



## Polymeric and Textile Materials and the Environment

### Polymera och textila material och miljö

7.5 credits

7.5 högskolepoäng

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**Ladok Code:** A527TA

**Version:** 4.0

**Established by:** Committee for Education in Technology 2021-10-08

**Valid from:** Spring 2022

**Education Cycle:** Second cycle

**Main Field of Study (Progressive Specialisation):** Polymeric Technology (A1F)

**Disciplinary Domain:** Technology

**Prerequisites:** Meets the requirements for admission to the Master's programme in Resource Recovery

**Subject Area:** Chemical Engineering

**Grading Scale:** Seven-degree grading scale (A-F)

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### Content

Polymer materials have become an important part of modern society. Polymer materials come in many forms and have become indispensable in our everyday lives. Examples of polymer materials are plastics, textiles, rubber, and composites. These materials are very important and form an integral part of modern society. Polymer materials are often inexpensive and have properties that can contribute to a more sustainable society. For example, plastics can be used to generate energy via solar cells and wind turbines or to protect food. The low weight of plastics results in fuel savings during transport and protects goods and products when they are transported.

However, the use of polymer materials is not always sustainable. Polymer materials are generally made from non-renewable resources and these materials are usually not biodegradable. At the same time, we are not very successful at recycling polymer materials and large amounts end up polluting the environment. As these materials are not biodegradable, they will slowly disintegrate and form microplastics. The relatively large release of polymer materials into the environment together with the lack of biodegradation lead to accumulation in the ecosystem.

The course aims to provide students with an understanding of how polymer materials affect the environment and how these materials can be recycled. The course deals with different polymer materials such as plastics, textiles, and composites and how these affect the environment. Different ways to recycle polymer materials such as mechanical recycling, chemical recycling, thermal methods, and biodegradation are discussed in the course. The course also deals with how polymers can be made from renewable materials.

### Learning Outcomes

After completing the course, the student will be able to:

#### Knowledge and understanding

- 1.1 explain how the use of polymer materials such as plastics, textiles, and composites affects the environment,
- 1.2 describe the most common technical methods for recycling polymer materials,
- 1.3 account for the environmental risks that the use of polymer products may entail,
- 1.4 explain the concept of microplastics,
- 1.5 explain how plastics can be made from renewable materials.

#### Skills and abilities

- 2.1 discuss the advantages and disadvantages of biodegradable plastics,
- 2.2 assess how a polymer product, taking into account the polymer's composition, properties, and area of use, affects the environment.

### **Evaluation ability and approach**

3.1 problematise how the handling of polymer materials affects the environment,  
3.2 reflect on how polymer materials can be integrated into a sustainable society.

### **Forms of Teaching**

The course consists of:

- Lectures
- Seminars

The language of instruction is English.

### **Forms of Examination**

The course is examined through the following components:

- Examination  
Learning outcomes: 1.1-1.5, 2.1-2.2, 3.1-3.2  
Credits: 3.5  
Grading scale: A-F
- Project work with seminar  
Learning outcomes: 1.1-1.5, 2.1-2.2, 3.1-3.2  
Credits 4.0  
Grading scale: Pass/Fail

The examination component “Examination” determines the final grade of the course, which is issued only when all components have been passed.

Grading scale for the course is: Seven-point grading scale (A-F)

If the student has received a decision/recommendation regarding special pedagogical support from the University of Borås due to disability or special needs, the examiner has the right to make accommodations when it comes to examination. The examiner must, based on the objectives of the course syllabus, determine whether the examination can be adapted in accordance with the decision/recommendation.

Student rights and obligations at examination are in accordance with guidelines and rules for the University of Borås.

### **Literature and Other Teaching Materials**

#### **Student Influence and Evaluation**

The course is evaluated in accordance with current guidelines for course evaluations at the University of Borås in which students' views are to be gathered. The course evaluation report is published and returned to participating and prospective students in accordance with the above-mentioned guidelines, and will be taken into consideration in the future development of courses and education programmes. Course coordinators are responsible for ensuring that the evaluations are conducted as described above.

#### **Miscellaneous**

The course is primarily intended for students in the Master Programme in Resource Recovery - Polymer Materials for the Circular Economy, but is also offered to exchange students. The course builds further upon knowledge from the courses Polymer Technology, 7.5 credits, Polymers and Textiles in Composites, 7.5 credits, and Experimental Methods for Polymers and Textiles, 7.5 credits. This syllabus is a translation from the Swedish original.