

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 between 09:00 on Tuesday 8 October 2019 to 09:00 on Wednesday 9 October 2019 or on terminals in the DPO in the afternoon on Tuesday 8 October 2019 when staff will be on hand to help with any problems. Login to the application is via Raven.

There are two parts to IB registration and it is important that both are completed by 09:00 on Wednesday:

1. **Students form lab groups:** Students choose a lab group from those available on the online form for their College. It does not matter which groups are used, but the pairings must be correct so students need to have decided on lab group pairings in advance. Students cannot change someone else's entry if they have already signed up for a group, but they can change their own.
2. **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 codes on the online sign-up sheets will be converted into lab group numbers. Unpaired students will be paired up automatically when lab group numbers are assigned. When a College has an odd number of students, a pair will be formed with a student from another College.
- Any student whose details are not entered by 09:00 on Wednesday 9 2019 will be allocated a lab group number automatically.
- Lab group numbers will be displayed [online](#) and on boards in the Baker building foyer on the afternoon of Wednesday 9 October 2019 All students must check these lists **before** the first lab session at 9am on Thursday 10 October 2019.

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.

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' | |

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 |
| Electrical engineering: | E1. Power amplifier | S |
| | E2. Synchronous machine | S |
| | E3. Induction motor | S |
| | E4. Wave transmission | L |
| Information engineering: | I1. Spectrum analysis | L |

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| Associated paper | Experiment number and title | Long or short |
|------------------|-----------------------------|---------------|
| | 12. Vehicle motion control | S |
| | 13. 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 the following:

- A copy of the handout for that experiment
- 2 Lab books (one to be used for long experiment lab sessions; the other is for the extended exercise in the integrated coursework).

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 a catch-all feedback session in the Department on Wednesday of week 1, see the timetable for full details.

Part IB exchange fair

We currently have student exchange programmes with National University of Singapore (NUS) and CentraleSuperlec Paris (formerly known as Ecole Centrale 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, two of our students are at NUS and two at Centrale Superlec.

To introduce you to the process and to show you what is on offer, an exchange fair will be held on Friday 1 November. Representatives from each of the exchange programmes will be on hand to discuss any queries you may have. A sandwich lunch will be provided.

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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