

3rd YEAR CONSTRUCTION ENGINEERING

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Partial Differential Equations and Numerical Analysis

Introducing

Description

Chapter 1 - Introduction to PDEs and classification -
Prerequisites in linear algebra, integration, resolution of ordinary differential equations, functions of several variables; Terminology and Examples of PDEs; Classification of linear PDEs of order 2.

Chapter 2 - Fourier Series -
Physical motivation; Space of periodic functions of square integrable; Trigonometric series; Fourier coefficient; Fourier series in L^1 (Dirichlet Thm) then in L^2 (Parseval Identity).

Chapter 3 - Fourier Transform -
Analysis and Synthesis of the Fourier transform on L^1 , algebraic and derivation properties, inverse Tf and Plancherel Formula, Convolution; TF on L^2 and illustrative examples.

Chapter 4 - Sturm Liouville Problem -
Definition, examples and properties of the solutions.

Chapter 5 - Solving PDEs by Separation of Variables
Well-posed problem and Boundary conditions; Homogeneous 1D heat equation; Homogeneous 1D wave equation; Generalities on the method of separation of variables (homogeneous Eq, then with source term, then with non-homogeneous boundary conditions, and interest in knowing the associated Sturm Liouville problem)

Students will be provided with a course handout, TD statements (then their corrections) and TP. The TP will be carried out under Python

Objectives

This UE aims to master some basic mathematical concepts for the study of partial differential equations (PDE) by the future engineer in Civil Engineering or Mechanical Engineering. This UE is naturally composed of academic knowledge presented in lectures, and computational know-how (studied in tutorials) and numerical know-how (implemented in practical work). Students will learn to identify and classify PDEs according to their nature (elliptic, parabolic, hyperbolic). They will approach the basic concepts, properties and theorems concerning Fourier series and Fourier transforms, which are powerful tools for solving PDEs, particularly in areas related to periodic phenomena and vibrations. Finally, the separation of variables, a classic and effective technique for solving certain classes of PDEs, will be formalized and studied. This method will be illustrated through several concrete examples linked to wave-type equations (vibration phenomenon) or heat (diffusion phenomenon).

Necessary prerequisites

Mathematics UE for years 1 and 2.

More specifically:

- linear algebra (Diagonalization of matrices)
- integration (change of variable, Integrations by parts)
- resolution of ordinary differential equations (characteristic polynomial, solution of the homogeneous equation and particular solution...)
- functions with several variables (derivation)

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Solid mechanics

Introducing

Description

Theory of stresses, theory of strains, displacement-strain relationship, linear elasticity constitutive law, formulation of the elasticity problem, analytical methods for solving the general problem of linear elasticity. Applications in practical exercises using Python programming language.

Objectives

At the end of this module, the student should have a comprehensive understanding of solid deformation mechanics, stresses, linearized strains, displacement fields and the constitutive relationship in elasticity.

The student should be able to:

- Analyze the state of stress and strain of a solid under loading.
- Calculate the stress state based on the strain state and vice versa.
- Calculate the strain state based on the displacement field.
- Establish equations for the local equilibrium of the solid at every point.
- Propose a relevant modeling of a real problem, particularly in terms of boundary conditions.
- Calculate the stresses from the diagrams of internal solicitations obtained from beam theory.

Necessary prerequisites

Mathematics (analysis, linear algebra, numerical analysis), general mechanics (statics and kinematics), beam theory (internal solicitations, stresses in beams...), basics in Python programming.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Fluid mechanics

Introducing

Description

****Fluid Mechanics:**** Introductory definitions and general properties of a fluid, forces acting on a fluid particle. Fluid statics for incompressible and compressible fluids, manometry, buoyant force, forces and moments exerted by a fluid on flat and curved surfaces, and pressure distribution in rigid body motion. Fluid dynamics and kinematics, Euler's equation, Bernoulli's equation, mass conservation, control volume and Reynolds transport theorem, linear momentum equation.

Objectives

****Fluid Mechanics:****

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

- The concept of a fluid and the forces acting on a fluid particle.
- The distribution of static pressure within a fluid and the forces exerted by the fluid on a solid surface.
- The ideal fluid in motion: kinematics and dynamics.

The student should be able to:

- Calculate the forces exerted by a fluid on flat and curved solid surfaces.
- Use Bernoulli's equation (energy conservation) and Euler's theorem (momentum conservation) in a wide range of practical applications.

Necessary prerequisites

Basic thermodynamics concepts facilitate a better understanding of the fundamental principles.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Ecological Transition, GHG Reduction, Responsibility and Environment (EARTH)

Introducing

Description

The teaching includes a "2 tonnes" workshop, which provides a fun way of understanding the orders of magnitude linked to the objectives of carbon neutrality in 2050. It also includes assignments on the following topics: housing; electricity production; inequalities and responsibilities; mobility; the climate inaction debate; agriculture and food; and aeronautics. Students also work on a complex problem linked to ecological issues, starting their reflections from an everyday object or service.

Objectives

At the end of this module, the student will be able to:

- ✕ Be comfortable with the fundamental concepts related to greenhouse gas emissions, and be able to make simple calculations on this subject.
- ✕ Know the order of magnitude of important quantities.
- ✕ Be able to fetch emission values from the ADEME database and use them appropriately.
- ✕ Think about ecological issues in all their complexity and study a specific problem
- ✕ Have an understanding of life cycle analysis and how to apply it
- ✕ Be able to research scientific literature

- ✕ Be able to understand and analyse figures/data
- ✕ Draw political conclusions from scientific facts and one's own values
- ✕ Debate, discuss and confront points of view.

Necessary prerequisites

Basic knowledge on energy.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Cementitious materials

Introducing

Location(s)

 Toulouse

Description

The course covers the following topics

- history of cementitious materials
- cement manufacture and composition
- structure and texture of cement paste
- hydration, setting and hardening
- behavior of hardened concrete
- deferred behavior of concrete
- concrete durability
- fire resistance and freeze/thaw cycles
- formulation optimization

Objectives

This course develops a materials science culture concerning cementitious materials.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Ecodesign and Civil Engineering

Introducing

Description

Teaching mainly in the form of project-based learning (PBL) (construction technology + concrete engineering) and group work (eco-design).

Objectives

- Concrete engineering
Drawing up specifications (NF EN 206) and then formulating concrete according to the properties required for the fresh and/or hardened material
Be aware of the standard (NF EN 206), regulatory and economic environment concerning concrete materials
Familiarise yourself with certain concretes for specific uses: use of mineral additives, admixtures, etc.
 - Eco-design
Learn how to design buildings to take account of environmental issues.
Learn how to specify and understand the issues involved in choosing concrete materials.
Learn how to specify construction systems.
 - Construction technology
Locate the structures - represent and quantify them - explain the functions - find the most appropriate method of construction - propose a phasing plan - propose a QSE control plan.
-

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Architecture double track

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Job Hunting Techniques

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Job search

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Humanities elective course

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Physical Education

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Partial Differential Equations and Numerical Analysis

Introducing

Description

Chapter 1 - Introduction to PDEs and classification -
Prerequisites in linear algebra, integration, resolution of ordinary differential equations, functions of several variables; Terminology and Examples of PDEs; Classification of linear PDEs of order 2.

Chapter 2 - Fourier Series -
Physical motivation; Space of periodic functions of square integrable; Trigonometric series; Fourier coefficient; Fourier series in L^1 (Dirichlet Thm) then in L^2 (Parseval Identity).

Chapter 3 - Fourier Transform -
Analysis and Synthesis of the Fourier transform on L^1 , algebraic and derivation properties, inverse Tf and Plancherel Formula, Convolution; TF on L^2 and illustrative examples.

Chapter 4 - Sturm Liouville Problem -
Definition, examples and properties of the solutions.

Chapter 5 - Solving PDEs by Separation of Variables
Well-posed problem and Boundary conditions; Homogeneous 1D heat equation; Homogeneous 1D wave equation; Generalities on the method of separation of variables (homogeneous Eq, then with source term, then with non-homogeneous boundary conditions, and interest in knowing the associated Sturm Liouville problem)

Students will be provided with a course handout, TD statements (then their corrections) and TP. The TP will be carried out under Python

Objectives

This UE aims to master some basic mathematical concepts for the study of partial differential equations (PDE) by the future engineer in Civil Engineering or Mechanical Engineering. This UE is naturally composed of academic knowledge presented in lectures, and computational know-how (studied in tutorials) and numerical know-how (implemented in practical work). Students will learn to identify and classify PDEs according to their nature (elliptic, parabolic, hyperbolic). They will approach the basic concepts, properties and theorems concerning Fourier series and Fourier transforms, which are powerful tools for solving PDEs, particularly in areas related to periodic phenomena and vibrations. Finally, the separation of variables, a classic and effective technique for solving certain classes of PDEs, will be formalized and studied. This method will be illustrated through several concrete examples linked to wave-type equations (vibration phenomenon) or heat (diffusion phenomenon).

Necessary prerequisites

Mathematics UE for years 1 and 2.

More specifically:

- linear algebra (Diagonalization of matrices)
- integration (change of variable, Integrations by parts)
- resolution of ordinary differential equations (characteristic polynomial, solution of the homogeneous equation and particular solution...)

- functions with several variables (derivation)

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Solid mechanics

Introducing

Description

Theory of stresses, theory of strains, displacement-strain relationship, linear elasticity constitutive law, formulation of the elasticity problem, analytical methods for solving the general problem of linear elasticity. Applications in practical exercises using Python programming language.

Objectives

At the end of this module, the student should have a comprehensive understanding of solid deformation mechanics, stresses, linearized strains, displacement fields and the constitutive relationship in elasticity.

The student should be able to:

- Analyze the state of stress and strain of a solid under loading.
- Calculate the stress state based on the strain state and vice versa.
- Calculate the strain state based on the displacement field.
- Establish equations for the local equilibrium of the solid at every point.
- Propose a relevant modeling of a real problem, particularly in terms of boundary conditions.
- Calculate the stresses from the diagrams of internal solicitations obtained from beam theory.

Necessary prerequisites

Mathematics (analysis, linear algebra, numerical analysis), general mechanics (statics and kinematics), beam theory (internal solicitations, stresses in beams...), basics in Python programming.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Fluid mechanics

Introducing

Description

****Fluid Mechanics:**** Introductory definitions and general properties of a fluid, forces acting on a fluid particle. Fluid statics for incompressible and compressible fluids, manometry, buoyant force, forces and moments exerted by a fluid on flat and curved surfaces, and pressure distribution in rigid body motion. Fluid dynamics and kinematics, Euler's equation, Bernoulli's equation, mass conservation, control volume and Reynolds transport theorem, linear momentum equation.

Objectives

****Fluid Mechanics:****

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

- The concept of a fluid and the forces acting on a fluid particle.
- The distribution of static pressure within a fluid and the forces exerted by the fluid on a solid surface.
- The ideal fluid in motion: kinematics and dynamics.

The student should be able to:

- Calculate the forces exerted by a fluid on flat and curved solid surfaces.
- Use Bernoulli's equation (energy conservation) and

Euler's theorem (momentum conservation) in a wide range of practical applications.

Necessary prerequisites

Basic thermodynamics concepts facilitate a better understanding of the fundamental principles.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Dynamic Systems

Introducing

Description

Fundamentals of signals and systems. Transfer functions of linear time-invariant systems. Systems of 1st order, generalized 1st order, 2nd order, system delay. Frequency response in Bode diagram and its asymptotic plot. Introduction to state space representation.

Objectives

At the end of this module, the student should have understood the basics on signals and linear systems as well as the dynamical and frequency performances of the systems.

The student should be able to:

- Build in Matlab/Simulink a dynamic model of a system out of its algebro-differential equations;
- Determine and analyze the dynamic and frequency performances of a system of intermediate complexity (1st or 2nd order) based on its dynamic model;
- Carry out the preliminary sizing of a system of intermediate complexity (1st or 2nd order) to fulfill the dynamic specifications.

Necessary prerequisites

Laplace transform. Basic notions to model mechanical, electrical, thermal and hydraulic systems

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Mechanical design

Introducing

Description

The EU is divided into 3 parts:

1/ Mechanical Design:

- Modeling of mechanisms
- Design of complete removable links
- Design of the pivot links: friction and bearing

2/ Tolerancing:

- Geometric: ISO method

3/ Manufacturing Analysis

examen écrit, oral, compte-rendu, rapport écrit,
évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Objectives

The objective of this teaching unit is to increase skills in the design and manufacture of mechanical products.

Necessary prerequisites

2IC CO12

2IC CT12

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes :

Mechanical manufacturing

Introducing

Location(s)

 Toulouse

Description

Tolerancing : CM 3,75h, TD 7,5h,
Manufacturing Analysis : TD 15h, TP 5h

Objectives

At the end of the Tolerancing-Manufacturing Analysis (TMA) module, the student should be able to develop a process plan for a simple part using appropriate methods, after decoding, interpreting, and/or creating the definition drawing.

Necessary prerequisites

Industrial Drawing, Design

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Ecological Transition, GHG Reduction, Responsibility and Environment (EARTH)

Introducing

- ✂ Be able to understand and analyse figures/data
- ✂ Draw political conclusions from scientific facts and one's own values
- ✂ Debate, discuss and confront points of view.

Description

The teaching includes a "2 tonnes" workshop, which provides a fun way of understanding the orders of magnitude linked to the objectives of carbon neutrality in 2050. It also includes assignments on the following topics: housing; electricity production; inequalities and responsibilities; mobility; the climate inaction debate; agriculture and food; and aeronautics. Students also work on a complex problem linked to ecological issues, starting their reflections from an everyday object or service.

Objectives

At the end of this module, the student will be able to:

- ✂ Be comfortable with the fundamental concepts related to greenhouse gas emissions, and be able to make simple calculations on this subject.
- ✂ Know the order of magnitude of important quantities.
- ✂ Be able to fetch emission values from the ADEME database and use them appropriately.
- ✂ Think about ecological issues in all their complexity and study a specific problem
- ✂ Have an understanding of life cycle analysis and how to apply it
- ✂ Be able to research scientific literature

Necessary prerequisites

Basic knowledge on energy.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Job Hunting Techniques

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Job search

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Humanities elective course

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Physical Education

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Fluid mechanics

Introducing

Description

Fluid mechanics for Civil Engineers :

- Properties of real fluids
- Pressurized flows in cylindrical pipes (gravity networks; pump-network coupling)
- Open-channel flows in uniform flow conditions

Objectives

Fluid Mechanics of Real Fluids

By the end of the session, the student will be able to:

- Apply the generalized Bernoulli equation and perform head loss calculations;
- Design gravity-driven and pressurized flow networks;
- Select an appropriate pump;
- Estimate flow rates for uniform open-channel flows.

Necessary prerequisites

Fluid statics. Real fluid flow.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des

enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Heat transfers

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Analysis of Static Structures



ECTS



Hourly volume
56h

Introducing

Description

1. Notion of hyperstaticity
2. Force method
 - 2.1 Associated system: static equivalence and kinematic equivalence
 - 2.2 Energetic method
 - 2.3 Special cases: articulated trusses
 - 2.4 Special cases: continuous beams
3. Displacement method
 - 3.1 Kinematic analysis
 - 3.2 Locking and embedding moments
 - 3.3 Principle of virtual work for Rigid Body Motion

- solve a hyperstatic structure using the displacement method;
- argue the choice of resolution method;
- calculate the support reactions of the structure;
- draw internal force diagrams (bending moment, shear force, normal force);
- calculate structural deformations (displacements, rotations);
- write a clear, accurate and concise calculation note.

Necessary prerequisites

Solving isostatic systems and determining internal forces.

Objectives

By the end of this module, students should have understood and be able to explain :

- the distribution of internal forces in structures under static mechanical loads (continuous beams, trusses, frameworks, etc.) and the associated fields of stress, strain and displacement;
- the essential elements of a calculation note.

Students should 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 using the force method;

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

Toulouse

Numerical culture and skills 2

Introducing

Description

The flow of Machine Learning
Data preparation
Machine Learning Terminology
Data types
Data visualization, quality and size
Reliability
Some activation functions
Model performance
Environmental impact

Objectives

At the end of this module, which follows the 2A module, the student will have consolidated his knowledge of the field of AI: accuracy, loss function, overfitting, batch size, visualization techniques... He will also have prepared and passed a PIX certification.

Necessary prerequisites

Basics of Python programming

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Deepening in Structures

Introducing

Description

Ce module se compose de 3 parties indépendantes.

Un module d'Analyse des Structures Dynamiques présente les bases de modélisation de systèmes sous sollicitation dynamique afin d'en déterminer les modes propres de vibration. La modélisation peut concerner aussi bien des systèmes continus que discret. Les modes propres sont étudiés via une résolution exacte mais aussi par une approximation (méthode de Rayleigh-Ritz).

Un module de Vieillessement des Ouvrages s'intéresse au comportement à long terme des ouvrages de Génie Civil et à leur interaction avec leur environnement : altération physico-chimique et comportement visco-élastique des matériaux du génie civil seront étudiés.

Un module Modélisation d'Ouvrage Existant consiste à choisir un ouvrage réel, en proposer une modélisation de type RDM et rédiger une note de calcul pour en déterminer la répartition des efforts internes.

Objectives

A la fin de cours, l'étudiant aura acquis des compétences de bases relatives :

- au comportement dynamique des structures de Génie Civil ;
- à leur vieillissement au cours de leur durée de service ;
- à la modélisation RDM à partir d'un système réel.

Necessary prerequisites

- Résistance Des Matériaux ;
- Comportement des Matériaux Cimentaires ;
- Principe Fondamental de la Dynamique.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Deepening in Climatics – Aerolitics – Fluid Mechanics

Toulouse

Introducing

Description

- Building Hydraulics (Cold water, wastewater)
- Introduction to fire safety for public-access buildings (ERP): basics of fire safety regulations and fundamentals of emergency system design.

Objectives

By the end of the session, the student will be able to:

- Design a cold water and wastewater system for a building.
- Design emergency response systems for a public-access building (ERP).

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)



Geotechnic 1

 Toulouse

Introducing

Description

Geotechnical engineering covers all activities relating to the application of soil mechanics, rock mechanics and engineering geology.

Geotechnics plays an essential role in all building, civil engineering and development projects.

Objectives

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

- Quote and measure the physical properties of a soil
- Calculate the stresses in a soil
- Calculate soil settlement
- Calculate soil resistance

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

Reinforced concrete

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Prestressed Concrete

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Business Game

Introducing

Description

Simulation of 5 years of company life (decision making in production, finance, marketing) using the SIMGEST business game.

Objectives

The student must have understood and be able to explain the interdependence of the company's functions (production, commercial, financial, human resources) through decision-making and analysis of the company's economic and financial results. He will have to understand how a company operates, construct financial statements, calculate costs, create simple management tools, optimize resources to make the company profitable, present an oral report of activities (in English)

Necessary prerequisites

financial management cours in 3A

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Company Finance

Introducing

Location(s)

 Toulouse

Description

Income statement, Cash flow, Balance sheet. Elements on costs. The break-even point. Taking inventory into account in financial statements. Debt financing. Company profitability.

Objectives

The student must have understood and be able to explain the company's financial summary documents as well as the basics of cost calculation in the industrial company.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Business Communication

Introducing

None

Description

Students will create a fictitious start-up in a market of their choice, conducting market analysis and identifying competitors. They will produce a GoFUND Me video and practice holding meetings and solving business challenges in English. The final presentation will be a “Shark Tank”-style competition, where students pitch their business idea to a panel of investors.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Objectives

This course aims to equip students with essential business communication skills. Students will learn to understand a simple business plan and market research, conduct meetings, and use key business vocabulary. They will develop skills to describe graphs and create high-impact presentations. Students will also practice pitching to investors, introducing a company, and discussing social and environmental responsibility in the workplace.

Necessary prerequisites

Physical Education

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Professional Path Initiative 3rd Year

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Societal Openness Modules

Introducing

Description

- Openness to societal issues (Energy transition, Ecological transition, Digital society, Health global, Mobility and infrastructure)
- Themes with interdisciplinary approaches, mixing Sciences & Techniques and Human Sciences and Social or Thematic in SHS complementary to the base proposed by INSA Toulouse.

Each year, the Opening Modules Commission draws up the list of MOs which will be offered in the 2nd semester. Students then choose the MO they wish to experience via a wish phase on a dedicated application. Students are informed of the MO they will follow during the month of January.

- Offered in the 2nd semester of 3A, Monday afternoon from 2 p.m. to 4:45 p.m.
- Open to all specialty pre-orientations (PO)
- Duration: 30 hours student (NB: additional personal work of around 30 hours is expected)

Educational format:

- Active pedagogies
 - Face-to-face, hybrid or fully remote
 - ECIU+ Challenge Based Learning possibility
-

Objectives

The Societal Openness Modules are courses open to the 5 societal issues addressed by INSA Toulouse, allowing complex situations to be understood and covering themes not covered in INSA courses.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Heat transfers

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Systems Control

Introducing

Description

- A) Frequency analysis of closed-loop systems; rapidity-precision dilemma, stability.
B) Controller design: series, parallel, feed-forward and state feedback.

Objectives

At the end of this module, the student will have understood and be able to explain the fundamentals of control engineering for linear systems in time and frequency domains

The student will have to be able to design a controller to fulfil a set of required dynamic performance, by using Matlab.

Necessary prerequisites

Systems Engineering

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des

enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Logical systems

Introducing

Description

A) Combinatorial logic: basic notions, Boole algebra, representation of logical functions.

B) Sequential logic: design of sequential production systems

- detailed study of a specification language: Grafcet
- study of the Statechart language
- how to define operating modes using both language.

C) Realization of sequential control systems using Programmable Logic Controller.

Objectives

At the end of this module, the student will have understood and be able to use the main tools and methods for the specification and sequential control of automated production systems.

The student will have to be able to:

- 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.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Introduction to Systems Engineering

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Numerical culture and skills 2

Introducing

Description

The flow of Machine Learning
Data preparation
Machine Learning Terminology
Data types
Data visualization, quality and size
Reliability
Some activation functions
Model performance
Environmental impact

Objectives

At the end of this module, which follows the 2A module, the student will have consolidated his knowledge of the field of AI: accuracy, loss function, overfitting, batch size, visualization techniques... He will also have prepared and passed a PIX certification.

Necessary prerequisites

Basics of Python programming

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Machine elements

Introducing

Description

3 parts :

- First on the modeling of a mechanical architecture using multiphysics simulation software: Making the model/real link, parameters, validation of the model and exploitation of the results
 - A second on kinematic modeling of a complex system (kinematic diagram, hyperstatism, equivalent connections)
 - A final part on design and sizing of mechanical systems. We will focus on actuators (cylinders and motors) and pivot connections.
- A project, carried out in small groups over the entire semester, will complete and reinforce knowledges acquired in previous parts.
- Disassembly of gearboxes and differentials during practical work sessions

Objectives

Student must be able to :

- Valid a simulation model and exploit results.
- Analyze a technological system from the real object (behavior during different phases of use, identify components ensuring the different functions, etc.), design its kinematic and architectural diagram in 3D, calculate and possibly modify its degree of hyperstatism.
- Choose an actuator (technology and sizing)
- Design and size a pivot connection with radial contact

bearings (all types of external loads)
- Create a dimension chain

Necessary prerequisites

Mechanical drawings
Mechanic (Kinematic connections, PFS, PFD)
Mechanical technology

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Digital Control and Computer-Aided Manufacturing

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Metrology

Introducing

Description

CM 8,75h, TD 10h, TP 8h

Objectives

At the end of this course, the student should be able to:

- _ Adopt a methodology that enables the successful development of a product within a quality-driven approach,
- _ Understand the stakeholders involved and identify the documentation generated,
- _ Interpret the implementation of production and assembly methods, as well as the means and methods for product inspection and improvement.

Regarding inspection methods and techniques, the student should be able to:

- _ Have a basic understanding of cost/quality/time controls at all stages of the development and manufacturing cycle, with the objective of mastering the geometric quality of a product,
- _ Be familiar with the main technical tools used for dimensional and geometric inspection of mechanical parts,
- _ Be able to establish an inspection plan for a specification by zone or template, using a surface plate or a Coordinate Measuring Machine (CMM),
- _ Understand the main surface association criteria (Least Squares, Least Squares Tangent, Mini-Max),
- _ Be capable of characterizing a measuring device

(calibration, interpretation of measurement uncertainties, etc.),

- _ Have some knowledge of arithmetic and statistical functional tolerancing.

Necessary prerequisites

In the INSA courses :

Bureau d'études (cf. UE 3ICCM51 - Conception Mécanique)

Tolérancement (dimensionnel, géométrique), et Analyse de Fabrication (cf. UE 3ICCM51 - TAF du S5)

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Heat Treatment and Welding

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Business Game

Introducing

Description

Simulation of 5 years of company life (decision making in production, finance, marketing) using the SIMGEST business game.

Objectives

The student must have understood and be able to explain the interdependence of the company's functions (production, commercial, financial, human resources) through decision-making and analysis of the company's economic and financial results. He will have to understand how a company operates, construct financial statements, calculate costs, create simple management tools, optimize resources to make the company profitable, present an oral report of activities (in English)

Necessary prerequisites

financial management cours in 3A

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Company Finance

Introducing

Location(s)

 Toulouse

Description

Income statement, Cash flow, Balance sheet. Elements on costs. The break-even point. Taking inventory into account in financial statements. Debt financing. Company profitability.

Objectives

The student must have understood and be able to explain the company's financial summary documents as well as the basics of cost calculation in the industrial company.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Business Communication

Introducing

None

Description

Students will create a fictitious start-up in a market of their choice, conducting market analysis and identifying competitors. They will produce a GoFUND Me video and practice holding meetings and solving business challenges in English. The final presentation will be a “Shark Tank”-style competition, where students pitch their business idea to a panel of investors.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Objectives

This course aims to equip students with essential business communication skills. Students will learn to understand a simple business plan and market research, conduct meetings, and use key business vocabulary. They will develop skills to describe graphs and create high-impact presentations. Students will also practice pitching to investors, introducing a company, and discussing social and environmental responsibility in the workplace.

Necessary prerequisites

Physical Education

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Professional Path Initiative 3rd Year

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Societal Openness Modules

Introducing

Description

- Openness to societal issues (Energy transition, Ecological transition, Digital society, Health global, Mobility and infrastructure)
- Themes with interdisciplinary approaches, mixing Sciences & Techniques and Human Sciences and Social or Thematic in SHS complementary to the base proposed by INSA Toulouse.

Each year, the Opening Modules Commission draws up the list of MOs which will be offered in the 2nd semester. Students then choose the MO they wish to experience via a wish phase on a dedicated application. Students are informed of the MO they will follow during the month of January.

- Offered in the 2nd semester of 3A, Monday afternoon from 2 p.m. to 4:45 p.m.
- Open to all specialty pre-orientations (PO)
- Duration: 30 hours student (NB: additional personal work of around 30 hours is expected)

Educational format:

- Active pedagogies
 - Face-to-face, hybrid or fully remote
 - ECIU+ Challenge Based Learning possibility
-

Objectives

The Societal Openness Modules are courses open to the 5 societal issues addressed by INSA Toulouse, allowing complex situations to be understood and covering themes not covered in INSA courses.

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse