UNIVERSITÀ DEGLI STUDI DI TRIESTE

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SUBJECT 0

Course chart

Course **Structural and Technological Design of Building Envelopes**

0.1

Course goals

Themes

The Course aims to develop students' critical ability to identify and define the requirements and performance capabilities of modern high-efficiency building envelope systems, while providing them with the knowledge required to make appropriate and technologically feasible design decisions.



Themes

The **structural module** (8 hours) addresses the load path from the facade to the primary structure, focusing on environmental actions (wind and thermal loads according to Eurocodes) and structural materials (aluminum, steel, and structural glass mechanics).

The **technological module** (16 hours) focuses on both market-mature facade systems (curtain walls, double skins, ventilated facades) for new constructions and advanced deep energy retrofit strategies for existing buildings.

0.2

Course structure

Themes

COURSE LECTURES

The course will combine **theoretical lectures** and **seminar-based sessions**.

The lecturers will take turns delivering the Tuesday sessions according to a predetermined **schedule**, which will be updated as necessary.
Each session will follow a coherent progression designed to connect and integrate the **course content** across the different subject areas.
Throughout the sessions, lectures will alternate with social and **collaborative learning activities**, as well as open and **spontaneous discussions**, encouraging **active participation** and interaction among students and lecturers.

Evaluation

EXAM

The examination covers the content of the courses HVAC Load Calculation, HVAC System Design, and Structural and Technological Design of Building Envelopes (588MI).
With regard to this course, assessment consists of an oral examination held upon completion of the course.

The oral examination is intended to assess the student's technical accuracy and substantive understanding of the topics covered (50% of the final mark), the methodological soundness of the approaches adopted in developing solutions to design problems (30%), and the appropriate and accurate use of technical terminology (20%).

Contacts



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Office hours and teaching support: by appointment, after class.

0.3

Time schedule

Schedule

month	week	day	time	hours	Teacher	Argument	Meaning
SET	2	29	15-17	2	Carlo A Stival	Introduction	Course chart. Time Schedule. Course agreement. Topics.
	3	6	15-18	3	Carlo A Stival	Ventilated Facades and Energy Retrofit Strategies (1)	Ventilated Facades (Rainscreen Cladding): Operating principles, stack effect in the air cavity, cladding materials, sub-structures, and open/closed joint management.
	4	13	15-17	2	Carlo A Stival	Ventilated Facades and Energy Retrofit Strategies (2)	Application of external thermal insulation composite systems (ETICS) and ventilated facade over-cladding onto concrete/masonry buildings.
OTT	5	20	15-18	3	Carlo A Stival	Thermal Mass & Active Solar Control	Phase Change Materials (PCM): Latent heat storage principles, incorporation methods in opaque envelopes (PCM-enhanced plasterboards, sandwich panels). Smart Glazing Systems: Passive solutions: Thermochromic and photochromic glass. Active solutions.
	6	27	15-18	3	Chiara Bedon	Actions and Loads on Building Skins	Overview of the envelope load path to the main building structure. Structural analysis of wind actions according to Eurocode 1 (EN 1991-1-4): pressure/suction coefficients, local effects on corners. Thermal movements, expansion joints, and seismic interactions between the facade grid and primary structure
NOV	9	17	15-18	3	Chiara Bedon	Structural Materials and Glass Mechanics (1)	Properties and structural behavior of facade materials: Aluminum alloys, structural steel, and stainless steel fasteners. Fundamentals of structural glass design: types of glass, and post-breakage behavior. Concepts of Structural Sealant Glazing (SSG) and point-fixed glass systems.
	10	24	15-18	3	Carlo A Stival	Curtain Walls & Double Skin Facades	Curtain Walls: Continuous framing systems, thermal break technology, air/water tightness details. Double Skin Facades (DSF): Typologies, airflow physics (stack effect), and mechanical/natural ventilation modes
DIC	11	1	15-18	2	Chiara Bedon	Structural Materials and Glass Mechanics (2)	Concepts of Structural Sealant Glazing (SSG) and point-fixed glass systems. Application: Sizing calculation example of a curtain wall vertical mullion under wind and dead load actions.
	13	15	15-18	3	Carlo A Stival	Renewable Integration and Adaptive Systems	Building-Integrated Photovoltaics (BIPV): Technologies (crystalline silicon vs. thin-film), architectural integration. Shape Memory Alloys/Materials (SMA) & Variable Configuration Materials. Kinetic Facades.

0.4

Students and teachers

«Behavioral guidelines»

TEACHER

- Is committed to being punctual and to **adhering to the agreed schedule**.
- Provides **adequate advance notice** of any **changes** to the **schedule** (e.g., attendance at conferences, conflicts with specific deadlines, etc.).
- Respects and is **attentive** to **students**' **needs**.
- Presents the course topics clearly, providing all necessary explanations, and makes **lecture materials** and **outlines available** to students.
- Ensures appropriate **availability** to students
- Actively **engages students** throughout the teaching and learning process.
- **Assesses** the work undertaken by students **fairly** and **objectively**.

«Behavioral guidelines»

STUDENTS

Enrol on the course (**Moodle** and **Microsoft Teams**) by **13 October 2026**.

Attend classes punctually and comply with the **procedures** and **deadlines** for **registering** for **examinations**.

Attend classes **regularly** and **actively**, engaging attentively with the material presented. Supplement the content covered in class with the recommended bibliography and reference materials, and **catch up independently on any classes missed**.

Ask for clarification whenever a concept is difficult to understand or has not been explained clearly by the lecturer.

Provide **objective** and **constructive feedback** when completing the final course evaluation questionnaire.