INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

3rd YEAR IC_SEMESTER 6 INSA

Practical info

Location(s)

Toulouse

Geotechnics 1

ECTS
5 crédits

Hourly volume
57h

Practical info

Location(s)

Toulouse

Reinforced concrete

ECTS
5 crédits

Hourly volume
78h

Practical info

Location(s)

Toulouse

Heat and Mass Transfers, 2

ECTS
6 crédits

Hourly volume
83h

Practical info

Location(s)

Toulouse

Analysis of Static and Dynamic Structures

ECTS
4 crédits

Hourly volume
56h

Introducing

Objectives

The student will be expected to understand and be able to explain (main concepts):
- the distribution of internal forces in structures under static mechanical loads (continuous beams, trusses, frames, etc.) and that of the associated stress, strain and displacement fields,
- the dynamic behaviour of discrete and continuous structures,
- The student must be able to: - understand the basic principles of the design process.

The student must be able to
- formulate and justify relevant assumptions for the static resolution of a structure,
- determine the degree of hyperstaticity of a structure,
- The student must be able to: formulate and justify relevant hypotheses for the static resolution of a structure, determine the degree of hyperstaticity of a structure, solve a hyperstatic structure by implementing the method of forces,
- solve a hyperstatic structure using the displacement method,
- argue on the choice of the method of resolution,
- calculate the support reactions of the structure,
- draw diagrams of internal forces (bending moment, shear force, normal force),
- calculate the deformation of the structure (displacements, rotations),
- formulate and justify relevant hypotheses for the dynamic resolution of a structure,
- Put into equations a simple dynamic problem (discrete or continuous system),
- determine the solution of a simple dynamic problem, including dissipative and excited,
- determine the eigenmodes of a dynamic system by solving the associated equations,
- determine the eigenmodes of a dynamical system by implementing the Rayleigh-Ritz method,
- write a clear, fair and synthetic calculation note.

Competences INSA (GC) mobilized :
1.1: Master the mathematical concepts and the calculatory tools of the engineer
1.2 : Master the concepts of physics, mechanics, chemistry, thermodynamics for the engineer
1.3 : Implement rigorous scientific reasoning and develop the capacity for abstraction
4.3 : Manage a group: lead a team, argue and negotiate, communicate in crisis situations
4.6 : Be able to integrate socially in a group to progress together

INSA competences (GC) evaluated :
2.1 : Know, understand and apply the methods of calculation of structures and evaluate or predict their behaviour
2.2 : Know and master the formulation, characteristics and performances of the main materials used
2.4: Know and implement the main procedures, regulations and methods applicable to construction operations
3.1: Formulate and model problems, especially in complex systems
3.2: Solve, in an analytical or systemic way, a problem (decompose, prioritise, mobilise resources)

Necessary prerequisites

- Notions of stresses, strains, displacements, rigid body movements.
- Support conditions.
- Fundamental principle of Statics.
- Integration and derivation of polynomial functions.
- Geometry (calculation of surfaces, centres of gravity, lengths, angles, etc.).
- Characterisation of sections.
- Internal forces: bending moment, normal force, shear force.
- Degree of hyperstaticity.
- Resolution of isostatic structures (calculation of support reactions, internal force diagrams, calculation of the deformation by integration of the moment-curvature relation).
- Fundamental Principle of Dynamics.
- Solving second member differential equations, with constant coefficients and variable second member.

Practical info

Location(s)

Toulouse

INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

Mechatronics

ECTS
3 crédits

Hourly volume
32h

Practical info

Location(s)

Toulouse

Manufacturing 2

ECTS
3 crédits

Hourly volume
30h

Toulouse

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):
Methods and the implementation of the NC machining and CAM from a digital definition and scanning methods and control.

The student will be able to:
_ Develop a production program a part and the NC program ISO manually or by CAM,
_ Scan a part and build its numerical model,
_ Develop an inspection CMM or to design a monitoring arrangement.

Necessary prerequisites

Read technical drawings with functional dimensioning, reading NC ISO code, line manufacturing of simple parts, Generation of surfaces by simple cutting tool.

Practical info

Location(s)

Dynamics and Control

ECTS
7 crédits

Hourly volume
103h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain:
- the fundamentals on signals and systems
- the analysis methods for the prediction of the dynamic performance of systems
- the fundamentals of control engineering for linear systems in time and frequency domains
- the main tools and methods for the specification and sequential control of automated production systems.

The student will have to be able to:
- Build the dynamical model of a system using Matlab/Simulink;
- Predict the dynamic performance of a medium complexity system (1st or 2nd order) out of its dynamic model;
- Conduct the preliminary design of a medium complexity system (1st or 2nd order) in order to fulfil a set of dynamic specifications;
- Design a controller to fulfil a set of required dynamic performance, by using Matlab;
- Design the sequential control of an automated production system;
- Implement on a Programmable Logic Controller the various operating modes of a sequential automated system of medium complexity.

Necessary prerequisites

Linear algebra, ordinary differential equations, fundamentals of mechanics, electrical circuits, heat transfer and hydraulics.

Practical info

Location(s)

Toulouse

INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

Mechanical Design and Manufacturing

ECTS
6 crédits

Hourly volume
113h

Practical info

Location(s)

Toulouse

Finite elements design

ECTS
4 crédits

Hourly volume
38h

Introducing

Objectives

At the end of this module, the student should have understood and be able to explain (main concepts):
the fundamentals of the finite element method applied to the design of structures in the field of linear elasticity.

The student should be able to:
- build and assemble elementary operators for certain types of simple elements (bars, beams, plane elasticity)
- analyze the behaviour of a simple mechanical part subjected to static using an industrial FE software.
- propose a model of a real problem by choosing a small but sufficient number of suitable elements and apply representative boundary conditions.
- take the usual precautions to obtain reliable results.
- critically analyze the quality of the solution with respect to the numerical phenomena that can alter it.

Necessary prerequisites

Rigid body mechanics (statics)
Continuum Mechanics (stress, strain, constitutive relation, boundary conditions)
Beam theory

Practical info

Location(s)

Toulouse

Improving one's autonomy and building one's own professional project

ECTS
5 crédits

Hourly volume
48h

Practical info

Location(s)

Toulouse

Companies in their environments and languages

ECTS
5 crédits

Hourly volume
63h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):
- An overall view of financial documents used by the company. Introduction to the calculation of costs in the industrial firm
- the interdependence of the functions of the company through decision making and results analysis
- Students will also be prepared for their careers by reviewing
and further developing both oral and written transversal communication skills.

The student will be able to:
- understand companies, their structure and their environment
- use newly-acquired Business English vocabulary
- develop financial statements used and calculate business costs for a company
- organise a group project : create their own company, hold meetings¿
- give an oral presentation of a documentary synthesis and a business report (in English), using presentation skills
- create basic management tools
- optimise resources to make the company profitable
- take ethical concerns into account
- take into account cultural differences in business
- appreciate the impact of the major parameters of the socio-economic and financial environment on a company
- write professional letters and emails

Second language course (optional ¿ commitment for years 3 and 4)
The objectives are defined according to European specifications for the five language skills and specific to the various languages proposed - German, Spanish, and Chinese, Italian or Sign language ¿ and to students' levels.

Whenever his/her level is sufficient, the student will be able to:
¿ synthesise and present professional documents
¿ give an oral presentation in front of a group
¿ take into account the various dimensions of interculturality
¿ analyse a job ad
¿ simulate a job interview
¿ write a CV and a cover letter

Remedial English (upon teachers¿ decision)
In some specific cases, a remedial English course is offered in replacement of the second language course with the objective of reinforcing the language skills useful for the TOEIC, i.e reading, listening, grammar and vocabulary

Necessary prerequisites

Management notions : non
Level : B2 in English (intermediate)

LV2 : A2 min. in the studied language German,

Spanish, Italian. A1 in Chinese ans Sign language ¿
Course not open to exchange students

Practical info

Location(s)

Toulouse

Engineering and ecological issues 2nd semester

ECTS
3 crédits

Hourly volume
26h

Practical info

Location(s)

Toulouse