



Course syllabus

Biobaserade byggmaterial Biobased Building Materials

VBMN20, 7,5 credits, A (Second Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED V

Date of Decision: 2023-02-07

General Information

Elective for: V5-hb, V5-bf

Language of instruction: The course will be given in English on demand

Aim

Because of the need to reduce the climate impact from our society there is a general need and interest to transfer towards an increased use of biobased materials. This is the case also for the construction sector and the interest and need of using biobased building materials such as wood, wood based materials and materials based on plant fibers is therefore increasing. This course will give in depth knowledge on these materials' properties as well as strengths and weaknesses for different areas of usage.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- Have knowledge of the micro- and macrostructure of different bio-based materials.
- Have in-depth knowledge of moisture properties of bio-based materials.
- Have in-depth knowledge on durability related properties.
- Have in-depth knowledge on how the properties of biobased materials are related to the material structure.
- Have knowledge of techniques that can be used to change the material properties and how these techniques affect the properties.
- Be able to put bio-based building materials in a life cycle perspective and understand which factors that influence the environmental impact of these materials.

Competences and skills

For a passing grade the student must

- Be able to perform, evaluate and analyse results from experiments as well as report the results in writing as well as orally.
- Be able to discuss material properties of bio-based materials based on knowledge of their structure.

Judgement and approach

For a passing grade the student must

- Be able to discuss strengths and weaknesses, advantages and disadvantages of bio-based materials for different applications.
- Develop increased awareness of building materials' effect on the environment.

Contents

- Macro and micro structure of biobased materials
- Moisture sorption and moisture properties
- Durability
- Modification techniques and how these affect the material properties
- Thermal and mechanical properties
- Biobased materials in a life cycle perspective
- Usage of biobased materials in buildings/structures

The project assignment is performed in groups of 1-2 students where each group works with one material. The assignment includes investigating the origin and structure of the material, the material properties, its environmental impact in a life cycle perspective and possible applications. The assignment also includes experimental work and evaluation and analysis of the results. The project assignment is presented both orally and as a written report. Feedback is given from teachers regularly during the course, after the oral presentation and on the written report. Before the oral presentation, each group also receives/gives feedback from/to another group both written and orally.

The lab events include the topics micro and macro structure, sorption, dimensional stability and modification techniques and the students work in groups of 2-3 persons. During these events the students perform experiments and evaluate, analyse and discuss the results from these.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: To pass the course, the student needs to pass the oral exam, to pass the laboratory events, and pass the written and oral presentation of the project assignment.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Parts

Code: 0121. **Name:** Oral Exam.

Credits: 4,5. **Grading scale:** TH. **Assessment:** The student need to pass the oral exam.

Code: 0221. **Name:** Project Assignment.

Credits: 2. **Grading scale:** UG. **Assessment:** Approved project assignment

Code: 0321. **Name:** Laboratory Exercises.

Credits: 1. **Grading scale:** UG. **Assessment:** Approved laboratory exercises

Admission

Admission requirements:

- VBMA25 Building Materials or VBMA30 Building Materials or VBMA35 Building Materials

Assumed prior knowledge: VBMF05 Building Material Science

The number of participants is limited to: No

The course overlaps following course/s: TFRP10

Reading list

- Jones, David P and Shmulsky, R: Forest Products and Wood Science: An Introduction. Wiley-Blackwell, 2019. This book is available as e-book without cost for students at Lund University (found through LUBSearch). Some chapters in the book are included in the course.
- edited by Jörg Müssig: Industrial application of natural fibres, Structure properties and technical applications. Wiley, 2010. This book is available as e-book without cost for students at Lund University (found through LUBSearch) Some chapters in the book are included in the course.
- Danish Transport and Construction Agency: Introduction to LCA of Buildings. 2016. Available via Canvas as a pdf.
- Additional course material and scientific papers for seminars are included and will be available at the course webpage.
- Thybring, Emil; Fredriksson, Maria: Wood and Moisture from Springer Handbook of Wood Science and Technology. Springer, 2023. Available via Canvas as a pdf.

Contact and other information

Course coordinator: Maria Fredriksson, maria.fredriksson@byggtek.lth.se

Course administrator: Linnéa Ekman, linnea.ekman@ebd.lth.se

Course homepage: [http:// www.byggnadsmaterial.lth.se](http://www.byggnadsmaterial.lth.se)