

SHAKE THE FUTURE.



ENGINEERING PROGRAMME

SPECIALISATION

CIVIL ENGINEERING
SPRING SEMESTER

UNDERGROUND STRUCTURES

CIVIL ENGINEERING, ENGINEERING PROGRAMME SPECIALISATION
SPRING SEMESTER

Professor: Giulio SCIARRA

Objectives

Design methods for standard civil engineering structures are based on more and more complex developments. For exceptional structures, the design must consider complex phenomena that traditional methods can not treat. The project is based on the numerical and/or experimental methods to study, for example, non-linear aspects of the behaviour of geomaterials, the water flow in geomaterials, the coupling between mechanical and hydraulic effects, the work phasing, soil-structure interaction, etc.

The project consists in modeling and analysing the behaviour of a civil engineering structure: tunnel, special foundation, etc.

Course contents

- Introduction to underground structures.
- Modeling of complex structures by finite elements.

Course material

Keywords

Civil engineering structures, physics, modeling, experiments

Links with other programmes

mechanics and physics of materials, structural calculations, civil engineering materials, modelling in civil engineering, reinforced concrete, geotechnical engineering.

LANGUAGE	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT
French	3	18 hrs	12 hrs	0 hrs	0 hrs

ADVANCED STRUCTURAL DESIGN

CIVIL ENGINEERING, ENGINEERING PROGRAMME SPECIALISATION
SPRING SEMESTER

Professor: Ahmed LOUKILI

Objectives

- 1) Design and justify by calculation the main structural elements of reinforced concrete.
- 2) Understand the justification for prestressed concrete components by addressing design office aspects with the current regulations.

Course contents

Following the course entitled reinforced concrete, buckling, continuous beams, special studies (slabs and other).

Course material

Keywords

Concrete Reinforcement, Eurocode

Links with other programmes

structural calculations, reinforced concrete, civil engineering materials

LANGUAGE	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT
French	3	18 hrs	12 hrs	0 hrs	0 hrs

STEEL STRUCTURES AND HIGHWAY ENGINEERING

CIVIL ENGINEERING, ENGINEERING PROGRAMME SPECIALISATION

SPRING SEMESTER

Professor: Ahmed LOUKILI

Objectives

1) This course teaches the design and justification of the calculation of the main steel elements. Students will learn the design principles for steel buildings according to the rules. The principles of the overall analysis of metal structures and assembly technology are also taught.

2) Students will also be introduced to pavement structures and materials, to understand the principle and approach to pavement design (including the Alizé calculation), catalogue of pavement structures and some developments and innovation in this area.

Course contents

1) Metal construction: Terminology of the various structural elements - Design elements under simple or compound of sollicitation tensile, compression, flexural - Design principles of the legal requirements: CM 66, EUROCODE 3 - elastic instabilities: buckling, warping and spill

2) Pavement Materials and Structures, Principle and approach to highway design, manual design calculation of highways, catalogue of pavement structures, design calculation with Alizé, catalogue comparison, example of design study

Course material

Keywords

Steel, structure, Eurocode, pavements, bituminous concrete

Links with other programmes

structural calculations, reinforced concrete, Advanced Structural Design, Modelling in civil engineering.

LANGUAGE	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT
French	3	22 hrs	8 hrs	0 hrs	0 hrs

EARTHQUAKE ENGINEERING

CIVIL ENGINEERING, ENGINEERING PROGRAMME SPECIALISATION
SPRING SEMESTER

Professor: Panagiotis KOTRONIS

Objectives

This course raises student awareness of seismic risks, and teaches them how to analyse the dynamic behaviour of a structure, to understand soil dynamics, to make nonlinear calculations and covers the main principles of earthquake resistant design.

Course contents

Outline:

Dynamics of structures

- Seismic risk, seismic zones
- Dynamic equation of a simple oscillator, solving the equation
- Dynamic equation of a multi-degree of freedom system, solving the equation
- Modal analysis, modal superposition technique, spectrum analysis
- Earthquake resistant structures design according to EC8, capacity design
- Nonlinear calculations, multifiber beams, macro element for Soil Structure Interaction

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

Acquired skills:

Calculating a structure submitted to an earthquake loading.

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.

Keywords

earthquakes, risk, Eurocode

Links with other programmes

Reinforced concrete, Strength of materials, Geotechnical Engineering, Finite element method.

LANGUAGE	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT
French	3	18 hrs	12 hrs	0 hrs	0 hrs

PROJECT 2

CIVIL ENGINEERING, ENGINEERING PROGRAMME SPECIALISATION
SPRING SEMESTER

Professor: Emmanuel ROZIERE

Objectives

To design a civil engineering work based on a real call for tender.

- To illustrate or present one particular aspect of the civil engineering field, in addition to courses, and make the most of lecture and visit opportunities.

- To present the information centres and organizations involved in construction and the environment.

To prepare engineering students to join a company by discovering the principal stages in a building project (construction and civil engineering works), related terminologies, materials and techniques, launch and costing.

Students will also study in groups a set technological subject by reading reports, contacting companies and or suppliers. This work is the subject of a written report and oral presentation to all the students.

Course contents

Following on from the civil engineering project in the first semester, the design of the structure will be checked by structural calculations and the selection of insulation material and methods should be proposed.

Course material

- Joint Technical Report, professional rules, Technical Evaluation Document

- Supplier documentation.

- Calculation software structures (Robot, etc.).

Keywords

Links with other programmes

All

LANGUAGE	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT
French	2	0 hrs	0 hrs	0 hrs	48 hrs