University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Properties of Matter			
Code: PHYS08004	**SCQF Level: 8 (Scottish Credit and Qualifications Framework)**	**Credit Points: 20**	**ECTS: 10 (European Credit Transfer Scheme)**
School:	School of Computing, Engineering, and Physical Sciences		
Module Co-ordinator:	Marcus Scheck		

Summary of Module

This module is a core module at Level 8 on Institute of Physics (IoP) accredited Physics programmes. The aim of this module is to develop understanding of the properties of condensed, liquid, and gaseous matter at an introductory level.

The module covers the following topics.

Distinction between solids, liquids and gases; ionic, covalent, Van der Waals, and metallic bonds; interatomic forces/potential energies; fluid pressure; buoyancy; Bernoulli's equation; surface tension; viscosity; elastic properties of solids; thermal expansion of solids' crystal structures; point defects, dislocations and grain boundaries.

The introductory thermodynamics aspects of the course include the Kelvin temperature scale, properties of ideal gases, equation of state of ideal and real gases, 0^{th} and 1^{st} law of thermodynamics, kinetic gas theory, Maxwell-Boltzmann distribution, 2^{nd} law of thermodynamics, entropy, heat engines, Carnot cycle, microscopic interpretation of entropy, transport phenomena.

The module also includes **practical lab classes** which enable students to put into practice the principles covered in the lectures and tutorials. They cover topics on viscosity in liquids, ideal gas law, adiabatic processes, latent heat, and the elastic and hydrostatic properties of matter.

We have defined a set of Graduate Attributes that are the skills, personal qualities and understanding to be developed through your university experience that will prepare for life and work in the 21st century (https://www.uws.ac.uk/current- students/your-graduate-attributes/). The Graduate Attributes relevant to this module are listed below.

- Graduate Attributes - Academic: critical thinker; analytical; inquiring; knowledgeable; digitally literate; problem solver; autonomous; incisive; innovative
- Graduate Attributes - Personal: effective communicator; influential; motivated
- Graduate Attributes - Professional: collaborative; research-minded; enterprising; ambitious; driven

Module Delivery Method					
Face-To-Face	**Blended**	**Fully Online**	**HybridC**	**Hybrid 0**	**Work-Based Learning**
☒	☐	☐	☐	☐	☐
See Guidance Note for details.					

Campus(es) for Module Delivery						
The module will **normally** be offered on the following campuses / or by Distance/Online Learning: (Provided viable student numbers permit) (tick as appropriate)						
Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
☒	☐	☐	☐	☐	☐	Add name

Term(s) for Module Delivery					
(Provided viable student numbers permit).					
Term 1	☐	Term 2	☒	Term 3	☐

Learning Outcomes: (maximum of 5 statements) **These should take cognisance of the SCQF level descriptors and be at the appropriate level for the module.** At the end of this module the student will be able to:	
L1	Relate the concepts of temperature and pressure to the properties of an ideal gas
L2	State the laws of thermodynamics and apply them to simple physical systems.
L3	Apply the basics of kinetic theory to problems involving gases.
L4	Describe and explain the properties and behaviour of liquids and solids.
L5	Conduct prescribed laboratory experiments, record and analyse data, estimate experimental uncertainties and draw conclusions. Record experimental procedures and observations in a lab report.

Employability Skills and Personal Development Planning (PDP) Skills

SCQF Headings	During completion of this module, there will be an opportunity to achieve core skills in:	
Knowledge and Understanding (K and U)	SCQF Level **8** • A critical understanding of underlying theories governing properties of matter. • A critical approach towards problem solving	
Practice: Applied Knowledge and Understanding	SCQF Level **8** • Using a selection of mathematical skills, techniques and practices applicable to modern day physics. • Confirmation of theoretical models with laboratory experiments. • Practicing literature searches and experimental methodologies such as uncertainty evaluation.	
Generic Cognitive skills	SCQF Level **8** Critical appreciation of underlying physical concepts. Problem analysis, evaluation and solving.	
Communication, ICT and Numeracy Skills	SCQF Level **8** • Use of calculators and computers. • Literary skills, enabling the communication of obtained results e.g. lab-report.	
Autonomy, Accountability and Working with others	SCQF Level **8** • Individual studying and small project management. • Working towards deadlines and avoiding unnecessary penalties. • Team-working abilities, as lab work is encouraged to be done in groups.	
Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code: PHYS07006 PHYS07007 MATH07003 MATH07009	**Module Title:** Introductory Physics A Introductory Physics B Applied Mathematics Mathematical Analysis
	Other:	or equivalent
Co-requisites	**Module Code:**	**Module Title:**

*Indicates that module descriptor is not published.

Learning and Teaching

In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture/Core Content Delivery	24
Tutorial/Synchronous Support Activity	12
Laboratory/Practical Demonstration/Workshop	12
Independent Study	152
	200 Hours Total

****Indicative Resources: (eg. Core text, journals, internet access)**

The following materials form essential underpinning for the module content and achieving the learning outcomes:

B.H Flowers and E. Mendoza: Properties of Matters [ISBN 0471 26497 0]

Material Sciences (Chapter 9):
https://openstax.org/details/books/university-physics-volume-3

Fluid Mechanics (chapter 8):
https://openstax.org/details/books/university-physics-volume-1

Introduction to Thermodynamics:
https://openstax.org/details/books/university-physics-volume-2

(**N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements

In line with the Student Attendance and Engagement Procedure: Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.

Equality and Diversity

The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code.
(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	Physical Sciences
Assessment Results (Pass/Fail)	Yes ☐No ☒
School Assessment Board	Physical Sciences
Moderator	Des Gibson
External Examiner	H Boston
Accreditation Details	Institute of Physics
Changes/Version Number	**3.0** Module descriptor amended to conform to the new template format and to reflect outcomes from ILR 2023.

Assessment: (also refer to Assessment Outcomes Grids below)
Assessment 1 – Class Test (60%)
Assessment 2 – Coursework Assignment worth 20% of the final grade
Assessment 3 – 4x laboratory experiments, in sum worth 20% of the final grade
(N.B. (i) **Assessment Outcomes Grids** for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed. (ii) An **indicative schedule** listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Assessment Outcome Grids (**See Guidance Note)**

Component 1							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**

Class Test	✔	✔	✔	✔		60	2

Component 2							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Course work	✔	✔	✔	✔		20	0

Component 3							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Laboratory Experiments	✔	✔	✔	✔	✔	20	12
					Combined Total for All Components	100	14