Module Descriptor

Title	Properties of Matter		
Session	2025/26	**Status**	Published
Code	PHYS08004	**SCQF Level**	8
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	Marcus Scheck		

Summary of Module

This is a core SCQF Level 8 module for the Physics programmes presented in the second term. The aim of this module is to develop the students scientific 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 includes the Kelvin temperature scale, properties of ideal gases, equation of state of ideal and real gases, 0th and 1st law of thermo-dynamics, kinetic gas theory, 2nd law of thermodynamics, entropy, heat engines, Carnot cycle, microscopic interpretation of entropy, introduction to the macrostate, microstate, and the Maxwell-Boltzmann distribution.

The course material is primarily presented in lectures with complementary small-group tutorials and problems classes. The module also includes practical lab classes which enable students to put into practice the principles covered in the lectures and tutorials. The laboratory investigation covers topics ranging from viscosity in liquids, the ideal gas law, adiabatic processes, latent heat, to the elastic and hydrostatic properties of matter. An essential part is the writing of comprehensive laboratory reports.

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	On-Campus[1] ☒	Hybrid[2] ☐	Online[3] ☐	Work -Based Learning[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries	☐ Lanarkshire ☐ London ☒ Paisley	☐ Online / Distance Learning ☐ Other (specify)	

Terms for Module Delivery	Term 1 ☐		Term 2 ☒	Term 3 ☐	
Long-thin Delivery over more than one Term	Term 1 – Term 2 ☐		Term 2 – Term 3 ☐	Term 3 – Term 1 ☐	

Learning Outcomes	
L1	Describe and explain the properties and behaviour of liquids and solids.
L2	Relate the concepts of temperature and pressure to the properties of an ideal gas
L3	State the laws of thermodynamics and apply them to simple physical systems
L4	Apply the basics of kinetic theory to problems involving gases, as well as the ability to apply statistical physics in various areas of physics.
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 8** Demonstrate and work with: · A broad knowledge of introductory aspects of the physical ideas for explaining the properties of condensed matter. This knowledge is embedded in the main theories, concepts and principles of physics. · An awareness of the evolving nature of knowledge and understanding · An understanding of the difference between explanations based in evidence and other forms of explanation and of the importance of this difference.

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

Practice: Applied Knowledge and Understanding	**SCQF 8** Use of the basic and routine professional skills, techniques, practices, and materials used in physics.
Generic Cognitive skills	**SCQF 8** · Present and evaluate arguments, information, and ideas in physics · Use a range of approaches to addressing problems and issues in physics
Communication, ICT and Numeracy Skills	**Please select SCQF Level** · Use a wide range of routine skills and some advanced skills in physics. For example: o Convey ideas in well-structured and coherent form o Use a range of forms of communication effectively in both familiar and new contexts o Use standard applications to process and obtain a variety of information and data o Use a range of numerical and graphical skills in combination o Use numerical and graphical data
Autonomy, Accountability and Working with Others	**SCQF 8** · Exercise some initiative and independence in carrying out defined activities · Take account of own and others' roles and responsibilities in carrying out and evaluating tasks · Work with others in support of current professional practice under guidance

Prerequisites	**Module Code**	**Module Title**
	PHYS07006	Introductory Physics A
	PHYS07007	Introductory Physics B
	MATH07011	Applied Mathematics
	MATH07008	Python Fundamentals
	MATH07009	Single Variable Calculus
	Other or equivalent	
Co-requisites	**Module Code**	**Module Title**

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** (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
Please select	
Please select	
TOTAL	200

Indicative Resources
The following materials form essential underpinning for the module content and ultimately for 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. **For the purposes of this module, academic engagement equates to the following:** Attendance of Lectures, Tutorials, and especially the Laboratories

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	**Engineering Physical Sciences**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☒ **Yes** ☐ **No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
School Assessment Board	Mathematics and Physics
Moderator	Y. Chen
External Examiner	TBC
Accreditation Details	Institute of Physics
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	3.1 Module descriptor amended to conform to the new template format. Moderator updated. Prerequisite module titles updated.

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Class Test (60%)
Assessment 2
Coursework: Problem Sets and Laboratory Work (40%)
Assessment 3
n/a
(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.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**

Class Test	☒	☒	☒	☒	☐	60	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Coursework	☒	☒	☒	☒	☒	40	12

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
	☐	☐	☐	☐	☐		
Combined total for all components						100%	14 hours

Change Control

What	**When**	**Who**
Moved to new template	18/03/2025	M. Scheck
Moderator updated	18/03/2025	M. Scheck
Prerequisite module titles updated	02/04/2025	R. Meeten