Module Descriptor

Title	Classical Mechanics		
Session	2025/26	**Status**	Published
Code	PHYS08007	**SCQF Level**	8
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	Maximilien Barbier		

Summary of Module

This is a core SCQF Level 8 module for the Physics programmes presented in the first term.

This module is designed to provide an introduction to classical mechanics, including the analytical mechanics formulations of Lagrangian and Hamiltonian approaches.

This first part of the module will provide a detailed overview of the ideas of classical mechanics from a Newtonian perspective. The module will begin with a review of Newton's laws and vector manipulations. We will then introduce the ideas of work and potential energy, and study rotation motion. We will then proceed with a treatment of rigid-body dynamics, covering ideas of moment of inertia, torque, angular momentum and Euler angles. We also discuss how conservation of momentum allows to treat collision problems. The second part of the module will be a treatment of analytical mechanics focusing on variational principles. We discuss the Lagrangian and Hamiltonian formalisms including Poisson brackets and generalised coordinates.

The module will be taught using a combination of lectures and tutorials supplemented by laboratory sessions to reinforce the theoretical concepts.

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	Demonstrate knowledge of vector algebra applied to classical mechanics in three dimensions.
L2	Demonstrate knowledge and understanding of classical mechanics including rigid body kinematics and dynamics.
L3	Understand how to set up and solve problems using different systems of coordinates. Appreciation of fictitious forces.
L4	Demonstrate an appreciation of variational principles and the formalisms of Lagrangian and Hamiltonian mechanics and recognise where these descriptions are more useful than the Newtonian approach.
L5	Demonstrate practical ability in performing laboratory experiments, and recording and analysing the results, and maintaining a laboratory notebook.

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** • Concepts of vector algebra, matrices, calculus and 3-dimensional coordinate systems. • A critical understanding of underlying theories governing motion in space. • Abstract approaches of analytical mechanics. • A critical approach towards problem solving.

[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** • 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 8** Critical appreciation of underlying physical concepts. Problem analysis, evaluation and solving.
Communication, ICT and Numeracy Skills	**SCQF 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 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.

Prerequisites	**Module Code** PHYS07006 PHYS07007 MATH07011 MATH07008 MATH07009	**Module Title** Introductory Physics A Introductory Physics B Applied Mathematics Python Fundamentals 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:

University Physics, Young and Freedman, Addison Wesley, (2011 or later)

An Introduction to Mechanics, Kleppner and Kolenkow, Cambridge (2013 or later)

Course of Theoretical Physics (Vol 1): Mechanics, Landau & Lifshitz, Elsevier (2003 or later)

(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:

The School of Computing, Engineering and Physical Sciences considers attendance and engagement to mean a commitment to attending, and engaging in, timetabled sessions. You will scan your attendance via the scanners each time you are on-campus and you will login to the VLE several times per week. Where you are unable to attend a timetabled learning session due to illness or other circumstance, you should notify the Programme Leader that you cannot attend. Across the School an 80% attendance threshold is set. If you fall below this, you will be referred to the Student Success Team to see how we can best support your studies.

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.

Aligned with the University's commitment to equality and diversity, this module supports equality of opportunity for students from all backgrounds and learning needs. Using the VLE, material will be presented electronically in formats that allow flexible access and manipulation of content. This module complies with University regulations and guidance on inclusive learning and teaching practice. This module has lab-based teaching and as such you are advised to speak to the Module Co-ordinator to ensure that specialist assistive equipment, support provision and adjustment to assessment practice can be put in place, in accordance with the University's policies and regulations.

(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	G. V. Morozov
External Examiner	TBC
Accreditation Details	Institute of Physics (IoP)
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	3.1 Module descriptor amended to conform to the new template format 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.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	20/03/2025	M. Barbier
Prerequisite module titles updated	02/04/2025	R. Meeten