

Thermal Engineering and Heat Transfer

Direction de l'enseignement

Department –

Bachelor in Infrastructure and Transitions

École nationale des ponts et chaussées is recruiting a lecturer to serve as coordinator for the module Thermal Engineering and Heat Transfer.

This course is part of the Bachelor in Infrastructure and Transitions. This call for applications is launched as part of the creation of a new teaching module.

This position is held as secondary employment and is remunerated on an hourly teaching basis.

Context

École nationale des ponts et chaussées is developing, jointly with Universidad Politécnica de Madrid (as degree-awarding party) and with İstanbul Teknik Üniversitesi (as mobility partner), the *Bachelor in Infrastructure and Transitions – Bachelor of Science and Engineering*. This three-year, 180-ECTS programme is taught in English and provides an international education in civil engineering and infrastructure, with a particular focus on ecological and digital transitions. The first two academic years, delivered at ENPC, establish the scientific, technical, digital and methodological foundations required for the subsequent study of civil engineering systems and sustainable infrastructure.

Thermal Engineering and Heat Transfer is part of the civil engineering sciences component of the third semester of the programme. This course introduces the physical principles governing thermal phenomena and energy exchanges in engineering systems. Students learn to describe thermodynamic states, formulate simple energy balances, and analyse the main modes of heat transfer. The course emphasises physical interpretation, simplified modelling, and engineering orders of magnitude, in order to prepare students for later work in building physics, energy efficiency, and thermal rehabilitation.

Module « Thermal Engineering and Heat Transfer »

Public

The Bachelor welcomes a small international cohort of around 40–60 students from different educational and cultural backgrounds. The programme is taught entirely in English and is designed for students with a solid scientific background and a strong interest in engineering, infrastructure and sustainability.

Students are beginning their second year of higher education and have completed the core scientific and methodological foundations of Year 1. Semester 3 marks the transition towards engineering systems, with greater emphasis on applied sciences, civil engineering, data analysis and the interpretation of real engineering situations. Students are expected to mobilise knowledge acquired across several disciplines and to work with increasing autonomy.

Timetable

42 hours are reserved for this course in the students' timetable, in the third semester (September - January). These hours can be devoted to teaching (courses and tutorials) but also to other types of educational activities (practical work, discussion and correction of work done at home, tutored or non-tutored group work, etc.); See the pedagogical information below. Exams and defenses must be organized in these slots.

The course is credited with 4 ECTS credits (European credit transfer system) which corresponds to a total volume of work per student (attendance in class and personal or group work outside sessions) of between 100 and 120 hours. The work to be done outside the timetable must therefore be calibrated for between 58 and 78 hours.

Objectives

Upon completion of this module, students should:

- Understand thermodynamic systems and state variables, the first-law energy balance, the mechanisms of conduction, convection and radiation, and the concepts of thermal resistance, energy losses, efficiency and simplified thermal performance.
- Formulate and apply energy balances to simple thermal systems; analyse basic heat-transfer situations; interpret thermal losses, resistance and efficiency; use heat-transfer laws to discuss the behaviour of buildings and technical systems; and assess the assumptions and limits of simplified models.

Course content

The main teaching content is outlined below:

1. Thermodynamic systems and state variables: open and closed systems, equilibrium, intensive and extensive variables
2. Energy conservation and balances: internal energy, work, heat, simple closed and open systems
3. Heat transfer mechanisms: conduction, convection, radiation, dominant effects
4. Thermal performance and efficiency: useful energy, losses, resistance, insulation
5. Engineering applications: buildings, walls, pipes, containers, simplified thermal modelling

Where a module provides prerequisites for another module, close coordination between the relevant module coordinators is expected in order to ensure continuity of learning and maintain the overall coherence of the curriculum.

Specific pedagogical guidance for this module

The creation of this module is intended to ensure disciplinary rigour, progressive learning and coherence across the curriculum. This is the first course in the programme specifically devoted to thermal engineering and heat transfer. Students are therefore being introduced to a new disciplinary field, and particular attention should be paid to establishing clear physical foundations and a coherent engineering vocabulary. The module provides the essential basis for S4-UE2 Rehabilitation, Energy Efficiency and Thermal Comfort, where these concepts will be applied to building performance and rehabilitation. Close coordination between the two modules is therefore important, both in terms of scope and progression, to ensure continuity and avoid unnecessary overlap or gaps.

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Selection procedure

The application file shall include:

- a CV (in particular specifying teaching experience and including a list of any publications)
- a course proposal including in particular:
 - a restatement of the objectives
 - the content and syllabus
 - the bibliography (and webography)
 - the methods used to assess students' learning outcomes
 - the organisation (teaching methods, planned course materials, proposed teaching team, possible guest lecturers)

- the module description sheet (in French and English), which will appear in our course catalogue if your application is selected. You will find the Word template [HERE](#).

The application file should be sent via the link:

<https://forms.studizz.fr/forms/6aad319973efc4423f0440fc>

The deadline for receipt of applications is 15-nov-2026. Candidates whose applications have been shortlisted will be interviewed by a jury convened by the Bachelor in Infrastructure and Transitions. The jury may include members from outside the ENPC.

Additional information

Contacts

For any questions regarding the application or the module, candidates may contact:

European-bachelor@enpc.fr

Role of the module coordinator

The module coordinator is responsible for forming and leading their teaching team: occasional guest lecturers, teaching staff and tutorial instructors. External contributors may therefore be involved to deliver certain sessions, take responsibility for tutorial groups, or provide tutoring in person or remotely. The module coordinator must nevertheless be sufficiently available throughout the teaching period. They are responsible for the coherence of the course and for the quality of the course as a whole.

Responsibility for the module includes sending the École administration all the information required to determine and reserve the necessary logistical resources (rooms, software, visits, remuneration of contributors, etc.).

The module coordinator ensures that the online description of the module is accurate (see <https://educnet.enpc.fr>); they inform students and programme coordinators in writing of any significant change during the year, in particular any change to the methods used to assess learning outcomes.

They are committed to the continuous improvement of the course. At the end of each edition of the course, they take part in the evaluation committee, which brings together a student representative, the module coordinator (accompanied, if they wish, by members of their teaching team), the programme coordinator and a pedagogical adviser; they inform their team of the committee's conclusions.

As far as possible, they take part in meetings of teaching staff to which they are invited, in particular department councils and the teaching staff day, and take an interest in the different aspects of their students' education (the programme to which the course belongs, other courses in the programme, student projects, internships, etc.).

Every module coordinator may be asked to support students during an internship, final-year project or professional thesis, in their field of expertise, as an École tutor. This support is subject to specific remuneration.

Common pedagogical guidance at École des Ponts

Alignment of learning objectives and assessment of learning outcomes

The most important thing is not what has been taught, but what the student has learned. Learning objectives express what the student must have acquired by the end of the module, what they must know and what they must be able to do. Learning objectives form the basis of the pedagogical contract linking the programme coordinator, the module coordinator and the student. This is why you are asked to reformulate these objectives in your proposal. Once validated, the objectives will serve as the basis for building your learning-outcomes assessment system (how will I make sure that students have, to a greater or lesser extent, acquired what they were expected to acquire?) and will serve as the basis for our evaluation of course quality (does this course achieve the objectives assigned to it for the great majority of students?).

Students often express a need to understand the purpose of the activities required of them as part of their education. This purpose lies in the proper alignment between learning activities (what students do in the module), learning objectives (what they must know and be able to do at the end of the module) and programme objectives (the professional competences to whose development this module contributes).

Student engagement and autonomy

The École pays particular attention to students' engagement in their learning and to the development of their autonomy. Teachers are therefore expected to encourage autonomous student work, whether individual or in groups. The work expected outside class sessions must be made explicit, supported where appropriate, and assessed. Teaching approaches are encouraged that:

- encourage students to start working very early and place them in the position of active participants in their own learning;
- provide students regularly with information on the quality of their work;
- are based on real situations and enable students to connect the knowledge or know-how acquired with their future professional practice;
- use digital tools to promote continuity between in-class and out-of-class work; at a minimum, course materials are expected to be made available in digital format on the educnet.enpc.fr platform.

Correction of student work

Every assignment must receive feedback or correction (whatever the form: written or oral, individual or collective) that enables students to know where they stand in their learning and to use this information to make progress. All the more so, graded work must receive feedback that enables students to understand their grade. If it is an intermediate assessment, the correction must be provided before the final examination. A resit arrangement must be provided for students who have not passed the module. Examination scripts are returned to the École after correction.

Teaching in English

The Bachelor is taught entirely in English, including in-person teaching, assignments, assessments and oral defences. All exercises and teaching materials must be prepared and provided in English. All communication with students in connection with teaching and learning activities must also be conducted in English.

Course materials

Teachers are encouraged to produce a structured and fully written course handout and to distinguish it from the visual materials used in their oral presentations (slides). Unlike slides, which are not normally intended to be printed, the course handout may be printed by the reprographics service. It may also be distributed, in one or more blocks, on the École des Ponts teaching platform, <https://educnet.enpc.fr>. It is strongly recommended that all course materials be made available to students in digital format on the [educnet](https://educnet.enpc.fr) platform.

It is often useful to produce a syllabus that reproduces the standardised course description as it appears online in our course catalogue at <https://educnet.enpc.fr> and supplements it with more precise information on what is expected of students. For example: details of readings or work to be completed before each session, clarification of what forms the core of the learning and what is provided for information or cultural enrichment, details of assessment methods, submission dates, etc.

Other forms of materials may be created with support from the Teaching Engineering and Innovation Service (S2iP). For example: video capsules (lectures, exercise corrections, laboratory experiments),

self-positioning or self-assessment quizzes, wikis and forums. The development of e-learning opens up new possibilities for enriching courses and for autonomous student work, which teachers are encouraged to explore. If this seems relevant to you, teaching delivered partly or entirely at a distance may be considered.

It is also possible to use pre-existing materials: books and manuals, websites, etc. The documentation service is available to help you find these resources.

Support provided by the École

The teaching departments and programme coordinators are the primary contacts for teachers on matters relating to course content and to students enrolled in the course.

The Teaching Engineering and Innovation Service (S2iP) supports teachers on request. It can support pedagogical design (drafting the module description and syllabus, reflection on learning-outcomes assessment), facilitate the use of digital tools (educnet platform, electronic voting devices, digital boards) and co-produce learning resources intended for autonomous learning (videos, quizzes). Contact: contact-s2ip@enpc.fr.

A website dedicated to teaching, <https://pedagotheque.enpc.fr>, provides teachers with information on the tools available to them, highlights interesting teaching initiatives, and offers opportunities for teachers to meet (lunchtime teaching sessions, thematic workshops, training). A teacher's guide is available to you: [HERE](#).