

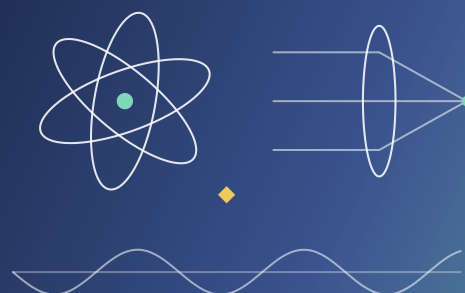
Module code

SPP-2201

Type of module

Undergraduate: Applied Physics – Major Core

Thermal Physics and Optics



Modular credits

4

Total student
engagement

56 hours

Prerequisite

None

Anti-requisite

None

Aims

To provide students with a solid foundation in the fundamental principles of thermal physics and optics, through the study of thermodynamic laws and light-matter interactions, and to apply these principles to physical systems and real-world technologies.

Module learning outcomes (MLO)

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

MLO 1

Apply basic concepts of thermal physics and thermodynamic laws to analyse heat and work transformations in practical systems, including the operation and efficiency limits of heat engines.

MLO 2

Solve thermodynamic problems using thermodynamic equations and interpret the behaviour of gases using kinetic theory principles.

MLO 3

Apply principles of geometrical optics and interferometry to interpret and solve problems involving image formation and lens systems.

MLO 4

Analyse the quantum nature of light and its interaction with matter, and evaluate the limitations of classical optics in explaining modern optical phenomena such as polarisation.

MLO 5

Analyse experimental outcomes collaboratively in a group when conducting experiments in thermal physics and optics, and connect theoretical principles to practical observations.

Module contents

Temperature and Heat	Kinetic Theory of Gases	The First Law of Thermodynamics
The Second Law of Thermodynamics	Thermal Properties of Matter	Phase Changes
Review of light theory wave-particle duality	Reflection and refraction	Lens and mirror systems
Image formation	Interference and diffraction	Polarisation and birefringence
Optical instruments and applications		

Assessment

60% **40%**
Examination Coursework



■ Examination — 60% ■ Class tests — 30% ■ Assignments — 10%

Formative assessment

Lab experiments,
weekly discussion and
feedback

Summative assessment

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

Graduate attributes and skills

Programme learning objectives (PLO) addressed

1	PLO 1 (Core Disciplinary Knowledge)	2	PLO 2 (Critical Thinking and Comparative Analysis)
3	PLO 3 (Experimental and Instrumentation Skills)	4	PLO 4 (Numerical and Analytical Competence)
6	PLO 6 (Communication and Professionalism)		

Sustainability concept addressed

4	SDG 4 Quality Education
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Digital skills/software used (not limited to)

☐	Word processing software (e.g. Microsoft Word)
☐	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
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Document details

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