



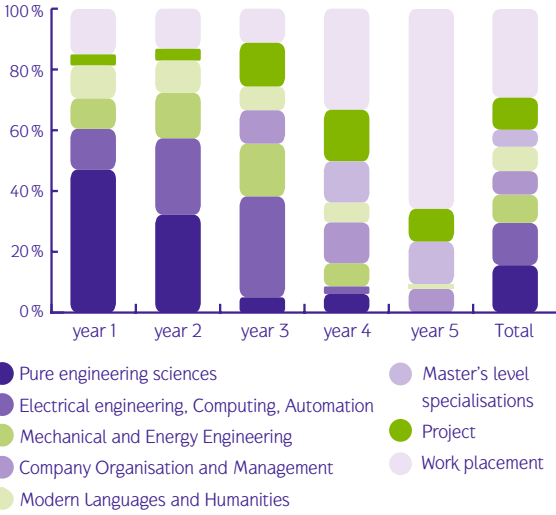
Academic Programme

2012-2013

General
Engineering School

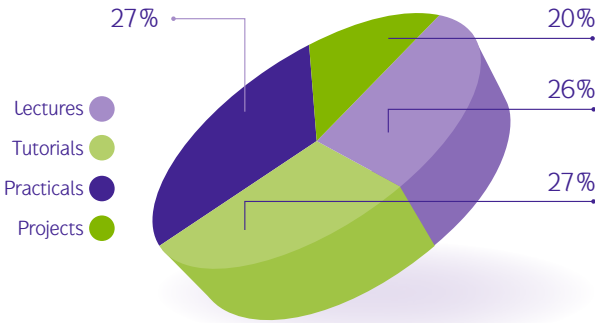


Main areas of EIGSI's Academic Programme

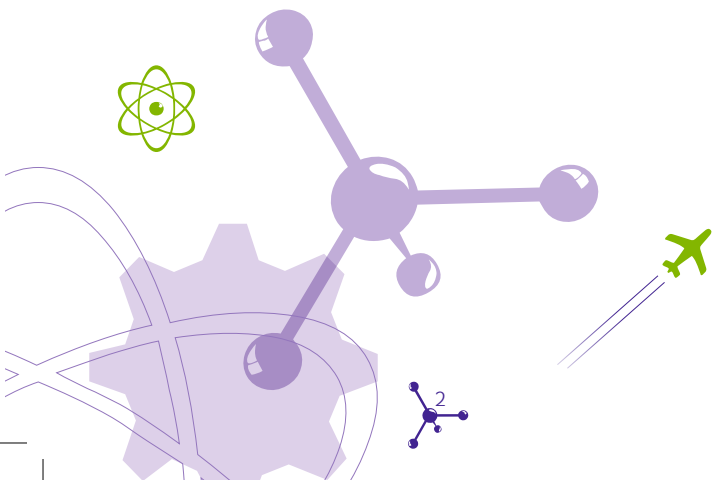


A 5 year high quality general science and engineering degree...

A balanced syllabus



One of our Academic Programme's strengths is its balance between theoretical and applied approaches to teaching.





1st year

Semester 1

Hours

Linear algebra

24

Module objectives

- To become familiar with matrix calculation and its applications
- To be able to resolve systems of equations and know the different resolution methods
- To be able to recognise linear transformations of the plane and space using the notions of vector space, linear operators and change of base

Describing and reasoning (part 1)

24

Module objectives

- To understand what a mathematical theory is and how it is constructed. To acquire mathematical formalism
- To identify, formulate and resolve problems using rational investigation methods
- To practise reasoning, conceptualising, formalising and visualising

Series and elementary functions

21

Module objectives

- To consolidate and complete students' knowledge of the most common analysis functions and their properties
- To develop students' mental representations

Algebra and geometry of the complex plane (part 1)

21

Module objectives

- To revise, combine and generalise final year notions in order to factor real polynomials
- To be able to perform two types of division in order to break down all fractions in preparation for the integral calculus module
- To be able to easily handle algebraic operations

Real numbers and Taylor expansions

21

Module objectives

- To be able to use algebra to obtain any Taylor series
- To acquire the theoretical concepts and apply them

Describing and reasoning (part 2)

24

Module objectives

- To develop students' capacity to model a magnitude variation problem according to one or more variables, to interpret a differential equation, to resolve linear equations with constant coefficients and to interpret analytical solutions, to calculate uncertainties
- To develop students' abstraction and representation capacities

Integral calculus

21

Module objectives

- To calculate simple integrals of continuous functions: to consolidate knowledge, to handle so-called elementary functions, to be able to perform a calculation without errors
- To be able to use these integrals in various fields of Mathematics and Physics
- To acquire working methods (use the lesson, write a formula, identify the main ideas and fundamental techniques)

Geometric and matrix optics

33

Module objectives

- To become proficient in the application of the laws of geometric optics for calculation of the characteristics of complex optical systems
- To become familiar with the applications of optical components and procedures for reducing aberrations in optical instruments

Physical mechanics (part 1)

24

Module objectives

- To understand the physical phenomena that can be assimilated to the dynamics of a material point
- To apply the concepts to simple physical systems: harmonic oscillators, particle dynamics, celestial mechanics
- To be able to make use of the results in graph format (change of variables, linear regression method, etc.)



Logical circuits

32

Module objectives

- To provide basic notions in digital electronics in order to become acquainted with how digital systems work
- To develop a critical mind by comparing hardwired and programmable logic
- To address combinational logic, sequential logic and express system components in equations

Computer architecture

17

Module objective

- To understand the general workings of a computer by describing the nature of its components and interactions between them

Mechanical construction & manufacturing (part 1)

35

Module objectives

To be able to:

- read and interpret a simple overall plan
- identify the mechanical functions and the contribution of each component in a chain of actions
- establish kinematic and architecture diagrams for a simple system
- identify elements and functional surfaces
- identify and define functional conditions
- produce and formalise a detailed plan of a simple component
- choose construction elements to execute simple technical functions

Communication and business perspectives

19.5

Module objectives

- To raise awareness of business, the world of industry and engineering careers
- To acquire effective tools for contacting companies and finding a work placement
- To be introduced to business culture through observation
- To improve working methods, learn new methods and acquire teamwork skills

English

18

Module objectives

- To consolidate the basics of English grammar
- To initiate work towards the TOEIC examination
- To develop fundamental language skills
- To become familiar with a broad range of general English topics
- To learn to communicate in writing and orally on specific topics

Modern language 2

18

Module objectives

- To adjust to daily life, general knowledge and scientific and technical knowledge
- To revise the basic grammar required to develop clear written and spoken language

Semester 2

Describing and reasoning (part 3)

21

Module objectives

- To develop the capacity for analysis and synthesis
- To develop the capacity for abstract thought and representation
- To learn to mobilise mathematical knowledge to deal with more complex problems and systems, calling on computer tools where necessary

Algebra and geometry of the complex plane (part 2)

21

Module objectives

- To use knowledge gained about the complex plane, dealing with basic geometric concepts and tools
- To become proficient in changes in coordinates in a plane and in space
- To develop the ability to visualise problems and solve them methodically

Geometry and integral calculus of curves and surfaces

42

Module objectives

- To acquire a spatial visualisation ability and be capable of explaining the properties of a geometrical entity on the basis of its equation
- To supply the geometric, differential and integral properties required for mechanics, electromagnetism and other fields of Physics and Engineering Science



Electricity

63

Module objectives

- To become proficient in the application of the laws and theorems of steady and transient-state circuits
- To become familiar with the use of steady and transient-state circuits
- To know how to conduct and interpret an energy assessment for an electrical circuit including sources of voltage and/or current, coils, condensers
- To become familiar with the use of passive harmonic filters

Electromagnetism (part 1)

21

Module objectives

- To obtain sufficient knowledge to understand fields based on the concepts of electromagnetism and put them into practice in the analysis and design of systems and industrial applications
- To develop the capacity for clear analysis of cause-and-effect relationships in complex systems and of the simplified model approach
- To be introduced to an intuitive approach to complex situations in addition to a thorough analysis
- To be able to link up elements from different fields for problem-solving

Physical mechanics (part 2)

24

Module objectives

- To understand the concepts of trajectory studies (kinematics) and be able to apply these to common trajectories
- To recognise and transpose mathematical techniques to describe concepts
- To be introduced to metrology (quantification of error, calculation of uncertainty relating to direct and indirect measurements, etc.)

Algorithms and programming

51

Module objectives

- To learn basic algorithm structures
- To design and develop programmes in Java using Eclipse

Internet programming

32

Module objective

- To become familiar with techniques and their use in building a website

Introduction to operating systems

14

Module objectives

- To supply key pointers with regard to operating systems in order to develop a critical mind
- To raise awareness of risks relating to the use of a computer system
- To raise awareness of the "technological intelligence" aspect through practice

Mechanical construction (part 2)

38

Module objectives

- To apply the general knowledge gained during the first semester
- To identify links and functional surfaces for actual mechanisms
- To define and check functional conditions
- To become familiar with the use of CATIA for certain basic planning functions
- To explore traditional manufacturing resources and geometric control
- To obtain basic technological knowledge of the various processing and inspection techniques for products (theory)

Communication and business perspectives

18

Module objectives

- To learn the basics of written and oral communication
- To find out about the world of business
- To learn how to find a work placement
- To develop general and scientific knowledge



English

18

Module objectives

- To consolidate the basics of English grammar
- To initiate work towards the TOEIC examination
- To develop fundamental language skills
- To become familiar with a broad range of general English topics
- To learn to communicate in writing and orally on specific topics

Modern language 2

18

Module objectives

- To adjust to daily life, general knowledge and scientific and technical knowledge
- To revise the basic grammar required to develop clear written and spoken language

→ Manual work placement



2nd year

Semester 3

Advanced matrix calculus

21

Module objectives

- To use linear algebra (basis, change of basis, linear mapping and matrices)
- To establish and use the properties of real and complex coefficient matrices of all sizes
- To introduce the diagonalisable matrix method (know when it can be used and apply to examples)

Complex series (part 1)

14

Module objectives

- To learn to use the mathematical tools necessary for engineers to solve actual problems
- To understand and be able to apply rules (Alembert's principle, Cauchy's theorem, seeking equivalent of the general term, etc.)
- To understand abstract notions (convergence, more accurate knowledge of limit definitions, etc.)

Electromagnetism (part 2)

36

Module objectives

- To obtain sufficient knowledge to understand fields based on the concepts of electromagnetism and put these into practice in the analysis and design of systems and industrial applications
- To develop the capacity for clear analysis of cause-and-effect relationships in complex systems and of the simplified model approach
- To develop an intuitive approach to complex situations in addition to a thorough analysis
- To be able to link up elements from different fields for problem-solving

Thermodynamics (part 1)

18

Module objectives

- To become familiar with the basic notions and fundamental laws of thermodynamics to apply them in practical fields of engineering. The emphasis is placed on the notion of energy and its use
- To carry out global energy balances of complex systems. To dimension simple energy systems
- To obtain the basic knowledge required to follow courses dealing with energy

Introduction to optimisation

27

Module objectives

- To understand the principles and use of the main analytical methods and numerical optimisation algorithms
- To be able to use standard linear optimisation software (Xpress)
- To be capable of formulating practical problems leading to an optimisation procedure
- To be able to analyse the results obtained in an optimisation process

Electronics

54

Module objectives

- To become familiar with the essential components of analogue and power electronics
- To become familiar with the different functions of electronics
- To be able to analyse an electronic circuit

This module is organised into several parts:

- physics of semi-conductors
- the basic components of electronics and power electronics
- the basic functions of electronics (filtering, amplification, conversion, power supply, regulation, etc.)
- the global approach to a system (functional description)
- introduction to power electronics

Polyphase systems and transformers

48

Module objectives

- To become familiar with alternating current phenomena
- To study the usual polyphase systems (three-phase and six-phase), particularly the three-phase network (symmetrical three-phase system)
- To learn about the usual connection types (star and delta) and their practical installation
- To study the AC magnetic circuit
- To study transformers under load (single-phase and pre-phase)

Object-oriented programming

51

Module objectives

- To become familiar with the principles of object-oriented programming
- To use Java programming language in business applications

Resistance of materials

21

Module objectives

- To be capable of analysing or designing part of a mechanical system subject to distinct types of stress: external actions, internal forces, deformation; and dimensioning certain parts of it
- To be able to analyse yield stress and maximum deformation

System mechanics

36

Module objectives

- To understand and calculate various physical parameters (inertia, forces, moments, energy, etc.)
- To study the relations between these parameters

Industrialisation & mechanical manufacturing

29

Module objectives

- To obtain basic knowledge in the field of mechanical manufacturing and control of products on the basis of practical productions in the workshop
- To learn about different part shapes according to how they are manufactured

Fluid mechanics (part 1)

21

Module objectives

- To be capable of dimensioning an experiment by means of dimensional analysis
- To be able to analyse pressure forces affecting a body
- To be able to determine the equilibrium of a floating body
- To be able to determine the force produced by a flow (relationship between speed and pressure)

Professional communication

20

Module objectives

- To be able to communicate within a company
- To be able to work in a team
- To be able to write scientific abstracts
- To gain knowledge about the engineering world

English

18

Module objectives

- To consolidate the use of English grammatical structures to enable clear written and oral communication
- To work towards the TOEIC exam
- To become familiar with a broad range of engineering topics
- To be capable of understanding technical and scientific subjects orally and in writing
- To be capable of discussing scientific and technical subjects
- To be able to write an abstract or report on a technical or scientific subject

Modern language 2

18

Module objectives

- To adjust to daily life, general knowledge and scientific and technical knowledge
- To revise the basic grammar required to develop clear written and spoken language



Complex series (part 2)**20****Module objectives**

- To learn to use the mathematical tools required for engineers to solve real problems
- To understand and be able to apply rules (Alembert's principle, Cauchy's theorem, seeking the equivalent of the general term, etc.)
- To understand abstract notions (convergence, more accurate knowledge of limit definitions, etc.)

Mathematics for signal processing**35****Module objectives**

- To provide students with an introduction to continuous signal processing and solving ordinary and linear partial differential equations
- To increasing their ability to use equations relating to physical modelling

Probabilities and statistics (part 1)**36****Module objectives**

- To become familiar with the main fundamental probabilistic concepts in the study of various discrete and continuous probabilistic models
- To become familiar with the fundamental notions of random variables and probability law enabling a hypothetical, infinite population to be defined conceptually
- To become familiar with the probability laws relating to practical situations in various fields of engineering and industry
- To be able to use Excel statistical and graph functions to prepare useable templates

Numerical analysis (part 1)**24****Module objectives**

- To become familiar with the basic methods of numerical analysis, to solve linear systems (direct and iterative methods), or to extract the components of a matrix (eigenvalues and eigenvectors)
- To become familiar with the basic performance of these methods: precision, convergence speed, calculation time (operations count), rounding errors
- To be able to apply, and implement these methods with particular matrices (dominant diagonal, tridiagonal, positive definite) using MATLAB

MATLAB**15****Module objectives**

- To become proficient in the use of MATLAB Simulink
- To self-train on software, with a view to using it at a later date (project dimensioning, numerical analysis, automation, etc.)

Thermodynamics (part 2)**30****Module objectives**

- To be able to apply the fundamental concepts of thermodynamics to the analysis of practical situations. Particular emphasis is placed on the notion of energy and its use
- To be able to apply general notions to many different contexts

Wave and corpuscular theory optics**27****Module objectives**

- To understand the wave and corpuscular phenomena underlying the workings of certain instruments and passive analysis techniques
- To introduce notions of signal propagation
- To apply notions to free and guided transmissions

Wave physics**30****Module objectives**

- To become familiar with the fundamental elements describing wave phenomena: eigenfrequencies of oscillating systems, signal transport, wave composition and energy aspects, in order to deal with the various fields of application using the required basis.
- To apply a single set of concepts to various fields of application
- To generalise simple notions presented in specific contexts to other contexts

APIND project**22****Module objectives**

- To be able to put into practice notions and methods seen in fundamental engineering science lectures
- To be able to draw together a corpus of knowledge to deal with a given problem
- To organise the approach to complex problem-solving

Electrical networks

24

Module objectives

- To become proficient in the distribution of low-voltage electricity in businesses and the different means of back-up electricity generation
- To become familiar with the hazards of electrical current and their effects on the human body. Introduction to systems for the protection of people and property
- To become familiar with the earthing systems of industrial electrical installations in order to choose appropriately depending on service continuity issues and the related protection

Computer networks

24

Module objectives

- To understand the vocabulary used in networks
- To understand how different types of networks function (Ethernet, Token ring)
- To understand the notion of protocol and be familiar with the OSI and TCP/IP models
- To know how to deploy and configure Ethernet and industrial networks

Algorithms and programming (project)

22

Module objective

- To apply the knowledge acquired during the first 3 semesters

Sequential automation

45

Module objectives

- To present a global approach to automated systems (sequential or continuous) and understanding automation issues
- To present tools for describing sequential systems (GRAFCEC model in particular)
- To study the main functions of an automated system: controlling (presentation of sensors), processing (presentation of various tools, including the programmable logic controller - PLC), commanding (compressed air and hydraulic technologies), communicating (introduction to industrial networks and supervision)
- To apply: commanding sequential systems (study of stop/start modes, safety, programmed commands), introduction to a software workshop for designing and producing a sequence control system, communication between PLCs via an industrial network, supervision

Computer-assisted design

39

Module objectives

- To study, alter and transform a mechanical system using specifications specifying the changes to the existing system
- To create the drawing file for the modified system
- To use the main functions for modelling mechanical components and systems in CATIA
- To draw in CATIA

Professional communication

9

Module objective

- To develop an area of improvement from the following 3 options:
 - Written communication
 - Oral communication
 - Learning methods

English

18

Module objectives

- To consolidate the use of English grammatical structures to enable clear written and oral communication
- To become familiar with a broad range of engineering topics
- To be capable of understanding technical and scientific subjects explained orally and in writing
- To be able to write an abstract or report on a technical or scientific subject
- To work towards the TOEIC exam

Modern language 2

18

Module objectives

- To adjust to daily life, general knowledge and scientific and technical knowledge
- To revise the basic grammar required to develop clear written and spoken language

→ Work placement - technician/personal project





3rd year

Semester 5

Hours

Numerical analysis (part 2)

24

Module objectives

- To become familiar with basic methods of numerical analysis to solve differential equations and linear partial differential equations (finite differences)
- To become familiar with methods of numerical integration (Euler's method, Gauss integration points) and interpolation methods
- To become familiar with the notions of precision, convergence and calculation time for these methods (explicit and implicit calculation)
- To know how to apply and implement these methods (in MATLAB) for particular problems: matrix derived from a physical problem (resistance of materials), numerical integration points, conditioning of related matrices

Energy conversion

51

Module objectives

- To apply the understanding of switching phenomena in power components studied in Electronics in the light of various static converters (rectifiers-inverters-choppers-cycloconverters)
- To study the different types of static converters that enable the conversion of electrical energy: alternating/direct - direct/alternating - direct/direct - alternating/alternating

Object-oriented modelling

51

Module objectives

- To be capable of understanding the specifications of a system described by "object-oriented" concepts expressed in UML language
- To be capable of producing specifications for simple systems (modelling static and dynamic elements); use of UML language
- To be capable of choosing modelling elements and applying an analysis procedure with a view to describing and documenting a system
- To be able to use computer-aided software
- To appreciate the advantages of a normalised relational database for object persistence and be capable of producing one

Continuous automation (continuous systems)

51

Module objectives

- To understand the fundamental principle of master/slave control systems and its models
- To become proficient in the analysis methods of the behaviour of linear systems
- To understand the effects of PID controllers and become proficient in PID synthesis methods and various control strategies
- To become proficient in modelling methods for dynamic systems

Signal processing

24

Module objectives

- To become familiar with fundamental results for the Fourier transform and convolution and correlation operations
- To be able to calculate a Fourier transform
- To be able to calculate convolution and correlation and then give the interpretation
- To become familiar with the physical and spectral representations of a signal

Dimensioning machine components

36

Module objectives

To be able to:

- Analyse and model contact actions within mechanical connections, in the case of point or section contacts (Hooke's laws) and contacts between extended surfaces
- Apply these models to the components commonly used in mechanical connections and guides: dimensioning bearings, bushes, pins, screw connections, tapered connections, etc.)
- Use analytical methods to dimension principal power transmission components (gear systems, belt pulley, chains, springs, etc.)
- Choose these components according to functional, dimensional and economic criteria

Materials for engineering (part 1)

36

Module objective

- To gain general knowledge of materials, their characteristics and uses, and enable selection of the appropriate material according to the functionality of the component

Energy (part 1)

21

Module objectives

- To acquire a global methodology for the analysis of an energy process to evaluate flows and unit calculations involved in the process
- To understand the basic concepts enabling theoretical representation of a process and gain an overview of the modelling difficulties in the case of heterogeneous energy systems
- To be able to apply thermodynamics principles and balance laws (mass, energy) to characterise the main industrial energy systems (refrigeration, separation processes, combustion engine, etc.)

Continuum mechanics

21

Module objectives

- To systemically present the common concepts used subsequently in Structure Analysis, Vibration, Fluid Mechanics, Energy and Materials
- To be capable of analysing the results of these studies and making a critical judgement as to their validity, in comparison with numerical and analytical test cases, or in comparison with experimental methods

Project management

42

Module objectives

- To situate project management within a company's activities
- To be able to organise and plan a project in a project environment
- To understand one's role in a project and be ready to make an effective contribution to its management

Analysis of industrial systems

35

Module objectives

- To become familiar with the main approaches and methods used for the analysis of industrial systems
- To become proficient in the use of problem-solving tools and be able to choose suitable tools according to the problem to be solved

Personal and professional profile

21

Module objectives

- To acquire the necessary information about engineering professions and sectors
- To grow in self-awareness, in preparation for personal assessment
- To draw up an initial career plan
- To finalise applications for technician work placements

TOEIC

18

Module objectives

- To score 785 in the TOEIC exam
- To be able to understand and communicate information orally and in writing
- To learn tactics to pass the TOEIC exam
- To work autonomously on English for the TOEIC exam

Modern language 2

18

Module objectives

- To deal with the professional aspect of language
- To enable students to find a work placement or job and communicate in a professional setting

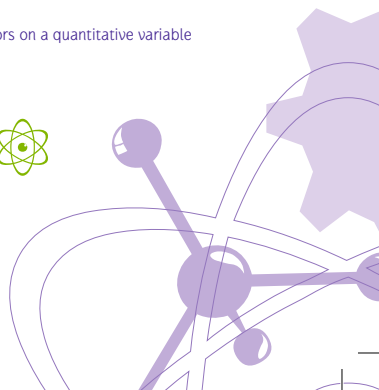
Semester 6

Probabilities and statistics (part 2)

36

Module objectives

- To be able to describe and analyse a data series for a variable
- To study the link between two variables using the least-squares method
- To be able to use Excel statistics and graph functions to prepare spreadsheets
- To be able to link probability calculations to inferential statistics
- To be able to use statistical methods to estimate a mean, standard deviation and frequency
- To be able to study the influence of one or more factors on a quantitative variable using the variance analysis method



Electrical machines and variable speed

51

Module objectives

- To supply the key foundations for understanding and studying electrical machines
- To supply students with the resources required to control electrical machines
- To choose and dimension an electrical drive according to the application

Electrical networks (dimensioning)

30

Module objectives

- To be able to carry out dimensioning (wire diameters) and choose protection systems (for property and people) for electrical installations
- To be able to calculate electricity rates and reduce billing (optimisation criteria)

Continuous automation (sampled systems)

51

Module objectives

- To present the make-up of digital command systems and how to choose the sampling period correctly
- To study the performance (stability and precision) of sampled systems
- To present and apply synthesis methods used by digital regulators (particularly PID regulators)
- To present the principles of computer control description of the architecture, interfaces with the system to be controlled, methodological aspects

Instrumentation - sensors

12

Module objectives

- To understand the basic concepts and workings of a sensor in a measurement chain
- To be able to analyse a chain and determine its metrological characteristics (resolution - accuracy - response time, etc.)
- To be capable of defining specifications for the choice of instruments and measurement chain for a system or process

Object-oriented design

36

Module objectives

- To acquire database skills
- To be capable of dealing with a problem requiring the use of a database
- To be capable of interrogating a database to extract information

Multitasking and real time

30

Module objectives

- To understand the working principle of an IT system
- To ascertain the difficulties in developing effective software applications
- To approach the issue of Real Time applications
- To specify communication between processes by means of formal models

CAD and dimensioning

42

Module objectives

To be able to:

- Study a mechanical system; analyse and define an optimal solution in response to an expressed need on the basis of specifications
- Choose and calculate the drive chain and mechanical components to meet the requirement
- Calculate mechanical components
- Model the complete system and create the drawing file using CATIA
- Constitute the complete design file for the proposed system

Materials for engineering (part 2)

18

Module objectives

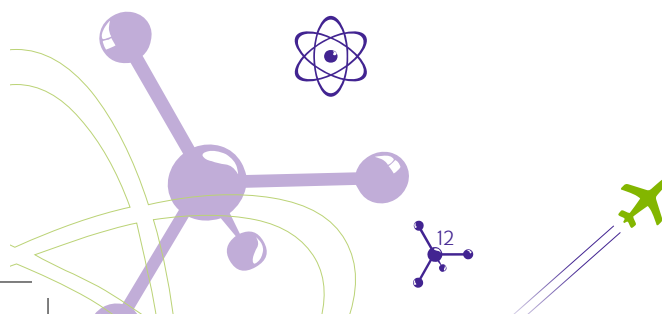
- To become familiar with material characterisation methods using applications on case studies (tension tests, hardness tests, etc.).
- To become familiar with the techniques for treating materials with applications to actual cases (hardening, tempering, etc.)

Fluid mechanics (part 2)

32

Module objective

- To be able to apply the fundamental equations of fluid mechanics to dimension an installation (pressure, flow) and the power of the related machine (pump or turbine) by means of an analysis of the installation's pressure differentials



Energy (part 2)**9****Module objective**

- To be able to apply the principles of thermodynamics and balance laws (mass, energy) to characterise the principal industrial energy systems (refrigeration, separation processes, combustion engine, heat exchanger, turbomachinery, etc.)

Industrial management**57****Module objectives**

- To become proficient in the techniques of production management
- To become conversant with the issues and considerations relating to the different levels of production scheduling
- To become familiar with supply methods
- To systematically associate production assets with the related costs
- To become proficient in budgetary techniques and cost prioritisation

Technical assignment**120****Module objective**

- To consolidate technical and scientific skills through the analysis and design of systems incorporating several technologies

How to communicate in a company?**18****Module objectives**

- To develop skills in the field of written professional English
- To be able to understand and communicate information orally in a company
- To be capable of finding a work placement in an English-speaking country

Modern language 2**18****Module objectives**

- To deal with the professional aspect of language
- To enable students to find a work placement or job and communicate in a professional setting

→ Work placement - technician/personal project**4th year****Semester 7****Financial mathematics****21****Module objectives**

- To present all fields of finance (corporate finance, investments, financial institutions) within a single conceptual framework
- To become proficient in finance-related vocabulary
- To provide the essential foundations of financial calculation
- To become proficient in the use of financial management tools
- To introduce the related assessment models and mathematical tools (stochastic calculus and time series)

Distributed systems**24****Module objectives**

- To become familiar with the advantages, drawbacks and risks of the principal information systems architectures
- To be capable of giving guidelines when drafting specifications to upgrade an information system
- To raise students' awareness of the notion of "agile enterprises"

Heat transfer**24****Module objectives**

- To understand heat transfer and transport phenomena
- To be able to apply an energy balance and the transfer laws associated with a thermal transfer process with a view to analysis and dimensioning
- To be able to state a complex thermal transfer problem as an equation and solve it using a numerical method



Finite elements methods

36

Module objectives

- To be able to move from a system of differential equations characteristic of the modelling of a physical problem (mechanics, fluid mechanics, thermal engineering, structure, etc.) to a matrix system which can be solved numerically using the finite element method
- To become familiar with the main stages: geometry, meshing, assembly, resolution
- To be able to apply this type of method to simple problems
- To be able to use an industrial design code rationally
- To be capable of analysing the results from a finite element calculation

Vibrations

21

Module objectives

- To understand vibration phenomena
- To obtain basic knowledge for forming equations and measurements
- To be able to apply this knowledge to dimensioning mechanical systems, and the maintenance of these systems

Overall risk

27

Module objectives

- To raise awareness of the concept of risk management
- To be introduced to risk assessment tools and methods

Company simulation

24

Module objectives

- To put into practice the lessons learned in " Company Organisation and Management"
- To familiarise students with teamwork in a competitive context
- To develop the sense of strategy and a results-oriented culture

Industrial assignment

120

Module objectives

- To be capable of working as a project team to meet the expectations of one of the school's "client" companies
- To be able to apply acquired technical, scientific and organisational skills to meet the specifications (Deliverables, Quality, Cost and Time)
- To apply lessons learnt in Human Sciences, by acting professionally in relations with the client company

Introduction to management

35

Module objectives *(bilingual teaching in English and French)*

- To understand history, definitions & major trends in managerial thinking
- To develop industrial management skills: planning, organising, human resources, executive management & controlling
- To initiate future engineers to the basics of industrial management and its application in corporate and industrial structures in a European and global context

Engineering work in industry

18

Module objectives

- To gain knowledge about the world of industry and engineering in English-speaking settings
- To study a product in all its phases (approaches of various business lines): from R&D to marketing
- To discuss industrial topics
- To give professional presentations

Modern language 2

18

Module objectives

- To undertake advanced study of everyday and professional language
- To enable students to adapt to most situations they are likely to encounter

Semester 8

Data analysis

35

Module objectives

- To be capable of analysing data
- To develop the capacity to interpret numerical and graphical results

Experiment plan

36

Module objectives

- To be able to draw up an experiment plan and use the results
- To become proficient in the choice and use of orthogonal plans for the optimisation of an industrial process

Statistical process control

11

Module objectives

- To raise student engineers' awareness of the fundamental principles of Statistical Process Control
- To be able to conduct a capability study for production and measurement equipment

Marketing

17

Module objectives *(taught in English)*

- To initiate future engineers to the basics of marketing and their application in corporate and industrial structures in a European and global context
- To develop Management skills: analysing, planning, negotiating, selling and creativity
- To initiate future engineers to the basics of management and their application in corporate and industrial structures in a European and global context
- To develop Management skills: organising, directing, motivating, controlling and creativity

QHSE management system

21

Module objectives

- To understand the concept of "Quality in business"
- To become proficient in the use of basic tools and be able to use the statistical tools used for quality (six sigma, SPC, etc.)
- To become familiar with the procedure for implementing a quality system in a company
- To become proficient in the general conditions of ISO 9000 standards and certification procedures
- To become familiar with the concept and applications of the integrated management system (quality, security, environment)

Project management seminar

30

Module objectives

- To implement project management with a simulation project
- To produce a project master plan

Skills assessment and Human Relations in Business seminar

24

Module objectives

- To gain the tools required to interpret the culture of a company in order to facilitate integration
- To acquire assertive communication in order to:
 - assume one's place in the company
 - lead a working team
 - run a meeting
 - solve a problem with a group

Ethical management & sustainable development (part 1)

12

Module objectives

- To understand the implications of sustainable development and the challenges for society and related values
- To situate the role of ethics in achieving sustainable development objectives
- To become familiar with the company's responsibilities with respect to sustainable development and the issue of ethics in the management of a company
- To understand the relationship between corporate governance and social responsibility
- To situate "ethical" behaviour in core business and functions

The Engineering Manager

18

Module objectives

- To consider issues relating to future engineers
- To express one's opinions in debates
- To ask questions about the future as an engineer
- To open up to other cultures and take an interest in current affairs

DELE and ZD preparation

9

Module objective

- To prepare to sit the DELE (Diploma de Español como Lengua Extranjera) or ZD (Zertifikat Deutsch)

Innovation in engineering (part 1)

6

Module objective

- To become aware of innovations in engineering procedures



Master's level specialisations

In the 4th year, students will choose one of the following Master's level specialisations:

► Design and Industrialisation of Mechanical Systems

The objective is to train engineers capable of **designing, analysing, and optimising** mechanical systems taking into account knowledge relating to **industrialisation** and **product processing resources**.

The course enables future engineers to gain skills in **modelling** and **optimisation** of mechanical components and assemblies, **product characterisation** and **simulation**, and **industrialisation** (including & Computer-Assisted Design and Manufacture). The classes enable the **design of suitable digital models** and **proficient use of simulation software** aimed at reaching the best compromise between performance, cost, reliability, ergonomics and the design of systems for lean manufacturing in line with expressed needs.

	Hours
General design methods (PLM)	24
Metallic materials	17
Structural calculations	30
Components and power transmission	18
Methods, transformations and controls	32
Virtual industrialisation engineering	30
Design project (part 1)	30
Research & Development project	60

► Energy and the Environment

On completion of this Master's level specialisation, EIGSI students will be **capable of drawing up an energy and environmental efficiency balance for complex systems** and suggesting improvement solutions. If they remain in this track, they will integrate and operate energy transformation and storage systems.

The course enables future engineers to gain skills relating to the main **sources of energy** - in particular **alternative energy sources** (solar, wind, geothermal, hydraulic, etc.) - **rational use** of energy, concentrating on its **storage**, and also deals with **hydrogen**, a future energy vector. The issue of the impact of energy use on **health and the environment** is also examined, concentrating in particular on the issue of **transport** (reducing greenhouse gas emissions, improving power supplies and new power sources - hybrid and electric - low environmental impact technologies, integrated approaches using biofuels and biomaterials, waste management, etc.).

Non-renewable energies	30
Renewable energies and energy carriers	75
Energy system design	30
Environmental impacts	35
Research & Development project	60

► Networks and Information Systems Integration

For the past two decades, telecommunications, which long remained limited to telephony, have been undergoing a complete revolution thanks to the numerous connected communications networks worldwide. This revolution has opened up new communication resources and spaces within companies, in public places and for private individuals. We have gone beyond the "Listen to what I have to say" stage to the "See what I mean" stage by transmitting images and data.

The objective is to train engineers **capable of apprehending the IT revolution** in progress: that of **wireless networks** and **data sharing worldwide** in other words... that of **nomadism**.

The course enables future engineers to gain skills relating to **communication systems** whatever the **nature of the information being transmitted** (voice, image, data), the **medium used** (cable, fibre optics, radio waves, etc.) and the **terminal equipment**.

Telecommunications systems	30
Fundamental principles of networks	30
Operating systems	30
Access networks	30
IP technology and the internet	30

Applications for mobile terminals	30
Research & Development project	60

► Management and Engineering for Industrial Systems

The objective is to train engineers who will be proficient in using **continuous improvement methods and techniques** aimed at the **efficiency of industrial organisations**, i.e. least-cost efficiency through the systematic elimination of waste (prevention of defects, reduction of scattering, reduction of immobilisation time). The course deals with issues relating to the **design** and **coordination of production systems** aimed at the **improvement of industrial performances**. It enables future engineers to gain skills relating to **total quality procedures, problem-solving methodologies, operating information systems (ERP: Enterprise Resource Planning), modelling, simulation** and **optimisation** of flows in the **Supply Chain**.

Strategic tools	24
Sourcing	24
Production system management organization	24
Methods and maintenance (Support functions)	24
Risk management	18
Industrial auditing	24
Flow modelling and simulation	24
ERP for flow control	24
Research & Development project	60

► Mechatronics

Mechatronics **is an approach to the integration of electronic intelligence within a mechanical system**. It represents a thorough revolution **in the design** and optimisation of new equipment: this new "discipline" combines and incorporates disciplines which previously existed alongside one another (mechanical engineering, electronics, automation and computer science). This makes mechatronics a new multidisciplinary skill to be developed in industry.

The course enables future engineers to gain interdisciplinary skills relating to methods and tools for design, modelling, simulation, process control and new technologies, as well as in-depth knowledge of initial technologies, the elementary building blocks of "mechatronics" (mechanics, hydraulics, electronics, computer science, thermal engineering, etc.) as well as sensors, actuators and control laws.

Integration processes	42
Multi-physics aspects	60
Dynamic behaviour (part 1)	60
Research & Development project	78

► Construction and Public Works

The objective of this Master's level specialisation is to train general engineers for work in civil engineering. It aims to provide the knowledge required **for studying and designing construction projects** for Construction and Public Works. Particular focus will be given to **project management** incorporating the specific characteristics of Construction and Public Works.

Building technology	18
Topography, roads and networks	30
Reinforced concrete structures	30
Steel structures	18
Structural design	18
Geotechnology	18
Earthquake resistance	18
Project design	18
Acoustic and thermal environments	18
Research & Development project	60



► Digital Modelling for Mechanics



In partnership with the University of La Rochelle

The Digital Modelling for Mechanics Master's level specialisation carries on from the intensive use of digital simulation in industry, for transports, defence, aeronautics, aerospace and civil engineering.

The objective of this specialisation is to supply a **solid foundation in the field of modelling for mechanical engineering, both theoretically and digitally**. At the end of the course, student engineers will be able to design and use digital simulation codes for solid mechanics, fluid mechanics and in fluid/structure interactions for industrial applications.

Broadly speaking, the course covers Mechanical sciences (solid and structural mechanics, fluid mechanics, thermal engineering, acoustic engineering, mechanical linkage problems, fluid-structure interaction, etc.), mathematical tools and more particularly optimisation and numerical methods applied to mechanical problems (finite elements, finite volumes, calculation of structures, flow simulation, numerical methods for linkage phenomena, fluid/structure interaction calculation, etc.).

	Hours
Digital flow simulation	60
Introduction to turbulence	60
Thermal transfers	60
Research & Development project	50

→ Engineering work placement



5th year

Semester 9

Law 24

Module objectives

- To introduce students to the understanding of legal systems
- To identify the basics of business law
- To identify the basics of employment law
- To enable student engineers to apprehend the issue of industrial and intellectual property

International Affairs 20

Module objectives

- To become familiar with the concepts of Change Management, Knowledge Management, Team Management
- To gain the basic principles of negotiation
- To be able to place oneself in a professional presentation situation in an international setting

Entrepreneurship 84

Module objectives

- To raise students' awareness of entrepreneurship:
 - setting up a business
 - taking over a business
 - development of organisation within a company
- To present new support tools for entrepreneurship
- To detect and/or identify potential entrepreneurs

Innovation in engineering (part 2) 6

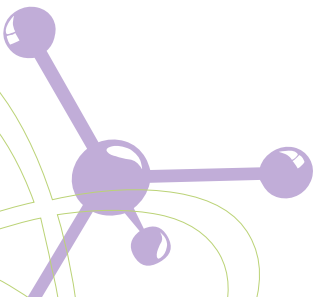
Module objective

- To be aware of innovations in engineering procedures

Career Start-up Management Seminar 21

Module objectives

- To know how to acquire the necessary information before arriving on the job market
- To update students' skills assessment
- To direct job applications
- To train for group and individual interviews



Operational dependability	31
---------------------------	----

Module objectives

- To examine in more detail the statement that "zero risk does not exist"
- To learn to limit the occurrence of unwelcome events

Ethical management & sustainable development (part 2)	6
---	---

Module objectives

- To understand the implications of sustainable development and the challenges for society, related values
- To situate the role of ethics in achieving sustainable development objectives
- To become familiar with the company's responsibilities with respect to sustainable development and the issue of ethics in the management of a company
- To understand the relationship between corporate governance and social responsibility
- To situate "ethical" behaviour in core business and functions

Master's level specialisations

► Design and Industrialisation of Mechanical Systems

Project re-engineering: optimisation, industrialisation and manufacture	60
---	----

Advanced mechanical system modelling	30
--------------------------------------	----

Non-metallic materials and processing	30
---------------------------------------	----

"Industrial" project	60
----------------------	----

Research & Development project	60
--------------------------------	----

► Energy and the Environment

Energy control and and companies	48
----------------------------------	----

Environment and companies	42
---------------------------	----

Applied to buildings:

Buildings and energy	60
----------------------	----

Energy control and quality in buildings	30
---	----

Applied to transport:

Motive power and energy	60
-------------------------	----

Sustainable mobility	30
----------------------	----

Research & Development project	60
--------------------------------	----

► Management and Engineering for Industrial Systems

Industrial management control	24
-------------------------------	----

Lean management	66
-----------------	----

Supply Chain Management	24
-------------------------	----

Transport Organisation & Management	36
-------------------------------------	----

Company modelling	24
-------------------	----

ERP for cost control	24
----------------------	----

Research & Development project	60
--------------------------------	----

► Mechatronics

Components and control/command	87
--------------------------------	----

Engineering for complex systems	63
---------------------------------	----

Dynamic behaviour (part 2)	30
----------------------------	----

Research & Development project	60
--------------------------------	----



► Networks and Information Systems Integration

	Hours
Network and information system security	30
Wireless networks	30
Network administration and supervision	30
Script Language and web technologies	45
Distributed software architectures	45
Research & Development project	60

► Construction and Public Works

Road design and dimensioning	18
Prestressed concrete structures	30
Safety and risk prevention	30
High Environmental Quality Standards	18
Project design	18
Construction project management	30
Construction economics and management	30
Research & Development project	60

► Digital Modelling for Mechanics

In partnership with the University of La Rochelle

Mathematical tools	60
Turbulence and digital simulation	60
Scientific design for industry	60
Modelling of interacting fluid flows	60

Semester 10

→ **Final work placement**



ACADEMIC NETWORKS

Founding member



26 rue de Vaux-de-Foletier - 17041 LA ROCHELLE CEDEX 1 France
Admissions department - +33 (0)5 46 45 80 04 - admissions@eigsi.fr

www.eigsi.fr

