CH991-15 Plastics: the good, the bad, and the future

24/25

Department
Chemistry
Level
Taught Postgraduate Level
Module leader
Stefan Bon
Credit value
15
Module duration
10 weeks
Assessment
40% coursework, 60% exam
Study location
University of Warwick main campus, Coventry

Description

Introductory description

In the 20th century polymer science gave us materials with remarkable and durable properties to the great benefit of humanity. Plastics were fantastic. Now, a green polymer (r)evolution is urgently needed so that plastics will be the material that rebalances the needs and prosperity of humanity with the environmental and sustainable needs of our planet. This module will discuss how different types of plastics are made, what they are used for and why they are the current material of choice. It will discuss the environmental sustainability challenges that we face and how we can find an environmental sustainable way forward to live in harmony with a healthier planet.

Module aims

The overall module aim is to provide participants with the knowledge on what polymers are, how they are made, why they are used, and why they will play a key role in the challenge of this generation of humanity to provide for a greener and environmentally sustainable planet.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

BLOCK 1A: A brief history of polymer science and overview of current global polymer production (2 hours)
BLOCK 1B: Introduction to key polymer chemistry, physics, and engineering (4 hours) [Reinforced with more depth for particular polymers in blocks 2-4]

BLOCKS 2, 3, and 4. will discuss a selection of particular types of polymers and their products (6 hours for each block): How are they made, what are their key physical and mechanical features, what are they used for and why (4 hours) ? What are the sustainability ideas and challenges (2 hours) ? Polymers that can be discussed are:

- Poly(olefins): PE/PP
- Poly(vinyl chloride): PVC
- Polyesters/amides with a focus on PET
- Polymer composites (epoxy resins/ poly(urethanes))
- Polymer dispersions and their applications

BLOCK 5: The Green Polymer (R)evolution: what are the scientific/societal issues and where do we go from here? (2 x 3 hours)

Learning outcomes

By the end of the module, students should be able to:

- Understand the key fundamental and contemporary aspects of polymer science developing specialized knowledge in the area of polymer science and being able to integrate this across the wider areas of chemistry, chemical engineering, physics, manufacturing, environmental and socio-economic impact.
- Evaluate diverse points of view embedded within varying frameworks which may include, technological/scientific contexts, societal and environmental impact, temporal and trending contexts.
- Engage in critical inquiry and develop their skill set to process, understand, and communicate/explain and evaluate scientific principles and their impact.
- Apply and integrate concepts introduced during the module in an interactive discussion format.
- Effectively verbally communicate and present their ideas.
- Evaluate and ethically assess a design and reason for the use (or not) of polymer materials in contemporary society.

Indicative reading list

See Talis Aspire link

View reading list on Talis Aspire

Interdisciplinary

This module is optional for all STE(A)M+ students at Warwick. It does not require any particular background.
The module considers polymer materials from an interdisciplinary perspective considering the technological, scientific, societal and environmental contexts.

Subject specific skills

The students will have developed the skills to:

- Evaluate scientific principles and their impact.
- Assess the social and environmental impact of plastics.
- Evaluate designs and assess the pros and cons for the use of polymer materials.
- Communicate clearly their understanding of current scientific principles relating to polymers and their impact.

Transferable skills

- Numeracy
- Problem solving
- Critical thinking
- Teamwork

Study

Study time

Type	Required
Lectures	10 sessions of 3 hours (20%)
Fieldwork	10 sessions of 4 hours (27%)
Online learning (scheduled sessions)	10 sessions of 1 hour (7%)
Online learning (independent)	10 sessions of 45 minutes (5%)
Private study	50 hours (33%)
Assessment	12 hours 30 minutes (8%)
Total	150 hours

Private study description

Lectures (3h pw for 10 weeks): These will be interactive.
Private study: reading and understanding the course material (50 hours in total)
Field work: time to be spend on group case study (40 hours in total, 4 hours per week)
Online learning (independent): ask questions/provide answers to online discussion channel (45 mins pw)
Online learning (scheduled session): online office hour (1 h pw (10 h in total))

Seminar (assessed, 5 CATS, 33%): talk and poster presentation of group case study (10 hours in total, 1 day event)
Written exam (assessed, 10 CATS 67%): 2 hours + 30 min download/upload time.

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group D

	Weighting	Study time	Eligible for self-certification
Assessment component			
Group project: Industrial Case Study, Talk and Poster Presentation	40%	10 hours	No
Throughout the module the students will undertake a group project, which will be presented on the seminar day (1 full day, 10 hours: 5 CATS) This will have 2 parts: 1. 20 min group talk (3 CATS) 2. A group scientific poster presentation (2 CATS)			
Reassessment component			
Individual Essay			No
Resit assignment in place of group project.			
Assessment component			
Written exam	60%	2 hours 30 minutes	No
Written examination ~Platforms - AEP			

	Weighting	Study time	Eligible for self-certification

- Online examination: No Answerbook required

Reassessment component is the same

Feedback on assessment

Group and Cohort feedback

Past exam papers for CH991

Availability

Courses

This module is Core optional for:

- TCHA-F764 Postgraduate Taught Global Decarbonisation and Climate Change
  - Year 1 of F764 Global Decarbonisation and Climate Change
  - Year 1 of F76A Global Decarbonisation and Climate Change (Science)
  - Year 2 of F764 Global Decarbonisation and Climate Change

This module is Optional for:

- Year 1 of TCHA-F1PW Postgraduate Taught Polymer Science

This module is Core option list A for:

- TCHA-F764 Postgraduate Taught Global Decarbonisation and Climate Change
  - Year 1 of F764 Global Decarbonisation and Climate Change
  - Year 2 of F764 Global Decarbonisation and Climate Change