CENTRALE NANTES

INGÉNIEUR, SPÉCIALITÉ MÉCANIQUE

2021-2022

Year 3

PROGRAMME SUPERVISOR

Pascal COSSON

Year 3

Course unit	ECTS Credits	Course type	Course code	Title
UE300	20			
		Core course	MECA3_ENTRE	Business Skills
UE301	3			
		Core course	MECA3_SSAT	Social Sciences Applied to Work
UE302	7			
		Core course	MECA3_GI	Industrial Engineering
UE303	4			
		Core course	MECA3_MEF	Finite Element Method
UE304	3			
		Core course	MECA3_MECAF	Fluid Mechanics
UE305	3			
		Core course	MECA3_ANVAL	Product Lifecycle Management
UE306	6			
		Core course	MECA3_AUTOM	Automatisms
		Core course	MECA3_CONTRL	Control
UE307	6			
		Option Conception, Simulation et Dimensionnement	MECA3_CAO	CAD and Virtual Reality
		Option Conception, Simulation et Dimensionnement	MECA3_NUM3D	3D Digitalisation
		Option Conception, Simulation et Dimensionnement	MECA3_OPTIM	Optimisation
UE308	6			
		Option Conception, Simulation et Dimensionnement	MECA3_DYNRAP	Dynamic responses of structures under Impact and Crash loadings
		Option Conception, Simulation et Dimensionnement	MECA3_MATCOMP	Matériaux Composites
		Option Conception, Simulation et Dimensionnement	MECA3_MATCOMPSIMU	Composite Materials - Simulation
UE309	8			
		Option Usine du Futur	MECA3_CAMAT	Non Destructive Testing Methods for Materials
		Option Usine du Futur	MECA3_MATCOMP	Matériaux Composites
		Option Usine du Futur	MECA3_MATCOMPPROC	Composite Materials - Processes
		Option Usine du Futur	MECA3_MATMETAL	Metallic Materials
		Option Usine du Futur	MECA3_MATMETALPROC	Metallic Materials - Processes
UE310	4			
		Option Usine du Futur	MECA3_COBROB	Cobotics and Robotics
		Option Usine du Futur	MECA3_MACNU	Modelling and Digital Chain
UE311	2			

Course unit	ECTS Credits	Course type	Course code	Title
		Core course	MECA3_MATERPROJ	Project in materials
UE312	2			
		Core course	MECA3_PSI	International Experience Project

Business Skills [MECA3_ENTRE]

LEAD PROFESSOR(S): Marie GOUGEON / Pascal COSSON

Objectives

This third year business skills course, following on from the first two years, is not an academic course. Rather it addresses the learner's experience in the host company during his/her apprenticeship and the analysis he/she makes of this experience. It focuses on the learner's development during his/her periods in the company, on the skills acquired and on his/her ability to project him/herself as an engineer. The first year course was more geared more towards discovering the company, joining the world of work, and the first assignments. The second year should have enabled the student to take on more responsibility. In the third year the End of Studies Project should allow the student to prove that he or she is capable of fulfilling all aspects of an engineering post: organisational, scientific and technical, human and economic.

The course is assessed using the following elements:
- completion of ``the Carnet de Suivi Electronique", an electronic logbook;
- the evaluation completed by the industrial tutor at the end of each semester;
- dissertation and defence of the End of Studies project.

Course contents

As in the first two years, the industrial tutor completes the skills matrix at the end of each semester and focuses on the skills acquired in the company during the second year. The skills targeted are those of the RNCP "formation Ingénieur Spécialité Mécanique". Each competency is assessed through activities for which four levels are defined:

- level 0: does not know how to do or not applicable;
- Level 1: knows how to do under supervision;
- Level 2: knows how to do independently;
- Level 3: knows how to do and can train others.

The End of Study Project, which takes place within the company during the third year of training, is an opportunity for the apprentice to demonstrate that he or she is capable of fulfilling all four aspects of an engineering post (as listed above): organizational, scientific and technical, human and economic. The dissertation written by the apprentice at the end of the third year presents the work he or she undertook as part of his or her End of Studies Project. In this document he or she demonstrates his or her ability to carry out a project taking into account the aspects specified above. This document (about 80 pages long) must contain the following elements:

- presentation of the company;
- reasons for the project;
- organizational and human aspects of the project;
- scientific and technical aspects of the project;
- the economic situation of the project.

In this dissertation, the apprentice must not simply describe actions carried out in the framework of the End of Studies Project. He or she must also demonstrate his or her ability to analyze a situation, propose and implement solutions, measure and analyze the effects of what he or she has achieved, and propose ways to improve. This dissertation is completed with a defense.

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	6 hrs	0 hrs	0 hrs	0 hrs	0 hrs

Social Sciences Applied to Work [MECA3_SSAT]

LEAD PROFESSOR(S): Fabien THOMAS / Pascal COSSON

Objectives

The objectives of this module are as follows:
▪ acquire a rational approach to questioning in the context of a human work-related practice;
▪ acquire a data collection methodology adapted to this questioning;
▪ learn about human work-related practice;
▪ bring together "practices" and "theories" based on the professional experience of degree-apprenticeship engineering students (in conjunction with practice analysis sessions);
▪ transform this knowledge into professional know-how.

To this end, the module includes:
▪ presentations on various areas of human work;
▪ research conducted over three years, based on a work situation in the apprentice's host company (formalised via a dissertation);
▪ individual follow-up with a course teacher (questioning, structuring the research, and correction of the deliverables and dissertation).

The teaching provided is based on an alternating educational approach, specific to apprenticeship. This requires degree-apprentice engineering students to focus on real-life situations in their company. However, they should neither endorse nor denigrate the latter, nor express their personal opinions or feelings. Discipline, perspective, research work, and personal culture in various areas such as economics, social and legal matters are required.

Course contents

Writing practice
Intercultural management
Conducting an interview
Information System (IS) and Work
Macro-economic perspective
Welfare and work
Supporting a project
Micro-dissertation presentations

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	49 hrs	0 hrs	0 hrs	0 hrs	7 hrs

Industrial Engineering [MECA3_GI]

LEAD PROFESSOR(S): Catherine DA CUNHA

Objectives

- Model and solve a problem
- Understand customer expectations

Course contents

I Operational management
- CSR
- Climate change
- Carbon accounting

II Customer
- Customer-oriented approach
- Managerial communication

III Cross-functional - Processes
- Process management
Skills developed:
-Ability to highlight the challenges of one's final year project, within the framework of the host company's strategy
-Ability to identify the economic performance criteria of his/her project,

IV Economics
- Management control
- Financing / investment
- Different financing policies
- How financial markets work
Skills developed:
-Ability to put discounted cash flow at the forefront of one's considerations,
-Ability to identify possible financing options according to financial constraints,
-Ability to integrate the financial dimension when seeking investment.

Course material

Assessment

Individual assessment: EVI 1 (coefficient 0.25)
EVI 2 (coefficient 0.25)
EVI 3 (coefficient 0.25)
EVI 4 (coefficient 0.25)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	100 hrs	0 hrs	0 hrs	0 hrs	0 hrs

Finite Element Method [MECA3_MEF]

LEAD PROFESSOR(S): Hervé OUDIN

Objectives

How to calculate in a practical way the structures consisting of bars and beams.
Understand and use numerical models (MEF) to calculate lattice and gantry structures.
Generalize to the problems of physics, and know how to apply the MEF to the calculation of structures.
Know how to organize the calculations and determine the discretization error.
Analyze a problem and propose models by questioning the modeling error.

Course contents

Model bar application to treillis.
Beam model application to portiques.
Variational methods and matrix writing of equations.
Numerical methods applied to the MEF.
Using finite element code in matlab for simple problems.
Notion of modeling, application to problems of the engineer using an industrial code.
Methods and tools for analyzing the results of a finite element model.

Course material

all documents are visible on the site: https://meefi.pedagogie.ec-nantes.fr/MEF/MEF.htm

Assessment

Individual assessment: EVI 1 (coefficient 0.5)
EVI 2 (coefficient 0.5)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	30 hrs	0 hrs	30 hrs	0 hrs	0 hrs

Fluid Mechanics [MECA3_MECAF]

LEAD PROFESSOR(S): Sandrine AUBRUN

Objectives

The Fluid Mechanics programme contains the essential elements for any mechanical engineer, enabling him/her to understand at an advanced level a problem involving fluid media and to transfer it to specialists, if necessary.
At the end of the module, the student will be able to:
- Calculate the pressure forces due to fluids
- Understand and interpret fluid flow phenomena
- Understand and interpret the phenomena related to the action of fluids on objects
- Dimension a hydraulic installation
- Choose hydraulic machines adapted to some industrial configurations

Course contents

1. Properties of fluids and essential mathematical tools (2HCTD)
2. Fluid Statics. Hydrostatic law and associated hydrostatic forces (4HCTD)
3. Kinematics of fluids (1HCTD)
4. Dynamics of perfect incompressible fluids. Bernoulli's equation and applications (3HCTD)
5. Viscous fluid dynamics. Navier-Stokes equations. Dimensional analysis. Laminar and turbulent regime. Notion of boundary layer (5HCTD)
6. Applications of the momentum theorem (5HCTD)
7. Flow under load. Flow in pipes. Generalized Bernoulli equation, head losses. hydraulic circuits (6HCTD)
8. Industrial applications. Hydraulic machines (6HCTD)
9. Practical works (2x3HTP)

Course material

Assessment

Individual assessment: EVI 1 (coefficient 0.7)
EVI 2 (coefficient 0.3)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	32 hrs	0 hrs	6 hrs	0 hrs	2 hrs

Product Lifecycle Management [MECA3_ANVAL]

LEAD PROFESSOR(S): Florent LAROCHE

Objectives

Module Objectives
- Analyze an industrial problem
- Step back from traditional design practices
- Know how to innovate and define the value of a product

This module will be done in active pedagogy. All the knowledge will be acquired by the practice of a case study specific to each apprentice. These studies will be done as a project team.

Course contents

Course Outline
- Value Analysis (AFI/AFE) Florent Laroche
- Axiomatic design Stéphane Caro
- TRIZ Florent Laroche
- Working in project mode Florent Laroche

Project = The goal is to convince your management (represented by the other students) to implement the solution you propose.
- Overview of the problem
- Key functions
- Solutions considered
- Selection criteria
- The final choice

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	40 hrs	0 hrs	0 hrs	0 hrs	0 hrs

Automatisms [MECA3_AUTOM]

LEAD PROFESSOR(S): Jean-Claude BARDIAUX

Objectives

Objectifs :

A l'issue de l'enseignement le futur ingénieur doit pouvoir :

analyser, étudier et comprendre des automatismes industriels,

procéder à la mise en oeuvre et à l'installation des automatismes,

mettre au point ou modifier ou faire modifier certains automatismes,

documenter les automatismes industriels et former le personnel exploitant le matériel,

assister techniquement le personnel de maintenance.
451/800
Traduire un document
Objectives:

At the end of the course the future engineer must be able to:

analyse, study and understand industrial automation,

implement and install the automation systems,

develop or modify or cause to be modified certain automations,

document industrial automation and train personnel operating the equipment,

Provide technical support to maintenance personnel.

Course contents

Program of the module:

1. Logical systems and industrial automation - Jean-Claude BARDIAUX (courses and TP)

Structure of an automated production system.

Objectives of automation.

Reminders:

Analysis and synthesis of combinatorial logical systems.

Analysis and synthesis of sequential logic systems.

Graphic representation of the specifications of a sequential automatism by the Grafcet (symbolism, rules of evolution, elementary structures, macrosteps, macroactions, structures of coordination of tasks).

Study and representation of the modes of walking and stopping by Gemma and Grafcet (hierarchisation of the Grafcet).

Programmed implementation of the control part on an industrial programmable automaton (structure, operation and programming of an A.P.I., digital processing, communication).

Human-Machine Interface Technology.

Interface technology part control-operating part (power control, data acquisition).

Course material

Assessment

Individual assessment: EVI 1 (coefficient 0.7)
EVI 2 (coefficient 0.3)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	26 hrs	0 hrs	12 hrs	0 hrs	2 hrs

Control [MECA3_CONTRL]

LEAD PROFESSOR(S): Jean-Claude BARDIAUX

Objectives

At the end of the course the future engineer must be able to: analyse, study and understand industrial automatisms, carry out the implementation and installation of automatisms, develop or modify or modify certain automatisms, document industrial automation and train personnel operating the equipment, provide technical support to maintenance personnel.

Course contents

Control systems and industrial regulation - Jean-Claude BARDIAUX (course) and Guy LEBRET (TP)
Goals of the automatic, functional analysis.
Systems modeling, transfer function and temporal responses, stability.
Analysis of servo systems, precision performance, stability and speed.
Position and speed controls.
Summary of control systems, adjustment and correction.
Technology of industrial controllers PID, constitution and adjustment.
Practical work on pilot processes (speed and position control,).
Knowledge check 1 written assignment + TP.

Course material

Assessment

Individual assessment: EVI 1 (coefficient 0.7)
EVI 2 (coefficient 0.3)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	26 hrs	0 hrs	12 hrs	0 hrs	2 hrs

CAD and Virtual Reality [MECA3_CAO]

LEAD PROFESSOR(S): Damien CHABLAT

Objectives

Course contents

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	12 hrs	16 hrs	0 hrs	0 hrs	0 hrs

3D Digitalisation [MECA3_NUM3D]

LEAD PROFESSOR(S): Florent LAROCHE

Objectives

The objective of this course is to learn about the different 3D digitalization technologies and understand the associated reverse engineering processes.

Course contents

3 areas will be covered in the course: methods, tools and applications.

A case study will be run to compare several technologies:
1. 3D laser scanning and photogrammetry
2. Point Cloud Processing
3. CAD modeling in Catia V5
4. Topological comparison

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	12 hrs	8 hrs	0 hrs	0 hrs	0 hrs

Optimisation [MECA3_OPTIM]

LEAD PROFESSOR(S): Fouad BENNIS / Stéphane CARO

Objectives

Course contents

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	12 hrs	8 hrs	0 hrs	0 hrs	0 hrs

Dynamic responses of structures under Impact and Crash loadings [MECA3_DYNRAP]

LEAD PROFESSOR(S): Patrick ROZYCKI

Objectives

Industrial safety issues, particularly in the area of transportation, require more precise knowledge of the behaviour of materials and structures submitted to rapid dynamic loadings.

This course aims to examine current practices and future trends in this field, with regard to mechanical, numerical and experimental aspects. The main concepts covered are materials modelling for dynamic loadings (constitutive laws, strain rate sensitivity, experimental characterisation methods), crash design rules, numerical simulation (tools and integration schemes for a model), and experimental methods to characterise structure behaviour.

The students will identify strong links between numerical model creation and experimental conditions, confronting themselves to the different issues through these concepts. They can strengthen their critical thinking ability and increase their capacity to provide the best numerical/experimental correlations.

The students will undertake a project to consolidate the learning process: first, they will participate in a dynamic experiment of crushing tubes. Then, they will have to provide a numerical model of the experiment. Finally, they will have to analyse the results and highlight the various problems at each step.

Course contents

1. Overview of shocks
   - Nature, type and classification of shocks

2 Crash in the field of transportation
   - Overview, safety, different approaches used

3. Numerical modelling
   - Constitutive laws, different time integration methods, non-linearities

4. Experimental devices
   - Description, different types of tests (front or side-impact)

5 Study of an analytical model for circular or square tubes

6 Simple case study
   - Experiment on a simple structure, numerical simulation and experimental/numerical correlations

Course material

N. Jones, Structural Crashworthiness, Cambridge University Press, 1997

Jorge A.C. Ambrósio, Manuel F.O. Seabra Pereira, F. Pina da Silva, Crashworthiness of Transportation Systems: Structural Impact and Occupant, Springer Netherlands, 1997

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	12 hrs	6 hrs	22 hrs	0 hrs	0 hrs

Matériaux Composites [MECA3_MATCOMP]

LEAD PROFESSOR(S): Laurent GORNET

Objectives

Composites and Constituents

Course contents

Part 1: Composites and Constituents (S. Comas)
Introduction File
Fibres and Fibrous Reinforcements File
Thermoplastic matrices File
Thermosetting Dies

Part 2: Composite Processes (C. Binetruy)
Introduction
Manual processes
Industrial processes
processes:
Porous media manufacturing process-laws
Constitutive laws
Forming , Squeeze flow

Part 3: Mechanical Composites (L. Gornet)
Anisotropy
Identification of the mechanical properties of composite materials
Break Criteria

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	20 hrs	0 hrs	0 hrs	0 hrs	0 hrs

Composite Materials - Simulation [MECA3_MATCOMPSIMU]

LEAD PROFESSOR(S): Laurent GORNET

Objectives

Course contents

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	12 hrs	8 hrs	0 hrs	0 hrs	0 hrs

Non Destructive Testing Methods for Materials [MECA3_CAMAT]

LEAD PROFESSOR(S): Bertrand HUNEAU / Christian BURTIN

Objectives

The production of industrial products requires the use of non-destructive testing to detect possible defects. These techniques are also used to monitor structures in service (bridges, offshore platforms, aircraft, etc.) in order to prevent any fracture. The teaching of these techniques, with the capacities and limits of each, aims to enable an engineer to choose the most appropriate one and to know how to use it in an optimal way .
Among the other analysis techniques used in industry, the X-ray diffraction technique, which allows for example the calculation of residual stresses, will be detailed.
Finally, the optical and electronic microscopy techniques (destructive techniques as opposed to NDT) used both to characterise the microstructure of materials and to analyse fracture surfaces will be presented and illustrated.

Course contents

Lectures given by Bertrand Huneau (8h over 16h)

1) Non-destructive testing
- Liquid Penetrant Testing
- Magnetoscopy
- Radiography (X-ray, gamma)
- Ultrasound
- Eddy currents

2) Microscopy techniques and structural and chemical analysis in materials science
- Optical Microscopy
- Scanning Electron Microscopy
- X-ray diffraction
- Energy dispersive spectroscopy of X-rays

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	16 hrs	0 hrs	0 hrs	0 hrs	0 hrs

Matériaux Composites [MECA3_MATCOMP]

LEAD PROFESSOR(S): Laurent GORNET

Objectives

Course contents

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	20 hrs	0 hrs	0 hrs	0 hrs	0 hrs

Composite Materials - Processes [MECA3_MATCOMPPROC]

LEAD PROFESSOR(S): Sébastien COMAS-CARDONA

Objectives

At the end of the course the students will be able to:

- Manufacture composites with consolidation and infusion processes
- Model main mechanisms observed during manufacturing
- Simulate draping and impregnation phases with softwares

Course contents

These lectures aim at presenting and giving a broad overview of composite materials processes.
The main content of the course is as follows:
- Experimental lab sessions: Composite and Constituents Characterization, Thermoforming Process, Infusion Process
- Process classification based on occurring physics, yield rate and performances
- Governing and constitutive equations (fluid dynamics, heat transfer, mechanics) adapted to composites and porous (fibrous) materials.
- Numerical lab sessions: Simulation of composite processing

Course material

1. Traité des matériaux (Editions Ecole Polytechnique Fédérle de Lausane)
2. P. Boisse, Composite Reinforcements for optimum performance , 2011
3. Friedrich Klaus, Fakirov Stoyko, & Zhang Zhong. (2005). Polymer Composites: From Nano- to Macro-Scale. Boston, MA: Springer Science+Business Media, Inc
4. Campbell Flake C. Manufacturing Processes for Advanced Composites. New York: Elsevier, 2004
5. Process Modeling in Composites Manufacturing, Second Edition, 2010 by CRC Press, 630 Pages, Suresh G. Advani, E. Murat Sozer
6. Mechanics of fibrous composites, C.T. Herakovich, Wiley1998

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	8 hrs	4 hrs	12 hrs	0 hrs	0 hrs

Metallic Materials [MECA3_MATMETAL]

LEAD PROFESSOR(S): Aude CAILLAUD BOUDELIER / Pascal COSSON

Objectives

Course contents

Course material

Assessment

Individual assessment: EVI 1 (coefficient 0.5)
EVI 2 (coefficient 0.5)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	8 hrs	0 hrs	16 hrs	0 hrs	0 hrs

Metallic Materials - Processes [MECA3_MATMETALPROC]

LEAD PROFESSOR(S): Matthieu RAUCH

Objectives

At the end of the course the students will be able to:
▪ Understand the methods and tools to be implemented within the framework of Computer Aided Manufacturing with Numerical Control Machine-Tools
▪ Understand the challenges associated with Additive Manufacturing and High Speed Machining
▪ Implement Design for Manufacturing approaches dedicated to Machining and Additive Manufacturing.

Course contents

- introduction to machining and NC controller manufaturing
- introduction to additive manufacturing processes
- DFAM approahces

lectures/tutorials/microproject

Course material

▪ CADAM Theory and Practice, I. Zeid, Mc Graw-Hill
▪ Surface Modeling for CadCam, BK. Choi, Elsevier
▪ Fundamentals of Computer Integrated Manufacturing, A.L. Foston, CL Smith, T. Au, Prentice Hall
▪ NC Machine Programming and Software Design, CH Chang, MA Melkanoff, Prentice Hall
▪ Lecture and tutorial notes

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	4 hrs	8 hrs	12 hrs	0 hrs	0 hrs

Cobotics and Robotics [MECA3_COBROB]

LEAD PROFESSOR(S): Damien CHABLAT

Objectives

Course contents

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	16 hrs	0 hrs	8 hrs	0 hrs	0 hrs

Modelling and Digital Chain [MECA3_MACNU]

LEAD PROFESSOR(S): Matthieu RAUCH

Objectives

Within the framework of simultaneaous engineering, the cours aims to acquire knowledge on industrial products modelling, all alond the CAD/CAM/CNC data chain.

Course contents

volumic representation of industrial products
numerical formats for data exchanges
modelling using curves
CAD/CAM/CNC data chains
Product Data Management

Course material

- Machine à commande numérique, B. MERY, Hermès
- CADCAM Theory and Practice, I. Zeid, Mc Graw-Hill
- Surface Modeling for CadCam, BK. Choi, Elsevier
- Fundamentals of Computer Integrated Manufacturing, A.L. Foston, CL Smith, T. Au, Prentice Hall
- NC Machine Programming and Software Design, CH Chang, MA Melkanoff, Prentice Hall
- Notes taken during lectures and practical sessions.

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	2 hrs	0 hrs	22 hrs	0 hrs	0 hrs

Project in materials [MECA3_MATERPROJ]

LEAD PROFESSOR(S): Christian BURTIN

Objectives

application of knowledge acquired during the studies with a project on material science. The project in made with problems seen in the company where the student is actually working

Course contents

description of the project
work
written report
oral defence

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	0 hrs	0 hrs	0 hrs	0 hrs	0 hrs

International Experience Project [MECA3_PSI]

LEAD PROFESSOR(S): Alan BALL / Pascal COSSON

Objectives

Course contents

Course material

Assessment

Individual assessment: EVI 1 (coefficient 1)

LANGUAGE OF INSTRUCTION	ECTS CREDITS	LECTURES	TUTORIALS	LAB	PROJECT	EXAM
French	-	16 hrs	8 hrs	0 hrs	0 hrs	0 hrs