



TROYES CAMPUS



Sustainable Engineering & Architecture

#ARCHITECTURALPROGRAMMING #SUSTAINABLEANDFUTURECITIES
#SMARTGRIDS #DIGITALSIMULATION #BUILDINGANDCITYINFORMATIONMODELING
#EUROCODESTRUCTURALDESIGN #BIO-BASEDMATERIALS
#ENERGYEFFICIENCY #PASSIVEBUILDING #SMARTBUILDING



ENGINEERING SCHOOL
Creating the future together



COURSE OBJECTIVES

The Sustainable Engineering & Architecture major will provide you with a core set of skills to meet the challenges of building sustainable cities and buildings, in light of the energy and digital transitions.

The learning objective of the major is to **prepare generalist engineers capable of designing buildings and urban environments using new technologies in a creative way while incorporating sustainability considerations.**

It is a multidisciplinary course that provides engineers with a global vision that includes cross-disciplinary skills: energy efficiency, building structures, comfort and urban planning, enabling the design of buildings

and cities for a sustainable future in compliance with current regulations, while being in harmony with the environment and ensuring an optimal level of comfort.

Theoretical knowledge is complemented by training in the digital tools necessary for modelling buildings and cities.

The academic programme is designed to develop both soft and hard skills and is enhanced by real-life projects and work experience to achieve a profile of a responsible engineer with multiple career opportunities.

COURSE DESCRIPTION

The Major in Sustainable Engineering & Architecture spans two academic years structured around two academic semesters and two semesters of internships: a student-engineer internship in Year 4 and a 'final year project' internship in Year 5.

YEAR 4 . COMPULSORY MODULES

Urban planning	64 hours 5 ECTS
<ul style="list-style-type: none">• Land-use planning• GIS (Geographic Information System)• Complex urban project• Architectural programming	Gain in-depth knowledge of land-use planning tools and techniques to meet the challenges of sustainable urban development and to develop local/regional strategies.
Architecture	64 hours 5 ECTS
<ul style="list-style-type: none">• Architectural analysis• Bioclimatic architecture• BIM I: digital modeling (Autocad 8h/Sketchup pro 6h/Revit Archi 14h/Twin motion 4h)	Develop the skills necessary to design buildings and public spaces with a focus on building-climate interaction & environmental standards. Become familiar with software for producing 2D plans and 3D models. Learn about the concept of digital modeling: BIM (Building Information Modeling) levels 1 and 2.
Building structure	64 hours 5 ECTS
<ul style="list-style-type: none">• Resistance of building materials• Design of concrete structures• Design & renovation of buildings• Soil, foundations & geotechnical works	Acquire basic knowledge of building structure, building materials and in particular eco-materials, soil and a review of the basics of structural design.
Energy transition in the building sector	64 hours 5 ECTS
<ul style="list-style-type: none">• Physical acoustics• Advanced thermal engineering• Renewable energy• Lighting for buildings	Develop an understanding of advanced acoustics, thermal and lighting concepts in buildings by using renewable energy to improve energy efficiency.
Engineering knowledge	64 hours 5 ECTS
<ul style="list-style-type: none">• Sustainability and Life Cycle Assessment (LCA)• Traditional and bio-based construction materials• VBA programming• Digitalization of existing buildings & 3D printing	Acquire cross-disciplinary skills, new tools and essential methods for a future engineering career.
Project	150 hours 5 ECTS
Project: from architectural programming to the proposal of a digital model	
Integration into the world of work & networking	

YEAR 5 . COMPULSORY MODULES

Sustainable cities	64 hours 5 ECTS
<ul style="list-style-type: none">• Sustainable cities• Smart city• Smart grid & auto-consumption• Surveying & understanding cities in practice• CIM (city information modeling)	Understand the basic concept of smart cities taking into account the new socio-economic, digital and energy challenges.
Digital transition & architecture	64 hours 5 ECTS
<ul style="list-style-type: none">• BIM II: multidisciplinary (MEP/structure)• BIM III: collaborative project• Dynamic thermal simulation (DTS)• Smart building	Acquire advanced notions of Building Information Modeling (BIM level 3) in a multidisciplinary collaborative framework around the digital model serving as a design and simulation tool.
Design & renovation according to Eurocode standards	64 hours 5 ECTS
<ul style="list-style-type: none">• Wooden structure• Steel-framed structure & seismic design• Finite element methods• Digital simulation (robot structural analysis)	Know how to calculate structures and check the dimensions of existing buildings under the effect of static and dynamic loads in compliance with the standards in force.
Building energetics	64 hours 5 ECTS
<ul style="list-style-type: none">• Building energy efficiency• Building acoustics• Energy equipment	Be able to include the dimension of indoor and outdoor comfort in the design and renovation of buildings with HVAC equipment.
Employability	64 hours 5 ECTS
<ul style="list-style-type: none">• Employment law• Risk management• Business engagement & networking (conferences and visits)• Construction economics & financial analysis of projects	Learn project management tools that integrate risk, quality and sustainable development aspects while taking into account the legislation concerning employment law.
Project	150 hours 5 ECTS
Building energy audit	
Calculation/renovation of building structures	



YOUR FUTURE AFTER THE SUSTAINABLE ENGINEERING & ARCHITECTURE MAJOR:

GROWTH SECTORS

- Leading construction groups
- Energy efficiency design offices
- Energy auditing and consulting firms
- Architectural planning offices
- Technical control offices
- Architecture and urban planning agencies
- Public or private research organizations in the energy, building and urban planning sector
- Local and regional authorities

JOBS OF THE FUTURE

- Architectural programming engineer
- BIM manager (Building Information Modeling)
- Planning, scheduling and coordination engineer
- Technical design manager: EEB (Energy Efficiency in Buildings) and materials engineer
- Technical design manager: Environmental Quality in Buildings and materials engineer
- Project manager - Technical expert / Consulting engineer
- Certification project manager / auditor
- Works manager

REAL-WORLD PROJECTS TO DEVELOP YOUR EMPLOYABILITY

In Years 4 and 5, the projects used to challenge our student-engineers will give you the opportunity to put into practice the knowledge acquired during the semester in real-world situations on the topics of architectural programming and design, urban development, sustainable renovation and building energy audits.

You will carry out these projects in collaboration with engineering offices and local authorities.

ENGINEERING STUDENT INTERNSHIP

IN FRANCE

In Urban Planning («Parcours d'excellence»)

- CentraleSupélec: Master's degree in Sustainable Planning and Construction
- Sciences Po: Master's degree in «Stratégies Territoriales et Urbaines»; Master's degree in «Governing the Large Metropolis»; Master's degree in «Governing Ecological Transitions in European Cities».

ABROAD

In Architecture

- «Civil Architect Engineer» program with the University of Liège (Belgium)

In Civil Engineering

- Master's degree in Civil Engineering with the University of Quebec (UCAC) (Canada)



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Thibault BOURLAND

2022 Graduate

“ I came to EPF with an undergraduate degree after a Physics & Technology preparatory course, so I had a year to choose my major. I’m currently in my 4th year, in the Engineering & Sustainable Architecture major and I have been able to discover needs analysis as well acquiring a sound command of tools through project management.

During my internship, I worked with the *Patrimoine Bâti 4.0* Cluster, which is a group of local actors working on the renovation and modernization of the built heritage. I have really appreciated the support of the professors, who are always available to help us in our choices and our career orientation. ”

PRACTICAL DETAILS

- **Duration of studies:** 2 years
- **Location:** Troyes Campus

ANY QUESTIONS?

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