

SYLLABUS

Biocomposites 7.5 credits

T7017T

Biokompositer

Course syllabus admitted: Autumn 2023 Sp 1 - Present

DECISION DATE
2021-02-17

Biocomposites 7.5 credits T7017T

Biokompositer

Second cycle, T7017T

Education level	Grade scale	Subject	Subject group (SCB)
Second cycle	G U 3 4 5	Trä och bionanokompositer	Materials Technology

Main field of study

Materials Science and Engineering

Entry requirements

General experience in writing report, project plan and project management, material science and solid mechanics.

Selection

The selection is based on 30-285 credits

Course Aim

The student will after the course have knowledge about biocomposites in which the reinforcement or matrix polymer is based on renewable material. The goal is that student will have fact knowledge of different raw materials used in biocomposites, understand their hierarchical structure, be able to list the most important components, be able to identify different type of fibers, understand differences between fibers and polymers which can be used, be able to list the most important properties and know definitions biopolymers and nanomaterial. The student should be able describe different manufacturing methods and understand how and why biocomposites are uses in different applications. The student should also be able to analyze composites mechanical properties and explain differences between different materials compositions.

The student should have developed understanding of interaction between the fibers and materials polymer, how the addition of fibers is affecting properties in relation to the matrix polymer.

Contents

Raw materials: Reinforcement consisting of wood, natural fibers and bionanomaterials, fiber properties and how these materials bare made and their composition. Matrix: thermoplastics, thermosets, biopolymers, polymer structure, composition, important properties. Composite material: traditional wood composites, new formable wood composites and bionanocomposites.

Processing methods: such as extrusion, injection molding, compression molding, resin injection methods and casting. Testing and properties: mechanical properties moisture stability, thermal stability compatibility, density, weather stability and durability. Applications for biocomposites: such as construction materials, vehicles packaging and in medical

Laboratory where students will manufacture biocomposites using twin-screw extrusion, prepare test samples using injection molding and test the most important properties of the composites.

Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

The course is conducted usually in the form of lectures, 3 assignments which can be made in small groups of two students, and one laboratory is made in larger groups approx. 4 students. The laboratory is about manufacturing of biocomposite or wood composites using a twin-screw extruder and make test samples with injection molding. The goal is that students will get knowledge how the addition of biofibers is made and how they affect the properties.

The students will help with preparation of raw materials, suggest extrusion parameters and help with the calibration of the processing equipment. Materials properties such as tensile testing, density, viscosity and microstructure (adhesion between fibers and matrix) are studied and the results from different groups are collected to given to all students. The lab-report need to contain description of the laboratory, materials used and test as well as the results. In the course usually an inspiration seminar about biocomposites is included.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided. The examination will consists -Delivered exercises -Lab report -Oral and poster presentation of the roject -Written exam

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term "unauthorized aids" refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Overlap

The course T7017T is equal to T7012D

Course offered by

Department of Engineering Sciences and Mathematics

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0005	Laboratory work	U G#	2	Mandatory	A12	
0006	Assignment report	U G#	1.5	Mandatory	A12	
0007	Written exam	G U 3 4 5	4	Mandatory	A21	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via

My LTU.

Last revised

by Head Faculty Programme Director Niklas Lehto 2021-02-17

Syllabus established

The syllabus was established by the Department of Applied Physics and Mechanical Engineering 2009-06-16, and remains valid from autumn 2009.