Autumn semester

Concrete structures 1	6 credits	68h
Indoor building physics	4 credits	65h
Improve your management abilities	4 credits	45h
Quality Safety Environment, Sport	6 credits	86h
Geotechnics 2	4 credits	47h
Advanced non linear and computational structural and solid mechanics	6 credits	51h

Concrete structures 1	6 credits	68h
Indoor building physics	4 credits	65h
Improve your management abilities	4 credits	45h
Quality Safety Environment, Sport	6 credits	86h
Building networks (hot and cold water networks, aeraulics)	5 credits	66h
Building devices (thermodynamic devices, electricity)	5 credits	70h

Concrete structures 1

ECTS
6 credits

Component
INSTITUT NATIONAL DES SCIENCES APPLIQUEES TOULOUSE

Number of hours
68h

Presentation

Description

* Basic rules of structural design for concrete structures according to Eurocdes.
* Actions and combinations of actions on structures.
* Foundations: actions on foundations, pad footings, pile caps.
* Choice of materials according to mechanical and environmental performance criteria.
* Effects of horizontal actions on bracing walls.
* Design and verification of simple elements:

- Vertical load-carrying components: columns and walls.

- Horizontal load-carrying components: continuous concrete beams, floors (continuous supported slabs).

- Bracing wall with or without windows.

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

Prominent design parts (bearing frames, foundations, bracing systems), and calculation of reinforced concrete buildings, submitted to vertical or horizontal loads.

The student will be able to:

Identify actions on the structures and environmental conditions, understand and predict the mechanical behavior of a structure, argue its technological choices (type of components and carrying systems, strength class of materials), design the various structural elements of a common construction and possess the needed basis to go further into particular domains, enrich a numerical model.

Pre-requisites

Structural analysis and engineering

Reinforced Concrete and prestressed concrete

Useful info

Place

Toulouse

Indoor building physics

ECTS
4 credits

Component
INSTITUT NATIONAL DES SCIENCES APPLIQUEES TOULOUSE

Number of hours
65h

Presentation

Description

Programme (detailed contents):

- Thermal and acoustic Comfort;

- Sensitizing with RT2012, the practice of the thermal insulation, bioclimatic concepts and labels HQE, LEED, BREAM ;

- Aerolics: principles to design a network;

- Heating: heat production, distribution and emission;

- Air conditioning: moist air diagram, elementary evolutions, design the elements of a air handling unit.

- Acoustics: physical acoustics, sound insulation of buildings, acoustics of the rooms, lawful aspects.

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

- useful criteria to qualify comfort;

- basic knowledge for designing a system of heating, ventilating and air conditioning (HVAC);

- to be sensitized to energy saving in HVAC systems and to thermal code RT;

- basic knowledge to treat the sound insulation of buildings.

The student will be able to:

- To design a simple installation of heating and air conditioning;

- To analyze the operation of the elements of an air conditioning and heating installation;

- To calculate the sound insulation of a wall, the time of reverberation of a room and to propose a treatment;

- To calculate the direct and reverberated acoustic fields;

- To enrich a numerical model.

Expected skills :

* design a basic HVAC installation
* analyze the operation of the elements of a heating and air conditioning system ;

* calculate the sound insulation of a wall , the reverberation time of a room and offer treatment

Pre-requisites

Heat transfer and Fluid Mechanics I & II

Useful info

Contacts

Education manager

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Place

Toulouse

Improve your management abilities

ECTS
4 credits

Component
INSTITUT NATIONAL DES SCIENCES APPLIQUEES TOULOUSE

Number of hours
45h

Presentation

Objectives

At the end of this module, the student will have understood and be able to explain :

* The basic rules of business law

* The objectives, principles and means of marketing

* The principles and procedures of financial diagnosis and / or investment

The student will be able to :

Apply principles and rules of management and law in simple situations. Take into account the parameters of the management (customer needs, cost effectiveness and legal compliance).

Useful info

Contacts

Education manager
LUCIE LECLERT
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Place

Toulouse

Quality Safety Environment, Sport

ECTS
6 credits

Component
INSTITUT NATIONAL DES SCIENCES APPLIQUEES TOULOUSE

Number of hours
86h

Presentation

Description

Acquire a culture of QSE and understand the principles of QSE management in the civil engineering construction.

- Risk prevention (E-Learning)

- Environmental Management

- Security Management

- Quality Management through LEAN Management

The conferences are given by civil engineers .

The "Risk Prevention" is an E-Learning module in partnership with OPPBTP

Implementation of a collective project, linked to the chosen physical and sports activities, through a deeper practice and knowledge of these PSAs.

Organization (process):

Part1: This teaching takes place in the form of conferences and independent projects to deepen certain key concepts (half a day / week).

Part 2: Physical and sporting activities (2h / week)

Useful info

Contacts

Education manager
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Place

Toulouse

Geotechnics 2

ECTS
4 credits

Component
INSTITUT NATIONAL DES SCIENCES APPLIQUEES TOULOUSE

Number of hours
47h

Presentation

Description

Programme :

Geotechnical:

5 Active and passive soil pressure.

6 Verification of gravity and sheet pile walls.

7 Principal in situ testing.

8 Shallows foundations.

9 Deeps foundations.

Special geotechnical works

Objectives

Geotechnical design:

Design and verify foundations and earth retaining wall with Eurocode 7.

Determinate the active and passive soil pressure. Determinate forces of earth pressure.

Design a retaining wall.

Analyze famous in-situ testing.

Design shallows and deeps foundations.

Pre-requisites

Geotechnics 1

Useful info

Contacts

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Place

Toulouse

Advanced non linear and computational structural and solid mechanics

ECTS
6 credits

Component
INSTITUT NATIONAL DES SCIENCES APPLIQUEES TOULOUSE

Number of hours
51h

Presentation

Description

Programme (detailed contents):

Use limitations of first order analysis (linear analysis)

Non linear geometry

Local buckling: buckling, Lateral buckling, Lateral torsional buckling

Global buckling : Rayleigh-Timoshenko method

Non linear behaviour of materials

Yielding : constitutive laws and criteria, cross-section yielding, limit analysis of structures

Viscoelasticity: constitutive laws, stress relaxation and creep. Long term strain calculation using Laplace transform

Finite Element Method

Variational formulation, Principe of virtual power

Discretization

Assembly of system matrices and computation

Element properties

BEAM

PLATE-SHELL

SOLID

Stationary analysis, dynamic analysis (eigenvalue calculation), buckling

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

The use limitations of the linear mechanic

The different phenomena of buckling corresponding to different scales : cross-section, members, global structure

Analysis of structures with plastic hinges

Viscoelastic analysis, constitutive model of viscoelasticity, application to creep, stress relaxation and calculation of long-term strain

The structure modelling using Finite Element Method

Elements properties : BEAM, PLATE and SHELL, SOLID

The student will be able to:

Calculate the global buckling of structure

Calculate the local buckling of structural members

Calculate the ultimate load bearing capacity using plastic hinge method

Calculate a structure using Finite Element Software

Pre-requisites

Structural analysis and engineering

Useful info

Place

Toulouse

Building networks (hot and cold water networks, aeraulics)

ECTS
5 credits

Component
INSTITUT NATIONAL DES SCIENCES APPLIQUEES TOULOUSE

Number of hours
66h

Presentation

Description

Program (detailed contents):

* Hot water networks

In-depth presentation of the heating system (heat production, emission, distribution, operation)

Hydro-thermal performance of a heating system

* Hydraulics

Based on the Technical Document 60-11: sizing of indoor hot and sanitary water devices, study of Legionella problem, sizing of storage systems, of pressure maintain devices. Sizing of sewage disposal.

* Aeraulics

Increase public awareness of an the stakes of ventilation like to the movements of air out and in a building and to their "nonfatal" use in natural ventilation (VN). To learn how to choose and dimension an installation of ventilation (VN and VMC). To approach the lawful context (RT), aeraulic modeling (CFD, diffusion...), and to present demonstrative buildings.

Organisation:

The technologies related to the heating systems are studied during regular classroom and a visit of a real heating network is planned.

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

1. The hydro-thermal characteristics of a heating system
2. The pressure distribution in a network
3. The control strategies applied to heating systems used in buildings
4. How to design indoor hot and cold sanitary water devices (Building hydraulic)
5. How to design air devices: transport, supply (Building air devices)

The student will be able to:

- Design hydraulic and air networks by using the methods exposed during the seminars
- Analyse the behaviour of existing heating systems
- Design and size a heating system for collective housing

Pre-requisites

Heat transfer and Fluid Mechanics I & II

Useful info

Contacts

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Place

Toulouse

Building devices (thermodynamic devices, electricity)

ECTS
5 credits

Component
INSTITUT NATIONAL DES SCIENCES APPLIQUEES TOULOUSE

Number of hours
70h

Presentation

Description

Program:

* Applied thermodynamic

Reminder of thermodynamic basics (1st and 2nd principles), study of the devices through their cycle: vapor turbine, thermal motors, cogeneration… Power and efficiency calculations

* Electricity

Study of the C15-100 of the UTE C 15-105 guide. Analyze of various protections relating to the safety of electrical installations:

- protection of the circuits (choice of the protection apparatus adapted to a drain);

- protections of the people (modes of neutral, differential protection);

* Metrology

Metrology fundamentals, basics of uncertainty calculation, calibration. Practical application to real HVAC systems.

Organization:

Thermodynamics and Electricity : Lecture, seminar

Metrology: lecture, tutorials, lab work.

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):

- The behavior and the design of classical thermodynamic devices used in buildings. (Applied thermodynamic)

- Protection and security techniques used in houses, collective housing or industrial buildings (Electricity)

- How to determine experimentally the energy balance of heating and cooling units (Metrology)

The student will be able to:

- Name and explain the protection and security techniques used in classical buildings

- Calculate thermodynamic devices efficiency (refrigeration, cogeneration…) and draw the corresponding cycles on thermodynamic charts

- Analyse experimental data and calculate the related uncertainty

Useful info

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