

Part IB registration and start of year information

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Part IB lab group registration

Part IB registration is a fully [online](#) process accessible from Friday 30 September 2022 until 9 am on Tuesday 4 October 2022. Login to the application is via Raven. Those new to the department starting in IB will need to follow different instructions sent by their DOS.

Students record their choice of specialisation for the integrated design project. This information is used to create teams with balanced sets of interests.

Notes

- Lab group numbers will be displayed [online](#) and all students must check these lists **before** the first lab session at 9am on Thursday 6 October 2022.

Introduction to Part IB

Wednesday 5 October 2022 12pm

An Introduction to Part IB will be held in the Constance Tipper Lecture Theatre.

[A recording of this session is now available.](#)

Part IB coursework & labs overview

Introduction

Outlines of the Part IB coursework activities and experiments are given below, together with the number of timetabled sessions allocated to them.

Also see the [general information about Part I labs & coursework](#).

Integrated coursework

An integrated coursework activity links four of the short labs (in vibration, structures, soils and signal processing) together round the common topic of “earthquake-resistant structures”, with students choosing one extension activity to pursue in more depth, leading to a report and presentation.

It consists of:

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1. an introductory lecture to set the scene and define the problems;
2. 4 short experiments in vibrations, soil mechanics, signal processing and structures including a risk assessment;
3. an extension exercise, in which you will design and conduct a follow-up to any aspect of the short experiments (taking 1-2 lab sessions);
4. a report and short presentation on your extension activity.

The integrated coursework runs over a four-week period, in the term in which you are not doing the IDP. The goals of this lab are to make the coursework open-ended and inter-disciplinary, to relate the labs more closely to Part IA and IB lectures, and to promote teamwork and presentation skills.

NOTE: All students will need their teaching system log in details (these are not the same as your email or Raven access).

Computing

The Michaelmas term computing course introduces students to microprocessor programming using C++ as the primary language.

Integrated design project

Students work in teams of six to design, build and test a mobile robot vehicle as an integrated design project (IDP). Various tasks, typical of those faced by the automated guided vehicles used in modern manufacturing plants, are set for the vehicles. Each team member is individually responsible for a particular sub-system, e.g. structure and drive train, power supply, sensors, electronic control or software integration, as well as contributing to the overall system design and optimisation. The project builds on Part IA teaching in electronics, computing, mechanics and structures, and aims to develop teamwork and communication skills. Students spend three two-hour sessions for four weeks working on this project. The resulting vehicles are tested in a competition to determine the best. Assessment is by quality of the robot vehicle and of team, sub-team and individual reports.

For further details see the [IDP website](#) on Moodle.

Sustainable engineering

In the Michaelmas term, a series of five lectures presents contemporary applications of the different disciplines to sustainable engineering. The lectures are delivered by a mixture of internal and external speakers and provide an opportunity to hear first-hand from some of the most influential workers in the field. Assessment is through a poster on a topic selected by the student, prepared over the Christmas vacation and presented to a small group of students in the Lent term.

For further details see the [sustainable engineering Moodle page](#). Coursework instructions will be given during the lecture course.

Coursework activities

Term	Coursework	No. of timetabled 2-hour (morning) lab sessions + afternoons
Michaelmas and Lent	Experiments Computing Integrated coursework Integrated design project	16 plus sign-up for long labs Optional helpdesks (schedule on Moodle) 5 + 2 or 3 morning/afternoon 13 + 1 afternoon lecture
Christmas Vacation	Poster on 'sustainable engineering'	

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Term	Coursework	No. of timetabled 2-hour (morning) lab sessions + afternoons
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Aims and purposes of Part IB labs

- To acquire practical skills from using different types of equipment and a variety of measuring techniques and to develop a critical approach to assessing the limitations and accuracy of the methods used.
- To learn to work to a sensible number of significant figures.
- To obtain direct experience of physical phenomena, such as the annealing of a metal or the reflection of an electric wave.
- To learn more deeply by doing. Lab work is designed to reinforce the treatment of topics covered in lectures.
- To foster interest and understanding in the subject through practical work that demonstrates engineering applications.
- To gain experience of situations where practical experiments are better than mathematical methods for solving problems.
- To develop an awareness of the limitations of mathematical modelling by testing the validity of models and the assumptions on which they are based against physical observation and experiment; and to reject unsatisfactory models and assumptions if necessary.
- To acquire presentational skills through practice in (a) recording accurately and in a professional manner observations made in the laboratory and (b) writing concise accounts of what has been observed, the significance of the results and the conclusions that can be drawn.
- To develop skills in organisation and co-operation through working in pairs or in larger groups on a common task to meet a specified deadline.
- To develop an awareness of the safety of the individual and the group through the safe and careful operation of potentially hazardous equipment.

This is a long list of aims to be achieved, and others could be added to it. Remember that departures from expected behaviour can be more interesting and thought-provoking than results that fit the predictions exactly. Experiments are the physical reality: if you find that to within the accuracy of your measurements there are discrepancies within the theory, then it is the theory or more likely the assumptions on which it is based that are wrong. Respect your measurements and remain sceptical about theories until the physical evidence is convincing.

Experiments (Michaelmas/Lent terms)

All students undertake 20 experiments, as listed below. There is a mixture of long and short experiments.

Associated paper	Experiment number and title	Long or short
Integrated coursework: (interdisciplinary)	A1. Dynamic vibration absorber	S
	A2. Model structures	S
	A3. Soil mechanics	S
	A4. Fourier signal analysis	S
Mechanics:	D1. Rotor dynamics	S
Structures:	S1. Plastic collapse	S
Materials:	M1. Materials characterisation	S + L
	M2. Heat treatment	S
	M3. Torsion testing	L
Thermofluid mechanics:	T1. Heat pump	S
	T2. Pipe-flow	S
	T3. Boundary layers	L
	T4. Heat transfer	S

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Associated paper	Experiment number and title	Long or short
Electrical engineering:	E1. Power amplifier	S
	E2. Synchronous machine	S
	E3. Induction motor	S
	E4. Wave transmission	L
Information engineering:	I1. Spectrum analysis	L
	I2. Vehicle motion control	S
	I3. Position control	S

Lab handouts

All the introductory information regarding laboratories, as well as handouts for ALL of the experiments are available [on moodle](#).

It is important that you take the time to read through the documentation on that page and to consult the handout for each experiment PRIOR to the day of the laboratory. Hard copies of handouts will be available in each laboratory.

At your **first** laboratory, please ensure that you collect a copy of the handout for that experiment.

All lab leaders and technicians have been made aware of this procedure and will have the relevant materials ready for collection.

Part IB Mars Lander feedback session

Some colleges will be arranging small feedback sessions in October for their own students: your Director of Studies will advise. There will also be an open-to-all feedback session on Wednesday of week 1 at 2pm in the Constance Tipper lecture theatre.

Part IB exchange fair

We currently have student exchange programmes with National University of Singapore (NUS) and CentraleSupélec Paris. Cambridge third year students spend a full year at these institutions, returning to Cambridge for their fourth year. Numbers are strictly limited: this year, three of our students are at CentraleSupélec and three at National University of Singapore.

To introduce you to the process and to show you what is on offer, an exchange fair will be held. Further details will follow.

Course material on Moodle

Most of the Department's courses have a page on the [University's Virtual Learning Environment Moodle](#).

These pages are maintained by course lecturers. Students registered to these courses are automatically enrolled at the start of the course and can engage in the course activities, including coursework submission when appropriate.

Other members of the University, staff or students, can self-enrol as observer and gain access to handouts and other documents made available to the students by the lecturers. This access is provided to students so that they can make an informed decision regarding their course selection. There might be copyright restrictions to the course material; any use of the course content that is not related to students education is not allowed. The material should

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not be redistributed by the students in any circumstances.

A key is needed to self-enrol on any course. By using this key, you indicate that you agree with the condition above.

Enrolment key: **cued_moodle_access**

You may wish to look at our ['getting started' guide](#).

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