

Energy and Indoor Environment

Subject area: Civil Engineering/Architecture

University:	CTU
Level:	BA4, MA1, MA2, PhD
Teaching mode:	blended: mostly online, but presence on campus required in certain period
Instructor(s):	prof. Ing. Karel Kabele, CSc. course guarantee Ing. Pavla Dvořáková, Ph.D. Ing. Zuzana Veverková, Ph.D.

Short description

The course introduces students to the theoretical and applied background of the aspects of indoor environmental quality (IEQ) and energy performance of buildings. We will learn about the different components of the indoor environment, their effects and human perception, their impact on productivity and health in the context of the basic principles of energy use for the creation of the indoor environment in technical systems for heating, cooling, ventilation and air conditioning etc.

Full description

The course will introduce the students to the theoretical background of indoor environmental quality (IEQ) aspects and interaction with building energy performance. It familiarizes students with particular components of indoor environment, their effects and perception by a human, its effect on productivity and though on economic benefits of better IEQ. For four main IEQ components- thermal comfort, indoor air quality, lighting and acoustics – in seven lectures it gives definitions, describes modelling, important ideas and values for the design, way of possible assessment and effects of discomfort. In each of these lectures a relevant list of valid standards is available.

During several seminars students will experience IEQ assessment on their own using different measuring instruments, working with valid standards to assess the quality of different IEQ components either in the lecture hall or in a lab.

On top of that the students will work on individual projects. Students will have to select at least three different building types. They will try to do IEQ and energy assessment for these spaces. Their conclusions will be based on available documentation and individual findings. Examples of buildings to be investigated within the project: University spaces, students' dormitory, theatre, exhibition hall, railway station, shopping centre, gym, library, church, cinema...

Course is concluded by submission of final report and presentation of the project.

Main topics of lectures:

1. Energy and buildings
2. Thermal Comfort
3. Indoor Air Quality
4. Acoustical Comfort

5. Light Comfort
6. Psychological comfort
7. IEQ assesment methods

Learning outcomes

Students will

- identify, formulate and solve indoor environmental quality and energy performance of buildings problems.
- analyze thermal comfort, air quality, light quality and other IEQ components using observation, measurement and questionnaires
- classify and differentiate energy use in technical building systems for building operation
- judge and critique energy performance of building and indoor environmental quality
- design measures to improve energy performance of building and indoor environmental quality

Recommended in particular for students of the following study programmes

Buildings and Environment Architecture Architectural Engineering Built Environment Civil Engineering Intelligent buildings

General information

Contact hours per week: 2 hours/ week at specific time, 2 hours/week self study, 6 hours work on the project - Presence on campus, 6 hours lab-works - Presence on campus

Total workload: 70 (in student hours for the whole course)

ECTS credits: 2

Language: English

Course start date: 20 February 2023

Course end date: 28 May 2023

Add. info about start date: Start course date refers to starting date of spring semester at CTU. Schedule will be available 1 or 2 weeks before semester starts.

Weekly teaching day/time:

Time zone: CET (Denmark, Germany, France, Netherlands, Switzerland, Czech Republic)

Further information: Presentations slides (pdf version) will be available for the students. On-line consultation hours every week.

Prerequisites: Basic knowledge of the field

- building typology
- structural design of buildings
- building physics
- principles of technical systems of heating, cooling, ventilation, water supply and waste water disposal

Activities and methods: Lectures, Lab-work, Self-study
Presence on campus: Lab-work and work on project 12 hours in 5 days in the 13th week of the semester or 1st week of exam period 29.5.2023-.2.6.2023)

Final examination

Form: project
Date:
Location/format:
Re-sit possibility:
Transcript available: end of semester
Add. info/requirements: The students will work on individual projects during the semester. Students will have to select at least three different building (room) types. They will try to do IEQ and energy performance assessment for these spaces. Their conclusions will be based on available documentation and individual findings. Examples of buildings to be investigated within the project: University spaces, students' dormitory, theatre, exhibition hall, railway station, shopping centre, gym, library, church, cinema...
Course is concluded by submission of final report and presentation of the project.

Registration

To register for this course, follow the registration requirements of your **home university** as specified here: www.euroteq.eu/courses-registration.

Administration

Number of places: 10
Minimum participants: 3
Internal course code: 125TIE
Contact: kabele@fsv.cvut.cz

This course is part of the EuroTeQ Engineering University joint course catalogue 2023. This is a collaborative activity of the partner universities DTU, L'X, TU/e, TalTech, CTU, TUM as well as Technion. Students from these universities can participate in the offered courses. It is the responsibility of the student to check if you fulfil the requirements to participate in a specific course. Students are also advised to check with their home institution how to get recognition of the ECTS credits gained in courses of the EuroTeQ course catalogue. For further information about EuroTeQ Engineering University, visit www.euroteq.eu or get in touch with the above-mentioned point of contact.