

Basic details

UID	<input type="text"/>	Cohorts covered	Earliest cohort 2021-22	Latest cohort <input type="text"/>
Long title	<input type="text" value="Advanced Classical Physics"/>			
New code	<input type="text" value="PHYS60005"/>	New short title	<input type="text" value="Advanced Classical Physics"/>	
Brief description of module <i>(approx. 600 chars.)</i>	<input type="text" value="This course covers advanced concepts in classical physics. It explores rotating systems and provides the foundations for Lagrangian and Hamiltonian mechanics. This allows the student to understand the transition from classical to quantised systems. The course also prepares the student for progression onto general relativity by introducing the classical theory of fields in covariant notation and onto field theory by introducing the Lagrangian for a vector field and the resulting Maxwell's equations. Finally, the course provides the student with an appreciation for the role played by symmetries in fundamental physics."/>			
				623 characters
Available as a standalone module/ short course?	<input type="text" value="N"/>			

Statutory details

Credit value	ECTS <input type="text" value="7.5"/>	CATS <input type="text" value="15"/>	Non-credit <input type="text" value="N"/>	HECOS codes	<input type="text"/>
FHEQ level	<input type="text" value="Level 6"/>				<input type="text"/>

Allocation of study hours

	Hours	
Lectures	<input type="text" value="26"/>	
Group teaching	<input type="text" value="10"/>	<i>Incl. seminars, tutorials, problem classes.</i>
Lab/ practical	<input type="text"/>	
Other scheduled	<input type="text" value="12"/>	<i>Incl. project supervision, fieldwork, external visits.</i>
Independent study	<input type="text" value="139.5"/>	<i>Incl. wider reading/ practice, follow-up work, completion of assessments, revisions.</i>
Placement	<input type="text"/>	<i>Incl. work-based learning and study that occurs overseas.</i>
Total hours	<input type="text" value="187.5"/>	
ECTS ratio	<input type="text" value="25.00"/>	

Project/placement activity

Is placement activity allowed?

Module delivery

Delivery mode	<input type="text" value="Taught/ Campus"/>	Other	<input type="text"/>
Delivery term	<input type="text" value="Term 1"/>	Other	<input type="text" value="Term 1, exam in term 3"/>

Ownership

Primary department	<input type="text" value="Physics"/>
Additional teaching departments	<input type="text" value="None"/>

Delivery campus **South Kensington**

Collaborative delivery

Collaborative delivery? **N**

External institution **N/A**
External department **N/A**
External campus **N/A**

Associated staff

Role	CID	Given name	Surname
Module Leader		Claudia	de Rham

Learning and teaching

Module description

Learning outcomes	<p>On completion of this module you will be able to:</p> <ul style="list-style-type: none">- Transform from a rotating frame to a static frame- Describe the rotation of Rigid bodies- Demonstrate familiarity with Lagrangian mechanics- Demonstrate familiarity with Hamiltonian mechanics- Establish the stability of a solution- Demonstrate familiarity with electromagnetism in relativistic notations.
Module content	<ul style="list-style-type: none">• Rotating Rigid bodies: Inertia tensor, Principal moments and principal axes of inertia, Euler angles.• Lagrangian Mechanics: Calculus of variations, Action integral, Principle of least action, Euler-Lagrange equation, Generalised co-ordinates and momenta, Degrees of Freedom, Constraints and Lagrange Multipliers, Conserved Quantities, Normal modes, Stability analysis.• Hamiltonian Mechanics: Hamilton's equations, Poisson brackets, Canonical transformations, Noether's theorem, dynamical systems and stability analysis.• Relativistic Electromagnetism: Four-vectors, Lorentz transformation in tensor formulation, Minkowski Metric, Contravariant and covariant vectors, Lorentz tensors, relativistic formulation of Lorentz law, Field Strength tensor, Lorentz transformations for electromagnetic fields, Maxwell's equations in four-vector form, Four-vector potential, Maxwell Lagrangian.
Learning and Teaching Approach	Students will be taught over a term using a combination of lectures, office hours and directed exercises on theoretical work.
Assessment Strategy	<p>Assessment based on final exam: 2 hour written exam that will evaluate competences in the following 4 topics:</p> <ul style="list-style-type: none">• Rotating Bodies and Tensors of Inertia• Lagrangian Mechanics• Hamiltonian Mechanics• Relativistic Electromagnetism <p>Questions may mix the various topics (e.g., a question may involve the moments of inertia in Lagrangian formulation).</p>
Feedback	Problem Sheets are provided weekly (9 in total) with questions and examples students can get practice with. Out of those questions, one or two are marked as Rapid Feedback questions. Students can hand in their answers to those questions which will be reviewed and annotated (no formal mark). Rapid Feedback questions are then reviewed during a Rapid Feedback session with teaching assistant.
Reading list	Lecture notes are provided to students. The notes are designed to be self-contained, and there is no designated textbook required for this course. There are however also some excellent textbooks that are suggested as supplementary or complementary reading for those of you wishing to explore further some

Quality assurance

Date of first approval
Date of last revision
Date of this approval

Module leader

Notes/ comments

Office use only

QA Lead
Department staff
Date of collection

Date exported
Date imported

Programme structure

Associated modules

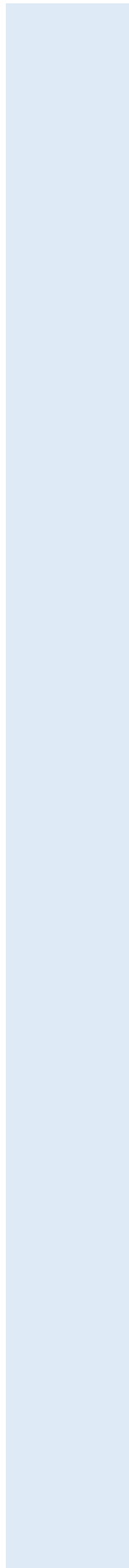
UID	Legacy code	Module title	Requisite type
-----	-------------	--------------	----------------



Programme structure

Associated programmes

UID	Legacy code	Programme title	Core?
-----	-------------	-----------------	-------



Assessment details

Grading method	Numeric	Pass mark	40%
----------------	---------	-----------	-----

Assessments

Assessment type	Assessment description	Weighting	Pass mark	Must pass?
Examination	2h final examination	100%	40% N	

100%