativity and innovation	MODULE		13.5	3.5 hours	
management English (TOEIC level not achieved) S7 Modern languages	MODULE		25.5		
(TOEIC level achieved)	MODULE		40.5		
English S7 Modern	MODULE				
Language 2	SUBJECT				
Italian TD German	CHOICE TD		15		
TD Spanish TD	Tutor ial				
Japanese TD					
Intercomprehension of Romance Languages TD Advanced English S7	Tutor		20 20		
Optional internship S7	ial		20 20		
Support (half of Thursday afternoons when FISA students are present)	Tutor ial		20 21		
	Tutor ial				
	SUBJECT				
	MODULE				
	MODULE				
UE702 Construction Engineering	UE				10 credits
Reinforced Concrete 1	MODULE	18	15	6	
Structural Design and Modeling Geotechnics 1	MODULE	hours 9	hours	hours	
	MODULE	hours	21	12	
		7.5	hours	hours	
		hours	9	12	
			hours	hours	

Structural Mechanics	MODULE	6	21	8	
UE703 Building Energy	UE				10 credits
Building thermal engineering Climate	MODULE	18	22.5		
engineering	MODULE	hours	18	32	
		9 hours			
Thermal and environmental regulations	MODULE	10.5 hours	7.5	20	
UE704 BIM	UE				4 credits
APP: BIM	MODULE			36	

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	MODULE	a.m. 6	7.5		
achieved)	MODULE	p.m.	40.5		
English S8 Modern	MODULE				
Language 2	SUBJECT				
Italian TD German	CHOICE TD		3 p.m.		
TD Spanish TD	Tutor				
Japanese TD	ial				
Intercomprehension of Romance Languages TD Advanced English S8	Tutor		8 p.m.		
Optional internship S8	ial		8 p.m.		
Support (half of the Thursdays when FISA is present)	Tutor		8 p.m.		
	ial		8 p.m.		
	Tutor		8 p.m.		
	ial		9 p.m.		
	SUBJECT				
	MODULE				
	MODULE				
UE802 Internship	UE				6 credits
Internship Assistant Engineer S8	MODULE				
UE803 elective	CHOICE				
UE803 Energy Systems Thermodynamics	UE				7 credits
	MODULE	16.5	28.5		
Fluid Network Design EU803 Construction Engineering	MODULE UE	12 hours	10.5	32	
Reinforced Concrete 2	MODULE				7 credits
		21	30	6 hours	
Metal construction	MODULE	12 hours	19.5 hours		
UE804 elective	CHOICE				
UE804 Renewable Energy and the Environment Renewable Energy	MODULE				7 credits
		19.5 hours	31.5		
Energy, economic, and environmental issues UE804 Construction Engineering-3	MODULE UE	25.5 hours	16.5		
Geotechnics 2 and Eco-Construction in Earth	MODULE				7 credits
		13.5	19.5	12	
Site management	MODULE	27 hours	33		
UE805 Design & Studies	UE				4 credits

APP: Design and Studies in Wood Construction Wood Construction CM Wood Construction TD	MODULE MODULE CM Tutorial	 3 p.m.	 6 p.m.	36	

IGE5 - Building Eco-construction Energy

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 Italian TD	MODULE MODULE MODULE SUBJECT CHOICE TD		40.5 hours 15h 20h		
German TD	Tutorial		20		
Spanish TD	Tutorial		8 p.m.		
Japanese TD	Tutorial		8 p.m.		
Intercomprehension of Romance Languages TD Advanced English S9 Optional internship S9	Tutorial SUBJECT MODULE		20 hours 21 hours		
UE902 Design & Studies	UE				8 credits
Building Renovation	MODULE				
Building Renovation CM	Lecture	9			
Building renovation TD	TD MODULE CM		25.5		
Structural dynamics and earthquake engineering Structural dynamics and earthquake engineering CM Structural dynamics and earthquake engineering TD Structural dynamics and earthquake engineering TP	Tutorial Practical	13.5	13.5		
				4	
APP Multitechnical project - Design and studies	MODULE			60	
UE903 Process of organizing a construction operation	EU				5 credits
Life cycle of a construction project Legislative context of building Legislative context for CM buildings	MODULE MODULE CM	6 p.m. 9 p.m.	9		
Legislative context of building CM (common)	CM	12 p.m.			
UE904 Renewable energies and eco-construction	UE				7 credits
Solar Thermal Energy Solar Photovoltaic Energy	MODULE	12 hours	12 hours	12 hours	
Building and Energy Systems Modeling Building and Energy Systems Modeling CM Building and Energy Systems Modeling TD	MODULE MODULE CM	13.5 hours	15 hours	8 hours	
Numerical Methods	TD MODULE	12h 3h	18h		
			13.5h		

Semester 10

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

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Campus

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Program

IGE3 - Eco-construction and Energy Building - Work-study program

Semester 5

	Nature	Lectures	Tutorial	Practical	Credits
UE501 SHES - Languages	UE				8 credits
Support (every Thursday afternoon) Labor law and corporate structure 1	MODULE				
	MODULE	20 hours	12		
Introduction to sustainable development and CSR - Cognitive development	MODULE	4 p.m.	12 hours	4	
English	MODULE		37 hours		
UE502 Work experience	UE				4 credits
Project 1 (Launch and follow-up) Development	MODULE	1		4	
in the workplace	MODULE				0 credits
UE503 Engineering Sciences	UE				11 credits
Computer Science Refresher	MODULE			24	
Course	MODULE		18		
Mathematics Applied Mechanics Fluid	MODULE	12 hours	18h		
Mechanics	MODULE	13.5 hours	21h		
Electricity	MODULE	10.5	24h	4	
	MODULE	6	6		
				hour	
				s 3	
				hour	
				s	
UE504 Building Sciences	UE				7 credits
Heat transfer Building materials	MODULE	18	18		
APP: Building Functions and Technologies	MODULE	hours	hours		
APP: Building Functions and Technologies CM APP: Building Functions and Technologies TD APP: Building Functions and Technologies TP	MODULE CM TD TP	13.5 hours	10.5 hours		
		13.5			
			15		
				12 hours	

Semester 6

	Subject	Lectures	Tutorial	Practical	Credits
UE601 SHES - Languages	UE				4 credits
Support (every Thursday afternoon when FISA staff are present) Introduction to sustainable development and CSR	MODULE				
	MODULE	6	4		
Sustainable development - Site approach (Environmental management) English (TOEIC level not achieved)	MODULE	4	6		
English (TOEIC level achieved)	MODULE		hours		
	MODULE		3 hours		
			30		
UE602 Work experience	UE				10 credits

Project 1 (Monitoring and reporting) Development in the workplace (4 areas)	MODULE MODULE	4

UE603 Engineering Sciences	UE				6 credits
Mathematics	MODULE	13.5 hours	22		
APP: Introduction to digital building modeling Challenges of artificial intelligence	MODULE	6		24	
	MODULE				
UE604 Building Sciences	UE				10 credits
Building Thermodynamics Soil Mechanics	MODULE	13.5 hours	15		
	MODULE	9		12	
Structural design Structural mechanics	MODULE	10.5	18 hours	12	
	MODULE	10.5	16.5 hours		

IGE4 - Building Eco-construction Energy - Work-study program

Semester 7

	Nature	Lectures	Tutorial	Practical	Credits
UE701 SHES - Languages	UE				8 credits
Support (half of Thursday afternoons when FISA staff are present) Management	MODULE				
	MODULE		32		
Business structure and entrepreneurship 2 Sustainable development - Product approach English (TOEIC level not achieved) English (TOEIC level achieved)	MODULE	12 hours	12 hours	8	
	MODULE	4 hours	2 hours		
	MODULE		34 hours		
	MODULE		34		
UE702 Work experience	UE				10 credits
Project 2 (launch and follow-up) Career development	MODULE	1 hour		8	
(progression)	MODULE				
UE703 Building Energy Efficiency	UE				7 credits
Climate Engineering Energy	MODULE	13.5	28.5		
Building Physics	MODULE	15	21 hours	32	
	MODULE		22.5 hours		
UE704 Construction Engineering	UE				5 credits
Geotechnics Reinforced Concrete	MODULE	12 hours	16.5 6 p.m.	8	
	MODULE	18 hours			

Semester 8

	Nature	Lecture	Tutorial	Practical	Credits
UE801 SHES - Languages	UE				5 credits
Support (half of the Thursdays when FISA staff are present) Management and technical communication	MODULE				
	MODULE	6	4	12	
English (TOEIC level not achieved)	MODULE		40 hours		
English (TOEIC level achieved)	MODULE		40		
UE802 Work experience	UE				7 credits

Project 2 (Monitoring and reporting)	MODULE			8	
Development in the workplace (4 areas)	MODULE				
UE803 Eco-construction and BIM	UE				4 credits
APP: Design/Studies and BIM Wood Construction	MODULE CM			8 p.m.	
Wood Construction CM	MODULE				
Wood Construction TD	TD				
		3 p.m.			
			6 p.m.		
UE804 Building Energy Efficiency	UE				7 credits
Climate engineering Building acoustics	MODULE	9 hours	6 p.m.	4 p.m.	
Thermal and Environmental Regulations	MODULE	12 hours	6 p.m.	12	
	MODULE	10.5	7.5	p.m. 8	
		hours	hours	p.m.	
UE805 Construction Engineering	UE				7 credits
Construction Management Reinforced Concrete	MODULE	27	27		
Structural Mechanics II	MODULE	hours	hours 42		
	MODULE	21	hours		
		hours	16.5	8	
		9	hours		
		hours			

IGE5 - Building Eco-construction Energy - Work-study program

Semester 9

	Nature	Lectures	Tutorial	Practical	Credits
UE901 SHES - Languages	UE				7 credits
Legislation, labor law, occupational health, sustainable engineering, decarbonization	MODULE	18 hours	8	8	
GEPC, Humanities, management, ergonomics	MODULE	28			
English (TOEIC level not achieved)	MODULE		26 hours		
English (TOEIC level 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 Construction Engineering	UE				4 credits
Building Renovation	MODULE				
Building renovation CM	CM	9 a.m.			
Building renovation TD	TD MODULE		25.5		
Structural dynamics and earthquake engineering Structural dynamics and earthquake engineering	CM				
	Tutorial				
CM Structural dynamics and earthquake engineering TD Structural dynamics and earthquake	Practical	13.5			
engineering TP			13.5		
				4	
UE904 Building Energy Efficiency	UE				9 credits
Solar Thermal Energy Solar Photovoltaic Energy	MODULE	12	12	12	
Renewable Energy II		hours	hours	hours	
Building & Energy Systems Modeling	MODULE	13.5	15	8	
		hours	hours	hours	
	MODULE	24	36		
	MODULE		hours		

Building & Energy Systems Modeling CM	Lecture	12			
Building & Energy Systems Modeling TD	Tutorial		18		
Photovoltaic Solar Energy	MODULE	1:35 p.m.	3 p.m.	8 hours	

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 Economics - Innovation - Construction	UE				8 credits
Energy Economics	MODULE	15	12		
Innovation, Entrepreneurship, Research & Development Metal Construction	MODULE	hours	hours		
	MODULE	12	12		
		hours	hours		
		12	15		
		hours	hours		

UE501 Bridge to the professional world

ECTS
8 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

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

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

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

English S5 (LANG501_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. 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

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Campus

Le Bourget-du-Lac / Savoie Technolac campus

Sports (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 is based on physical and sports activities and focuses on 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 in 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

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

Polytech-Bourget Corporate Relations

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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

In brief

Languages of instruction: French

Open to exchange students: Yes

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 hours	
Databases (business management information database) MAraTHon: Support/Refresher courses	MODULE	6	4.5	12	
Mathematics Core Curriculum	MODULE				
	MODULE				
		16.5	37.5		

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

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. Practical exercises and case studies (3 hours of tutorials)
4. 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-skill	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 greater depth in order 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

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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

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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 analytical foundations 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

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE503 Engineering Sciences

ECTS
13 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Heat transfer	MODULE	22.5 hours	18		
APP: Building Functions and Technologies	MODULE				
APP: Building Functions and Technologies CM	Lecture	13.5			
APP: Building Functions and Technologies TD	TD		15		
APP: Building Functions and Technologies TP	Practical			12	
Fluid Mechanics	MODULE	10.5	28.5		
Applied Mechanics	MODULE	16.5 hours	21	4	
Electricity	MODULE	13.5 hours	15	12 hours	

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Heat Transfer (ENER511_BAT)

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

Acquisition of physical principles relating to the three modes of heat transfer: conduction, radiation, and convection. Knowledge of these modes of heat transfer should enable the modeling and analysis of different systems or processes in order to study their thermal behavior and improve their efficiency.

Objectives

By the end of this course, students will be able to define the equations describing each mode of transfer and determine the modes of transfer associated with a given configuration.

Teaching hours

Lectures	Lecture	22.5
TD	Tutorials	18

Mandatory prerequisites

- Mathematical concepts: partial derivatives, solving differential equations, concept of gradient, etc.
- Thermodynamics concepts: 1st law, etc.

Course outline

1. Introduction

- Fundamental physical quantities
- Surface balance

2. Conduction

- Fourier's law
- Heat diffusion equation
- Initial and boundary conditions
- Steady state and transient conditions

3. Radiation

- Fundamental quantities: black body, gray body, emissivity, etc.
- Exchanges between black surfaces
- Exchanges between gray surfaces

4. Convection

- Boundary conditions
- Laminar and turbulent flow
- Dimensionless numbers
- Forced and natural convection

Bibliography

- J.F. Sacadura, Introduction to Heat Transfer, Technique et Documentation. 1980, 445 pages
- Incropera - Dewitt, Fundamentals of Heat and Mass Transfer, Seventh Edition, 1048 pages

Skills acquired

Macro-skill	Micro-skills

Practical information

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

APP: Building Functions and Technologies (PROJ580_BAT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

After presenting the "actors" approach, the "functions" approach, the performance-based approach, and the phasing of a construction project, this course focuses on building technology: technical choices to consider, justification of the solutions selected, and performance indicators.

Reading building plans and the main concepts of electricity (as defined by NFC 14-100 or NFC 15-100) are covered.

The following building-related topics are explored in depth through projects: 1/purpose and scope of a technical system, 2/performance analysis and evaluation, 3/justification of technical choices and construction of indicators.

Objectives

Understand the stages and roles of the various stakeholders in a construction project

Learn the main operating principles of technical system families (structure, technical equipment, envelope)

Be able to locate and interpret a building plan/section

Mandatory prerequisites

No prerequisites

Course outline

1. Project life cycle:
    1. Stakeholders
    2. Phasing
2. Building breakdown
    1. System approach
    2. Functional logic
    3. Organizational approach
    4. Performance-based approach
    5. Actor logic
3. Construction technology and processes
    1. Foundations and retaining structures
    2. Vertical and horizontal load-bearing structures
    3. Frames, roofing, and waterproofing
    4. Cladding
    5. Finishing work: insulation, partitioning, carpentry, cladding
4. Electricity (3 hours of lectures, 6 hours of tutorials)
    1. Low-voltage installation
    2. NFC 1400
    3. NFC 1500
5. Reading plans (1.5 hours of lectures)

Tutorial series 1: Purpose of a technical device, identification of scope, technical knowledge to be integrated, regulatory analysis, choice of performance indicators to compare two options.

Series 2 tutorials: Performance review of a system, proposed improvements, room for maneuver, new performance

Series 3 (practical work): Comparison of response methods for a problem, study of transposition to one's system, construction and questioning of the choice of indicators

Targeted skills

Be able to:

describe the construction process

understand the role and expectations of the various stakeholders

describe the different functions and systems of the project, understand the interactions between systems and functions analyze the relevance and treatment of the different functions in relation

to the selected indicators

understand electrical requirements and regulatory limitations/constraints identify and describe objects shown on plans

Bibliography

- Building handbook: design, implementation, standardization - by Didier, Denis - AFNOR & NATHAN
- Building construction: structural and finishing work technology - by Turaud, Jean - Technical Monitor Collection

Skills acquired

Macro-skill	Micro-skills

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
APP: Building Functions and Technologies CM	Lectures	13.5			
APP: Building Functions and Technologies TD	TD		15		
APP: Building Functions and Technologies TP	Practical			12 p.m.	

Practical information

Contact

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Course coordinator Catherine Buhe

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Campus

Le Bourget-du-Lac / Savoie Technolac campus

APP: Building Functions and Technologies CM

Polytech Annecy-Chambéry component

Presentation

Teaching hours

Lectures	Lecture	13.5

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Catherine Buhe
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Locations

Le Bourget-du-Lac (73)

APP: Building Functions and Technologies TD

Part of Polytech
Annecy-Chambéry

Presentation

Teaching hours

Tutorial	Tutorials	15

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Catherine Buhe
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Catherine.Buhe@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

APP: Building Functions and Technologies TP

Polytech Annecy-Chambéry

Presentation

Teaching hours

Practical	Practical work	12

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Catherine Buhe
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Locations

Le Bourget-du-Lac (73)

Fluid Mechanics (MECA511_BAT)

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

This course covers the fundamental concepts necessary for understanding the mechanics of incompressible and viscous fluids. It provides the basic tools for designing hydraulic circuits. It introduces the local equations of fluid mechanics, dimensional analysis, and free surface flows.

Objectives

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

calculate pressure losses in hydraulic circuits

determine and modify the operating point of a hydraulic circuit describe the Eulerian and Lagrangian approaches to flow

solve local fluid mechanics equations in simple cases

classify the different families of flows

define the main characteristic dimensionless numbers in fluid mechanics

apply dimensional analysis to develop dimensioning laws

Teaching hours

Lectures	Lecture	10.5
Tutorial	Tutorials	28.5

Mandatory prerequisites

General fundamentals of mechanics; knowledge of mathematical tools for engineers

Course outline

1. Characteristics of fluids (0.5 hours)
2. Fluid statics (4 hours)
3. Introduction to hydrodynamics (4.5 hours)
4. Pipe flow and pressure losses (6 hours)
5. Pumps and hydraulic circuits (6 hours)
6. Free surface flows (1.5 hours)
7. Fluid kinematics (4.5 hours)
8. Local equations of fluid mechanics (4.5 hours)
9. Dimensional analysis (4.5 hours)

Targeted skills

BAT-2.1 - designing and dimensioning structures and their components for a given use and application

BAT-2.2 - by selecting and mastering the methods and tools appropriate to a problem

BAT-1.1 - by mastering a broad field of fundamental sciences and developing the associated analytical and synthesis skills

BAT-1.2 - modeling and simulating complex physical phenomena and systems BAT-1.2 - modeling and simulating complex physical phenomena and systems BAT-2.2 - selecting and mastering the methods and tools appropriate to a problem

Bibliography

S. Candel Fluid Mechanics Dunod

S. Whitaker Introduction to Fluid Mechanics Prenice Hall Inc.

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

Applied Mechanics (MECA512_BAT)

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

The "Applied Mechanics" course aims to:

1. acquire basic knowledge of continuum mechanics (CM),
2. analyze stress states (stresses, strains, plasticity criteria) in simple structures, and
3. solve simple problems in continuum mechanics (CM).

Objectives

The learning objectives of the "Applied Mechanics" course are:

- master the statics of non-deformable solids in 2D applications,
- define stress states and deformation states,
- describe the law of elastic and isotropic behavior,
- write the general equations of continuous media and the methods of resolution,
- apply plasticity and dimensioning criteria.

Teaching hours

Lectures	Lecture	16.5
Tutorial	Tutorials	21
Lab	Practical work	4

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

Targeted skills

BAT-1.1 - mastering a broad field of fundamental sciences and developing the associated analytical and synthesis skills

BAT-1.2 - by modeling and simulating complex physical phenomena and systems

Title: "Mastering the statics of non-deformable solids: 2D application" Level: Master's

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

- define mechanical actions: external and internal on a 2D system

- calculate the moment using the concept of force * lever arm

- solve 2D static problems (practical engineering approach)

- calculate the cohesion torque (or internal force torque) in simple cases

- define tensile (compressive) stresses and shear stresses in simple cases Title: "Defining stress states and deformation states"

Level: Master's

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

- name and identify the components of the stress and strain tensors

- calculate the stress and strain vectors on any surface, as well as the principal stresses and strains using Mohr's circle

- correctly write the boundary conditions for an MMC problem

- manipulate the compatibility relations of deformations

Title: "Describe the law of elastic and isotropic behavior"

Level: Master's

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

- define the characteristic elastic constants of an isotropic material

- write the relationships between stresses and thermoelastic deformations

- calculate the deformation energies of an elastic material under mechanical stress

Title: "Writing general equations for continuous media and methods of resolution"

Level: Application

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

- define simple CEM problems

- solve simple CEM problems

- apply the solution method (displacement approach or stress approach)

Title: "Applying plasticity and dimensioning criteria"

Level: Master's

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

- identify the basic criteria for the "yield strength" of materials

- apply the criteria for "yield strength"

- deduce dimensions from simple imposed 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)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Learn more

Moodle MECA512_BAT

https://moodle.univ-smb.fr/course/view.php?id=11997

Electricity (EASI501_PCHY)

Polytech Annecy-Chambéry component

Time of year Fall

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Engineering and related techniques

Overview

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

Course coordinator Christelle Kempf-Coco +33 4 79 75 88 60
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE601 Bridge to the professional world

ECTS
8 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	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	SUBJECT		3 p.m.		
Italian TD	CHOICE 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

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

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-skill	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		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 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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Campus

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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 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

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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 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.

Teaching hours

Lectures	Lecture	6
AUTO	Independent study	4
PROJ	Project	10

Mandatory prerequisites

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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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 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 manage 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

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 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:

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/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

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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-skill	Micro-skills

List of lessons

	Nature	Lectures	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	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)

Italian TD

Chambéry University Institute of Technology

In brief

Languages of instruction: Italian

Open to exchange students: Yes

Presentation

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

Skills acquired

Macro-skills	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

Tutorials	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 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 coordinator

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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 employees in continuing education. 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

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

Le Bourget-du-Lac (73)

UE602 Engineering Sciences

ECTS
8 credits

Polytech Annecy-Chambéry component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Energy and fluids	MODULE	7.5 hours	9	32	
Building materials	MODULE	13.5 hours	10.5 hours		
Data and Decision Support	MODULE	13.5 hours	12		

Practical Information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Energy and Fluids (ENER613_BAT)

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

Thermodynamics:

The aim of this course is to teach the basic concepts of thermodynamics: the study of systems involving exchanges of work, heat, and energy in general, based on concrete applications encountered in engineering.

Practical work:

Applications of concepts covered in heat transfer, fluid mechanics, and thermodynamics.

Objectives

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

- use thermodynamic tables and diagrams

- determine the phase of matter (solid, liquid, vapor)

- characterize a two-phase mixture

- define the system under study and its boundaries with the outside

- calculate the energies exchanged in a simple system

- evaluate the irreversibilities of the system

At the end of the practical section, students will be able to:

- to distinguish between heat transfer phenomena (conduction, convection, and radiation)

- analyze and measure the main characteristics of hydraulic networks (pumps, flow measurement, and pressure losses)

Teaching hours

Lectures	Lecture	7.5
Tutorial	Tutorials	9
Lab	Practical work	32

Mandatory prerequisites

ENER511- Heat Transfer

MECA511- Fluid Mechanics

Course outline

1. Introduction

a) Grading
b) Definitions
c) Quantities
d) Fundamental principles

2. First principle (in its generalized form)

a) First principle of a closed system

b) First law of thermodynamics for open systems

c) Summary of thermodynamic variables

3. Thermodynamics of pure substances and multicomponent systems

a) State of matter

b) Equation of state and simple models for pure substances

c) Thermodynamic tables and diagrams

4. Introduction to the second law of thermodynamics and exergy analysis

a) Entropy

b) The Carnot cycle

c) The second law in its generalized form

d) The concept of exergy

Bibliography

- L. Borel, D. Favrat, Thermodynamics and Energy, from Energy to Exergy, Vol. 1. Lausanne: EPFL Press, 2010.
- J.-P. Pérez, Thermodynamics: Fundamentals and Applications, Vol. 1, 3rd Ed. Paris: Dunod, 2001.
- M. Feidt, Thermodynamics and Energy Optimization of Systems and Processes. Paris: Lavoisier, 2016.
- A. Bejan, Advanced Engineering Thermodynamics, 4th Ed. Hoboken: Wiley, 2016.
- M. Moran, H. Shapiro, Fundamentals of Engineering Thermodynamics, 6th Ed. USA: John Wiley & Sons, Inc., 2008.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Florine Giraud

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Building Materials (MATE611_BAT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Description

This course provides a comprehensive overview of the materials used in construction, with an emphasis on environmental issues, the fundamental properties of materials, and their use in innovative structures. The main objectives are as follows:

- Acquire knowledge of cementitious materials (particularly concrete), their carbon impact, and current strategies for reducing this impact (alternative formulations, mineral additives, recycling).
- Introduce the main families of eco-materials: wood, earth, recycled steel, bio-based materials, specifying their properties, environmental benefits, and areas of application.
- Understand the principles of innovative structures such as adaptive walls, variable thermal inertia systems, and bio-inspired structures.
- Understand the rational selection of materials and implementation processes using multiple constraints and objectives (mechanical performance, durability, cost, environmental impact), with the help of tools such as selection diagrams and material databases.

This course aims to train engineers to make informed and responsible choices in materials and structural design, fully integrating the challenges of ecological transition.

This course provides a comprehensive overview of construction materials, with a strong focus on environmental challenges, fundamental material properties, and their application in innovative structural systems. The main objectives are to:

- Develop an understanding of cement-based materials (particularly concrete), their carbon footprint, and current strategies to reduce it (alternative formulations, mineral additives, recycling).

- Introduce major families of eco-friendly materials such as wood, earth, recycled steel, and bio-based materials, highlighting their properties, environmental benefits, and typical uses.
- Explore innovative structural concepts such as adaptive façades, systems with variable thermal inertia, and bio-inspired structures.
- Understand the rational selection of materials and processing methods using multiple constraints and objectives (mechanical performance, durability, cost, environmental impact), supported by tools such as material selection charts and databases.

The course aims to train engineers capable of making informed, responsible decisions regarding material choices and structural design, fully aligned with the goals of ecological transition.

Teaching hours

Lectures		Lecture	13.5
Tutorial		Tutorials	10.5

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Anna Lushnikova

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Data and Decision Support (MATH612_BAT)

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 consists of two independent parts:

- The first part aims to enable students to acquire and master the basic concepts of probability and statistics.
- The second part provides the tools needed to construct and master a decision-making problem involving multiple criteria.

Objectives

- to choose and use descriptive statistical tools
- identify a discrete or continuous random variable, manipulate and calculate a distribution function, density, expectation, and variance
- use the various concepts of multi-criteria decision support
- to apply the principle of the aggregation method, to explain its advantages, limitations, and disadvantages, and to use this method
- choose one of the Electre I or II methods depending on the issue and apply the chosen method

Teaching hours

Lectures		Lecture	13.5
Tutorial		Tutorials	12

Mandatory prerequisites

High school probability and statistics program, general baccalaureate.

Course outline

1. **Probability and Statistics (13.5 hours)**
   a. Data processing (descriptive statistics)
   b. Random variables
   c. Probability laws
   d. Sampling - estimation
   e. Test examples
2. **Multi-criteria decision support (10.5 hours)**
   a. Constructing a decision-making problem: concepts of actions, criteria, preferences.
   b. Aggregation method (single synthesis criterion): advantages and disadvantages
   c. Study of ELECTRE-type outranking methods: ELECTRE II,

Bibliography

- F. Husson, J. Pagès, General Statistics for Users, Presses Universitaires de Rennes, 2005
- R. Veysseyre, Statistics and Probability for Engineers, Ed Dunod
- S. Morgenthaler, Introduction to Statistics, Presses Polytechniques et Universitaires Romandes
- Maystre, Pictet, ELECTRE multi-criteria methods, SymosPresses Polytechniques et Universitaires Romandes

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Adeline Berthier
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Places

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE603 Construction Engineering and Organization

ECTS
7 credits

Polytech Annecy-Chambéry component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
APP: Introduction to digital building modeling Structural mechanics	MODULE	15 hours	13.5	24 hours	
APP: Building Industry Stakeholders	MODULE			12 hours	
	MODULE			24	

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

APP: Introduction to Digital Building Modeling (PROJ680_BAT)

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: Architecture and building

Presentation

Description

This module provides an introduction to CAD (computer-aided design) tools commonly used in building design.

- AutoCAD for drawing plans (8 hours of practical work)

- Revit for 3D building design (12 hours of practical work)

The module concludes with an assessment session on both software programs.

This is the first module in a series of projects on building information modeling (BIM), spread over three semesters.

Objectives

The objective is to gain initial experience in CAD or to consolidate previous experience. At the end of the module, students will be able to continue using this software for building design projects using the BIM process.

Teaching hours

Practical work	Practical work	24

Mandatory prerequisites

None

Course outline

- 8 hours of practical work: introduction to AutoCAD
- 12 hours of practical work: introduction to Revit Architecture
- 4 hours: assessment

Targeted skills

Acquisition of the basics of CAD

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Course coordinator Simon Rouchier

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Campus

Le Bourget-du-Lac / Savoie Technolac campus

Structural Mechanics (GECH613_BAT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

This course aims to:

- analyze simple stresses and plot normal stress, shear stress, and bending moment diagrams in isostatic structures.
- dimension isostatic structures.
- calculate the deformation of structures subjected to simple stresses.
- Calculate the stresses resulting from normal stress, shear stress, bending moment, and torsion.

Objectives

Analyze simple stresses and plot normal stress, shear stress, and bending moment diagrams in statically determinate structures.

Define the geometric properties of a section. Dimension isostatic structures.

Calculate the deflection, deformation, and stresses in structures subjected to simple stresses.

Teaching hours

Lectures	Lecture	15
Tutorial	Tutorials	13.5
Lab	Practical Work	12

Mandatory prerequisites

Applied mechanics (PFS, concepts of stress, deformation, etc.) and basic knowledge of mathematics

Course outline

1. Introduction to structural mechanics (strength of materials: RDM)
2. Beams and isostatic frames: analysis for drawing diagrams

2.1. Diagrams of internal forces

1. Review of geometric characteristics and behavior laws
2. Study of simple stresses in structures
3. Determination of deformation.
4. Relationship between stresses and internal forces.
5. Internal energy - external energy and displacement calculations

Targeted skills

Analyze simple stresses and plot normal stress, shear stress, and bending moment diagrams in isostatic structures

Define the geometric properties of a section. Dimension isostatic structures

Calculate deformation, strain, and stresses in structures subjected to simple stresses

Bibliography

Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf, David F. Mazurek, "Mechanics of Materials," 7th Edition, McGraw-Hill

Strength of Materials, Volume 1, J. Roux, Eyrolle Publishing

Skills acquired

Macro-skill	Micro-skills

Practical information

Contacts

Course Director Manuel Lagache
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

APP: Building Industry Stakeholders (PROJ611_BAT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

The "Building Stakeholders" module allows students to develop a project and understand how the construction management team works collectively. Particular attention is given to the ecological impact of the project, with the aim of achieving carbon neutrality.

Objectives

The aim of this project is to understand the roles and responsibilities of the various stakeholders in a construction project throughout its life cycle.

Teaching hours

Practical	Practical work	24

Mandatory prerequisites

None

Course outline

The project is organized into two phases.

In the first phase, the students, divided into 12 teams, take part in an architectural competition. Each group puts on the architect's glasses and proposes a project. In the second phase, working on the four winning projects from phase 1, the students take part in a role-playing game involving the project management team. Three groups work on each project, each representing an architectural engineering firm, a fluid engineering firm, and a structural engineering firm.

Targeted skills

Be able to recognize and interact with different players in a project management team.

Bibliography

https://www.cerema.fr/fr/actualites/neutralite-carbone-construction-atouts-materiaux-biosources

https://www.carbone4.com/article-batiment-snbc

https://energieplus-lesite.be/theories/consommation-energetique/la-demarche-batiment-zero-carbone/

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Carmelo Caggegi

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE604 Energy and environmental quality of buildings

ECTS
7 credits

Polytech Annecy-Chambéry
Component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Climate engineering	MODULE	12 p.m.	28.5		
Acoustics and lighting	MODULE	6 p.m.	30	12	

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Climate engineering (GECH611_BAT)

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

This course is based on a technological approach to heat production, distribution, emission, and storage systems designed to meet the needs of buildings. Applications include hydraulic distribution networks and water-based heat emitters. The regulation of dynamic systems is also covered.

Objectives

Know how to calculate the heating and DHW requirements of buildings Dimensioning of heating installations
Calculating consumption

Teaching hours

Lectures		Lectures	12
TD		Tutorials	28.5

Mandatory prerequisites

Heat transfer Fluid mechanics
Building functions and technologies

Course outline

Climate engineering and heating systems: 6 hours of lectures, 16.5 hours of tutorials Functional diagrams: 3 hours of lectures, 6 hours of tutorials
Regulation: 4.5 hours of lectures, 7.5 hours of tutorials

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Simon Rouchier
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Acoustics and lighting (GECH615_BAT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Description

This module comprises two distinct parts:

- **architectural acoustics of buildings**, which includes an introduction to useful concepts and quantities in physical acoustics, acoustic correction and insulation of premises. These elements are developed with a view to meeting regulatory acoustic requirements and designing acoustic environments suited to the use of buildings and the comfort of occupants;

-**Interior lighting in buildings**, which aims to mobilize the skills needed to understand and study the relationship between a building and its environment in terms of natural and artificial lighting.

Objectives

- Apply the concepts of architectural acoustics to provide solutions during the design and dimensioning phases and to meet the acoustic regulatory requirements for buildings.

- Characterize the interior lighting environments of premises.

Teaching hours

Lectures	Lecture	18
Tutorial	Tutorials	30
Lab	Practical Work	12

Mandatory prerequisites

Basic knowledge of radiation for the Lighting section

Course outline

ARCHITECTURAL ACOUSTICS (Lectures: 12 hours; Tutorials: 21 hours)

1. Elements of physical acoustics
2. Characterization of sounds and noises
3. Propagation in free space
4. Propagation in enclosed spaces
5. Acoustic insulation
    1. General
    2. Acoustic insulation against internal airborne noise
    3. Acoustic insulation against external airborne noise

BUILDING LIGHTING (Lectures: 6 hours; Tutorials: 9 hours)

1. Lighting measurements. The eye and vision
2. Lighting equipment: lamps and luminaires
3. Artificial lighting in buildings; design methods
4. Natural lighting in buildings; Complementarity of artificial lighting and natural lighting

Targeted skills

- Characterize, model, and evaluate acoustic phenomena in built environments (interior and exterior)
- Implement acoustic correction and insulation principles in accordance with regulations.
- Analyze natural and artificial lighting conditions in buildings using basic photometric measurements.
- Assess lighting comfort in different environments based on usage and regulatory criteria.

Bibliography

- L. Hamayon, Réussir l'acoustique d'un bâtiment - Conception architecturale, isolation et correction acoustique (Achieving good acoustics in a building - Architectural design, insulation, and acoustic correction) - Le Moniteur 2013; ISBN: 978-2-281-11636-6

- B. Gréhant, Acoustics and Buildings, Technique et Documentation Lavoisier 1994; ISBN: 2-7430-0013-9
- J. Jouhaneau, Room Acoustics and Sound Reinforcement, Technique et Documentation Lavoisier 1997; ISBN: 2-7430-0183-6
- J. Jouhaneau, Room Acoustics and Sound Reinforcement - Exercises and Solved Problems, Technique et Documentation Lavoisier 1998; SBN: 2-7430-0237-9
- P. Vandeplanque, Lighting: Basic Concepts - Installation Projects, 5th edition, Technique et Documentation Lavoisier 2005; ISBN: 2-7430-0799-0
- S. Reiter and A. De Herde - Natural Lighting in Buildings. Presses universitaires de Louvain, Louvain-la-Neuve, 2004; ISBN: 2-930344-57-1

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Christelle Kempf-Coco +33 4 79 75 88 60
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE701 Bridge to the professional world

ECTS
6 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	CM	Tutorial	Practical work	Credits
Resources and professional dynamics	MODULE		13.5 hours	3.5	
Creativity and Innovation Management	MODULE		25.5		

	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)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Resources and Professional 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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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Creativity and Innovation Management (SHES704_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: Business and Administration

Presentation

Description

How can innovation and creativity be leveraged to enhance the 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 training course 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
- 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

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: 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 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)

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
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				
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		20 hours		
Advanced English S7	SUBJECT		9 p.m.		

Practical information

Contact

Course coordinator Christophe Lambert
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Locations

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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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	Lecture	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-skills	Micro-skills

Advanced English S7 (ENGL702_PCHY)

Polytech Annecy-Chambéry component

Presentation

Teaching hours

Tutorials	Tutorials	21

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Christophe.Lambert@univ-savoie.fr

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 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 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 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 employees in continuing education. 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 training program

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)

UE702 Construction Engineering

ECTS
10 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Reinforced concrete 1	MODULE	6 p.m.	3 p.m.	6	
Structural design and modeling	MODULE	9 a.m.	9 p.m.	12	
Geotechnics 1	MODULE	7.5 hours	9 hours	12	
Structural Mechanics	MODULE	6	9 p.m.	8	

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Reinforced Concrete 1 (GECH711_BAT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

Dimensioning of rectangular and T-shaped reinforced concrete beams in accordance with Eurocode 2 and subjected to simple stresses: centered compression, simple bending, and shear stress

Objectives

Learn how to use Eurocode 2 for the dimensioning of elements subjected to simple stresses

Teaching hours

Lectures	Lecture	18
Tutorial	Tutorials	3 p.m.
Lab	Practical Work	6

Mandatory prerequisites

Understanding of RDM for simple stresses and response modes (elastic, plastic)

Course outline

1. Presentation of the EUROCODE 2 standard
2. Characteristics of material behavior (steel and concrete)
3. Calculation of the ELU and ELS of reinforced concrete sections (rectangular and T-shaped) subjected to normal stresses
    1. General rules
    2. Tension
    3. Centered compression
    4. Simple bending
4. Calculation of sections subjected to tangential stresses: shear force.

Targeted skills

Be able to:

implement reinforced concrete calculation methods in accordance with Eurocode 2

- know the characteristics of materials: concrete and steel
- calculate reinforced concrete elements subjected to different stresses: simple bending, centered compression dimension reinforced concrete structures according to Eurocode 2

- optimize reinforcement sections (isolated rectangular or T-shaped beams at ULS and ULK)
- Apply construction layout conditions: concrete cover, reinforcement spacing, minimum and maximum reinforcement sections, etc.

Bibliography

- Jean Roux - Pratique de l'Eurocode (Practical Guide to Eurocode) – Eyrolles (2009)
- Jean Roux - Mastering the Eurocode – Eyrolles (2009)
- Damien Ricotier – Dimensioning of concrete structures according to Eurocode 2 – Le Moniteur (2012)

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Catherine Buhe
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Structural Design and Modeling (GECH712_BAT)

Polytech Annecy-Chambéry
component

In brief

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

Overview

Description

This course provides an introduction to structural calculations from a regulatory perspective. It covers the definition of loads applied to buildings (permanent loads, operating loads, wind, snow, etc.), their transmission within the building, and initial calculations in terms of serviceability and ultimate limit states. Elastic instabilities (buckling, tilting, warping) and shear are also covered.

Objectives

Acquire knowledge and skills in the field of structural design.

Teaching hours

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

Mandatory prerequisites

The necessary foundations mainly correspond to the mechanics of isostatic structures and mathematical knowledge such as commonly used probability laws and second-order differential equations.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Jean-Patrick Plassiard +33 4 79 75 81 17
Jean-Patrick.Plassiard@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Geotechnics 1 (GECH713_BAT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

Course covering the fundamental concepts of soil physics (characterization, mechanics, hydraulics) through a theoretical/practical approach. Application cases will be taken from the fields of building (foundations) and civil engineering in general (earthworks, dykes).

Objectives

Learn how to represent soil and manipulate the main variables describing this porous medium. Know how to calculate total and effective vertical stresses and calculate settlement in different configurations. Understand the principle of flow in soils and describe it quantitatively. Understand soil testing methods.

Teaching hours

Lectures	Lecture	7.5
TD	Tutorials	9
Lab	Practical work	12

Mandatory prerequisites

Applied Mechanics / Fluid Mechanics

Course outline

1. Introduction. What is soil?
2. Stresses in soils
3. Groundwater hydrology
4. Settlement and consolidation

Additional information

N/A

Bibliography

N/A

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Noemie Prime
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Noemie.Prime@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Structural Mechanics (GECH717_BAT)

Polytech Annecy-Chambéry
component

In brief

Teaching methods: In person

Open to exchange students: Yes

Presentation

Description

Course covering the analysis of composite and deflected bending and the study of reactions at supports, internal forces, and stresses for hyperstatic systems, continuous beams, and trusses.

Objectives

The objective of this course is to familiarize students with structural calculations and the analysis of composite bending, deviated bending, hyperstatic structures, continuous beams, and trusses.

Teaching hours

Lectures	Lecture	6
TD	Tutorials	21
Lab	Practical Work	8

Mandatory prerequisites

The necessary foundations mainly correspond to the mechanics of isostatic structures and knowledge of mathematics.

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Course outline

Simple bending, deviated bending, compound bending, degree of hyperstaticity, force method, Menabrea's theorem, continuous beams, three-moment equation, trusses.

Targeted skills

Master the fundamental concepts of dimensioning.

Bibliography

Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf, David F. Mazurek, Mechanics of Materials, 7th Edition, McGraw-Hill

Strength of Materials, Volume 1, J. Roux, Eyrolle Publishing

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Carmelo Caggegi

Locations

Le Bourget-du-Lac (73)

UE703 Building Energy Efficiency

ECTS
10 credits

Polytech Annecy-Chambéry component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Building thermal engineering	MODULE	6 p.m.	22.5		
Climate engineering	MODULE	9 hours	18	32	
Thermal and environmental regulations	MODULE	10.5 hours	7.5	20	

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Building Thermodynamics (GECH714_BAT)

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

Building thermal engineering involves studying the hygrothermal and aerodynamic behavior of buildings in both steady-state and variable conditions. It provides an understanding of the concept of hygrothermal comfort and forms the basis for the design of HVAC systems (calculation of thermal loads) and calculations related to French thermal regulations.

Objectives

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

- define the equations that describe hygrothermal and aerodynamic transfers in buildings

- use electrical analogy as a modeling tool

Teaching hours

Lectures		Lecture	18
Tutorial		Tutorials	22.5

Mandatory prerequisites

- Concepts of heat transfer (conduction, convection, and radiation)

Course outline

1. Building thermal engineering
    1. Introduction
    2. Calculation of heat loss (surface, linear, point, airflow)
    3. Concepts of temperature and comfort
    4. Representation of heat transfer using electrical analogies (convection, conduction, short-wave and long-wave radiation)
    5. Towards positive energy buildings
2. Humidity and permeability
    1. Hygrothermal behavior of building envelopes
    2. Glaser method
    3. Wufi software: Dynamic study of hygrothermal transfers through walls

TD: insulation adjustment in steady state - heat loss through buried walls - power injection within a wall - thermal inertia - radiative exchanges within a room - transmission coefficient of glazing - solar chimney - effect of wind and thermal draft - hygrothermal transfers (calculations, software), permeability

Targeted skills

Define the thermal model associated with a given problem with a judicious choice of spatio-temporal conditions and simplifying assumptions

Bibliography

- H. Cortes, J. Blot. Heat transfer, application to housing. Study using the nodal method. Ellipse, 1999.
- Claude-Alain Roulet. Building energy efficiency - volume 2 - Building services, overall energy balance, Presses Polytechniques et Universitaires Romandes, April 1987
- Moisture transfer through walls - Assessing the risks of condensation, Technical Guide, CSTB, Abelé Charlotte, 2009.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Gilles Fraisse

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Climate engineering (GECH715_BAT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

This course introduces the physics of humid air and applies it to air handling units for ventilation, heating, and air conditioning of buildings.

Several practical sessions allow students to apply the knowledge acquired in Climate Engineering.

Objectives

Ensure the ventilation of a building Dimension an air

handling system

Dimension an air handling unit (AHU)

Teaching hours

Lectures	Lecture	9
Tutorial	Tutorials	6 p.m.
Lab	Practical Work	32

Mandatory prerequisites

- Heat Transfer, S5
- Fluid Mechanics, S5
- Climate Engineering and Electromechanics, S6

Course outline

1. **Fundamental equations of humid air**
    1. Saturation pressure of water vapor and associated quantities
    2. Wet air diagram
    3. Concepts of hygrothermal comfort
2. **Basic transformations of humid air: heating, humidification, cooling, dehumidification**
3. **Air handling units and heat recovery,**
4. **Building ventilation systems**
    1. Ventilation principles
    2. Technologies: natural ventilation, single-flow mechanical ventilation, dual-flow mechanical ventilation, etc.
5. **Air distribution networks**

- Comfort
- Humid air transformation
- Control
- Condensing gas boiler or wood boiler
- Radiator network balancing
- Thermal bridges
- Cooling tower
- Blower door

Targeted skills

Ensuring the energy performance of buildings

Integrating sustainable solutions adapted to the building's life cycle

Bibliography

- Climate Engineering, Dunod, by Hermann Recknagel, Eberhard Sprenger, Ernst-Rudolf Schramek
- Building Environment Quality: Thermal Comfort for Occupants, Transvalor - Presses des mines, Françoise Thellier, Fréderic Boeuf, et al.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course manager Mickael Pailha

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Thermal and Environmental Regulations (GECH716_BAT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

RE 2020 is the new energy and environmental regulation for all new construction. This course provides a detailed description of this regulatory context: the goal of limiting the primary energy consumption of buildings involves, in particular, the implementation of performance requirements (energy efficiency of buildings, energy consumption of buildings, summer comfort in buildings). The implementation of the current French thermal regulations (RE2020) and the use of dynamic thermal simulation tools (Pleiades) for buildings are discussed in detail.

In addition, the fight against climate change is based on two new guidelines for new construction: the widespread use of positive energy buildings and the deployment of buildings with a low carbon footprint throughout their life cycle, from design to demolition.

Objectives

Bring a building into compliance with thermal and environmental regulations Conduct a building Life Cycle Assessment (LCA)

Perform a dynamic thermal simulation (DTS)

Teaching hours

Lectures	Lecture	10.5
Tutorial	Tutorials	7.5
Lab	Practical work	20

Mandatory prerequisites

Concepts of heat transfer (conduction, convection, and radiation) and climate engineering (heating, cooling, ventilation, domestic hot water, etc.)

Course outline

1. Thermal and environmental regulations (history, context, objectives)
2. Dynamic energy simulation tools
3. Life cycle assessment of buildings (principles and methodological approach)

Targeted skills

Ensuring the energy performance of buildings

Integrating sustainable solutions adapted to the building's life cycle

Bibliography

- RT-Bâtiment website (June 2019): www.rt-batiment.fr
- Positive Energy Buildings and Carbon Reduction website (June 2019): www.batiment-energiecarbone.fr
- Energy Efficiency and Comfort in Buildings website (June 2019): www.effinergie.org
- Life cycle analysis in buildings: Scientific and Technical Center for Building (CSTB), Authors: Alexandra LEBERT and Jean-Luc CHEVALIER, Collection: Guide to Sustainable Development in Construction; Publication date: February 2018; EAN13: 9782868916563

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course manager Mickael Pailha
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE704 BIM

ECTS
4 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	CM	Tutorial	Practical work	Credits
APP: BIM	MODULE			36	

Practical

Location

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

APP: BIM (PROJ711_BAT)

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

This module is a practical application of building information modeling (BIM). This collaborative working method is approached in the form of problems illustrating the advantages of new digital tools in the design process.

Objectives

Learn to become familiar with BIM while consolidating your technical approach to building.

Teaching hours

Practical	Practical work	36

Mandatory prerequisites

Course outline

The practical sessions are divided into four parts to illustrate the BIM approach through examples.

- Interoperability between software and data exchange formats (8 hours)
- Collaborative work (8 hours)
- Applications to structural mechanics (10 hours)
- Applications to HVAC and building thermal engineering (10 hours)

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course manager Mickael Pailha
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE801 Bridge to the professional world

ECTS
6 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

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	TD		8 p.m.		
Spanish tutorial	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	Lecture	Tutorial	Practical	Credits
Optional internship S8	MODULE				
Support (half of the Thursdays when FISA is present)	MODULE				

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

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

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

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 (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
+33 4 50 09 24 51
Elodie.Gardet@univ-savoie.fr

Locations

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

Teaching hours

Tutorial	Tutorials	40.5 hours

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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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Modern Languages (TOEIC Level Achieved) (LANG802_PCHY)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **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 a professional context, using business English and scientific and technical vocabulary specific to the program being studied.

Mandatory prerequisites

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

Course outline

- Learn how to describe how a technical object works

Review appropriate vocabulary and grammatical structures

- Learn how to describe the prospects and opportunities offered by new inventions

- Learn how to describe the context of a product

Describe the profile of a company or laboratory, advertise a product, describe a product

Skills acquired

Macro-skill	Micro-skills

List of lessons

	Nature	Lectures	Tutorial	Practical	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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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 coordinator Christophe Lambert
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Locations

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	TD	Practical work	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

Venue

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

Overview

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-skill	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-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

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 employees in continuing education. 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

To promote the success of all students in their training program

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

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Internship Assistant Engineer S8	MODULE				

Practical

Location

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

S8 Assistant Engineer Internship (PROJ801_PCHY)

Polytech Annecy-Chambéry

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

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 elective

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
UE803 Energy Systems	UE				7 credits
Thermodynamics Fluid network design	MODULE	16.5 hours	28.5	32	
	MODULE	12 hours	10.5		
UE803 Construction Engineering	UE				7 credits
Reinforced Concrete 2 Steel	MODULE	21 hours	30h	6	
Construction	MODULE	s 12 hours	19.5h		

Practical information

Location

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE803 Energy Systems

ECTS
7 credits

Polytech Annecy-Chambéry component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	CM	Tutorial	Practical work	Credits
Thermodynamics	MODULE	16.5 hours	28.5		
Fluid network design	MODULE	12h	10.5 hours	32 hours	

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Thermodynamics (ENER811_BAT)

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 here is to enable students to analyze and understand how building energy systems work, both at the component level and at the overall system level.

Objectives

Energy and entropy balances and thermodynamic modeling of humid air are covered before moving on to energy systems (heat pumps, air handling units, heat or cold production or storage systems, etc.). The aim is also to acquire scientific and technical knowledge of the various combustion processes.

Teaching hours

Lectures	Lectures	16.5
Tutorial	Tutorials	28.5 hours

Mandatory prerequisites

Course outline

Thermodynamics

1. Matter, energy, and entropy balances in open and closed systems
    1. General equation, transient and steady-state conditions
    2. Application in steady state and transient conditions on different components;
2. Thermodynamic diagrams
3. Thermodynamic modeling of humid air
4. Thermal machines:
    1. General information,
    2. Operating modes, efficiencies, Carnot cycle
5. Components of heat and cold production and storage systems for buildings
6. Air handling units: thermodynamic modeling of the various components and their assembly
7. Heat pumps:
    1. General information, coefficient of performance, Carnot cycle,
    2. Refrigeration and heat production using vapor compression cycles Combustion:

1. General
2. Different types of combustion
3. Physicochemical, thermal, thermodynamic, and technical aspects of operation
4. Combustion calculation and diagram

Bibliography

- Thermodynamics, L. Couture, Ch. Chaine, R. Zitoun, Dunod Université Ed. 1989, 337 pages
- Heat and Thermodynamics, M.W. Zemansky, R.H. Dittman, Mc Graw Hill-Science 7th Ed. 1996, 487 pages
- Thermodynamics and Energy, Lucien BOREL, Presses Polytechniques Universitaires Romandes, 692 pages
- Introduction to Thermal Systems Engineering, Moran, Shapiro, Munson, Dewitt, Wiley, 561 pages
- Adrian Bejan. Advanced Engineering Thermodynamics. John Wiley & Sons Inc, third revised edition, 2006.
- J. M. Kuchta. Investigation of fire and explosion accidents in the chemical, mining, and fuel-related industries - a manual. Technical Report Bulletin 680, U.S. Bureau of Mines, 1985.

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

Fluid Network Design (ENER812_BAT)

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

This course aims to present the different technologies used in heat exchangers and fluid networks (heating, ESC, ventilation, cooling).

Objectives

The objectives of this course are:

- to present the different heat exchanger technologies and the associated tools for their design,
- apply the knowledge acquired on the various technological units involved in production, distribution, and emission to meet the combined needs of heating, hot water production, ventilation, and cooling in a building. This second part will be addressed in the form of Problem-Based Learning.
- At the end of this course, students will be able to:

  identify the different heat exchanger technologies

apply the mean logarithmic temperature difference method

apply the NUT method

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	10.5
Lab	Practical Work	32

Mandatory prerequisites

Mechanics and energy courses from previous years (MECA511

Course outline

Heat exchangers (lectures: 12 hours, tutorials: 10.5 hours)

1. Classification of heat exchangers according to different criteria, their advantages and disadvantages
2. Heat balances in a heat exchanger
3. Application of the mean logarithmic temperature difference method and the NUT method
4. Heat exchanger sizing

Fluid networks for buildings (36 hours of practical work)

This section will be taught in the form of Project-Based Learning applied to a real-world case study.

- Sizing of installations according to requirements (heating, ESC, ventilation, cooling) in compliance with regulations
- Reading schematic diagrams to understand how the various production, distribution, and emission units work together (including auxiliary equipment)
- Analysis of control principles (setpoints, measurements, and control variables)
- Proposals for technical developments to improve the energy performance of the installation

Targeted skills

BAT-1.1 - mastering a broad field of fundamental sciences and developing the associated analytical and synthesis skills

BAT-1.2 - by modeling and simulating complex physical phenomena and systems

BAT-1.3 - defining the functions and technological characteristics of building components

BAT-2.1 - designing and dimensioning structures and their components for a given use and application BAT-2.2 - selecting and mastering the methods and tools appropriate to a problem

BAT-2.3 - by participating in the continuous improvement of the performance of buildings and their equipment, from the observation of phenomena and data collection to the processing and analysis of results

BAT-2.4 - ensuring, using a multifunctional and multi-criteria approach, the implementation of the design, construction, and operation of structures

BAT-3.1 - by mobilizing scientific and technical skills aimed at understanding and reducing the environmental impacts of the building sector

BAT-3.3 - integrating multiple criteria (environmental, economic, legal, and social) from the definition of needs to operational implementation

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

UE803 Construction Engineering

ECTS
7 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Reinforced concrete 2	MODULE	9 p.m.	30	6	
Steel construction	MODULE	12 p.m.	7:30 p.m.		

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Reinforced Concrete 2 (GECH811_BAT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Description

This course aims to provide students with the skills necessary for the design and analysis of reinforced concrete structures. In particular, it enables students to:

- Define the framework of a reinforced concrete building based on its structural analysis.
- Master the calculation of common elements such as continuous beams, columns, floors, and foundations.
- Study the fire behavior of reinforced concrete structures, with a regulatory and practical approach.
- To introduce the concepts of eco-design through low environmental impact concrete (eco-concrete), with a view to sustainable construction.

This course combines theoretical, normative, and applied aspects in order to train engineers capable of designing safe, high-performance, and environmentally friendly structures.

This course aims to provide students with the skills required for the design and analysis of reinforced concrete structures. It specifically enables students to:

- Define the structural framework of a reinforced concrete building based on its structural analysis.
- Master the calculation of common structural elements such as continuous beams, columns, slabs, and foundations.
- Study the fire behavior of reinforced concrete structures, with both regulatory and practical perspectives.
- Introduce eco-design concepts through the use of environmentally friendly concretes (eco-concretes), in the context of sustainable construction.

The course combines theoretical, regulatory, and applied aspects to train engineers capable of designing safe, efficient, and environmentally responsible structures.

Teaching hours

Lectures		Lecture	21
TD		Tutorials	30
Lab		Practical Work	6

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Anna Lushnikova

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Metal Construction (GECH812_BAT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Presentation

Description

This module covers the design of steel-framed buildings. Most of the module focuses on the design of structural elements (beams, columns, etc.) in relation to stresses (compression, tension, shear stress, simple and compound bending, elastic instabilities) and the design of assemblies. Design and preliminary dimensioning are covered in a project at the end of the module.

Objectives

Know how to design steel structures in accordance with Eurocode 3.

Teaching hours

Lectures		Lecture	12
Tutorial		Tutorials	19.5

Mandatory prerequisites

This course builds on the knowledge acquired in the

- materials,
- structural mechanics,
- strength of materials
- and structural modeling.

Course outline

1. Introduction: steel as a material
2. Introduction to Eurocode 3 and reminders concerning Eurocode 0 and Eurocode 1
3. Dimensioning of simple elements: tension, compression, shear force, pure bending, compound bending, deflected bending, buckling, overturning, warping.
4. Dimensioning of metal assemblies: bolted assemblies, welded assemblies.
5. Project: design and dimensioning of a steel structure.

Targeted skills

BAT-1.1 - mastering a broad field of fundamental sciences and developing the associated analytical and synthesis skills

BAT-1.2 - by modeling and simulating complex physical phenomena and systems

BAT-1.3 - defining the functions and technological characteristics of building components

BAT-2.1 - by designing and dimensioning structures and their components for a given use and application BAT-2.2 - by selecting and mastering the methods and tools appropriate to a problem

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Jean-Patrick Plassiard +33 4 79 75 81 17
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE804 elective

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
UE804 Renewable Energy and the Environment	EU				7 credits
Renewable energies	MODULE 19.5 hours		31.5		
Energy, economic, and environmental issues	MODULE 25.5 hours		16.5		
UE804 Construction Engineering-3	UE				7 credits
Geotechnics 2 and eco-construction using earth Construction site	MODULE 13.5 hours		19.5	12	
management	MODULE 27 hours		33		

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE804 Renewable Energy and the Environment

ECTS
7 credits

Polytech Annecy-Chambéry component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Renewable energies	MODULE	19.5 hours	31.5		
Energy, economic, and environmental issues	MODULE	25.5 hours	16.5 hours		

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Renewable energies (ENER813_BAT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Engineering and related techniques

Overview

Description

Development of the scientific and technical foundations necessary for professional mastery of wood energy applications and geothermal or aerothermal heat pump systems.

Objectives

- Use the scientific and technical foundations necessary for the development of a wood energy project.
- Implement recommendations and rules for the design and sizing of geothermal installations.
- Implement recommendations and rules for the design and sizing of aerothermal heat pump installations.

Teaching hours

Lectures	Lecture	19.5
Tutorial	Tutorials	31.5

Mandatory prerequisites

- Semester 5 modules: Heat transfer; Fluid mechanics; AAP: Building functions and technologies;
- Semester 6 module: Climate engineering; Energy and fluids; Building thermodynamics;
- Semester 7 modules: Building Thermodynamics; Climate Engineering; Thermal and Environmental Regulations;

Course outline

Wood energy (Lectures: 6 hours; Tutorials: 6 hours)

1. Why wood energy?
    1. Wood in the national energy balance
    2. Great potential for development
    3. Wood energy: environment, employment, and local development
2. From forest to wood fuel
3. Technical systems
    1. Automatic wood chip boilers
    2. Automatic pellet boilers
    3. High-efficiency log boilers
    4. Wood cogeneration
    5. Other methods of biomass recovery
4. Feasibility study methodologies
    1. Specifications
    2. Sizing requirements and power
    3. Creating network scenarios
    4. Sizing of installations
    5. Economic and environmental study
    6. Project development

Geothermal systems: geothermal heat pumps and Canadian wells (Lectures: 7.5 hours; tutorials: 15 hours)

1. Geothermal energy: principles and physical quantities
2. Economic and technical overview of geothermal heat pump applications
3. Applications to vertical geothermal probes
4. Geothermal applications on aquifers
5. Canadian wells

Aerothermal systems: heat pumps and thermodynamic water heaters (Lectures: 4.5 hours; tutorials: 12 hours)

1. Presentation of aerothermal heat pumps
    1. Specific features of aerothermal heat pumps (operation, technologies, performance)
    2. Selecting an aerothermal heat pump
    3. Sizing of ancillary equipment (auxiliary heating, buffer tank)
2. Thermodynamic water heaters
3. Dual-purpose heat pumps

4. Hybrid heat pumps

Targeted skills

Skills related to the wood energy sector

- Identify the players in the wood energy sector and describe their respective roles and missions.
- Analyze the technical, environmental, and economic challenges of a wood energy project.
- Conduct a technical and economic feasibility study for a wood energy project.

Skills related to geothermal systems

- Explain the operating and design principles of geothermal systems and Canadian well installations.
- Size a geothermal system comprising vertical probes and/or a Canadian well according to thermal requirements.
- Design a low-energy geothermal project that takes into account site constraints and user needs.

Skills related to air source heat pumps

- Explain how an air source heat pump and a thermodynamic water heater work, as well as the roles of their components.
- Calculate the instantaneous and seasonal performance of an air source heat pump based on usage data.
- Size an air source heat pump according to the thermal needs of a building.
- Select a suitable air source heat pump (with or without auxiliary heating) based on specifications.
- Size the ancillary equipment for a heat pump system (circulators, heat exchangers, buffer tank, etc.).

Bibliography

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- BRGM Editions: Technical Guide - Geothermal Heat Pumps Using Aquifer Boreholes - 2012; ISBN: 978-2-7159-25328
- Karl OSCHNER - Geothermal Heat Pumps, A guide for planning and installing - 2007; EAN: 978-1-84407-406-8
- Jean LEMALE: Heat Pumps - Collection: Technique et Ingénierie DUNOD/ADEME - 2012; EAN13: 9782100565504
- Website of the Interprofessional Committee for Wood Energy (12-11-2013): http://www.cibe.fr/
- Jacques BERNIER: Heat Pumps, Ed. Pyc Livres - 2004; ISBN: 2-86243-071-4 (br.)
- Website of the Action Program for Construction Quality and Energy Transition: *http://www.programmepacte.fr/*
- NF EN 14825 standard: seasonal COP, partial load characteristics
- Standard NF EN 14511: test conditions for determining the performance of air-to-air, water-to-air, air-to-water, and water-to-water heat pumps.

- Jacques BOUTELOUP, Michel LE GUAY, Jean LIGEN: Air Conditioning: 2- Heating and Cooling Production, Editions parisiennes - 1997; ISBN: 2-86243-041-2 (br)

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Christelle Kempf-Coco +33 4 79 75 88 60
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Energy, economic, and environmental issues (ENER814_BAT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Engineering and related techniques

Overview

Description

Acquisition of the technical and economic foundations necessary for the analysis and evaluation of energy management and renewable energy projects.

Presentation of the challenges of energy transition and the French context: challenges, stakeholders, energy taxation, and levers for action.

Objectives

- To outline the principles and levers for action of the Energy Transition for Green Growth Act

- Understand and analyze the French and European energy system, from its historical evolution to its prospects for transformation, highlighting the complex interactions between the composition of the energy mix, the imperatives of sobriety, efficiency, and decarbonization, the organization and governance of the sector, the functioning of markets and infrastructure, and the emergence of new energy uses and their impact on the grid.

- Assess the technical and economic viability of an investment project in the field of energy efficiency and renewable energy equipment for the building sector.

Teaching hours

Lectures	Lecture	25.5
Tutorial	Tutorials	16.5

Mandatory prerequisites

Module on Sustainable Development (SHES502)

Course outline

1. Energy and Environmental Transition in Regions (Lecture: 3 hours; Tutorial: 3 hours)
    1. Context, issues, and challenges: climate change, technical, political, and societal challenges
    2. Methodological elements: presentation of the main existing tools, focus on diagnostic methodology
    3. Developing a strategy, planning actions: strategic directions and scenario planning, developing an action plan through consultation, anticipating implementation
    4. Monitoring and evaluating actions
2. Energy markets (Lectures: 6 hours)
    1. The role of electricity and gas in France and Europe
    2. The structure of the energy sector and its current organization
    3. Institutional players and public policy
    4. The functioning of energy markets and infrastructure
    5. New energy uses associated with buildings
3. Heat networks (Lectures: 3 hours; tutorials: 3 hours)
    1. Current situation - Current challenges
    2. Wood-fired heating networks
    3. Heat sales prices
4. Economic Analysis of Energy Projects (Lectures: 13.5 hours; Tutorials: 10.5 hours)
    1. Introduction to economic analysis - Economic criteria: Discounted Payback Period - Internal Rate of Return - Discounted Total Cost
    2. Economic analysis method of the "Capital Enrichment Rate"
    3. Application of this method to investment projects in renewable energies and energy efficiency
    4. Impacts of energy taxation

Targeted skills

Skills related to the energy transition for green growth and energy markets

- Analyzing and diagnosing the challenges of the Energy and Environmental Transition
- Develop, plan, monitor, and evaluate energy and environmental transition strategies
- Analyze the current composition and prospective developments of the French and European energy mix, in relation to the challenges of energy efficiency, energy conservation, and decarbonization.

- Explain the historical evolution, current organization, and governance mechanisms of the French energy sector, identifying the roles of the main institutional players and associated public policies.
- Describe the functioning of the electricity and gas markets and associated infrastructure, and analyze their role in regulating and securing energy supply.
- Identify and analyze new energy uses in the building sector (electric mobility, self-consumption, flexibility) and assess their impact on energy management and grid integration.

Skills related to heating networks

- Understand regional energy issues, master the operating principles of heating networks, and help support local authorities in implementing local energy projects.

Skills related to the economic analysis of energy projects

- Assess the economic profitability of an energy efficiency or renewable energy project using indicators (NPV, IRR, IRR, TRB, TEC)
- Analyze the sensitivity of a project's economic performance to changes in the regulatory environment and energy prices.
- Compare the economic profitability of a project with that of a baseline scenario or alternative solution to guide decision-making.

Bibliography

Ministry of Ecological and Solidarity Transition website: www.ecologique-solidaire.gouv.fr/politiques-publiques AMORCE

website:https://amorce.asso.fr/publications?search=&universes=2&yearMin=&yearMax=

Mener un projet de construction ou d'aménagement en coût global (Carrying out a construction or development project at overall cost) - Catherine Charlot-Valdieu, Philippe Outrequin - ISBN 13: 978-2-281-14220-4

Photovoltaique.info website: https://www.photovoltaique.info/fr/

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

UE804 Construction Engineering-3

ECTS
7 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Geotechnics 2 and eco-construction using earth	MODULE	13.5 hours	19.5 hours	12 hours	
Site management	MODULE	27	33 hours		

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Geotechnics 2 and eco-construction using earth (GECH813_BAT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

The Geotechnics 2 course covers the mechanical behavior of soils under large deformation (failure). The course will focus on the technical and regulatory aspects of geotechnical design: foundations and retaining walls.

The concepts of stress tensor in soil and effective stress will be consolidated, and the concept of failure criteria will be introduced and studied.

The process of building with unmodified raw earth will be introduced in this module.

Objectives

Learn how to characterize soil failure and design geotechnical structures in accordance with Eurocode 7. Understand the challenges, possibilities, and limitations of earth construction.

Teaching hours

Lectures	Lecture	13.5
Tutorial	Tutorials	19.5
Lab	Practical work	12

Mandatory prerequisites

Geotechnics 1, Applied Mechanics.

Course outline

PART 1: CHARACTERIZATION AND GENERAL INFORMATION

1. Evaluation of soil bearing capacity and strength
2. General information on structural calculations PART 2:

FOUNDATIONS

1. Shallow foundations
2. Deep foundations PART 3: SUPPORT

1. Limit states - Thrust and abutment
2. Dimensioning of retaining walls PART 4: EARTH CONSTRUCTION

Additional information

N/A

Bibliography

N/A

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Noemie Prime
+33 4 79 75 88 17
Noemie.Prime@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Construction site management (GECH814_BAT)

Annecy-Chambéry

Polytech
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and construction

Overview

Teaching hours

Lectures		Lecture	27
Tutorial		Tutorials	33

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Jean-Patrick Plassiard +33 4 79 75 81 17
Jean-Patrick.Plassiard@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE805 Design & Studies

ECTS
4 credits

Polytech Annecy-Chambéry component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	CM	Tutorial	Practical work	Credits
APP: Design and Studies	MODULE				36
Wood construction	MODULE				
Wood construction CM	CM	15 hours			
Wood construction TD	Tutorial		6 p.m.		

Practical information

Location

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

APP: Design and Studies (PROJ811_BAT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

This module is a continuation of module PROJ711: practical application of building information modeling (BIM). This collaborative working method is approached in the form of problems illustrating the advantages of new digital tools in the design process.

Objectives

The objective at the end of this series of BIM projects is to have gained an overview of the digital model: how it works, its advantages over traditional modeling methods, collaborative work, and software interoperability.

Teaching hours

Practical work	Practical work	36

Mandatory prerequisites

GECH680 - Modeling

Climate engineering, building thermodynamics, structural mechanics PROJ711

Course outline

12 hours Reinforcement and bracing 8 hours Plumbing networks
4 hours Life cycle analysis
8 hours Advanced STD or geotechnical engineering 4 hours Coordination and interference

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Simon Rouchier

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Simon.Rouchier@etu.univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Wood Construction (GECH816_BAT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Wood construction CM	CM	3 p.m.			
Wood construction TD	Tutorial		6 p.m.		

Practical information

Contact

Course leader Jean-Patrick Plassiard

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Jean-Patrick.Plassiard@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Wood construction CM

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Teaching hours

Lectures	Lecture	15

Skills acquired

Macro-skill	Micro-skills

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Wood construction TD

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Teaching hours

Tutorial		Tutorials	18

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

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		
Italian TD	SUBJECT TD		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 Advanced English 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	Supervised project	3 p.m.
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

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/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
+33 4 79 75 94 16
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				
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 S9	SUBJECT		9 p.m.		

Practical information

Contact

Course coordinator Christophe Lambert
+33 4 79 75 94 16
Christophe.Lambert@univ-savoie.fr

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

Contacts

Course Director Christophe Lambert
+33 4 79 75 94 16
Christophe.Lambert@univ-savoie.fr

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	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

Course coordinator Christophe Lambert
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Christophe.Lambert@univ-savoie.fr

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

Presentation

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

UE902 Design & Studies

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	CM	Tutorial	Practical work	Credits
Building renovation	MODULE				
Building renovation CM	CM	9			
Building renovation TD	TD		25.5		
Structural dynamics and earthquake engineering	MODULE				
Structural dynamics and earthquake engineering CM	Lectures	13.5			
Structural dynamics and earthquake engineering TD	TD		13.5		
Structural dynamics and earthquake engineering practical work (TP)	Practical				4
APP Multitechnical project - Design and studies	MODULE				60

Practical

Location

Le Bourget-du-Lac (73)

Building Renovation (GECH916_BAT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Building renovation CM	Lectures	9			
Building renovation TD	TD		25.5		

Practical information

Contact

Course coordinator Jean-Patrick Plassiard

+33 4 79 75 81 17

Jean-Patrick.Plassiard@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Renovation of CM buildings

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and construction

Overview

Teaching hours

Lectures	Lecture	9

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Jean-Patrick Plassiard +33 4 79 75 81 17
Jean-Patrick.Plassiard@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Renovation of TD buildings

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and building

Overview

Teaching hours

Tutorial	Tutorials	25.5

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Jean-Patrick Plassiard +33 4 79 75 81 17
Jean-Patrick.Plassiard@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Structural dynamics and earthquake engineering (GECH911_BAT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Structural dynamics and earthquake engineering CM	Lectures	13.5			
Structural dynamics and earthquake engineering TD	Tutorial		13.5		
Structural dynamics and earthquake engineering practical work (TP)	Practical			4	

Practical information

Contact

Course coordinator Jean-Patrick Plassiard

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Jean-Patrick.Plassiard@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Structural dynamics and earthquake engineering CM

Polytech Annecy-Chambéry
Component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and construction

Overview

Teaching hours

Lectures	Lecture	13.5

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Nicolas Bagneux
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Nicolas.Bagneux@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Structural dynamics and earthquake engineering TD

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Teaching hours

Tutorial	Tutorials	13.5

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course Director Nicolas Bagneux
+33 4 79 75 85 85
Nicolas.Bagneux@univ-savoie.fr

Location

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Structural dynamics and earthquake engineering practical

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Teaching hours

Practical work	Practical work	4

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Nicolas Bagneux

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

APP Multitechnical project - Design and studies (PROJ911_BAT)

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

The aim is to apply the knowledge acquired during the training by integrating it into a single multidisciplinary project involving multiple participants and simulating a real-life situation at the "study" stage. This project also aims to put into practice group work and project management, synthesis and in-depth study of economic, administrative, regulatory, and other aspects.

Objectives

conduct a technical study of a building and its systems based on specifications work as part of a team

Teaching hours

Practical work	Practical work	60

Mandatory prerequisites

All scientific and technical knowledge acquired during the BEE program (S5 to S9).

Course outline

In order to cover the full scope of the BEE specialization, students will be offered a choice of several topics covering various aspects of the following themes:

- Setting up a construction project,
- Building renovation,
- Technical studies of a building at the preliminary design stage,
- Technical studies of structures at the building level,
- Technical studies of an air treatment or heat production installation at the building level
- Analysis and minimization of a building's environmental impact

The organization of these projects will be the same regardless of the subject matter, with the following common characteristics:

- An identical real-world project for each practical work group,
- Multidisciplinary educational supervision, composed of teacher-researchers and professionals,
- Work in multidisciplinary groups of 3 to 5 students.

The project is based on meetings between the student groups and the teaching team. These project meetings are held periodically to allow students to review progress, refocus their approach, receive answers to key questions, and obtain the necessary information.

Bibliography

provided for each specific project

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Catherine Buhe
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Locations

Le Bourget-du-Lac (73)

UE903 Process of organizing a construction project

ECTS
5 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Life cycle of a construction project	MODULE	6 p.m.	9		
Legislative context of construction	MODULE				
Legislative context of construction CM	CM	9 p.m.			
Legislative context of building CM (common)	CM	12 p.m.			

Practical information

Locations

Le Bourget-du-Lac (73)

Life cycle of a construction project (GECH913_BAT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

After introducing the construction process, the parties involved, and the information produced and exchanged, the associated risk concepts are discussed. The aim of this course is to enable students to understand and manage the essential concepts of construction management.

Objectives

Establishing the link between building design, construction quality, and the implications for maintenance and asset management

Be able to understand and manage the essential concepts of building management.

Teaching hours

Lectures		Lectures	18
Tutorial		Tutorials	9

Mandatory prerequisites

Must also take SHES 911 on the legislative context of buildings (fire safety and accessibility sections)

Course outline

1. Construction process
    1. The phases of a construction project
    2. The parties involved and their roles
    3. Different forms of organization in the private and public sectors (MOP Law)
    4. Information produced and exchanged during a construction project (program, DCE, contract, DICT, DOE, DIUO, etc.).
    5. Formalization of the construction process: stakeholders, actions, and information (case study in tutorial
2. Assessment and management of construction-related risks
    1. Data acquisition strategy
    2. Normative and legislative tools
3. Crisis management and risk management
4. Real estate asset management
    1. Introduction - general information
    2. Maintenance in operational condition
    3. Maintenance and regulatory compliance
    4. Operating a real estate portfolio
    5. The evolution of a real estate portfolio
    6. Knowledge of properties
    7. Managing a real estate portfolio

Targeted skills

Be able to:

outline and explain the construction process (phases, stakeholders, information, etc.)

develop a multi-year maintenance plan (understand anticipatory needs, justify priorities, propose and plan actions)

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Catherine Buhe
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Catherine.Buhe@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Legislative context of building (SHES911_BAT)

Polytech Annecy-Chambéry
component

In brief

Teaching methods: In person **Open to exchange students:** Yes **ERASMUS reference:** Architecture and construction

Presentation

Description

This module introduces some basic concepts of construction law.

Objectives

To be aware of regulatory aspects in construction through a few specific examples.

Mandatory prerequisites

None

Course outline

1- Construction law

2- Fire safety

3- Accessibility

Skills acquired

Macro-skills	Micro-skills

List of lessons

	Nature	Lectures	Tutorial	Practical	Credits
Legislative context for buildings CM	CM	9 p.m.			
Legislative context of building CM (common)	CM	12 p.m.			

Practical information

Contact

Course coordinator Noemie Prime

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Locations

Le Bourget-du-Lac (73)

Legislative context for construction CM

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and construction

Overview

Teaching hours

Lectures	Lecture	21

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Noemie Prime

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Noemie.Prime@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Legislative context of the CM (common) building

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and construction

Overview

Teaching hours

Lectures	Lecture	12

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Noemie Prime

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Noemie.Prime@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE904 Renewable Energy and Eco-Construction

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Solar Thermal Energy	MODULE	12 hours	12	12	
Photovoltaic Solar Energy	MODULE	13.5 hours	15 hours	8	
Building and Energy Systems Modeling	MODULE				
Building & energy systems modeling CM Building & energy systems modeling TD	Lecture	12 hours TD	18		
Numerical Methods	MODULE	3	13.5		

Practical information

Location

Le Bourget-du-Lac (73)

Solar Thermal Energy (ENER913_BAT)

Polytech Annecy-Chambéry
Component

In brief

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

Presentation

Description

Acquisition of the scientific and technical foundations necessary for professional mastery of solar thermal energy applications in buildings.

Objectives

Learn about the different types of solar thermal systems, their implementation, design, and sizing in buildings

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	12
Lab	Practical Work	12

Mandatory prerequisites

Solid knowledge of:

- Heat transfer
- Fluid mechanics
- Thermodynamics
- Climate engineering

Course outline

1. Overview of the solar thermal energy market
2. Solar thermal collectors: technologies
3. Individual solar hot water: CESI
4. Collective solar systems (CESC)
5. Individual combined solar systems (CSS) Practical work:

design office work for the analysis, sizing, and optimization of solar thermal systems (for residential and commercial buildings)

Bibliography

- Dr. Felix A. Peuser, Karl-Heinz Remmers, Martin Schnauss; Solar Thermal Installations; publishers Systèmes Solaires, Solarpraxis and Le Moniteur; 2005; ISBN: 2-913620-29-9
- Solar heating systems for houses - A design handbook for solar combisystems; editor Werner WEISS; 2003; ISBN: 1-902916-46-8
- Solar thermal technologies for buildings - The state of the art; editor M. SANTAMOURIS; 2003; ISBN: 1-902916-47-6
- Solar-Assisted Air-Conditioning in Buildings - A Handbook for Planners; editor Hans-Martin HENNING; 2004; ISBN: 3-211-00647-8

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Nolwenn Le-Pierres
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Nolwenn.Le-Pierres@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Photovoltaic Solar Energy (ENER914_BAT)

Polytech Annecy-Chambéry
Component

In

Teaching methods: In person **Open to exchange students:** Yes **ERASMUS reference:** Architecture and building

Overview

Description

This course aims to train students in the design of grid-connected and off-grid solar photovoltaic (PV) installations.
All the components of a PV installation and their operating principles are presented: different PV solar collector technologies, battery storage, inverters, MPPT trackers, etc. Small case studies enable students to carry out a preliminary design of a solar installation connected to the grid or completely autonomous.

Objectives

Learn how to size a solar photovoltaic installation: preliminary sizing and standard BE sizing using professional tools (Archelios), choice of equipment, economic analysis (LCOE, return on investment). Implementation of engineering methods.

Teaching hours

Lectures	Lectures	13.5
Tutorial	Tutorials	15
Lab	Practical work	8

Mandatory prerequisites

Building thermodynamics, heat transfer, electricity

Course outline

Basics of solar energy (solar spectrum, atmospheric mass, regulatory testing conditions), building integration configurations (BIPV) and constraints, presentation of the basic components of a solar power plant, role and operating principle, case studies, application to professional design tools (dimensioning of a solar power plant integrated into a building roof)

Targeted skills

Design of a stand-alone solar power plant integrated into the building and connected to the grid. Implementation of design engineering methods

Bibliography

Photovoltaic installations - 6th edition, Anne Labouret, Michel Villoz, Adrien Villoz, Publisher Dunod

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Christophe Menezo
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Christophe.Menezo@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Building and Energy Systems Modeling (ENER911_BAT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Building & Energy Systems Modeling CM	Lecture	12			
Building & Energy Systems Modeling TD	TD		6 p.m.		

Practical information

Contact

Course coordinator Monika Woloszyn

+33 4 79 75 86 18

Monika.Woloszyn@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Building & Energy Systems Modeling CM

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Teaching hours

Lectures	Lecture	12

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Monika Woloszyn
+33 4 79 75 86 18
Monika.Woloszyn@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Building & Energy Systems Modeling TD

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Presentation

Teaching hours

Tutorial		Tutorials	18

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Monika Woloszyn
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Monika.Woloszyn@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Numerical Methods (GECH912_BAT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

Using examples from reference configurations in engineering, the Finite Element and Finite Difference methods are introduced. The aim is to enable the construction of a numerical solution associated with the modeling of the
problem.

Objectives

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

construct a model based on the assumptions and physical data provided

to perform a critical analysis of the numerical results obtained

propose numerical variants useful for improving the modeling of phenomena

Teaching hours

Lectures	Lecture	3
Tutorial	Tutorials	13.5

Mandatory prerequisites

Mathematics courses from previous semesters

Course outline

Introduction to Finite Differences based on the following possible physical configurations:

1. 1D beams
2. Hydraulic potential - Darcy flow 2D
3. Thermal bridges - 2D modeling

Targeted skills

BAT-1.1 - mastering a broad field of fundamental sciences and developing the associated analytical and synthesis skills

BAT-1.2 - by modeling and simulating complex physical phenomena and systems

BAT-1.3 - defining the functions and technological characteristics of building components BAT-2.2 - selecting and mastering the methods and tools appropriate to a problem

Bibliography

E.J. Hinch "Think before you compute" Cambridge 2020

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Christian Ruyer-Quil +33 4 79 75 81 93
Christian.Ruyer-Quil@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE001 Engineering internship

ECTS
30 credits

Polytech Annecy-Chambéry component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
S10 engineering internship	MODULE				

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

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

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	CM	Tutorial	Practical work	Credits
Support (every Thursday afternoon)	MODULE				

	Nature	CM	Tutorial	Practical	Credits
Labor law and corporate structure 1	MODULE	20 hours	12 hours	4	
Introduction to sustainable development and CSR - Cognitive development English	MODULE	16 hours	12 hours		
			37		

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Labor Law and Corporate Structure 1 (SHES510_PCHYFISA)

Polytech Annecy-Chambéry
component

Overview

Description

Common economic concepts used to characterize the economic situation of a company, their content and meaning, and understanding the distinction between economics and finance.

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, both in terms of its services (adapting to demand, innovation) and its organization (cost reduction, continuous improvement)	Mastery	Participating in the necessary evolution of the company
Knowing the common economic terms used to describe the company's economic situation, their content, and their meaning	Mastery	read an income statement and balance sheet

know and understand the distinction between economic and financial matters		draw up a simple provisional budget and take an economic approach to improvement measures
have a basic understanding of labor law	Concept	Know your rights within the company

Teaching hours

Lecture		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

Skills acquired

Macro-skills	Micro-skills

Practical information

Contacts

Course coordinator Jean-Patrick Plassiard +33 4 79 75 81 17
Jean-Patrick.Plassiard@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Introduction to Sustainable Development and CSR - Cognitive Development (SHES511_PCHYFISA)

Polytech Annecy-Chambéry
component

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

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 the company.

- 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
   - Learn how to manage 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—the "Brain Preferences" model—organization, identification of resources.)

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Jean-Patrick Plassiard +33 4 79 75 81 17
Jean-Patrick.Plassiard@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

English (LANG510_PCHYFISA)

Polytech Annecy-Chambéry
component

In brief

Teaching methods: Hybrid **Teaching format:** Tutorials **Open to exchange students:** Yes

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 location (Annecy or Le Bourget).

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	37

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, questions, adjectives, etc.)
    2. Review of lexical elements (TOEIC-specific vocabulary)
    3. Reading comprehension of authentic texts
    4. 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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Locations

Le Bourget-du-Lac (73)

UE502 Work experience

ECTS
4 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Project 1 (Launch and follow-up)	MODULE	1 hour		4	
Evolution in the workplace	MODULE				0 credits

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Project 1 (Launch and monitoring) (PROJ501_PCHYFISA)

Polytech Annecy-Chambéry
component

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

Mandatory prerequisites

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Nicolas Begel

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Nicolas.Begel@univ-savoie.fr

Location

Le Bourget-du-Lac (73)

Corporate Development (STAG501_PCHYFISA)

ECTS
0 credits

Polytech Annecy-Chambéry
component

Presentation

Description

Analysis of the apprentice's development during their integration into the company.

Objectives

Analysis of the apprentice's development during their integration into the company.

Mandatory prerequisites

None

Course outline

An assessment carried out by the company in January.

Bibliography

None

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Nicolas Begel

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Nicolas.Begel@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

UE503 Engineering Sciences

ECTS
11 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Computer Science	MODULE			24	
Refresher	MODULE		18 hours		
Mathematics Applied Mechanics Fluid	MODULE	12 hours	18		
Mechanics	MODULE	13.5 hours	hours	4	
Electricity	MODULE	10.5 hours	21		
	MODULE	6	hours		
			24	3	
			hours		
			6		

Practical information

Locations

Le Bourget-du-Lac (73)

Computer Science (INFO580_BAT_ALT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Information and Communication Technologies (ICT)

Overview

Teaching hours

Practical	Practical work	24

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Damien Decout

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Damien.Decout@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Refresher course (MATH580_BAT_ALT)

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: Mathematics and statistics

Presentation

Description

This course aims to reinforce the fundamentals of mathematics.

Teaching hours

Tutorial	Tutorials	18

Mandatory prerequisites

Solid foundation in high school mathematics

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 cases, 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
- Ead Polytech for links to a site containing courses, corrected exercises, multiple-choice questions, and links to other interesting sites.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Adeline Berthier

+33 4 79 75 85 85

Adeline.Berthier@univ-savoie.fr

Places

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Mathematics (MATH581_BAT_ALT)

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	12
Tutorial	Tutorials	18

Mandatory prerequisites

MATH580 Scientific refresher course

Course outline

1. Differential calculus: functions of several variables, differentiation, examples of partial differential equations
2. Vector analysis (part 1): differential operators and applications.
3. Curves and surfaces in the plane

a. Identification, parameterization, tangents to a curve, planes tangent to a surface

b. Double integrals

Bibliography

Books:

- J-P. Truc, Précis de Mathématiques, Nathan, 1997 (for MATH500)
- J. Stewart, Calculus: 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-skill	Micro-skills

Practical information

Contact

Course coordinator Adeline Berthier

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Adeline.Berthier@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Applied Mechanics (MECA580_BAT_ALT)

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 "Applied Mechanics" course 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 (CM).

Objectives

The "Applied Mechanics" course 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 (CM).

Teaching hours

Lectures	Lecture	13.5
Tutorial	Tutorials	21
Lab	Practical work	4

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

2.1. Stress state (stress tensor)

2.2. Deformation state (deformation tensor)

2.3. Linear elastic behavior law (stress/strain relationships)

2.4. General equations of continuous media in linear elasticity.

Targeted skills

Master the statics of non-deformable solids: 2D application. Define stress states and strain states Describe

the law of elastic and isotropic behavior

Bibliography

Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf, David F. Mazurek, "Mechanics of Materials," 7th Edition, McGraw-Hill

- 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 coordinator Francois Iapteff
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Francois.Iapteff@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Fluid Mechanics (MECA581_BAT_ALT)

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

This course covers the fundamental concepts necessary for understanding incompressible fluid mechanics, using the ideal fluid approximation. It provides the basic tools for designing hydraulic circuits and networks, including pumps and turbines.

Objectives

This course aims to enable students to design the main components of hydraulic circuits. At the end of this course, students will be able to:

- Calculate pressure losses in hydraulic circuits
- Determine and modify the operating point of a hydraulic circuit with pumps

Teaching hours

Lectures	Lecture	10.5
Tutorial	Tutorials	24

Mandatory prerequisites

General fundamentals of mechanics; knowledge of mathematical tools for engineers.

Course outline

1. Characteristics of fluids
2. Fluid statics
3. Introduction to hydrodynamics
4. Pipe flow and pressure loss
5. Pumps and hydraulic circuits
6. Dimensional analysis applied to fluid mechanics

Bibliography

- Michel Carlier, General and Applied Hydraulics, Eyrolles edition, EDF
- I.E. Idel'cik, Pressure Loss Handbook, Eyrolles, EDF
- Engineering techniques: fluid mechanics; fluid flow - flow in pipes. Networks; hydraulic pumps

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Nirina Chhay
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Electricity (ELEC580_BAT_ALT)

Polytech Annecy-Chambéry
component

Presentation

Description

Acquisition of the necessary knowledge of electricity for buildings.

Teaching hours

Lectures	Lecture	6
Tutorial	Tutorials	6
Lab	Practical work	3

Mandatory prerequisites

- Scientific and technological knowledge from the first cycle of university studies

Course outline

1. **Circuit analysis laws (4.5 hours of lectures)**
    1. Kirchhoff's laws, superposition theorem, Millman's theorem
    2. Thevenin generator, Norton generator
    3. Dipoles
    4. Impedance matching
    5. Steady state, transient state
2. **Electrical energy (6-hour course)**
    1. Electromechanical conversion
    2. Single-phase and three-phase distribution systems
    3. Active, reactive, and apparent power in single-phase and three-phase systems

4. Electrical protection

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Christelle Kempf-Coco +33 4 79 75 88 60
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Locations

Le Bourget-du-Lac (73)

UE504 Building Sciences

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Heat transfer	MODULE	18 hours	18		
Building materials	MODULE	13.5 hours	10.5 hours		
APP: Building Functions and Technologies	MODULE				
APP: Building Functions and Technologies CM	L	13.5			
APP: Building Functions and Technologies TD	TD		15		
APP: Building Functions and Technologies TP	Practical			12 p.m.	

Practical

Location

Le Bourget-du-Lac (73)

Heat transfer (ENER580_BAT_ALT)

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

Acquisition of the physical principles relating to the three modes of heat transfer: conduction, radiation, and convection. Knowledge of these modes of heat transfer should enable students to model and analyze different systems or processes in order to study their thermal behavior and improve their efficiency.

Objectives

By the end of this course, students will be able to: define the equations describing each mode of transfer and determine the modes of transfer associated with a given configuration.

Teaching hours

Lectures	Lecture	18
TD	Tutorials	6 p.m.

Mandatory prerequisites

Mathematical concepts: partial derivatives, solving differential equations, concept of gradient, etc. Thermodynamics concepts: 1st law, etc.

Course outline

1. Introduction

- Fundamental physical quantities
- Surface balance

2. Conduction

- Fourier's law
- Heat diffusion equation
- Initial and boundary conditions
- Steady state and transient conditions

3. Radiation

- Fundamental quantities: black body, gray body, emissivity, etc.
- Exchanges between black surfaces
- Exchanges between gray surfaces

4. Convection

- Boundary conditions
- Laminar and turbulent flow
- Dimensionless numbers
- Forced and natural convection

Bibliography

- J.F. Sacadura, Introduction to Heat Transfer, Technique et Documentation. 1980, 445 pages
- Incropera - Dewitt, Fundamentals of Heat and Mass Transfer, Seventh Edition, 1048 pages

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Gilles Fraisse
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Building Materials (MATE580_BAT_ALT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Presentation

Description

This course provides a comprehensive overview of the materials used in construction, with a focus on environmental issues, the fundamental properties of materials, and their use in innovative structures. The main objectives are as follows:

- To acquire knowledge of cementitious materials (particularly concrete), their carbon impact, and current strategies for reducing this impact (alternative formulations, mineral additives, recycling).
- Introduce the main families of eco-materials: wood, earth, recycled steel, and bio-based materials, specifying their properties, environmental benefits, and areas of application.
- Understand the principles of innovative structures such as adaptive walls, variable thermal inertia systems, and bio-inspired structures.
- Understand the rational selection of materials and implementation processes using multiple constraints and objectives (mechanical performance, durability, cost, environmental impact), with the help of tools such as selection diagrams and material databases.

This course aims to train engineers to make informed and responsible choices in materials and structural design, fully integrating the challenges of ecological transition.

This course provides a comprehensive overview of construction materials, with a strong focus on environmental challenges, fundamental material properties, and their application in innovative structural systems. The main objectives are to:

- Develop an understanding of cement-based materials (particularly concrete), their carbon footprint, and current strategies to reduce it (alternative formulations, mineral additives, recycling).

- Introduce major families of eco-friendly materials such as wood, earth, recycled steel, and bio-based materials, highlighting their properties, environmental benefits, and typical uses.
- Explore innovative structural concepts such as adaptive façades, systems with variable thermal inertia, and bio-inspired structures.
- Understand the rational selection of materials and processing methods using multiple constraints and objectives (mechanical performance, durability, cost, environmental impact), supported by tools such as material selection charts and databases.

The course aims to train engineers capable of making informed, responsible decisions regarding material choices and structural design, fully aligned with the goals of ecological transition.

Teaching hours

Lectures		Lecture	13.5
Tutorial		Tutorials	10.5

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Anna Lushnikova

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

APP: Building Functions and Technologies (PROJ580_BAT_ALT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

After presenting the 'actors' approach, the 'functions' approach, the performance approach, and the phasing of a construction project, this course focuses on building technology: technical choices to consider, justification of the solutions selected, performance indicators.

The reading of building plans and the main concepts of electricity (within the meaning of NFC 14-100 or NFC 15-100) are covered.

The following building-related topics are explored in depth through projects: 1/purpose and scope of a technical system, 2/performance analysis and evaluation, 3/justification of technical choices and construction of indicators.

Objectives

Understand the stages and roles of the various players in a construction project

Learn the main operating principles of technical system families (structure, technical equipment, envelope)

Be able to locate and interpret a building plan/section

Mandatory prerequisites

No prerequisites

Course outline

1. Project life cycle:
    1. Stakeholders
    2. Phasing
2. Building breakdown
    1. System approach
    2. Functional logic
    3. Organizational approach
    4. Performance-based approach
    5. Actor logic
3. Construction technology and processes
    1. Foundations and retaining structures
    2. Vertical and horizontal load-bearing structures
    3. Frames, roofing, and waterproofing
    4. Cladding
    5. Finishing work: insulation, partitioning, carpentry, cladding
4. Electrical work (3 hours of lectures, 6 hours of tutorials)
    1. Low-voltage installation
    2. NFC 1400
    3. NFC 1500
5. Reading plans (1.5 hours of lectures)

Tutorial series 1: Purpose of a technical device, identification of scope, technical knowledge to be integrated, regulatory analysis, choice of performance indicators to compare two options.

Series 2 tutorials: Performance review of a system, proposed improvements, room for maneuver, new performance

Series 3 (practical work): Comparison of response methods for a problem, study of transposition to one's system, construction and questioning of the choice of indicators

Targeted skills

Be able to:

describe the construction process

understand the role and expectations of the various stakeholders

describe the various functions and systems of the project, understand the interactions between systems and functions analyze the relevance and processing of the various functions in relation

to the selected indicators

understand electrical requirements and regulatory limitations/constraints identify and describe the objects represented on the

plan

Bibliography

- Building handbook: design, implementation, standardization - by Didier, Denis - AFNOR & NATHAN
- Building construction: structural and finishing work technology - by Turaud, Jean - Technical Monitor Collection

Skills acquired

Macro-skill	Micro-skills

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
APP: Building Functions and Technologies CM	Lectures	13.5			
APP: Building Functions and Technologies TD	Tutorial		15		
APP: Building Functions and Technologies TP	Practical			12 p.m.	

Practical information

Contact

Course coordinator Catherine Buhe

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE601 SHES - Languages

ECTS
4 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

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

	Nature	CM	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
English (TOEIC level not achieved)	MODULE		30 hours		
English (TOEIC level achieved)	MODULE		30 hours		

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Introduction to sustainable development and CSR (SHES611_PCHYFISA)

Polytech Annecy-Chambéry
component

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 the industrial sector;

- Understanding the evolution of the concept of sustainable development;
- Understanding responses to the climate crisis and identifying different approaches (international agreements, legislative framework, climate strategy);
- Developing a strategic vision to integrate climate issues and the need for ecological transition for an industrial company;
- Understanding what a Greenhouse Gas Emissions Assessment (GHG EA) 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.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Florine Giraud
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Florine.Giraud@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Sustainable Development - Site Approach (Environmental Management) (SHES612_PCHYFISA)

Polytech Annecy-Chambéry
Component

Presentation

Description

Energy production and environmental challenges

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.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Jean-Patrick Plassiard +33 4 79 75 81 17
Jean-Patrick.Plassiard@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

English (TOEIC level not achieved) (LANG610_PCHYFISA)

Polytech Annecy-Chambéry

In brief

Teaching methods: Hybrid **Teaching format:** Tutorials **Open to exchange students:** Yes

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	30

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, etc.)
   2. Review of lexical elements (TOEIC-specific vocabulary)
   3. Reading comprehension of authentic texts
   4. 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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Locations

Le Bourget-du-Lac (73)

English (TOEIC level achieved) (LANG611_PCHYFISA)

Polytech Annecy-Chambéry

In brief

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 score of at least 785 for apprenticeship students or 600 for continuing education students

Course outline

Various presentations by specialists in industrial and business-related fields, mainly English speakers

Bibliography

Various documents provided by speakers and/or the students themselves.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Christophe Lambert
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Locations

Le Bourget-du-Lac (73)

UE602 Work experience

ECTS
10 credits

Polytech Annecy-Chambéry component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Project 1 (Monitoring and reporting)	MODULE			4 hours	
Career development (4 areas)	MODULE				

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Project 1 (Monitoring and reporting) (PROJ601_PCHYFISA)

Polytech Annecy-Chambéry
component

Presentation

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 Other	4
Other			

Mandatory prerequisites

Must have completed module PROJ501_PCHYFISA

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Nicolas Begel

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Locations

Le Bourget-du-Lac (73)

Corporate Development (4 areas) (STAG601_PCHYFISA)

Polytech Annecy-Chambéry
component

Presentation

Description

This assessment 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

STAG501_PCHYFISA

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Nicolas Begel
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Nicolas.Begel@univ-savoie.fr

Places

Le Bourget-du-Lac (73)

UE603 Engineering Sciences

ECTS
6 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Mathematics	MODULE	13.5 hours	22		
APP: Introduction to digital building modeling Challenges of artificial intelligence	MODULE MODULE	6		24	

Practical information

Locations

Le Bourget-du-Lac (73)

Mathematics (MATH680_BAT_ALT)

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

Part 1: Determine an equation for a classic curve or surface and identify a curve or surface based on its equation, work on curve and surface parameterizations.

Obtain an equation for the tangent to a curve or the tangent plane to a surface.

Know how to calculate a scalar potential, a vector potential, a curvilinear integral, a surface integral, and a flux through a surface.

Part 2: Selecting and using descriptive statistics tools, understanding statistical testing, and knowing how to use sampling and estimation concepts

Part 3: Using the various concepts of multi-criteria decision support, creating and using graphs for initial analysis. Applying the principle of the aggregation method, explaining its advantages, limitations, and disadvantages, using this method, choosing one of the Electre I or II methods depending on the issue at hand, and applying the chosen method.

Teaching hours

Lectures		Lecture	13.5
Tutorial		Tutorials	22

Mandatory prerequisites

High school level probability and statistics course (technical baccalaureate)

MATH580

MATH581

Course outline

This course consists of **three independent parts**.

1. **The first part is devoted to additional mathematics for engineers, following on from the MATH581 module**.
   a. Calculation of double integrals
   b. Vector analysis: operators and curvilinear integrals
2. **Probability and statistics**
   a. Data processing (descriptive statistics)
   b. Random variables
   c. Binomial distribution and normal distribution
   d. Estimation - sampling
3. **Multi-criteria decision support**
   a. Construction of a decision support problem: concepts of actions, criteria, preferences.
   b. Aggregation method (single synthesis criterion): advantages and disadvantages
   c. Study of ELECTRE-type ranking methods: ELECTRE II,

Bibliography

- J. Stewart, Analysis, Concepts and Contexts, vol. 2, De Boeck, 2001
- F. Husson, J. Pagès, General Statistics for Users, Presses Universitaires de Rennes, 2005
- R. Veysseyre, Statistics and Probability for Engineers, Ed Dunod
- S. Morgenthaler, Introduction to Statistics, Presses Polytechniques et Universitaires Romandes
- Maystre, Pictet, ELECTRE Multi-Criteria Methods, SymosPresses Polytechniques et Universitaires Romandes

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Adeline Berthier
+33 4 79 75 85 85
Adeline.Berthier@univ-savoie.fr

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE604 Building Sciences

ECTS
10 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Building Thermodynamics	MODULE	13.5 hours	15		
Soil Mechanics	MODULE	9 hours	10.5	12	
Structural design	MODULE	10.5 hours	18	12	
Structural mechanics	MODULE	10.5 hours	16.5 hours	12	

Practical information

Locations

Le Bourget-du-Lac (73)

Building Thermodynamics (ENER680_BAT_ALT)

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

Building thermal engineering involves studying the hygrothermal and aerodynamic behavior of buildings in both steady-state and variable conditions. It provides an understanding of the concept of hygrothermal comfort and forms the basis for the design of HVAC systems (calculation of thermal loads) and calculations related to French thermal regulations.

Teaching hours

Lectures	Lecture	13.5
Tutorial	Tutorials	15

Mandatory prerequisites

Building thermal engineering: Concepts of heat transfer (conduction, convection, and radiation) Basic knowledge of radiation for the Lighting section

Course outline

- Building thermodynamics
  1. Introduction
  2. Calculation of heat loss (surface, linear, point, airflow)
  3. Concepts of temperature and comfort
  4. Representation of heat transfer using electrical analogies (convection, conduction, short-wave and long-wave radiation)
  5. Towards positive energy buildings
- Tutorial: insulation adjustment in steady state - heat loss through buried walls - power injection into a wall - thermal inertia - radiative exchanges within a room - glass transmission coefficient - solar chimney - effect of wind and thermal draft - hygrothermal transfers (calculations, software), permeability

Bibliography

- H. Cortes, J. Blot. Heat transfer, application to housing. Study using the nodal method. Ellipse, 1999.
- Claude-Alain Roulet. Building Energy Efficiency - Volume 2 - Building Services, Overall Energy Balance, Presses Polytechniques et Universitaires Romandes, April 1987.
- Moisture transfer through walls - Assessing the risks of condensation, Technical Guide, CSTB, Abelé Charlotte, 2009.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course manager Mickael Pailha

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Soil Mechanics (GECH680_BAT_ALT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

Course covering the fundamental concepts of soil physics (characterization, mechanics, hydraulics) through a theoretical/practical approach. Application cases will be taken from the fields of building (foundations) and civil engineering in general (earthworks, dykes).

Objectives

Learn how to represent soil and manipulate the main variables describing this porous medium. Know how to calculate total and effective vertical stresses and calculate settlement in different configurations. Understand the principle of flow in soils and describe it quantitatively. Understand soil testing methods.

Teaching hours

Lectures	Lecture	9
TD	Tutorials	10.5
Lab	Practical Work	12

Mandatory prerequisites

Applied Mechanics / Fluid Mechanics

Course outline

1. Introduction. What is soil?
2. Stresses in soils
3. Groundwater hydrology
4. Settlement and consolidation

Additional information

N/A

Bibliography

N/A

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Noemie Prime
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Structural Design (GECH681_BAT_ALT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Description

This course introduces the main concepts of structural design, in a context applied to concrete but which can be transposed to other construction materials later on. Current construction standards are presented (Eurocodes 0 and 1). The concept of limit states is presented through a series of checks aimed at introducing the necessary concepts during courses on reinforced concrete, metal construction, and wood construction. The structural design of the building with regard to vertical and horizontal loads is then carried out. Finally, three practical sessions dedicated to the design of a digital building model help students master the concepts related to load transfer and building bracing.

Objectives

Provide the prerequisites for designing buildings with regard to vertical and horizontal loads exerted on structural elements.

Teaching hours

Lectures	Lecture	10.5
Tutorial	Tutorials	18
Lab	Practical work	12

Mandatory prerequisites

Courses in applied mechanics and structural mechanics concerning simple stresses.

Course outline

1. Introduction to Eurocodes (Eurocodes 0 and 1)
2. Limit states and verifications
3. Load transfer
4. Bracing

Targeted skills

BAT-1.2 - modeling and simulating complex physical phenomena and systems

BAT-1.3 - defining the functions and technological characteristics of building components

BAT-2.1 - by designing and dimensioning structures and their components for a given use and application

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Jean-Patrick Plassiard +33 4 79 75 81 17
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Structural Mechanics (MECA682_BAT_ALT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

The course covers the fundamentals of Strength of Materials (SM): statics, internal force analysis, study of geometric properties of sections, stress and strain analysis, behavior laws, displacement analysis.

Objectives

This course aims to:

- analyze simple stresses and plot normal stress, shear stress, and bending moment diagrams in isostatic structures.
- dimension isostatic structures.
- calculate the deformation of structures subjected to simple stresses.

Teaching hours

Lectures	Lecture	10.5
Tutorial	Tutorials	16.5
Lab	Practical work	12

Mandatory prerequisites

Applied mechanics and knowledge of mathematics

Course outline

1. Introduction to structural mechanics (strength of materials: RDM)
2. Beams and isostatic frames: analysis for drawing diagrams

2.1. Diagrams of internal forces

1. Review of geometric characteristics and behavior laws
2. Study of simple structural stresses
3. Internal energy - external energy and displacement calculations

Targeted skills

Analyze simple stresses and plot normal stress, shear stress, and bending moment diagrams in isostatic structures

Define the geometric properties of a section. Dimension isostatic structures

Calculate the deformation of structures subjected to simple stresses

Bibliography

Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf, David F. Mazurek, "Mechanics of Materials," 7th Edition, McGraw-Hill
Strength of Materials, Volume 1, J. Roux, Eyrolle edition

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Francois Iapteff
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE701 SHES - Languages

ECTS
8 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Support (half of Thursday afternoons when FISA staff are present)	MODULE				

	Nature	CM	Tutorial	TP	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
English (TOEIC level not achieved)	MODULE		34 hours		
English (TOEIC level achieved)	MODULE		34 hours		

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Management (SHES701_PCHYFISA)

Polytech Annecy-Chambéry component

Presentation

Teaching hours

Tutorial	Tutorials	32

Skills acquired

Macro-skills	Micro-skills

Practical information

Locations

Le Bourget-du-Lac (73)

Business Structure and Entrepreneurship 2 (SHES702_PCHYFISA)

Polytech Annecy-Chambéry
component

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:
apply the concepts covered in the management module in a practical way	Master	use management concepts in the context of business projects
develop financial reflexes for managing the company in response to unforeseen events, opportunities, and market conditions	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

Business life simulation

Review and feedback

Bibliography

Business Strategy - Concepts, Models, Tools, Examples (2nd edition)

Dominique Jolly (Author)

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

Sustainable Development - Product Approach (SHES711_PCHYFISA)

Polytech Annecy-Chambéry
component

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 eco-design approach and the main challenges of its application in business	Application	to take environmental issues and regulations into account when designing a product or service

Teaching hours

Lectures	Lecture	4
Tutorial	Tutorials	2
Lab	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

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Jean-Patrick Plassiard +33 4 79 75 81 17
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Locations

Le Bourget-du-Lac (73)

English (TOEIC level not achieved) (LANG710_PCHYFISA)

Polytech Annecy-Chambéry

In brief

Teaching methods: Hybrid **Teaching format:** Tutorials **Open to exchange students:** Yes

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 location (Annecy or Le Bourget).

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	34

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, questions, adjectives, etc.)
    2. Review of lexical elements (TOEIC-specific vocabulary)
    3. Reading comprehension of authentic texts
    4. 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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Locations

Le Bourget-du-Lac (73)

English (TOEIC level achieved) (LANG711_PCHYFISA)

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. 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.

Teaching hours

Tutorial	Tutorials	34

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

Practical information

Contact

Course coordinator Christophe Lambert
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Locations

Le Bourget-du-Lac (73)

UE702 Work experience

ECTS
10 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Project 2 (launch and follow-up)	MODULE	1 hour		8	
Progress in the workplace (advancement)	MODULE				

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Project 2 (launch and monitoring) (PROJ701_PCHYFISA)

Polytech Annecy-Chambéry
component

Presentation

Description

In this module, engineering students will be required to carry out a mainly technical project within a 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, and the engineering student will develop its economic component. If company constraints do not allow this, it will be possible to choose a new project.

Objectives

Position 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 within 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

Mandatory prerequisites

PROJ601_PCHYFISA

Course outline

Introduction

Support: framing of technical missions/projects, implementation of project management/problem-solving tools/methods, taking a step back from the project - confidentiality, approach, choices, personal development, etc.

Interim oral presentation accompanied by a written report (project summary sheet)

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Nicolas Begel

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Locations

Le Bourget-du-Lac (73)

Career development (progression) (STAG701_PCHYFISA)

Polytech Annecy-Chambéry
component

Presentation

Description

This assessment allows us to see the apprentice's progress during 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

Course outline

Writing the project orientation sheet. Evaluation by the company.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Nicolas Begel

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Locations

Le Bourget-du-Lac (73)

UE703 Building Energy

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	CM	Tutorial	Practical	Credits
Climate engineering	MODULE	13.5 hours	28.5 hours		
Energy	MODULE	15h	21	32	
Building Physics	MODULE	12 hours	22.5 hours		

Practical information

Locations

Le Bourget-du-Lac (73)

Climate Engineering (ENER780_BAT_ALT)

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

This course is the first of two modules on climate engineering and covers building heating and domestic hot water production. It contains six main chapters:

- Calculation of building heating requirements and consumption, based on RE2020;
- Heat production, distribution, and emission devices: selection and sizing;
- Hydraulics: calculation of pressure losses, hydraulic balancing, pump operation;
- Domestic hot water: calculation of requirements and consumption, production and storage methods.
- Functional diagrams of heating networks;
- Regulation.

Objectives

Understanding how HVAC systems work, knowing how to justify solution choices, and performing calculations for sizing and consumption.

Teaching hours

Lectures		Lecture	13.5
Tutorial		Tutorials	28.5

Mandatory prerequisites

Heat transfer Fluid mechanics
Building functions and technologies

Course outline

Climate engineering and heating systems: 7.5 hours of lectures, 22.5 hours of tutorials

Regulation: 4.5 hours of lectures, 7.5 hours of tutorials

Assessment: 1.5 hours

Targeted skills

Know how to calculate heating and DHW requirements. Distinguish between requirements and consumption, primary and final energy. Select and size production, distribution, and emission devices.

Understand control modes and their technological principles.

Be able to read functional diagrams and understand the function of their components.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Simon Rouchier
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Energy (ENER781_BAT_ALT)

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 present the fundamentals of thermodynamics for energy analysis of buildings and their systems, the fundamentals of heat exchanger design, and the main existing technologies.

Objectives

The objectives are:

- to acquire a basic understanding of thermodynamics: the study of systems involving work and heat transfer, based on concrete applications encountered in buildings;
- acquire knowledge of the different heat exchanger technologies and apply heat balances and dimensioning methods.
- apply the concepts acquired during practical experiments

Teaching hours

Lectures	Lecture	3 p.m.
Tutorial	Tutorial	9 p.m.
Lab	Practical Work	32

Mandatory prerequisites

Fundamentals of heat transfer (ENER580) and fluid mechanics (MECA581)

Course outline

THERMODYNAMICS

- General: Thermodynamic systems, exchanges, and transformations; equilibrium, variables, and state functions
- Fundamental principles: Zero principle and the concept of thermal equilibrium, First principle and conservation of energy, Second principle, concept of irreversibility and concept of entropy
- System evolutions: Thermodynamic diagrams, energy balance, efficiency, and coefficient of performance HEAT EXCHANGERS

- Classification of heat exchangers according to different criteria, their advantages and disadvantages
- Heat balances in a heat exchanger
- Application of the mean logarithmic temperature difference method and the NUT method
- Heat exchanger sizing Practical work:

- Pumps (4 hours)
- Pressure losses (4 hours)
- Coupled heat transfers (4 hours)
- Boiler (4h)
- Co- and counter-current exchangers (4 hours)
- Heat exchanger technologies (4 hours)
- Heat pumps (4 hours)
- Flow measurements (4 hours)

Bibliography

Engineering techniques, Industrial thermal engineering, BE 9515 to 9520

Skills acquired

Macro-skill	Micro-skills

Practical

Contact

Course coordinator Florine Giraud
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Florine.Giraud@univ-savoie.fr

Location

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Building Physics (GECH780_BAT_ALT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Description

This course provides an in-depth look at building thermal science. On the one hand, we will focus on moisture transfer in building walls, airtightness of building envelopes, and ventilation systems. On the other hand, we will focus on interior lighting, which aims to develop the skills necessary to understand and study the relationship between a building and its environment in terms of natural and artificial lighting.

Objectives

be able to design the building envelope while minimizing the risk of condensation know how to measure the airtightness of the building and limit defects

know how to size a mechanical ventilation system

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	22.5

Mandatory prerequisites

Concepts of heat transfer: conduction, convection, radiation, mass transfer.

Course outline

1. **Air tightness and building ventilation systems**
   1. Air tightness of building envelopes
   2. Ventilation principles
   3. Technologies: natural ventilation, single-flow mechanical ventilation, dual-flow mechanical ventilation, etc.
2. **Hygrothermal transfers and condensation risks**
   1. Hygrothermal transfers in building walls
   2. Risks of condensation
3. **Lighting**
   1. Natural lighting
   2. Artificial lighting

Bibliography

- Hens, H. S. (2012). Building Physics-Heat, Air and Moisture: Fundamentals and Engineering Methods with Examples and Exercises. John Wiley & Sons.
- ENGINEERING TECHNIQUES - Energy Engineering - Home Thermal Engineering: Basic Data
- Alain LIEBARD, André DE HERDE - Treatise on Bioclimatic Architecture and Urban Planning. Designing, Building, and Developing with Sustainable Development
- Vandeplanque, Lighting: Basic Concepts - Installation Projects, 5th edition, Technique et Documentation Lavoisier 2005; ISBN: 2-7430-0799-0
- Reiter and A. De Herde - Natural lighting in buildings. Presses universitaires de Louvain, Louvain-la-Neuve, 2004; ISBN: 2-930344-57-1

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Monika Woloszyn
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE704 Construction Engineering

ECTS
5 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lecture	Tutorial	Practical	Credits
Geotechnics	MODULE	12 p.m.	16.5	8	
Reinforced Concrete	MODULE	6 p.m.	6 p.m.		

Practical information

Locations

Le Bourget-du-Lac (73)

Geotechnics (GECH781_BAT_ALT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French **Teaching methods:** In person
Open to exchange students: Yes
ERASMUS Reference Framework: Architecture and Building

Overview

Description

The Geotechnics 2 course covers the mechanical behavior of soils under large deformation (failure). The course will focus on the technical and regulatory aspects of geotechnical design: foundations and retaining walls.

The concepts of stress tensor in soil and effective stress will be consolidated, and the concept of failure criteria will be introduced and studied.

The process of building with unmodified raw earth will be introduced during this module.

Objectives

Learn how to characterize soil failure and design geotechnical structures in accordance with Eurocode 7.

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	16.5
Lab	Practical Work	8

Mandatory prerequisites

Geotechnics 1, Applied Mechanics

Course outline

PART 1: CHARACTERIZATION AND GENERAL INFORMATION

1. Evaluation of soil bearing capacity and strength
2. General information on structural calculations PART 2:

FOUNDATIONS

1. Shallow foundations
2. Deep foundations PART 3: SUPPORT

1. Limit states - Thrust and abutment
2. Dimensioning of retaining walls

Additional information

N/A

Bibliography

N/A

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Noemie Prime
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Reinforced Concrete (GECH782_BAT_ALT)

Polytech Annecy-Chambéry
component

In brief

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

Presentation

Description

Translator

Objectives

Translator

Teaching hours

Lectures	Lecture	18
Tutorial	Tutorials	6 p.m.

Mandatory prerequisites

Translator

Course outline

Translator

Targeted skills

Translator

Bibliography

Translator

Acquired skills

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Catherine Buhe
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Catherine.Buhe@univ-savoie.fr

Location

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE801 SHES - Languages

ECTS
5 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Support (half of the Thursdays when FISA is present)	MODULE				

	Nature	CM	Tutorial	Practical	Credits
Management and technical communication	MODULE	6	4	12	

	Nature	CM	Tutorial	Practical	Credits
English (TOEIC level not achieved)	MODULE		40 hours		
English (TOEIC level achieved)	MODULE		40 hours		

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Management and Technical Communication (SHES801_PCHYFISA)

Polytech Annecy-Chambéry
component

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 for self-awareness to enable them to communicate better and positively assume their future responsibilities, whether functional or hierarchical.	Master	communicate appropriately
		assume their future responsibilities
lead and report on their various projects	Mastery	prepare reports and presentations on projects carried out in the company

Teaching hours

Lectures	Lecture	6
Tutorial	Tutorials	4
Lab	Practical work	12

Mandatory prerequisites

This course aims to enable students to:	Level	By the end of this course, students will be able to:
define the main tools for self-awareness to enable them to communicate better and take on their future responsibilities in a positive manner, whether functional or hierarchical	Master	communicate appropriately
		assume their future responsibilities
lead and report on their various projects	Mastery	in preparing reports and presentations on projects carried out in the company

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

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Jean-Patrick Plassiard +33 4 79 75 81 17
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Locations

Le Bourget-du-Lac (73)

English (TOEIC level not achieved) (LANG810_PCHYFISA)

Polytech Annecy-Chambéry

In brief

Teaching methods: Hybrid **Teaching format:** Tutorials **Open to exchange students:** Yes

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.

Objectives

Specific objectives: by 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

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, questions, adjectives, etc.)
    2. Review of lexical elements (TOEIC-specific vocabulary)
    3. Reading comprehension of authentic texts
    4. 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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Locations

Le Bourget-du-Lac (73)

English (TOEIC level achieved) (LANG811_PCHYFISA)

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 a professional context, using business English and scientific and technical vocabulary specific to the program of study.

Teaching hours

Tutorial	Tutorials	40

Mandatory prerequisites

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

Course outline

- Learn how to describe how a technical object works
Review appropriate vocabulary and grammatical structures
- Learn how to describe the prospects and opportunities offered by new inventions
- Learn how to describe the context of a product
Describe the profile of a company or laboratory, advertise a product, describe a product

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

UE802 Work experience

ECTS
7 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Project 2 (Monitoring and reporting)	MODULE			8 hours	
Evolution in the workplace (4 areas)	MODULE				

Practical information

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Project 2 (Monitoring and reporting) (PROJ801_PCHYFISA)

Polytech Annecy-Chambéry
component

Presentation

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 understand 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 guidelines and decisions, management and performance indicators) and for the effective management of all or part of a 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 translate them clearly for their appropriation and use at operational levels of the company:

- present and use the economic and management data of a project

Teaching hours

Practical work	Practical work	8
Other	Other	1

Mandatory prerequisites

PROJ601_PCHYFISA

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 -

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Nicolas Begel
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Locations

Le Bourget-du-Lac (73)

Corporate Development (4 areas) (STAG801_PCHYFISA)

Polytech Annecy-Chambéry
component

Presentation

Description

This assessment allows us to see the apprentice's development throughout the various projects and tasks carried out within 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

STAG501_PCHYFISA; STAG601_PCHYFISA; STAG701_PCHYFISA

Course outline

Writing a project orientation sheet. Assessment by the company.

Skills

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Nicolas Begel
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Locations

Le Bourget-du-Lac (73)

UE803 Eco-construction and BIM

ECTS
4 credits

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
APP: Design/Studies and BIM	MODULE			20	
Wood construction	MODULE				
Wood construction CM	CM	3 p.m.			
Wood construction TD	Tutorial		6 p.m.		

Practical information

Location

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

APP: Design/Studies and BIM (PROJ880_BAT_ALT)

Polytech Annecy-Chambéry
Component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and construction

Overview

Description

This module is a practical application of building information modeling (BIM). This collaborative working method is approached in the form of problems illustrating the advantages of new digital tools in the design process.

Teaching hours

Practical	Practical work	20

Mandatory prerequisites

Completion of design and modeling modules in the fields of climate engineering and structural mechanics

Course outline

The practical sessions are divided into four parts to illustrate the BIM approach through examples.

- Interoperability between software and data exchange formats (4 hours)
- Collaborative work (8 hours)
- Applications to structural mechanics (8 hours)

- Applications in HVAC engineering and building thermal engineering (4 hours)

Targeted skills

TC-1.2 - Ability to select and/or implement tools and methods for project completion TC-1.5 - Ability to work effectively in a multi-stakeholder collaborative environment

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Simon Rouchier
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Wood Construction (GECH814_BAT_FISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Objectives

This course presents the possible uses of wood in building construction. After a review of general information about wood (type, origin, etc.) and basic structural standards (Eurocodes 0 and 1), the course focuses on the dimensioning of wood structures in accordance with current standards (Eurocode 5 and national annex).

This module will also include a section on the specific characteristics of wooden structures in terms of the hygrothermal properties of the building envelope (inertia, thermal bridges, moisture transfer, etc.), as well as the comfort inherent in indoor environments and the life cycle analysis of these structures.

Mandatory prerequisites

This course builds on the knowledge acquired in the following modules:

- materials,
- strength of materials and structural mechanics,
- heat transfer, and building thermodynamics.

Course outline

Part One: Wood as a building material

1. Wood as a material: origin, wood species
2. Introduction to Eurocode 5 and reminders concerning Eurocode 0 and Eurocode 1
3. Dimensioning of simple elements: tension, compression, shear force, pure bending, compound bending, deflected bending, buckling, tilting, warping
4. Dimensioning of assemblies
5. Design and dimensioning of a timber frame

Part Two: Thermal behavior of wood frame buildings

1. General information on the thermal design of wood-frame buildings
2. Hygrothermal characteristics of the envelope (inertia, thermal bridges, moisture transfer, etc.) and indoor comfort

Part Three: Life cycle analysis of wood-frame buildings

Skills acquired

Macro-skill	Micro-skills

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Wood construction CM	CM	3 p.m.			
Wood construction TD	Tutorial		6 p.m.		

Practical information

Contact

Course leader Jean-Patrick Plassiard

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE804 Building Energy

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Climate engineering	MODULE	9	6 p.m.	4 p.m.	
Building acoustics	MODULE	12 p.m.	6 p.m.	12	
Thermal and environmental regulations	MODULE	10.5 hours	7.5	20	

Practical information

Locations

Le Bourget-du-Lac (73)

Climate Engineering (ENER880_BAT_ALT)

Polytech Annecy-Chambéry component

Time of year Spring

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Engineering and related techniques

Overview

Description

This course introduces the physics of humid air and applies it to air handling units, particularly for heating and air conditioning buildings.

Several practical sessions allow students to apply the knowledge acquired in Climate Engineering.

Objectives

- Understand the physics of humid air
- Analyze and explain the behavior of climate control systems
- Know how to size air handling units (particularly energy aspects) to meet the needs of a space

Teaching hours

Lectures	Lecture	9
Tutorial	Tutorials	6 p.m.
Lab	Practical Work	4 p.m.

Mandatory prerequisites

- Knowledge of heat transfer and energy balance,
- Knowledge of fluid mechanics (pressure, pressure losses, etc.)

Course outline

1. **Fundamental equations for humid air**
   1. Saturation pressure of water vapor and associated quantities
   2. Wet air diagram
   3. Concepts of hygrothermal comfort
2. **Basic transformations of humid air: heating, humidification, cooling, dehumidification**
3. **Air handling units and heat recovery,**
   1. Room loads and supply air line
   2. Summer/winter sizing,
4. **Enthalpy balances, and Energy saving levers**

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Monika Woloszyn
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Building Acoustics (GECH880_BAT_ALT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Description

This module focuses on the architectural acoustics of buildings, including an introduction to useful concepts and quantities in physical acoustics, as well as acoustic correction and insulation of premises. These elements are developed with a view to meeting regulatory acoustic requirements and designing acoustic environments suited to the use of buildings and the comfort of occupants.

Objectives

Apply the concepts of architectural acoustics to provide solutions during the design and dimensioning phases and to meet the acoustic regulatory requirements for buildings.

Teaching hours

Lectures	Lecture	12
Tutorial	Tutorials	6 p.m.
Lab	Practical Work	12

Mandatory prerequisites

No prerequisites

Course outline

1. Elements of physical acoustics
2. Characterization of sounds and noises
3. Propagation in free space
4. Propagation in enclosed spaces: acoustic correction
5. Acoustic insulation
    1. General
    2. Acoustic insulation against internal airborne noise
    3. Acoustic insulation against external airborne noise

Targeted skills

- Characterize, model, and evaluate acoustic phenomena in built environments (interior and exterior)
- Implement acoustic correction and insulation principles in accordance with regulations.

Bibliography

- L. Hamayon, Réussir l'acoustique d'un bâtiment - Conception architecturale, isolation et correction acoustique (Achieving good acoustics in a building - Architectural design, insulation and acoustic correction) - Le Moniteur 2013; ISBN: 978-2-281-11636-6
- B. Gréhant, Acoustics and Buildings, Technique et Documentation Lavoisier 1994; ISBN: 2-7430-0013-9
- J. Jouhaneau, Room Acoustics and Sound Reinforcement, Technique et Documentation Lavoisier 1997; ISBN: 2-7430-0183-6
- J. Jouhaneau, Room Acoustics and Sound Reinforcement - Exercises and Solved Problems, Technique et Documentation Lavoisier 1998; SBN: 2-7430-0237-9

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

Course coordinator Christelle Kempf-Coco +33 4 79 75 88 60
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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Thermal and environmental regulations (GECH883_BAT_ALT)

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

RE 2020 is the new energy and environmental regulation for all new construction. This course provides a detailed description of this regulatory context: the objective of limiting the primary energy consumption of buildings involves, in particular, the implementation of performance requirements (energy efficiency of buildings, energy consumption of buildings, summer comfort in buildings). The application of the current French thermal regulations (RE2020) and the use of dynamic thermal simulation tools (Pleiades) for buildings are discussed in detail.

In addition, the fight against climate change is based on two new guidelines for new construction: the widespread use of positive energy buildings and the deployment of buildings with a low carbon footprint throughout their life cycle, from design to demolition.

Teaching hours

Lectures	Lectures	10.5
Tutorial	Tutorials	7.5
Lab	Practical work	20

Mandatory prerequisites

Concepts of heat transfer (conduction, convection, and radiation) and climate engineering (heating, cooling, ventilation, domestic hot water, etc.)

Course outline

1. Thermal and environmental regulations (history, context, objectives)
2. Dynamic energy simulation tools
3. Building life cycle analysis (principles and methodological approach)

- 12 hours of practical work: Application of French thermal regulations (RET2020)
- 8am Practical: Dynamic energy simulation of buildings (Pleiades-Comfie software)

Bibliography

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- Positive Energy Buildings and Carbon Reduction website (June 2019): www.batiment-energiecarbone.fr
- Energy efficiency and comfort in buildings website (June 2019): www.effinergie.org
- Life cycle analysis in buildings: Scientific and Technical Center for Building (CSTB), Authors: Alexandra LEBERT and Jean-Luc CHEVALIER, Collection: Guide to Sustainable Development in Construction; Publication date: February 2018; EAN13: 9782868916563

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

UE805 Construction Engineering

ECTS
7 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lecture	Tutorial	Practical	Credits
Construction Management Reinforced	MODULE	27	27h		
Concrete	MODULE	hours	42h		
Structural Mechanics II	MODULE	21	4:30 p.m.		
		hours		8 hours	
		9			

Practical information

Locations

Le Bourget-du-Lac (73)

Project Management (GECH881_BAT_ALT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Description

Basic elements for conducting construction work: site organization; scheduling and planning; cost analysis; safety and prevention of risks and environmental hazards.

Objectives

To provide training in the various fundamental tools for construction management.

Teaching hours

Lectures	Lectures	27
Tutorial	Tutorials	27

Mandatory prerequisites

Functions and technological processes used in building construction

Course outline

1. **Construction site methods** (6 hours of lectures and 6 hours of tutorials): project management and production management concepts; site preparation and opening: objectives of site preparation, site preparation methodology, site installation plan; choice of construction site equipment; design of structural work cycle and formwork rotation; management of human resources, materials, and equipment; cost and deadline control.
2. **Scheduling methods** (3 hours of lectures, 9 hours of tutorials): basics of scheduling calculations, the PERT method, scheduling methods taking resources into account, scheduling of repetitive tasks.
3. **Practical application of scheduling, management, and coordination tasks** (3 hours of lectures, 9 hours of tutorials): content of scheduling, management, and coordination tasks; principles of developing schedules for structural and finishing work; site supervision and monitoring; case studies.
4. **Estimating construction projects** (6 hours of lectures, 9 hours of tutorials): consultation documents for contractors (specifications, quantities, technical specifications); concepts of price and cost - setting a contractor's price; preliminary measurements (methods of calculation according to trade); rapid estimation methods.
5. **Prevention and safety on construction sites** (3 hours of tutorials): Regulatory requirements and best practices for implementing a prevention approach, ensuring safety, and protecting health.
6. **Waste management and environmental pollution & Demolition/deconstruction context** (6 hours): Collection, sorting, and recycling of construction waste, Demolition or deconstruction? Identifying the environmental, economic, and social issues involved in a deconstruction operation, Identifying the actions and responsibilities of those involved in a deconstruction operation, Identifying the main stages of a deconstruction project, Preparing and organizing the construction site.

Targeted skills

BAT-3.3 - integrating multiple criteria (environmental, economic, legal, and social) from the definition of needs to operational implementation

TC-1.1 - mastering the basics of operational management

TC-1.2 - by being able to choose and/or implement tools and methods for carrying out the project TC-1.3 - by being able to identify and mobilize resources from a specific scientific

and technical field TC-1.4 - by integrating the economic, financial, and/or legal aspects of the project

TC-1.5 - by being able to evolve in a context of multi-stakeholder collaboration

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

Reinforced Concrete (GECH882_BAT_ALT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Description

This course aims to provide students with the skills necessary for the design and analysis of reinforced concrete structures. In particular, it enables students to:

- Define the framework of a reinforced concrete building based on its structural analysis.
- Master the calculation of common elements such as continuous beams, columns, floors, and foundations.
- Study the fire behavior of reinforced concrete structures, with a regulatory and practical approach.
- To introduce the concepts of eco-design through low environmental impact concrete (eco-concrete), with a view to sustainable construction.

This course combines theoretical, normative, and applied aspects in order to train engineers capable of designing safe, high-performance, and environmentally friendly structures.

This course aims to provide students with the skills required for the design and analysis of reinforced concrete structures. It specifically enables students to:

- Define the structural framework of a reinforced concrete building based on its structural analysis.
- Master the calculation of common structural elements such as continuous beams, columns, slabs, and foundations.
- Study the fire behavior of reinforced concrete structures, with both regulatory and practical perspectives.
- Introduce eco-design concepts through the use of environmentally friendly concretes (eco-concretes), in the context of sustainable construction.

The course combines theoretical, regulatory, and applied aspects to train engineers capable of designing safe, efficient, and environmentally responsible structures.

Teaching hours

Lectures		Lecture	21
TD		Tutorials	42

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

Structural Mechanics II (GECH883_BAT_ALT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Engineering and related techniques

Presentation

Description

This course consists of two parts:

- beam stresses involving several terms of the stress tensor (deflected bending, composite bending)
- hyperstatic systems

Objectives

Determine the forces in structural elements such as sloping purlins, beams resting on several supports, bending walls, etc.

Teaching hours

Lectures	Lecture	9
TD	Tutorials	16.5
Lab	Practical Work	8

Mandatory prerequisites

Structural mechanics modules covering isostatic structures and applied mechanics.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Carmelo Caggegi

Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE901 SHES - Languages

ECTS
7 credits

Polytech Annecy-Chambéry
component

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 hours			

	Nature	CM	Tutorial	Practical	Credits
English (TOEIC level not achieved)	MODULE		26 hours		
English (TOEIC level achieved)	MODULE		26 hours		

Practical information

Locations

Le Bourget-du-Lac (73)

Legislation, labor law, occupational health, sustainable engineering, decarbonization (SHES901_PCHYFISA)

Polytech Annecy-Chambéry
component

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	to apply legal concepts in a business situation
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 from 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

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

GEPC, Humanities, Management, Ergonomics (SHES902_PCHYFISA)

Polytech Annecy-Chambéry
component

Presentation

Description

Project management and leadership Skills management

Objectives

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 workforce management) 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.)	Mastery	understand the principles behind the creation of these tools
		be able to write a simple job description
		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.)	Mastery	understand the legal framework for recruitment (basic concepts)
		Know 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 the roles of the various players, adapting to each type
   - Driving change: crisis or change, individual and collective emotional cost, qualities of the driver, successive stages and support
   - Managing conflict: preventive, remedial, 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 project presentations in companies

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

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Locations

Le Bourget-du-Lac (73)

English (TOEIC level not achieved) (LANG910_PCHYFISA)

Polytech Annecy-Chambéry
component

In brief

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

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).

This goal focuses primarily on preparing for the TOEIC test, and most of the activities offered are geared toward this end. Students are evaluated throughout each semester.

Objectives

Achieve level B2 (score of 785) in the TOEIC certification exam held at the end of the semester

Teaching hours

Tutorials	Tutorials	26

Mandatory prerequisites

CEFR level B1

Course outline

Grammar and vocabulary review related to the TOEIC test

Regular practice with shortened tests and detailed corrections Regular practice with tests under exam conditions

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

English (TOEIC level achieved) (LANG911_PCHYFISA)

Polytech Annecy-Chambéry

In brief

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

Presentation

Description

This course prepares students for their entry into professional life. Leading 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. Preparation of the engineering theme (English section compulsory) Simulation of an 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 presentations of oneself and business

projects

Bibliography

Various documents provided by speakers and students themselves

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

Course coordinator Christophe Lambert

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Locations

Le Bourget-du-Lac (73)

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				

Practical information

Locations

Le Bourget-du-Lac (73)

Project 3 (Launch and monitoring) (PROJ901_PCHYFISA)

Polytech Annecy-Chambéry
component

Presentation

Description

In this module, engineering students will be required to carry out a management-oriented project within the 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

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.

Skills acquired

Macro-skill	Micro-skills

Practical

Contact

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Locations

Le Bourget-du-Lac (73)

Corporate Development (Progression) (STAG901_PCHYFISA)

Polytech Annecy-Chambéry
component

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

STAG501, 601, 701, 801

Course outline

Writing the project orientation sheet. Evaluation by the company.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

UE903 Construction Engineering

ECTS
4 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lecture	Tutorial	Practical	Credits
Building renovation	MODULE				
Building renovation CM	CM	9			
Renovation of TD buildings	TD		25.5 hours		
Structural dynamics and earthquake engineering	MODULE				
Structural dynamics and earthquake engineering CM	Lectures	13.5			
Structural dynamics and earthquake engineering TD	Tutorial		13.5		
Structural dynamics and earthquake engineering practical work (TP)	Practical			4	

Practical information

Location

Le Bourget-du-Lac (73)

Building Renovation (GECH916_BAT_FISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and building

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Building renovation CM	Lectures	9			
Building renovation TD	TD		25.5		

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Structural Dynamics and Earthquake Engineering (GECH911_BAT_FISA)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and construction

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Structural dynamics and earthquake engineering CM	Lectures	13.5			
Structural dynamics and earthquake engineering TD	Tutorial		13.5		
Structural dynamics and earthquake engineering practical work (TP)	Practical			4	

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

UE904 Building Energy

ECTS
9 credits

Polytech Annecy-Chambéry
component

List of courses

	Nature	Lectures	Tutorial	Practical	Credits
Solar Thermal Energy	MODULE	12	12	12	
Photovoltaic Solar Energy	MODULE	1:35 p.m.	3 p.m.	8	
Renewable Energy II	MODULE	24	36		
Building & Energy Systems Modeling	MODULE				
Building & energy systems modeling CM	Lecture	12 hours			
Building & Energy Systems Modeling TD	Tutorial		6 p.m.		
Photovoltaic Solar Energy	MODULE	13.5	3 p.m.	8	

Practical information

Location

Le Bourget-du-Lac (73)

Renewable Energies II (ENER982_BAT_FISA)

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: Architecture and Building

Presentation

Description

During this course, we will:

- Develop the scientific and technical foundations necessary for professional mastery of wood energy applications and geothermal or aerothermal heat pump systems.

- Provide technical, economic, and environmental design elements for the integration of these renewable energy systems into conventional energy systems.

Objectives

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

- identify the key players in the wood energy sector, their roles, and the technical, environmental, and economic challenges facing this sector

- to carry out a feasibility study for a wood energy project

- explain the operating and design principles of geothermal systems and Canadian well installations

- develop a project to design vertical geothermal probes and Canadian wells

- explain the operating principles of an air source heat pump, a thermodynamic water heater, and the components of these installations

- predict the instantaneous and annual performance of an air source heat pump after sizing it according to usage requirements

- to carry out a feasibility study of various energy supply solutions for buildings

- apply the pricing principles of heating networks

Teaching hours

Lectures	Lecture	24
Tutorial	Tutorials	36

Mandatory prerequisites

- Semester 5 modules: Heat Transfer (ENER511); Fluid Mechanics (MECA511); AAP: Building Functions and Technologies;
- Semester 6 module: Building thermal engineering;
- Semester 7 modules: Climate engineering; Energy;
- Semester 8 modules: HVAC engineering; Thermal and environmental regulations;

Course outline

1. Why wood energy?
2. From forest to wood fuel
3. Technical systems
4. Feasibility study methodologies

Geothermal systems: geothermal heat pumps and Canadian wells (Lectures: 7.5 hours; tutorials: 15 hours)

1. Geothermal energy: principles and physical quantities
2. Economic and technical overview of the uses of geothermal heat pumps
3. Applications to vertical geothermal probes
4. Geothermal applications on aquifers
5. Canadian wells

Aerothermal systems: heat pumps and thermodynamic water heaters (Lectures: 4.5 hours; tutorials: 12 hours)

1. Presentation of aerothermal heat pumps
    1. Specific features of aerothermal heat pumps (operation, technologies, performance)
    2. Selecting an aerothermal heat pump
    3. Sizing for boiler backup
2. Thermodynamic water heaters

Energy supply for buildings - District heating networks (Lectures: 3 hours; Tutorials: 3 hours)

1. Technical and economic feasibility of energy supply solutions for buildings
2. Integration of renewable energies
3. Heat networks (dimensioning elements, pricing, governance, and network management)

Bibliography

- BRGM Editions: Technical Guide - Geothermal Heat Pumps on Probe Fields - 2012; ISBN: 978-2-7159-25311
- BRGM Editions: Technical Guide - Geothermal Heat Pumps Using Aquifer Boreholes - 2012; ISBN: 978-2-7159-25328
- Karl OSCHNER - Geothermal Heat Pumps, A guide for planning and installing - 2007; EAN: 978-1-84407-406-8
- Jean LEMALE: Heat Pumps - Collection: Technique et Ingénierie DUNOD/ADEME - 2012; EAN13: 9782100565504
- Website of the Interprofessional Committee for Wood Energy (June 2019): http://www.cibe.fr/
- AMORCE Association website (June 2019): www.amorce.asso.fr/fr/energie-climat-reseaux-de-chaleur/reseaux-de-chaleur/presentation/
- RT-bâtiment website (June 2019)

Skills acquired

Macro-skill	Micro-skills

Practical information

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Places

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Building & Energy Systems Modeling (ENER911_BAT_FISA)

Polytech Annecy-Chambéry
component

In brief

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

List of courses

	Nature	Lecture	Tutorial	Practical	Credits
Building & Energy Systems Modeling CM	Lectures	12			
Building & Energy Systems Modeling TD	Tutorial		6 p.m.		

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

Campus

Le Bourget-du-Lac / Savoie Technolac campus

Photovoltaic Solar Energy (ENER914_BATFISA)

Polytech Annecy-Chambéry
component

Presentation

Description

Acquisition of the scientific and technical foundations necessary for professional mastery of solar energy applications in the following areas:

- Photovoltaic systems connected to the electrical grid with total grid injection and self-consumption without batteries
- Off-grid autonomous photovoltaic systems and grid-connected photovoltaic systems for self-consumption with batteries

Teaching hours

Lectures	Lectures	13.5
Tutorial	Tutorials	15
Lab	Practical work	8

Course outline

1. Solar resources
    1. Solar geometry and solar radiation
    2. Solar irradiation in a plane, databases
    3. Distant masks and nearby masksPhotovoltaics
2. Photovoltaics
    1. Different technologies and electrical characteristics
    2. Photovoltaic market and its evolution
    3. Cost evolution and life cycle analysis
3. Photovoltaic applications connected to the electrical grid
    1. Photovoltaic components and sizing
    2. Economic analysis, subsidies, and profitability

3. Ground-mounted photovoltaic power plants and building integration

4. Stand-alone photovoltaic applications
   1. Photovoltaic components and sizing
   2. Operational compatibility
   3. Energy balance and hybrid systems

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Location

Le Bourget-du-Lac (73)

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 hours	
Career development (4 areas)	MODULE				

Practical information

Locations

Le Bourget-du-Lac (73)

Project 3 (Monitoring and reporting) (PROJ001_PCHYFISA)

Polytech Annecy-Chambéry
component

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 10 review 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

Teaching hours

Practical work	Practical work	12
Other	Other	2

Mandatory prerequisites

PROJ501_PCHYFISA; PROJ601_PCHYFISA; PROJ701_PCHYFISA; PROJ801_PCHYFISA; PROJ901_PCHYFISA

Course outline

Writing the project guidance sheet.

Assessment by the company

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

Corporate Development (4 areas) (STAG001_PCHYFISA)

Polytech Annecy-Chambéry
component

Presentation

Description

This assessment allows us to see the apprentice's progress during 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

STAG501_PCHYFISA; STAG601_PCHYFISA; STAG701_PCHYFISA; STAG801_PCHYFISA; STAG901_PCHYFISA

Course outline

Drafting of the project orientation sheet. Evaluation carried out by the company.

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

UE002 Economics - Innovation - Construction

ECTS
8 credits

Polytech Annecy-Chambéry
component

List of courses

	Type	Lecture	Tutorial	Practical	Credits
Energy Economics	MODULE	3 p.m.	12		
Innovation, Entrepreneurship, Research & Development	MODULE	12 p.m.	12		
Metal Construction	MODULE	12 hours	3 p.m.		

Practical information

Location

Le Bourget-du-Lac (73)

Energy Economics (SHES081_BAT_ALT)

Polytech Annecy-Chambéry
component

In brief

Languages of instruction: French

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Description

Acquisition of the technical and economic foundations necessary for the analysis and evaluation of energy management and renewable energy projects.

Presentation of the challenges of energy transition and the French context: challenges, stakeholders, energy taxation, and levers for action.

Objectives

- Understand and analyze the French and European energy system, from its historical evolution to its prospects for transformation, highlighting the complex interactions between the composition of the energy mix, the imperatives of sobriety, efficiency, and decarbonization, the organization and governance of the sector, the functioning of markets and infrastructure, and the emergence of new energy uses and their impact on the grid.

- Assess the technical and economic viability of an investment project in the field of energy efficiency and renewable energy equipment for the building sector.

Teaching hours

Lectures	Lecture	15
Tutorial	Tutorials	12

Mandatory prerequisites

Sustainable Development Module (SHES780)

Course outline

1. Energy markets (Lecture: 6 hours)
    1. The role of electricity and gas in France and Europe
    2. The structure of the energy sector and its current organization
    3. Institutional players and public policy
    4. The functioning of energy markets and infrastructure
    5. New energy uses associated with buildings
2. Economic analysis of energy projects (Lectures: 13.5 hours; tutorials: 10.5 hours)
    1. Introduction to economic analysis - Economic criteria: Discounted Payback Period - Internal Rate of Return - Discounted Total Cost
    2. Economic analysis method of the "Capital Enrichment Rate"
    3. Application of this method to investment projects in renewable energies and energy efficiency
    4. Impacts of energy taxation

Targeted skills

Skills related to energy markets

- Analyze the current composition and prospective developments of the French and European energy mix, in relation to the challenges of energy conservation, energy efficiency, and decarbonization.
- Explain the historical evolution, current organization, and governance mechanisms of the French energy sector, identifying the roles of the main institutional players and related public policies.
- Describe the functioning of the electricity and gas markets and associated infrastructure, and analyze their role in regulating and securing energy supply.
- Identify and analyze new energy uses in the building sector (electric mobility, self-consumption, flexibility) and assess their impact on energy management and grid integration.

Skills related to the economic analysis of energy projects

- Assess the economic profitability of an energy efficiency or renewable energy project using indicators (NPV, IRR, IRR, TRB, TEC).
- Analyze the sensitivity of a project's economic performance to changes in the regulatory environment and energy prices.

- Compare the economic profitability of a project with that of a baseline scenario or an alternative solution to guide decision-making.

Bibliography

Ministry of Ecological and Solidarity Transition website: www.ecologique-solidaire.gouv.fr/politiques-publiques AMORCE website:https://amorce.asso.fr/publications?search=&universes=2&yearMin=&yearMax=
Mener un projet de construction ou d'aménagement en coût global (Carrying out a construction or development project at overall cost) - Catherine Charlot-Valdieu, Philippe Outrequin - ISBN 13: 978-2-281-14220-4
Photovoltaique.info website: https://www.photovoltaique.info/fr/

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

Innovation, Entrepreneurship, Research & Development (ENTR080_BATFISA)

Polytech Annecy-Chambéry
component

Presentation

Description

During periods spent at the company, engineering apprentices carry out what are known as "daily" tasks. These tasks evolve over the course of their training as they gradually take on more responsibility. These tasks are designed to promote:

- their integration as a full member of the company's workforce;
- their participation in a variety of tasks that promote their personal and professional development;
- their gradual advancement in skills from their initial status as a technician to their final status as an engineer.

Objectives

Ce cours vise à rendre l'élève apte à :	Niveau	A l'issue de ce cours l'élève sera capable :
évoluer progressivement vers le statut d'ingénieur	Maîtrise	

Teaching hours

Lectures		Lecture	12
Tutorial		Tutorials	12

Mandatory prerequisites

Must have completed modules ENTR580, ENTR680, ENTR780, ENTR880, and ENTR980.

Skills acquired

Macro-skills	Micro-skills

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)

Metal Construction (GECH080_BAT_FISA)

Polytech Annecy-Chambéry
component

In brief

Open to exchange students: Yes

ERASMUS reference: Architecture and Building

Overview

Description

The dimensioning of steel-framed buildings is studied during this module. Most of the module focuses on the dimensioning of elements (beams, columns, etc.) in relation to stresses (compression, tension, shear stress, simple bending, compound bending, elastic instabilities) and the dimensioning of assemblies. Design and preliminary dimensioning are covered in a project at the end of the module.

Objectives

Know how to design a steel frame using Eurocode 3.

Teaching hours

Lectures		Lecture	12
Tutorial		Tutorials	3 p.m.

Mandatory prerequisites

This course builds on knowledge acquired in courses on materials, structural mechanics, strength of materials, and structural modeling.

Course outline

1. Introduction: steel as a material
2. Introduction to Eurocode 3 and review of Eurocode 0 and Eurocode 1
3. Dimensioning of simple elements: tension, compression, shear force, pure bending, compound bending, deflected bending, buckling, overturning, warping.
4. Dimensioning of metal assemblies: bolted assemblies, welded assemblies.
5. Project: design and dimensioning of a steel structure.

Targeted skills

BAT-1.1 - mastering a broad field of fundamental sciences and developing the associated analytical and synthesis skills

BAT-1.2 - by modeling and simulating complex physical phenomena and systems

BAT-1.3 - defining the functions and technological characteristics of building components

BAT-2.1 - designing and dimensioning structures and their components for a given use and application BAT-2.2 - selecting and mastering the methods and tools appropriate to a problem

Skills acquired

Macro-skill	Micro-skills

Practical information

Contact

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Locations

Le Bourget-du-Lac (73)