CENTRALE NANTES

Master of Science (MSc)

2025-2026

YEAR 2

CIVIL ENGINEERING

MATERIAL AND STRUCTURES IN THEIR ENVIRONMENT

PROGRAMME SUPERVISOR:
Giulio SCIARRA

YEAR 2 - Autumn Semester

CORE COURSES

Course code	Title	ECTS Credits	Page number
CPM	Coupled Problems in mechanics: from mathematical formulation to numerical methods	6	4
PORME	Mechanics of Porous Media	5	5
SURR	Surrogate modeling	2	6
TOME3	Tools and Methods for Research 3	5	7

ELECTIVES COURSES (two modules from a choice of five)

Course code	Title	ECTS Credits	Page number
DESIG	Design and behavior of modern concrete	5	8
DURAB	Durability and Structural Maintenance	5	9
EARTH	Earthquake Engineering	5	11
HOMMS	Homogenization Methods for materials and structures	5	12
STATI	Statistics of Materials and Structural Reliability	5	14

LANGUAGE COURSES (one module from a choice of three) *

Course code	Title	ECTS Credits	Page number
CCE3	Cultural and Communication English	2	16
ESP3	Spanish Language	2	17
FLE3	French as Foreign Language	2	18

* *'French as Foreign Language' except for French native speakers who will study 'Cultural and Communicational English' or Spanish (depending on sufficient demand).*

YEAR 2 - Spring Semester

CORE COURSES

Course code	Title	ECTS Credits
THESIS	Internship / Thesis project	30

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Coupled Problems in mechanics: from mathematical formulation to numerical methods [CPM]

LEAD PROFESSOR: Laurent STAINIER

Objectives

At the end of the course the students will have:

- Knowledge and understanding of: the challenges of coupled problems in numerical simulation, the broad classes of coupled problems, the different algorithmic approaches which are used in practice, their relative advantages and associated difficulties;
- An ability to: identify and classify coupled problems of various types, identify sources and mechanisms of coupling and their implication from a computational point of view; logically formulate an adapted algorithmic strategy for different practical coupled problems and translate the formulation to a practical computational approach using existing tools as much as possible; study independently; use library resources; solve coupled problems with existing finite element code(s).

In particular competences provided by this course will help students to approach complex problems related to heterogeneous materials subject to environmental conditions (underground CO2 storage, renewable energy production as well as land protection and natural risks prevention).

Course contents

The course will present and discuss various computational approaches for the numerical simulation of coupled problems. The course will consider the problem from the abstract point of view of coupled systems. We will identify and describe:

- The various classes of coupled problems (weak vs. strong coupling),
- The various classes of algorithmic approaches (monolithic, staggered, sequential),
- The problems and difficulties linked to field transfer.
- Examples in thermo-mechanics and poro-mechanics

Course material

- D.E. Keyes et al., Multiphysics simulations: Challenges and opportunities, International Journal of High Performance Computing Applications 27: 4 (2013).
- L. Stainier, A Variational Approach to Modeling Coupled Thermo-Mechanical Nonlinear
- Dissipative Behaviors, Advances in Applied Mechanics 46:69-126 (2013).

Assessment

Individual assessment: EVI 1 (coefficient 1)

Language of instruction	ECTS Credits	Lectures	Tutorials	Lab	Project	Exam
English	6	33 hrs	12 hrs	0 hrs	0 hrs	2 hrs

Mechanics of Porous Media [PORME]

LEAD PROFESSOR: Giulio SCIARRA

Objectives

Introduction to the kinematics of porous media. Thermodynamics and fluid transfer. Thermal effects. Saturated/partially saturated porous media. Thermo-hydro-mechanical constitutive laws. Poroelasticity. (Poro-)plastic models of sands and clays. (Poro-)viscoelasticity. Case studies.

Course contents

The course covers the characterization of constitutive laws of porous media addressing both the behavior of natural materials (as soils and rocks) and concrete. In particular a thermo-hydro-mechanical approach is proposed to account for the coupling between classical solid continuum mechanics, mechanics of multi-phase fluids and thermal effects. Competences in this domain are of paramount importance in the sustainable management of energy resources (e.g. the underground storage of CO2 or of hydrocarbons/hydrogen synthesized from renewable energies or geothermal energy exploitation), in the thermal improvement of building materials (for reducing energy bills and greenhouse gas emissions) or in the protection against natural hazards (e.g. coastal erosion, landslides, floodings). Examples will be provided to coarsely describe some of the environmental issues that can be tackled by the acquired knowledge.

The lectures will cover the following:

- Introduction to the mechanics of porous media
- Thermodynamics & fluid transfer
- Thermal effects
- Partially saturated porous media
- Poroelasticity
- Thermo-hydro-mechanical constitutive laws
- (Poro-)plastic constitutive laws for soils
- (Poro-)viscoelasticity/plasticity
- Case studies

Course material

- O. Coussy Poromechanics 2004 Wiley
- O. Coussy Mechanics and Physics of Porous Solids 2010 Wiley
- L. Dormieux, E. Bourgeois Introduction à la micromécanique des milieux poreux 2002 Presses Ecole National des Ponts et Chaussées
- L. Dormieux, D. Kondo, F.J. Ulm Microporomechanics 2006 Wiley

Assessment

- Individual assessment: EVI 1 (coefficient 1)

Language of instruction	ECTS Credits	Lectures	Tutorials	Lab	Project	Exam
English	5	22 hrs	8 hrs	0 hrs	0 hrs	2 hrs

Surrogate modeling [SURR]

LEAD PROFESSORS: Mathilde CHEVREUIL / Valentine REY

Objectives

This course is an introduction to machine learning: the role of surrogate modeling in engineering design optimization, inverse problems or uncertainty quantification is presented and the basic concepts for its construction based on observations are introduced.

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

- Classify supervised or unsupervised learning methods,
- Describe and select model classes,
- Construct a model approximation based on observed data,
- Validate the approximation,
- Use the model approximation as a surrogate model (also known as metamodel).

Course contents

The lectures will cover the following:

- Design of experiment
- Classical parametrized model classes: neural networks, polynomial chaos, gaussian process, support vector machine, reduced order models
- Learning methods
- Validation metrics and techniques for error estimation

Tutorial and homework sessions will allow the students to practice and construct metamodels on benchmarks or data bases.

Course material

- The elements of Statistical learning, H. Friedman, R. Tibshirani and T. Hastie, Springer, 2009
- Model Reduction and Approximation: Theory and Algorithms, P. Benner, A. Cohen, M. Ohlberger and K Willcox, SIAM, 2017
- Neural networks and deep leaning, M. A. Nielson, 2015

Assessment

Individual assessment: EVI 1 (coefficient 1)

Language of instruction	ECTS Credits	Lectures	Tutorials	Lab	Project	Exam
English	2	16 hrs	14 hrs	0 hrs	0 hrs	2 hrs

Tools and Methods for Research 3 [TOME3]

LEAD PROFESSOR: Giulio SCIARRA

Objectives

The purpose of this module is to introduce every single student to the research topic which will be the subject of his/her master thesis and then of his/her PhD within the framework of the research currently developed in the GeM laboratory.

Advanced bibliographic research, laboratory activity and/or theoretical and numerical modeling of physical problems in Civil Engineering could be addressed.

Course contents

The course content is defined in accordance with the research program defined by the academic responsible of the project.

Course material

The course material is established by the academic responsible of the project.

Assessment

Individual assessment: EVI 1 (coefficient 1)

Language of instruction	ECTS Credits	Lectures	Tutorials	Lab	Project	Exam
English	5	0 hrs	0 hrs	0 hrs	30 hrs	0 hrs

YEAR 2 - Autumn Semester

Design and behavior of modern concrete [DESIG]

LEAD PROFESSOR: Ahmed LOUKILI

Objectives

The aim of the course is to provide knowledge of the physical, chemical and mechanical properties of materials used in the composition of concrete. Skills in practices of concrete formulation are provided to attain a target performance with respect to the mechanical behavior of the material and its durability.

Course contents

Cement hydration. Cement hydration in the presence of mineral additives. Physical consequences of cement hydration. Microstructure of the cement paste. Delayed behavior of concrete: shrinkage and creep. Theoretical basis for the formulation of concrete. Basics of the formulation of modern concrete, quantification of their environmental impact. Fracture mechanics of concrete. Advanced experimental methods.

Course material

- Documents provided by the responsible of the course.

Assessment

Individual assessment: EVI 1 (coefficient 1)

Language of instruction	ECTS Credits	Lectures	Tutorials	Lab	Project	Exam
English	5	22 hrs	8 hrs	0 hrs	0 hrs	2 hrs

Durability and Structural Maintenance [DURAB]

LEAD PROFESSOR: Abdelhafid KHELIDJ / Giulio SCIARRA

Objectives

Concrete is the most consumed and used material in the world. It is considered in the absence of precautions as a material polluting the atmosphere because of the large amount of CO2 emitted during the calcination of clay and limestone. Competences are transferred on the use of sustainability indicators, as permeability and diffusivity of chemical species, within the framework of sophisticated models of coupled transfers of chemical species. A performance approach to sustainability of structures is discussed based on the formulation of concrete for an expected lifespan in a given environment. Non-destructive testing skills are also provided to monitor life of structures and calibrate the models to evaluate their durability.

Course contents

Part 1 – Durability

- Reminders: Presentation of concrete - Hydration reactions and various compounds
- General approach to concrete durability: Corrosion -Sulphate attack - Alkali aggregate reaction - Frost
- Permeability: Darcy Law - Poiseuille law - How to measure permeability - Klinkenberg effect - Forsheimer law - Effect of damage - Effect of crack - Effect of temperature - Effect of saturation
- Chloride Diffusion: Fick's laws (1st and second) - Bind and free chloride - How to measure chloride diffusion? (Steady/Unsteady state) - Migration & Nernst-Planck law - Effect of temperature - Effect of crack
- Carbonation: When and where? - The condition for carbonation in concrete - How to measure the depth of carbonation?

Part 2 - Experimental aspects and Macroscopic modelling of chloride transfer in cementitious materials

- Mechanisms involved during chloride ingress (chloride binding, electrostatic interaction, Electrical Double Layer (EDL), activity of pore solution
- Approaches to modelling chloride transfer in saturated concrete: Mono specie Approach (Modified Fick's Law) – Multi species Approach based on Nernst-Planck equation - Multi species approach with consideration of EDL Approaches of modelling of chloride transfer in saturated concrete
- Initiation to chloride transfer in unsaturated concrete

Part 3 - Structural maintenance

- Context on NDT: Specificity of NDT, Employment situations and requirements - Implementation of NDT versus management cases - French associations promoting NDT quality
- Generality on NDT: Non-Destructive Testing aims – Vocabulary - Inverse problem
- Basics of ultrasonic methods: Basics of wave propagation (elastic homogeneous linear isotropic) – Geometry characterization - Material properties characterization
- Classical US techniques (transmission, refraction, ultrasonic pulse echo, impact echo): principle and experimental set-up - signal processing - example of results
- Advanced US methods (tomography, surface wave, coda wave): principle and experimental set-up - signal processing - example of results
- Ground Penetrating Radar technique: Physical Principle - Data processing - Civil engineering applications
- Electromagnetic NDT techniques: Low frequency technique - Infra-red technique -Gammagraphy

Part 4 - Performance-based specifications

- Context of durability and why performance-based specifications are needed: Examples - Delayed ettringite formation - Shrinkage-induced cracking
- Deemed-to-satisfy provisions: Standards - Minimum cover - Exposure classes
- Performance-based approach of durability: Carbonation – Chlorides – Leaching - External sulphate attacks

Course material

- Documents provided by the responsible of the course.

Assessment

Individual assessment: EVI 1 (coefficient 1)

Language of instruction	ECTS Credits	Lectures	Tutorials	Lab	Project	Exam
English	5	22 hrs	8 hrs	0 hrs	0 hrs	2 hrs

Earthquake Engineering [EARTH]

LEAD PROFESSOR: Panagiotis KOTRONIS

Objectives

The purpose of the course is to raise students' awareness of the seismic risk, learn to analyze the dynamic behavior of a structure, providing the general principles of earthquake-resistant design. In particular the proper choice of safety factors is framed in the context of sustainable engineering in order to cut down unnecessary strain on resources, which in turn affects future generations. An energy-conscious and performance based design of structures is therefore proposed based on the critical adoption of new design procedures.

Course contents

Part I - Dynamics of structures – Seismic risk and seismic hazard; dynamic equation of a simple oscillator, dynamic equation of a multi-degree-of-freedom structure; modal analysis, modal superposition technique, modal spectrum analysis. Earthquake-resistant structure design according to EC8, capacity design. Nonlinear calculations. Introduction to nuclear plant design.

Part II - Soil dynamics and geotechnical earthquake engineering – Dynamic soil properties: ground motion parameters, wave propagation, ground response analysis, soil liquefaction, seismic slope stability, seismic design of foundations.

Course material

- Dynamique des structures - Application aux ouvrages de génie civil, Patrick Paultre, Hermès, Lavoisier, 2004.
- Génie parasismique. Volumes I-II-III, Betbeder-Matibet , J., Hermes sciences publ., Lavoisier, 2003.
- Dynamics of Structures, Theory and Applications to Earthquake Engineering, Anil K. Chopra, second edition, Prentice-Hall, 2001.
- M. Géradin and D. Rixen. Mechanical vibrations. John Wiley and Sons, 1997.
- Pratique du calcul sismique guide d'application de l'Eurocode. Sous la direction de V. Davidovici. Eyrolles, Afnor éditions, 2013.
- Geotechnical Earthquake Engineering, Steven L Kramer

Assessment

Individual assessment: EVI 1 (coefficient 1)

Language of instruction	ECTS Credits	Lectures	Tutorials	Lab	Project	Exam
English	5	22 hrs	8 hrs	0 hrs	0 hrs	2 hrs

Homogenization Methods for materials and structures [HOMMS]

LEAD PROFESSOR: Giulio SCIARRA

Objectives

The course deals with the characterisation of the behavior of heterogeneous materials, eventually (saturated) porous materials, and slender structures by means of upscaling methods. Upscaling techniques allow to estimate equivalent constitutive properties of a continuum describing the deformation of a body using an average coarse formulation which stems from the knowledge of the characteristics of a more refined one. Examples are ubiquitous in materials & structures of civil engineering, as for instance granular materials, beam, shell and masonry structures, but also metamaterials, where the micro-structure designed to achieve a specific goal is homogenized into average macro-scale constitutive parameters.

The competences achieved will be of paramount importance in the comprehension of response of aggregate materials according to their specific composition and the design of control strategies of structures of civil engineering in response to complex loadings.

Course contents

- Microstructural descriptors: n-Point Probability Functions, ensemble averages, ergodic hypothesis and statistical homogeneity, scale separation, notion of the Representative Volume Element (RVE).
- Averaging operations, concentration and homogenization: uniform stress (strain) boundary conditions. Hill Lemma. Reuss and Voigt bounds.
- Classical homogenization schemes for elastic and poroelastic materials.
- Asymptotic expansion method for linear homogeneous elastic structures: beams and plates.
- Justification of the Euler-Navier-Bernoulli and Love-Kirchhoff models.
- Double-scale expansion and periodic homogenization. Applications to the study of incompressible Newtonian fluid flow through a rigid porous medium (the Darcy law) and quasi-statics of saturated deformable porous media.
- Homogenization of periodic heterogeneous beams.
- Practical projects: (i) numerical homogenization of heterogeneous materials, (ii) numerical solution of the homogenization problem for a periodic beam using Abaqus.

Course material

- J.L. Auriault et al. Homogenization of Coupled Phenomena in Heterogeneous Media. (2009) Wiley
- P.G. Ciarlet. Mathematical Elasticity - Volume II : Theory of Plates. Studies in mathematics and its applications. – North-Holland, Amsterdam, 1997
- L. Dormieux, D. Kondo, F.J. Ulm Microporomechanics. (2006) Wiley
- T. Kanit et al. Determination of the size of the representative volume element for random composites: statistical and numerical approach. Int. J. Solids Structures 40 (2003) 3647- 3679
- T. Lewinski, J.J. Telega. Plates, laminates and shells: asymptotic analysis and homogenization, Vol. 52. World Scientific, 2000.
- S. Torquato Random Heterogeneous Materials (2002) Springer
- L. Trabucho, J.M. Viano. Mathematical Modelling of Rods. Handbook of Numerical Analysis, ed. par P.G. Ciarlet et J.L. Lions. pp. 487–974. North-Holland, Amsterdam, 1996.

Assessment

Individual assessment: EVI 1 (coefficient 1)

Language of instruction	ECTS Credits	Lectures	Tutorials	Lab	Project	Exam
English	5	26 hrs	12 hrs	0 hrs	0 hrs	2 hrs

Statistics of Materials and Structural Reliability [STATI]

LEAD PROFESSORS: Franck SCHOEFS / Giulio SCIARRA

Objectives

The purpose of this module is to account for uncertainties in civil engineering: risk and reliability.

Course contents

Part 1 - Introduction to probability and reliability in physical space.

- Introduction to random variables and stochastic fields.

Second order variables and iso-probabilistic transformations - Example of typical laws - Random fields properties: stationarity and ergodicity - Typical autocorrelation function and calculation technique - Maximum likelihood: identification of the parameters characterizing probability distributions and autocorrelation functions.

- Probability of failure and reliability index of Rjanytzine-Cornell, the Hasofer-Lind extension.

Statement of a reliability problem starting from the concept of limit state: safety margin, limit state function - Evaluation of the probability of failure in the analytic case - Evaluation of the probability of failure in reference conditions and relation to the Rjanytzine-Cornell reliability index - Proof of the non-general character for a non-linear limit state function - Reliability of Hasofer-Lind

Part 2 - Evaluation of the reliability index in the physical space

- Method of the ellipsoid
- Approximate methods to estimate the probability of failure and errors: Monte-Carlo/ Importance Sampling/RSM

Part 3 - Practical cases with Matlab

- Numerical implementation and simulation of stochastic fields

Part 4 - Reliability index in the standard space

- Independent variables
- Correlated variables

Part 5 -Process of random degradation and reliability

- Introduction
- Basics of reinforced concrete:
- Overview of deterioration of reinforced concrete and corresponding legal issues
- Chloride-induced corrosion: mechanisms, models and parameters
- Corrosion propagation and cracking: mechanisms, models and parameters

- Fatigue of reinforced concrete: mechanisms, models and parameters
- Coupled mechanisms

Part 6 – Optimization

- Formulation of an optimization problem

Cost function - Optimization parameters - Optimization constraints - Example of optimization problems

- Fundamental optimization concepts

Global and local minima - Taylor polynomial expansion - Gradient Vector and Hessian matrix - Optimality conditions

- Linear optimization problems

Formulation of the linear programming problem - Simplex algorithm in linear programming

- Unconstrained nonlinear optimization

Study of the optimality condition on some functions - Mechanical Examples of unconstrained minimization

- Constrained nonlinear optimization problems

Equality constraints: Lagrange multipliers - Inequality constraints

Part 7 - Limit Analysis

- (Handout) Continuum mechanics: stress vector, stress tensor, Boundary conditions, stress eigen value and vectors, Bidimensional stress state, Mohr plane and Mohr circles, Normal stress and tangential stress, Local equilibrium equation
- (Handout) General concepts of plasticity: Notions of elastic limit, Partition to reversible and irreversible strains, bounding surface, Isotropic flow criteria, Anisotropic flow criteria, failure criterion, Loading and unloading criterion, Plastic flow law, Plastic potential, Work hardening modulus and plastic multiplier.
- Bars plasticity: Local equilibrium equation, Generalized behavior laws of beams, Failure state of beams
- Fundamental theorems in plasticity

Internal and external variables - Internal and external generalized variables - Principle of virtual work - Theorem of maximal plastic work of Hill - Static approach: Lower bound theorem - Kinematic approach: Upper bound theorem

Course material

- Documents provided by the responsible of the course.

Assessment

Individual assessment: EVI 1 (coefficient 1)

Language of instruction	ECTS Credits	Lectures	Tutorials	Lab	Project	Exam
English	5	22 hrs	8 hrs	0 hrs	0 hrs	2 hrs

Cultural and Communication English [CCE3]

LEAD PROFESSOR: David TROYA

Objectives

Team-building and Communicational English:

- Understand the general concepts of team-building
- Build a team-building project
- Understand and nurture the creative process
- Enhance self-belief and self-empowerment

Behavioral skills in an inter-cultural environment:

- Strengthen self-confidence and capacity for interaction
- Develop active listening and reformulation skills
- Develop networking skills

Course contents

Cultural and Communicational English: exercises to explore in practice the areas of culture and communication

Field-related or inter-cultural project (for example, construct content for inter-cultural teambuilding activities; example WIOBOX website etc).

Course material

Written and televised press, information and digital tools, general documents business environment and company strategies. Internet conferences (Ted Talks, etc.), our own educational materials on Hippocampus (Moodle).

Assessment

Individual assessment: EVI 1 (coefficient 1)

Language of instruction	ECTS Credits	Lectures	Tutorials	Lab	Project	Exam
English	2	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

YEAR 2 - Autumn Semester

Spanish Language [ESP3]

LEAD PROFESSOR: Marta HERRERA

Objectives

For beginners:

- Practice and reinforcement of the five skills (oral and written expression and comprehension as well as interaction) - - Acquisition of vocabulary and linguistic structures
- Be able to talk about yourself and those around you Be able to express oneself during daily activities Know how to give your opinion

For advanced students:

- Practice and reinforcement of the five skills (oral and written expression and comprehension as well as interaction) Acquisition of specialised vocabulary
- Be able to understand the essential content of concrete or abstract subjects including a technical discussion Be able to communicate spontaneously and fluently
- Be able to express oneself in a clear and detailed manner, to express an opinion on a topical subject

Course contents

For beginners:

- Personal environment (introduce yourself, express yourself, your tastes, your character, your hobbies, etc.), your surroundings (friends, family, location, climate), your interests (sports, leisure)
- Present tense (regular and irregular)
- Language patterns to express habit, obligation, "gustar" and its equivalents, Possessive adjectives
- Differences between "es", "está", "hay" Use of "por" and "para"
- Adverbs and frequency patterns Numeral adjectives

For advanced students:

- Knowledge of the Hispanic world (economic, technical, cultural and social environment) Present tense (regular and irregular)
- Imperative Past tenses
- Direct / indirect style Future tense Conditional tense
- Present and past subjunctive moods

Course material

Preparation manuals, our own tailor-made documents, written and internet press, general civilization documents, digital tools

Assessment

Individual assessment: EVI 1 (coefficient 1)

Language of instruction	ECTS Credits	Lectures	Tutorials	Lab	Project	Exam
Spanish	2	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

YEAR 2 - Autumn Semester

French as Foreign Language [FLE3]

LEAD PROFESSOR : Silvia ERTL

Objectives

The objective is to familiarize the learner with the French language and French culture through an entertaining task-based communicative language teaching, focused on speaking combined with:

- Phonetics
- Self-correcting exercises on our learning platform
- Learning Lab activities
- Project work
- Tutoring

Course objectives include the acquisition and reinforcement of vocabulary, syntax, and pronunciation by both traditional means and through the use of digital resources. Students will learn general French, develop language skills of oral and written comprehension and expression.

After completing this course (32 hours + personal work), the students will be able to communicate in spoken and written French, in a simple, but clear manner, on familiar topics in the context of study, hobbies etc. Another important goal of this course is to introduce the student to French culture.

At the end of the course, complete beginners can achieve an A1 level and some aspects of the A2 of The Common European Framework of Reference for Languages. More advanced students may aim for B1/B2 levels. Those who already completed the first year of the French course will be prepared for working in a French business environment.

Course contents

Two different tracks are proposed: track 1 for students newly arrived at Centrale Nantes and track 2 for students who have completed the first year of the French course. Track 1:

Full range of practical communication language exercises: reading comprehension, listening comprehension, written expression, oral expression.

Learners will be able to use the foreign language in a simple way for the following purposes:

1. Giving and obtaining factual information:

- Personal information (e.g. name, address, place of origin, date of birth, education, occupation)
- Non-personal information (e.g. about places and how to get there, time of day, various facilities and services, rules and regulations, opening hours, where and what to eat, etc.)

2. Establishing and maintaining social and professional contacts, particularly:

- Meeting people and making acquaintances
- Extending invitations and reacting to being invited
- Proposing/arranging a course of action
- Exchanging information, views, feelings, wishes, concerning matters of common interest, particularly those relating to personal life and circumstances, living conditions and environment, educational/occupational activities and interests, leisure activities and social life

3. Carrying out certain transactions:

- Making arrangements (planning, tickets, reservations, etc.) for travel, accommodation, appointments, leisure activities
- Making purchases
- Ordering food and drink

Track 2:

This track follows on directly from the first-year French course, developing and completing the concepts studied thus far. The main themes are: housing, health and work. These topics will help prepare students for their future work environment. For example, housing is explored in the form of a search for accommodation upon arrival in a new city. Special workshops for CVs and cover letters, elevator pitches and job interviews.

Course material

Preparation manuals, our own tailor-made documents, written and televised press, internet, general civilization documents, digital tools, our own educational materials on Hippocampus (Moodle).

Assessment

Individual assessment: EVI 1 (coefficient 1)

Language of instruction	ECTS Credits	Lectures	Tutorials	Lab	Project	Exam
French	2	0 hrs	32 hrs	0 hrs	0 hrs	0 hrs

Internship / Thesis project [THESIS]

LEAD PROFESSOR : Giulio SCIARRA

Objectives

- Be exposed to and adapt to an industrial or research environment
- Put in practice the scientific and technical skills acquired in the previous semesters
- Strengthen interpersonal and communication skills
- Be part of or manage a project
- Organize tasks, analyze results and build deliverables

Course contents

Students should be pro-active and career-oriented in the search for their thesis/internship. The topics are validated by the program supervisor to ensure an adequate Master level. The thesis/internship is evaluated through the submission of a written report and an oral defense.

Assessment

Individual assessment: EVI 1 (coefficient 1)

Language of instruction	ECTS Credits	Lectures	Tutorials	Lab	Project	Exam
English	30	0 hrs	0 hrs	0 hrs	0 hrs	0 hrs