CIV-E1010 Building Materials Technology (5 cr)

Course Syllabus

13.09.2021 - 28.10.2021

1. Course information

Status of the Course: Programme Name: Building Technology
Major studies; Construction and Maintenance
Level of the Course: Aalto Eng, Master degree course
Teacher in charge: Fahim Al-Neshawy, D.Sc. (firstname.surname@aalto.fi), Office – R249
Teaching Period: Autumn 2021 (Period I)
Registration for Courses: Registration to course using SISU - https://sisu.aalto.fi/
Language of Instruction: English

2. Learning outcomes

Upon successful completion of the course, students will gain:

- Knowledge:
  - Students gain a comparative knowledge on the basic properties of the most common building materials composition, properties and applications in buildings and structures
- Skills:
  - Students apply the gained knowledge to perform testing and performance evaluation for common building materials
- General competence:
  - Students understand how manufacturing processes affect the properties and the characteristics of building material
  - Students gains knowledge about the sustainability of building materials

3. Course content

This course offers an introduction to the common building materials, properties and their applications. The course is divided into the following topics:

1. Fundamental properties of building materials
2. Wood and structural timber
3. Aggregates for concrete and bituminous mixtures
4. Masonry bricks construction
5. Cementitious materials, concrete, and reinforcement steel
6. Bituminous materials and their applications
7. Sustainable use of building materials

4. Teaching and learning methods

The course includes the following learning methods and activities:

- Lectures and weekly exercises
- Laboratory demonstrations of the common building materials tests (subject to change because of COVID-19)
- Written exam at the end of the course

4.1 Lectures and weekly exercises schedule (subject to change)

The course includes 10 lectures covering the contents of the course as shown in the table below. Lecture notes and presentation slides will be added on myCourses as the course proceeds.

Lectures

Part I - Basic principles: material structures and properties				
1	Monday	13.09.2021	14.15–16.00	Microstructure of building materials
2	Tuesday	14.09.2021	10.15–12.00	Properties of building materials
Part II - Individual types and classes of materials				
3	Monday	20.09.2021	14.15–16.00	ORGANICS - Bituminous materials
4	Tuesday	21.09.2021	10.15–12.00	INORGANICS - Aggregates for concrete and bituminous bound construction materials
5	Monday	27.09.2021	14.15–16.00	INORGANICS - Common materials of masonry construction
6	Tuesday	28.09.2021	10.15–12.00	ORGANICS - Wood as a building material
7	Monday	04.10.2021	14.15–16.00	INORGANICS - Concrete as a building material
8	Tuesday	05.10.2021	10.15–12.00	METALS - Steel reinforcement
Part III - In-service aspects of materials: durability and failure				
9	Monday	11.10.2021	14.15–16.00	Failure 1: Effects of stress and applied loading Failure 2: Environmental degradation of materials Failure 3: Effects of fire on building materials
Part IV - Sustainability of materials				
10	Tuesday	12.10.2021	10.15–12.00	Sustainability and building materials

Laboratory and examination

Monday	18.10.2021	14.15–16.00	Laboratory demonstration - I
Tuesday	19.10.2021	10.15–12.00	Laboratory demonstration - II
Thursday	21.10.2021	08.30–10.00	Laboratory demonstration - III
Thursday	28.10.2021	13.00–16.00	Examination

The course includes weekly exercises (5 exercises). Weekly exercises include computational type questions. The exercise answers are submitted to MyCourses eLearning system “weekly”. The weighted value of the weekly exercises is 25% of the course grade.

Weekly Exercise

	Deadline	Topics
Exercise 01	20.09.2021 @ 14:00	Microstructure and properties of building materials
Exercise 02	27.09.2021 @ 14:00	Aggregates and bituminous materials
Exercise 03	04.10.2021 @ 14:00	Wood and masonry as building materials
Exercise 04	11.10.2021 @ 14:00	Concrete and steel reinforcement
Exercise 05	18.10.2021 @ 14:00	Sustainability and failure of building materials

4.2 Laboratory demonstrations (subject to change because of COVID-19)

Testing of Materials Laboratory "Testing Hall" is intended to give an experimental understanding and verification of the topics covered in the building materials course. Because of the nature of the laboratory experiments and the number of students attending the course, the experimental work is conducted as a class activity with students observing the tests. The laboratory staff and course assistants will take the lead in operating the equipment. An instructor will always be available in the laboratory to introduce the test, describe the operation of the equipment and discuss the expected results.

4.3 Final exam

The written exam includes 5 topics (15 points each) covering the course outcomes. The final exam is evaluated (grade: 0...5) and its weighted value is 75% of the final grade.

5. Course Workload

The course ETCS and the estimated workload are presented in the following table.

Student activities	Quantity	Duration (Hour)	Total workload (Hour)
Lectures	10	2	20
Weekly exercises - "attending" sessions	5	2	10
Solving and submitting the weekly exercises' solution	5	4	20
Laboratory tests - "attending"	3	2	6
Self-study: Independent work			76
Final examination	1	3	3
Total workload (Hours)			135
ECTS Credit of the course (workload / 27)			5

6. Assessment methods and grading scale - evaluation criteria and methods

The grading scale for course is: 5 (highest); 4; 3; 2; 1 (lowest passing grade); 0 (failed). The course outcome assessment include:

a) Individual work:
- Weekly exercises. [Weighted value 25% of the grade)

b) Written exam:
- Written exam [Weighted value 75% of the grade.

Activity	Total points	Grading	
Final grade	100	0	< 50
		1	50 ... < 60
		2	60 ... < 70
		3	70 ... < 80
		4	80 ... < 90
		5	90 ... 100

7. Study Materials

Recommended readings (selected chapters based on the course contents) from the following books:

- [in English] Michael S. Mamlouk, John P. Zaniewski. Materials for civil and construction engineers. *Available at: https://primo.aalto.fi/*
- [in Finnish] Siikanen, Unto. (2009) Rakennusaineoppi. Julkaistu: 2009. *Available at: https://primo.aalto.fi/*
- Course lecture notes and handout - include slides from lectures, explanatory notes, and exercises.

8. Prerequisites

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9. Further Information

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