



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Engineering, Characterization and Degradation of Polymers in The Marine Environment

2324-1-F7502Q046

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#### Aims

The course aims to define what polymers (including plastics and bioplastics) are in terms of physicochemical structure, their properties, their synthesis, and their production. Another goal of the course is to learn the current techniques for fabricating different types of materials based on polymers, and how to characterize them. Lastly, the concept of biodegradation, sustainable and green materials, the use of new biopolymers, and the impact and fate of these polymeric materials in the marine environment will be explained.

#### Contents

Introduction to Materials and Polymer Science. Definition, types, and physicochemical features of Polymers. Characterization of materials based on Polymeric structure. Design and fabrication of advanced polymeric materials. Degradation and Biodegradation in the marine environment of polymeric structure and their impact on the marine ecosystem.

#### Detailed program

Definition of polymer. Types and synthesis of polymers and their main features. Polymeric materials based on natural and synthetic polymers. Engineering advanced and active polymeric materials. Characterization of polymeric materials such as morphological, thermal, and mechanical properties, interaction with water, and others. Fabrication of polymeric materials such as solvent casting, spin coating, rod coating, electrospinning, extrusion, injection molding, blow molding, freeze drying, salt leaching, and others. Engineered living materials. Applications field of polymeric materials. Definition of biodegradable, compostable, eco-friendly, green, and sustainable

polymeric materials. Plastics, bioplastics, and micro-/nano-plastics. Biodegradation and impact in the marine environment.

## **Prerequisites**

No specific requisites are required.

## **Teaching form**

Online via webex.

## **Textbook and teaching resource**

Sustainable Food Packaging Technology; Edited by Athanassia Athanassiou. Wiley,  
Polymer Science and Innovative Applications; Edited by Mariam Al Ali Almaadeed, Deepalkeshmi Ponnamma,  
Marcelo A. Carignano. Elsevier 2020.  
Scientific Papers

## **Semester**

Second semester, first year.

## **Assessment method**

Oral exam.

## **Office hours**

By appointment (upon request by e-mail).

## **Sustainable Development Goals**

CLEAN WATER AND SANITATION | INDUSTRY, INNOVATION AND INFRASTRUCTURE | LIFE BELOW WATER

