



# **Option Transition Ecologique et Territoires**

# **Modules Spécifiques Option Transition Ecologique et Territoires**

# Filière Bâtiments et Infrastructures



## CONSTRUCTIONS

### MECHANICS FOR THE DESIGN OF BUILDINGS

Lecturers: **Eric VINCENS, Francesco FROILIO**

| Lecturers : 14.0 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 16.0 | Project : 0.0 | Language : FR

#### Objectives

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Through this course, three construction technologies most representative of current practices are approached, namely reinforced concrete, prestressed concrete and steel construction.

The aim of this course is to provide tools for making technological choices, and calculation techniques for dimensioning beams, floors, columns as well as load-bearing walls. The European regulatory framework which should guide the engineer in the design is also addressed. All the Practical Sessions associated with these courses are supervised by professional engineers.

**Keywords :** reinforced concrete, prestressed concrete, steel construction

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#### Programme

Steel construction: 2 practical sessions (4h each)

Reinforced concrete: lectures (10h) + 2 practical sessions (4h each)

Prestressed concrete: lectures (4h)

#### Learning outcomes

#### Independent study

Objectifs :

Méthodes :

#### Core texts

Jean Perchat , *TRAITÉ DE BÉTON ARMÉ - SELON L'EUROCODE 2*, Le Moniteur, 2010

Henry Thonier *CONCEPTION ET CALCUL DES STRUCTURES DE BÂTIMENT : L'EUROCODE 2 PRATIQUE*, Presses de l'École nationale des ponts et chaussée, 2006

Jean-Pierre Muzeau, *APKMANUEL DE CONSTRUCTION MÉTALLIQUE*, Eyrolles Afnor éd., 2012

#### Assessment

1 grade from the final exam\*0.75 + 1 grade from practical sessions\*0.25



## OUVRAGES POUR LA MOBILITÉ

### TRANSPORTATION WORKS AND STRUCTURES

Lecturers: **Eric VINCENS**

| Lecturers : 12 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 8 | Project : 0.0 | Language : FR

#### Objectives

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Transportation facilities are characterised by a long linear of works in an environment often more aggressive than for buildings or by non-standard geometries requiring technological solutions which are specific to them.

Among them, we can cite works of art, railway infrastructures as well as tunnels. Here, the main principles of design and monitoring of these structures will be given to fully understand the issues specific to their mechanical behavior and their durability. The speakers are all engineers, specialists in the field.

**Keywords :** bridge, railway, tunnel

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#### Programme

Bridges: CM 4h + 1BE 4h  
Tunnels: CM 4h + 1BE 4h  
Railways: CM 4h

#### Learning outcomes

#### Independent study

Objectifs :

Méthodes :

#### Core texts

Bernard-Gely, Jean-Armand Calgaro, *CONCEPTION DES PONTS*, Presses de l'École nationale des ponts et chaussées, 1994  
Michel Leboeuf *GRANDE VITESSE FERROVIAIRE.*, Cherche midi, 2014  
Jean Sulem , Marc Panet *LE CALCUL DES TUNNELS PAR LA MÉTHODE CONVERGENCE-CONFINEMENT*, Presses de l'École nationale des ponts et chaussées, 2021

#### Assessment

Continuous evaluation, in particular through the Practical Sessions



## PROJET TET

### GCE PROJECT

Lecturers: **Eric VINCENS, Pietro SALIZZONI**

| Lecturers : 0.0 | TC : 0.0 | PW : 70.0 | Autonomy : 0.0 | Study : 0.0 | Project : 0.0 | Language : FR

### Objectives

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The project is common to the three components of the "Option". It is based on the final project of the students's diploma from the National School of Architecture of Lyon belonging to the master's program "Eco-constructive and Architecture transitions". Through this interdisciplinary work between student-architects and student-engineers, the goal is to get engineering students to invest in a reflection on economically viable solutions, adapted to a Post-Carbon Society taking into account the scarcity of resources, the necessary energy frugality in a regenerated city.

**Keywords :** home comfort, structures, foundation engineering, pollution, LCA, circular economy

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### Programme

- Work on different themes at the Habitat and City scale including the lithosphere, hydrosphere and atmosphere
- 3 project monitoring meetings by theme

### Learning outcomes

### Independent study

Objectifs :

Méhodes :

### Core texts

Marie-Hélène Contal, Jana Revedin, *ARCHITECTURES DURABLES : UNE NOUVELLE ÉTHIQUE POUR L'ARCHITECTURE ET LA VILLE*, Le Moniteur Editions, 2009  
Laurence Lestel, Catherine Carré *LES RIVIÈRES URBAINES ET LEUR POLLUTION*, Quae, 2017  
Jean-Jacques Terrin *VILLES ET CHANGEMENT CLIMATIQUE : ÎLOTS DE CHALEUR URBAINS*, Parenthèses, 2015

### Assessment

0.33 \* oral defense + 0.33 \* final written report + 0.33 \* 2 interim reports

# Filière Ville et Aménagement Durable



## CLIMATOLOGIE URBAINE

### QUALITY AND WATER TREATMENT

Lecturers: **Pietro SALIZZONI**

| Lecturers : 15 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 10 | Project : 0.0 | Language : MI

#### Objectives

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The density of buildings and the construction materials used deeply alter the exchange of heat, humidity and momentum in the urban canopy, compared to a rural environment. These modifications induce very specific thermal and microclimatic conditions, which can in turn have a profound influence on the comfort of life. This module presents the issues associated with building architecture and urban planning to minimise the climate impact of urban areas, minimise the energy consumption of buildings and maximise the comfort of urban spaces.

Keywords :

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#### Programme

Thermal comfort of urban spaces CM 11h + BE 6h  
Natural ventilation of buildings: CM 4h + BE 4h  
(4h CMs are shared with the HD Stream - Air Renewal)

#### Learning outcomes

#### Independent study

Objectifs :

Méthodes :

#### Core texts

#### Assessment



## RÉGÉNÉRATION ET RÉSILIENCE URBAINE

### GEOGRAPHIC INFORMATION SYSTEM / CLIMATE CHANGE

#### Lecturers:

| Lecturers : 17 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 8.0 | Project : 0.0 | Language : MI

#### Objectives

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Conditional on the approval of the CE

Provide an overview of the issues associated with the transformation, conversion and regeneration of urban spaces to take account of the challenges arising from climate change and the need for sustainable development.

#### Keywords :

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#### Programme

Urban hydrology CM 8h + BE 4h

Soil depollution and reclamation CM4h + BE4h

The political, sociological and economic issues involved in urban regeneration CM 5h

#### Learning outcomes

#### Independent study

Objectifs :

Méthodes :

#### Core texts

#### Assessment

Written exam: 50%  
Project reports: 50%



## **PROJET TET**

### **SOIL POLLUTION**

**Lecturers:** Eric VINCENS, Pietro SALIZZONI

| Lecturers : 16.0 | TC : 0.0 | PW : 4.0 | Autonomy : 0.0 | Study : 4.0 | Project : 0.0 | Language : FR

### **Objectives**

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Keywords :

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#### **Programme**

#### **Learning outcomes**

#### **Independent study**

Objectifs :

Méthodes :

#### **Core texts**

#### **Assessment**

# Filière Habitat Durable



## CONFORT DE L'HABITAT

### BUILDING COMFORT

Lecturers: **Eric VINCENS**

| Lecturers : 16 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 12.0 | Project : 0.0 | Language : FR

#### Objectives

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This course will aim to provide the tools to understand the physics of the building envelope and quantify the performance of the Habitat with regard to comfort, both in winter and in summer, in a world constrained by requirements increasingly stringent in terms of regulation.

**Keywords :** Thermal comfort, air renewal, light

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#### Programme

- Thermal of environments, systems and individuals: CM 12h + 3 BE
- Air renewal: 4h CM shared with VAD "filière"

#### Learning outcomes

#### Independent study

Objectifs :

Méthodes :

#### Core texts

Malek Jedidi, Omrane Benjeddou, *DU CONFORT THERMIQUE AU CHOIX DES ÉQUIPEMENTS DE CHAUFFAGE ET DE CLIMATISATION*, Dunod, 2016  
Jean-Pierre Moya *ISOLATION THERMIQUE DURABLE DES BÂTIMENTS EXISTANTS - CHOIX MULTICRITÈRES - MANUEL PRATIQUE*, Le Moniteur Éditions, 2018  
Bureau Veritas *ISOLATION THERMIQUE ET ACOUSTIQUE DES BÂTIMENTS : RÉGLEMENTATION, PRODUITS, MISE EN OEUVRE*, Le Moniteur Éditions, 2017

#### Assessment

1 grade from the final exam \*0.67 + 1 grade from the Practical Sessions de projet \*0.33



## ENERGIES RENOUVELABLES

### RENEWABLE ENERGY SYSTEMS

Lecturers: **Eric VINCENS**

| Lecturers : 22.0 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 0.0 | Project : 0.0 | Language : FR

#### Objectives

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Our excessive dependence on fossil fuels to think of the building differently for greater sustainability. The idea of an autonomous or positive energy building is now a reality thanks to a better integration of renewable energy sources. The operation, integration and use of these sources used alone or in combination will be developed and illustrated through examples.

**Keywords :** heat pump, diagnosis, solar and photovoltaic panels

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#### Programme

- Heat pump: CM 4h
- Photovoltaic - thermal panels: CM 6h
- Diagnosis and energy performance of the Habitat: CM 12h

#### Learning outcomes

#### Independent study

Objectifs :

Méthodes :

#### Core texts

Bruno Béranger, *LES POMPES À CHALEUR*, Eyrolles Environnement, 2013  
Anne Labouret, Michel Villoz *ÉNERGIE SOLAIRE PHOTOVOLTAÏQUE*, Dunod, 2009  
Peuser Felix, Remmers Karl-Heinz, Schnauss Martin *INSTALLATIONS SOLAIRES THERMIQUES - CONCEPTION ET MISE EN OEUVRE*, Observ'er, 2005

#### Assessment

Continuous evaluation



## PROJET TET

### GBD PROJECT

Lecturers: Eric VINCENS, Pietro SALIZZONI

| Lecturers : 0.0 | TC : 0.0 | PW : 80.0 | Autonomy : 0.0 | Study : 0.0 | Project : 0.0 | Language : FR

### Objectives

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The option project is common to the three streams. It is based on the final project of the students' diploma from the National School of Architecture of Lyon involved in a master's degree in "Eco-constructive and Architecture Transitions ". Through this interdisciplinary work between student-architects and student-engineers, the goal is to get engineering students to invest in a reflection on economically viable solutions, adapted to a Post-Carbon Society taking into account the scarcity of resources, the necessary energy frugality in a regenerated city.

**Keywords :** home comfort, structures, foundation engineering, pollution, LCA, circular economy

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### Programme

- Réflexion sur différentes thématiques à l'échelle de l'Habitat et de la Ville incluant la lithosphère, l'hydrosphère et l'atmosphère
- 3 réunions de suivi de projets par thématique

### Learning outcomes

### Independent study

Objectifs :

Méthodes :

### Core texts

Marie-Hélène Contal, Jana Revedin, *ARCHITECTURES DURABLES : UNE NOUVELLE ÉTHIQUE POUR L'ARCHITECTURE ET LA VILLE*, Le Moniteur Editions, 2009  
Laurence Lestel, Catherine Carré *LES RIVIÈRES URBAINES ET LEUR POLLUTION*, Quae, 2017  
Jean-Jacques Terrin *VILLES ET CHANGEMENT CLIMATIQUE : ÎLOTS DE CHALEUR URBAINS*, Parenthèses, 2015

### Assessment

0.33 \* oral defense + 0.33 \* final written report + 0.33 \* 2 interim reports