Imperial College London

Module Specification (Curriculum Review)

Basic details

		Earliest cohort	Latest cohort
UID		Cohorts covered	2021-22	

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	3	
Group teaching	0	*Incl. seminars, tutorials, problem classes.*
Lab/ practical	128	
Other scheduled	4	*Incl. project supervision, fieldwork, external visits.*
Independent study	115	*Incl. wider reading/ practice, follow-up work, completion of assessments, revisions.*
Placement		*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	(term 1 and 2)

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		David	Colling
		Alex	Richards
		Julia	Sedgbeer
		Robert	Kingham

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 advanced coding techniques to maximise the efficiency of a program in Python 6) Plan, write and test a computer simulation of a physical event - presenting their results in a short report.
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. The students then present their results in a short report.

Learning and Teaching Approach	The module runs in Terms 1 and 2. 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 run over 8 weeks in the first term with the students receiving demonstrator support for three hours a week. As with the experiments the demonstrators encourage the students to find the solutions themselves.
Assessment Strategy	Half of the grade for each cycle 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 other half of the 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.
Feedback	Formative feedback on real-time progress is continual for laboratory and computing as demonstrators are proactive in providing advice and assistance. Reports and code 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 detailed written feedback aimed at improving their scientific writing and presentational abilities.
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	David Colling

Office use only

QA Lead	
Department staff	
Date of collection	
Date exported	
Date imported	

Notes/ comments

Template version 16/06/2017

Assessment details

		Pass mark
Grading method	Numeric	40%

Assessments

Assessment type	Assessment description	Weighting	Pass mark	Must pass?
Practical	Laboratory: assessment of day-to-day work in the laboratory	37.5%	40%	N
Coursework	Laboratory: two reports in different forms.	25.0%	40%	N
Practical	Oral Presentation	12.5%	40%	N
Practical	Computing: online tests	4.0%	40%	N
Coursework	Computing: submitted code and outputs	15.0%	40%	N
Coursework	Computing: two-page summary report	6.0%	40%	N

- 100%