

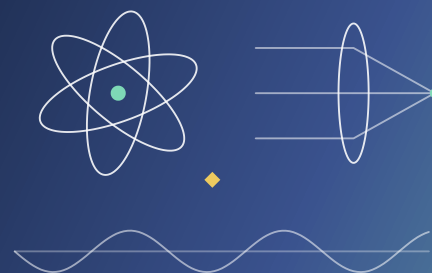
Module code

SPP-3402

Type of module

Undergraduate: Applied Physics – Elective

Polymer Physics



Modular credits

4

Total student
engagement

56 hours

Prerequisite

SPP-1203 Classical
Mechanics

Anti-requisite

None

Aims

To present the mechanical, optical, thermal and transport properties of polymers with respect to the underlying physics and physical chemistry of polymers in melt, solution, and solid state.

Module learning outcomes (MLO)

On successful completion of this module, a student will be expected to be able to:

MLO 1

Interpret and evaluate polymer microstructure by analysing their shapes, morphologies, and relationships with physical properties.

MLO 2

Apply and critically assess advanced physical techniques (e.g. NMR, Raman, UV-Vis spectroscopy, chromatography) to investigate polymer behaviour.

MLO 3

Correlate and appraise polymer microstructures with their mechanical, thermal, optical, and electronic properties.

MLO 4

Critically analyse and evaluate theoretical models, such as the Tube-Model, to explain polymer chain behaviour in different states.

MLO 5

Synthesise and communicate experimental findings through well-structured reports and professional presentations for real-world applications.

Module contents

Basic concept of polymers: History of the synthetic polymers, chemical nature of polymers	Classification of polymers: Thermoplastic versus thermoset polymers, amorphous versus crystalline polymers	Molecular sizes and shapes and ordered structures
Distributions of molar mass and their determination, the shapes of polymer molecules	Evidence for ordered structures in solid polymers, Morphology: crystallinity, orientation	Mechanical Properties: strength, modulus, elongation, hardness
Thermal properties, Optical properties and Electrical properties	Molecular interpretation of polymer chain behaviour; Tube- Model	Some physical techniques for studying polymer
Applications of polymers, processing, environmental issues and recycling		

Assessment

60% **40%**
Examination Coursework



■ Examination — 60% ■ Class tests — 20% ■ Assignments — 10% ■ Presentation — 10%

Formative assessment

Weekly discussion
and feedback

Summative assessment

COMPONENT	WEIGHTING
Examination	60%
Coursework	40%
Individual	30%
Class tests	20%
Assignments	10%
Group	10%
Presentation	10%

Graduate attributes and skills

Programme learning objectives (PLO) addressed

1 PLO 1 (Core Disciplinary Knowledge)	2 PLO 2 (Critical Thinking and Comparative Analysis)
5 PLO 5 (Interdisciplinary Applications, Materials and Sustainability)	6 PLO 6 (Communication and Professionalism)

Sustainability concept addressed

- 7** SDG 7 Affordable and Clean Energy
- 9** SDG 9 Industry, Innovation and Infrastructure
- 12** SDG 12 Responsible Consumption and Production

Digital skills/software used (not limited to)

- Word processing software (e.g. Microsoft Word)
- Presentation software (e.g. PowerPoint)
- Web Browsers (e.g. Internet Explorer)
- Learning Management Systems (e.g. Canvas)
- Communication Software (e.g. Microsoft Teams)

Micro-credentialling option

No

Stackable towards GenBESTARI Undergraduate Degree Programme or other relevant Lifelong Learning Programmes

No

Document details

Office **ODVCE** Document date **23 June 2026** Status **New** Approval **GBF (12/02/2026)**