

5th YEAR GM INSA _SEMESTER 9

Practical info

Location(s)

 Toulouse

System level modelling and simulation



ECTS

3 crédits



Hourly volume

29h

Introducing

Objectives

The student will be able to model, simulate and analyse multi-domain power systems

Necessary prerequisites

Dynamic systems, fluid mechanics, solid rigid mechanics.

Practical info

Location(s)

Toulouse

Composite structures and case study



ECTS

3 crédits



Hourly volume

46h

Introducing

Objectives

The student will be able to perform simple sizing of composite structures and to choose a couple manufacturing/material for a given case study.

The student will be able to:

- Choice a couple of fibers and matrix and their commercial products.
- Choice a type of composite architecture: laminates, sandwichs, 2D1/2,3D, 4D.
- Determine the manufacturing method: hand layup, fiber placement, RTM, LRI, RFI.
- To be inspired by solutions of automotive, naval, wind energy or aerospace industry.
- To be inspired by past experience in aeronautic industry.
- Know and use laminate theory.
- Knows and use simple sizing of junctions.
- Know issues of impact and ageing.
- Know issues of failure and damage.
- Realize a case study: example wing box of an acrobatic aircraft
- Make a presentation of their sizing and their design.
- Work in a collaborative manner.

behaviors.

Matrix Calculation

Practical info

Location(s)



Toulouse

Necessary prerequisites

Beam theory, continuum mechanics, materials

Heat Engines, Refrigerators and Heat Pumps



ECTS

3 crédits



Hourly volume

38h

Introducing

Objectives

At the end of this course, the student should have understood and will be able to explain the operation of conventional heat engines, refrigerators and heat pumps as well as the basics of combustion

The student should be able to size and optimize conventional heat engines, refrigerators and heat pumps

Necessary prerequisites

Fundamentals in thermodynamics (1st year)
Thermodynamics and Thermodynamic Analysis (1st year)

Practical info

Location(s)



Non destructive testing – English



ECTS

4 crédits



Hourly volume

20h

Introducing

Objectives

Module 1 : Non Destructive testing (NDT)

Students have to know the main nondestructive testing methods with advantages/drawbacks and how to apply them to practical industrial cases. They must be able to choose the most appropriate method to solve specific industrial issues.

Module 2 : Metallic alloys for high temperature applications & Creep behaviour

Analysis of the physics occurring during creep and of the parameters which affect creep resistance.

How to apply basic theoretical models to calculate rupture life expectancy.

Knowledge of the main metallic alloys withstanding creep at high temperatures.

Module 3 : English

Students must be able to organize their scientific speech and writing logically, to use proper English in a concise and appropriate style while meeting genre conventions; master technical terms; resort to appropriate registers (specialized/non specialized audiences/readers) and quote scientific sources according to international citation standards.

Module 1: Nondestructive testing (NDT)

L1, 2 and 3 courses or equivalent: knowledge of fundamental principles in physics i.e. electricity, electromagnetism, optics, atomic structure and Materials Science.

Module 2 : Metallic alloys for high temperature applications & Creep behaviour

Mechanics of Materials: defects in metallic materials and plastic deformation mechanisms; behaviour of materials

Module 3 : English

Students must master general English and know how to write and talk about general scientific elements in a rigorous way (1st, 2nd, 3rd & 4th year English courses).

Practical info

Location(s)



Toulouse

Necessary prerequisites

Research project part II



ECTS

4 crédits



Hourly volume

7h

Introducing

Location(s)



Toulouse

Objectives

The module is aimed at motivating students with research activities by means of a tutored projects involving groups of several students and directed by an academic or an industrial tutor.

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

- the concepts and techniques in relationship with the management of the research project involving several persons.

The student will be able to:

- finalize a research project involving several persons,
- integrate scientific approaches and techniques of different scientific domains to meet the realization goals of the research project

Necessary prerequisites

A final report

Practical info

Optional modulus



ECTS

7 crédits



Hourly volume

30h

Introducing

Objectives

The student will be able to successfully follow 3 optional modules related to mechanical design skills

Practical info

Location(s)

Toulouse

Human relations



ECTS

6 crédits



Hourly volume

78h

Introducing

Location(s)



Toulouse

Objectives

L'étudiant devra être capable de :

- Analyser des situations de groupe avec des concepts issus de la psychologie sociale
- Identifier les dimensions éthiques de ces situations et prendre position
- Repérer et comprendre des informations liées aux RH
- Analyser une situation de management d'équipe en référence à un cadre théorique
- Formuler et argumenter des solutions managériales
- Agir dans un milieu naturel : analyser, décider, agir ; mettre en œuvre la sécurité, utiliser du matériel spécifique. découvrir un site.
- Respecter et s'intégrer dans un environnement différent de ses habitudes
- S'engager avec cohérence dans le projet d'activités
- Prendre part activement au collectif
- Valider son projet professionnel et construire une stratégie pour trouver un emploi

Necessary prerequisites

None

Practical info

Multidisciplinary design



ECTS

4 crédits



Hourly volume

45h

Introducing

Objectives

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

Design of experiments

-To know the global concepts of DoE and understand the interest of the tool.

Surrogate models and sizing of mechatronic systems

-To explain the process and the different models useful for the optimal sizing of mechatronic systems

The student will be able to:

Design of experiments

-To be able to define and set into work some tests allowing to get an optimistic process.

-To carry out one's own design of experiments.

Surrogate models and sizing of mechatronic systems

-To define the sizing scenarios of a technical system

-To establish the estimation models and simulation modes of the set of components

-To set a design procedure and to define the optimization problem

-To implement the calculations in a numerical environment

Probability (basic), statistics (basic), notions of system architecture (mechanical, hydraulic, electric, etc.)

Practical info

Location(s)

Toulouse

Necessary prerequisites

Management of risks



ECTS

5 crédits



Hourly volume

68h

Introducing

Location(s)



Toulouse

Objectives

At the end of this module, the student will have understood and be able to explain the notions associated with dependability, reliability, maintenance and risk, as well as the organizations, trades, methods and activities useful to implement these notions.

The student will be able

- to identify the hindrances to the availability and to the reliability of systems,
- to make an assessment for choosing the most suitable architectures,
- to choose among the available methods the most appropriate to obtain the expected service of a system, when designing and maintaining, and to provide its insurance.

Necessary prerequisites

System life cycle.

Basic knowledge on probabilities.

Statistics.

Signal processing.

Practical info

Industrialization



ECTS

5 crédits



Hourly volume

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):
The systems of industrialization and its interfaces. The challenges of production management (PM) and supply chain (SCM) as well as issues of scheduling.

What is configuration management, what are the enablers and what is the purpose

The student will be able to:

- Have an overview on manufacturing processes
- Understand the historical context of Industrialization
- Have a critical view on global manufacturing strategy
- Understand the elements on Smart Manufacturing and Industry 4.0
- Use the information of the different types of Industrial Management Tools
- Roughly describe airbus world (A/Cs family, industrial sharing across the Europe)
- Define a hierarchical & appropriated breakdown of a complex product
- Apply the change process and identify required data to allow decision
- Identify mechanisms that enable management of product offer and its customisation
- Demonstrate that final product manufactured is conform to expectations

Necessary prerequisites

Not applicable (no pre-requisit needed)
Reading of plans, current metallic materials, various types of machining.
Basic elements on: probabilities -Linear programming -

Practical info

Location(s)

Toulouse

Systems on chip



ECTS

4 crédits



Hourly volume

47h

Practical info

Location(s)



Toulouse

Thermal engines and systems



ECTS

4 crédits



Hourly volume

56h

Introducing

Location(s)



Toulouse

Objectives

By the end of this module, the student should have understood and be able to analyze thermal and mechanical energy production systems and their associated components.

The student should be able to:

- Analyze the thermodynamic cycle associated with a power plant.
- Size a thermal engine to meet specifications in terms of requested power.
- Specify the components of a thermal engine or system.
- Calculate the air conditioning flow requirements to perform various functions (pressurization, fresh air renewal, heating, cooling) in an aircraft and adjust the recirculation and the flow distribution between the different cabin zones.

Necessary prerequisites

Basics of thermodynamics and heat transfer.

Practical info

[FRANCAIS] Projet de recherche et propriété industrielle

 ECTS
6 crédits Hourly volume
74h

Practical info

Location(s)

 Toulouse

Human relations



ECTS

6 crédits



Hourly volume

78h

Introducing

Location(s)



Toulouse

Objectives

L'étudiant devra être capable de :

- Analyser des situations de groupe avec des concepts issus de la psychologie sociale
- Identifier les dimensions éthiques de ces situations et prendre position
- Repérer et comprendre des informations liées aux RH
- Analyser une situation de management d'équipe en référence à un cadre théorique
- Formuler et argumenter des solutions managériales
- Agir dans un milieu naturel : analyser, décider, agir ; mettre en œuvre la sécurité, utiliser du matériel spécifique. découvrir un site.
- Respecter et s'intégrer dans un environnement différent de ses habitudes
- S'engager avec cohérence dans le projet d'activités
- Prendre part activement au collectif
- Valider son projet professionnel et construire une stratégie pour trouver un emploi

Necessary prerequisites

None

Practical info

[FRANCAIS] MASTER 2 GENIE MECANIQUE

Practical info

Location(s)

 Toulouse

[FRANCAIS] MASTER 2 ENERGIE

 ECTS
9 crédits Hourly volume

Practical info

Location(s)

 Toulouse

Energy production from renewable resources



ECTS

5 crédits



Hourly volume

32h

Practical info

Location(s)



Toulouse

Technologies and architectures for the conversion and storage of electrical energy

 ECTS
5 crédits

 Hourly volume
47h

Practical info

Location(s)

 Toulouse

Innovative materials for the energy



ECTS

5 crédits



Hourly volume

15h

Practical info

Location(s)

Toulouse

Combination of multi-sources of energy platform



ECTS

9 crédits



Hourly volume

161h

Practical info

Location(s)

Toulouse

The different generation technologies and energy management

 ECTS
5 crédits

 Hourly volume
7h

Practical info

Location(s)

 Toulouse

Human relations



ECTS

6 crédits



Hourly volume

78h

Introducing

Location(s)



Toulouse

Objectives

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- Valider son projet professionnel et construire une stratégie pour trouver un emploi

Necessary prerequisites

None

Practical info

Qualitative Approach



ECTS

4 crédits



Hourly volume

45h

Practical info

Location(s)

Toulouse

Quantitative Approach



ECTS

5 crédits



Hourly volume

45h

Practical info

Location(s)

Toulouse

Designing for safety



ECTS

5 crédits



Hourly volume

42h

Practical info

Location(s)

Toulouse

Process Safety



ECTS

5 crédits



Hourly volume

45h

Practical info

Location(s)



Toulouse

Functional Safety

Practical info

Location(s)

 Toulouse

[FRANCAIS] Structural Safety

Practical info

Location(s)

 Toulouse

Human relations



ECTS

6 crédits



Hourly volume

78h

Introducing

Location(s)



Toulouse

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Necessary prerequisites

None

Practical info

Toxic risks



ECTS

5 crédits



Hourly volume

42h

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU



ECTS

1 crédits



Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

 ECTS
2 crédits Hourly volume

Practical info

Location(s)

 Toulouse

[FRANCAIS] Challenge – Formation ECIU

 ECTS
3 crédits Hourly volume

Practical info

Location(s)

 Toulouse

[FRANCAIS] Challenge – Formation ECIU

 ECTS
4 crédits Hourly volume

Practical info

Location(s)

 Toulouse

[FRANCAIS] Challenge – Formation ECIU

 ECTS
5 crédits Hourly volume

Practical info

Location(s)

 Toulouse