Imperial College London

Module Specification (Curriculum Review)

Basic details

UID	
Cohorts covered	Earliest cohort: 2025-26; Latest cohort:
Long title	Advanced Practical Physics
New code	PHYS50001
New short title	Advanced Practical Physics

Brief description of module *(approx. 600 chars.)*

This module advances on the knowledge, skills and understanding developed in year 1 laboratory and computing. In lab, students carry out experiments exploring complex physical phenomena over several weeks, often with open-ended aims. The same kind of instrumentation used in research labs is employed and the students utilise their Python skills to help analyse data, culminating in the reporting of their results. In computing, the students utilise advanced coding techniques to carry out a programming project aimed at simulating physical phenomena.

552 characters

Available as a standalone module/ short course? N

Statutory details

	ECTS	CATS	Non-credit
Credit value	10	20	N

HECOS codes:

FHEQ level: 5

Allocation of study hours

	Hours	
Lectures	4	
Group teaching	4	*Incl. seminars, tutorials, problem classes.*
Lab/ practical	96	
Other scheduled	1	*Incl. project supervision, fieldwork, external visits.*
Independent study	145	*Incl. wider reading/ practice, follow-up work, completion of assessments, revisions.*
Placement	0	*Incl. work-based learning and study that occurs overseas.*
Total hours	250	
ECTS ratio	25.00	

Project/placement activity

Is placement activity allowed? No

Module delivery

Delivery mode	Taught/ Campus	Other	
Delivery term	Year-long	Other	(Terms 1, 2 and 3)

Ownership

Primary department	Physics
Additional teaching departments	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		Michael	Fox
		Bob	Forsyth
		Alex	Richards

Learning and teaching

Module description

Learning outcomes	On completion of this module you will be able to: 1) Test and construct theories by collecting, analysing and interpreting real, measured data. 2) Use a range of technical and practical specialist laboratory skills and describe the limitations of the equipment used. 3) Based on initial research, design and perform extensions to address open-ended questions 4) Present the results of such investigations, analysing them critically as a technical report, a 15 minute presentation (10mins presentation and 5mins of questions) and finally in a journal format, and discuss and defend them in conversations with your peers. 5) Use good coding practises to write efficient code in Python 6) Use advanced coding concepts to simulate physical phenomena in Python
Module content	In the laboratory students perform 3 experiments – interferometry, radioactivity and waves & wave propagation. The experiments are generally scripted in such a way as to introduce the students to the topic and equipment, using this to perform important tests of the relevant theories, before encouraging more open-ended investigations that the students plan and perform themselves. The students are expected to maintain an accurate lab book, analyse their data and discuss their results with their peers and demonstrators, and present their results. In computing students learn more advanced coding techniques in Python. They then use these in a longer coding project, such as developing their own ray-tracing program.

Learning and Teaching Approach	The module runs in Terms 1, 2 and 3. The students will carry out computing and one of the three experiments in the first term and the remaining two experiments in term 2. Each of the laboratory experiments is carried out over a 4 week cycle, with two three hour sessions per week being spent in the laboratory. There are up to 32 students in each experiment session. Each experiment has an experienced staff member who acts as a head of experiment, coordinating a team of several demonstrators, who could be staff or PhD students. Teaching usually consists of 15-30 minutes of direct lecturing by way of introduction, and then the practical work begins with demonstrators available to help as required (but instructed not to directly tell/show an answer, instead to encourage the students to think for themselves and interact with their peers to solve problems). At the end of the fourth week, the students finalise their analysis and present their results. The fifth week of the cycle is assessment week. Computing will be taught in Term 3 with the students receiving demonstrator support for six hours a week. As with the experiments the demonstrators encourage the students to find the solutions themselves.
Assessment Strategy	The module grade consists of 75% for lab work and 25% for computing. 24% of the module grade is assessed through day-to-day work in the lab - a combination of practical laboratory skills, lab book usage, quality of data recording and general professional skills in a laboratory context. The rest of the lab grade (51% of the module grade) is assessed through either a short technical report, an oral presentation or a formal publication style report (one for each of the three cycles) with assessment criteria being content, quality of results and analysis, depth of understanding and clarity of communication. For computing, assessment (25%) consists of two parts: one is online tests to test the coding skills being developed. The other assesses the quality of the code students develop and its outputs for logic, efficiency, clarity and accuracy. This second part is a project to simulate a physical phenomenon, which the students complete during the lab sessions and independently.
Feedback	Formative feedback on real-time progress is continual for laboratory and computing as demonstrators are proactive in providing advice and assistance during the sessions. Reports are marked by the demonstrators using a set of well-defined assessment criteria, that are clearly laid out to the students at the start of the year. The assessment of the students ability to present their work includes written and oral feedback aimed at improving their scientific writing and presentational abilities. The main source of feedback for Computing comes from automated code testing, providing immediate feedback.
Reading list	There are no text books for this module. Lab scripts are provided.

Quality assurance

Date of first approval	
Date of last revision	
Date of this approval	
Module leader	Michael Fox
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

Assessment details

Grading method	Numeric	Pass mark	40%

Assessments

Assessment type	Assessment description	Weighting	Pass mark	Must pass?
Practical	Laboratory: assessment of day-to-day work in the laboratory	24.0%	40%	N
Coursework	Laboratory: two reports in different forms.	34.0%	40%	N
Practical	Oral Presentation	17.0%	40%	N
Practical	Computing: online tests	5.0%	40%	N
Coursework	Computing: submitted project code and outputs	20.0%	40%	N

- 100%