

Course syllabus

Plastic and Circular Design - towards a Sustainable Future Plast och cirkulär design - mot en hållbar framtid

INNA05, 3.0 credits, G1 (First Cycle)

Valid for: 2025/26

Faculty: Faculty of Engineering LTH

Decided by: PLED M

Date of Decision: 2025-02-27

Effective: 2025-05-05

General Information

Depth of study relative to the degree requirements: First cycle, has only upper-secondary level entry requirements

Elective for: TILLF1

Language of instruction: The course will be given in English

Aim

Based on the most recent research findings the course aims to provide students with knowledge and insights about opportunities and limitations for plastic materials in a circular economy. A large amount of plastic materials is today being used to improve our daily lives. However, our use of plastic materials must become more circular to reduce the ecological footprint.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- for a given requirement specification propose a suitable plastic material with low environmental impact
- for a given conceptual solution propose a suitable design (considering strength, period of use, reuse and recycling)

- based on the chosen design propose a suitable method for reuse or recycling

Competences and skills

For a passing grade the student must

- based on a given requirement specification, select a suitable plastic material with low environmental impact
- independently, or in a group, communicate orally and in writing the design solution developed to representatives of an industrial company or the equivalent
- independently, or in a group, develop a unique design solution (considering strength, period of use, reuse and recycling)

Judgement and approach

For a passing grade the student must

- suggest the need for further and/or alternative design solutions
- in a research-based way reflect on the design solution developed and based on that propose additional and/or alternative design solutions

Contents

Plastic materials are used almost everywhere nowadays. The global annual plastic production is today more than 400 million tons, and it is expected to double in the coming 20 years. Unfortunately, the large use of plastic materials leads to problems, e.g. large amounts of plastic waste and massive release of greenhouse gases during manufacturing and disposal. To mitigate the problems associated with plastic materials, it is important to create a more circular use of the materials. In this course we are discussing pros and cons of biobased plastic materials, design for recycling and re-use, different recycling methods, and many more topics that are of importance to enable a sustainable use of plastic materials.

The course is designed for students who in their future profession will develop and manufacture plastic products (e.g. packaging solutions, automotive components and medical aids). However, the course is of great value for all students since it explains how we all can help to reduce the environmental impact of plastic materials.

During the first part of the course, areas of use for some common plastic materials are presented, with reference to material properties and cost. Pros and cons with bio-based plastic materials, compared to fossil-based plastic materials, are also addressed. In the second part of the course, ecological footprint of plastic products is discussed and the benefits of doing Life Cycle Assessments (LCA) is emphasized. In the third, and final, part of the course, re-use and recycling of plastic products are thoroughly reviewed. Both design for recycling, and design with recycled materials, are discussed. Different alternatives for recycling of plastic products are also presented.

In parallel to the theoretical/lecturing part of the course a group task will be carried out. The task follows the topics covered in the lectures and is carried out in groups of 3-5 students. At the end of the course all groups will present their results and findings in a written report. The group task is a compulsory part of the course.

Examination details

Grading scale: UG - (U, G) - (Fail, Pass)

Assessment:

Active participation in a minor project carried out in a group of 3-5 students presented in a written project documentation.

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.

Modules

Code: 0125. **Name:** Plastic and Circular Design - towards a Sustainable Future.

Credits: 3.0. **Grading scale:** UG - (U, G). **Assessment:** Active participation in a project carried out in a group of 3-5 students. **The module includes:** The group tasks consist of the following parts: consideration of environmental impact, choice of suitable material, design for reuse/recycling, and report. There is no written exam in the course. The grade on the group task report constitutes the final grade in the course.

Admission

The number of participants is limited to: 5

Selection: Completed university credits

Reading list

- Plastic waste and recycling : environmental impact, societal issues, prevention, and solutions. London : Academic Press, 2020, ISBN: 9780128178812.

Contact

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Course administrator: Lena Leveen, lena.leeven@design.lth.se

Further information

There will be a mix of on-site lectures at Campus Lund and online lectures via Zoom.

The course consists of 16 hours of lectures. The remaining part of the course consists of self-studies and a large part of these self-studies consists of preparing the upcoming lectures and carry out the group task.

The group tasks will be carried out in groups of 3-5 students. It is very important that all students take active part! If someone is not taking part in the work, it is important that the other members of the group inform the course administration about this, so that this problem can be fixed.

Lecturers are Associate Professor Anders Sjögren, e-mail: anders@ad-manus.se, mobile: +46-768-985092 and Associate Professor Joze Tavcar, e-mail: joze.tavcar@design.lth.se, phone: +46-46-222 15 56.

Questions about the course can also be put forward to the course administrator Lena Leveen, e-mail: lena.leeven@design.lth.se, phone: +46-46-222 46 95.