

Part IA briefing notes - general information

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Part IA structure

Lectures

Lectures are timetabled throughout the Michaelmas and Lent terms, and the first four weeks of the Easter term.

All students take the same four 3-hour examinations at the end of their first year. These papers and the lecture courses examined in them are:

Paper 1	Mechanical engineering	Mechanics (16 lectures) Mechanical vibrations (12 lectures) Thermofluid mechanics (24 lectures)
Paper 2	Structures & materials	Structural mechanics (24 lectures) Materials (20 lectures)
Paper 3	Electrical & information engineering	Physical principles of electronics, electromagnetics (12 lectures) Linear circuits and devices, AC power (22 lectures) Digital circuits and information processing (16 lectures)
Paper 4	Mathematical methods	Mathematics (40 or 32 lectures)* Computing (2 lectures + coursework lectures)

*Note on the fast & standard mathematics courses

The Michaelmas term mathematics course is given in two different versions: a standard course (three lectures per week) and a fast course (two lectures per week). Both will cover the same syllabus, and will use the same examples papers.

The **fast course** is aimed primarily at those who have taken maths and further maths at A-level and have good mathematical fluency, so they may already have seen some of this material. The **standard course** aims to cater for those with less prior training in mathematics, especially those with only single mathematics A-level. The lecturers will endeavour to keep in step, so that it will be possible to swap courses for particular broad topics.

Attend the first lecture which most suits your background, and the lecturer will explain the arrangements in more detail.

Engineering applications (8 lectures)

These sessions illustrate the applications of engineering principles in the widest possible context over a broad range of technologies.

Examples papers

One examples paper is issued for about every four lectures, on Wednesdays according to the termly schedule. The material is followed up in examples classes (see lecture timetable) and College supervisions. Solutions (cribs) of each examples paper will be made available to students online after the corresponding examples class.

Coursework

Important engineering skills are developed in a wide variety of coursework exercises. The Michaelmas term includes induction activities which lay foundations for the rest of the course.

Lecture & lab start times & lateness penalties

Lectures

Lectures run from five minutes past the hour to five minutes to the hour, with the following exception:

Part IA and IB lectures in LT0 will start promptly at 9am and 10am. Lecturers will start lecturing at precisely 9am in order to fit in the full 50 minutes of teaching that they need to deliver:

- First lecture 09.00-09.50 (non-standard)
- Second lecture 10.00-10.50 (non-standard)
- Third lecture 11.05-11.55
- Fourth lecture 12.05-12.55

This schedule allows LT0 to empty and refill at 11am. Students should leave LT0 by the doors at the front and on the North side at the back (leading to the roadway), allowing students to enter from the foyer and the courtyard.

Lab times and lateness penalties

Morning laboratory/coursework sessions begin at 5 minutes past the hour.

Afternoon activities start on the hour.

1. Students arriving up to 10 minutes late will be penalised 1 mark for late arrival, but may be excluded entirely at the discretion of the demonstrator in charge.
 2. Students arriving more than 10 minutes late, will be automatically excluded from any laboratory experiment. For other coursework activities (e.g. computing, drawing, IEP etc.) the student may, at the discretion of the demonstrator, be allowed to take part in the activity, but will be penalised for late arrival.
 3. Students who arrive late due to circumstances beyond their control should first try to rearrange the coursework activity. If this is not possible they may make an application for recovery of marks using the standard allowance procedure.
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Part IA coursework & labs overview

Introduction

Outlines of the Part IA 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](#).

Lego Mindstorms

Part IA coursework starts with an intensive, hands-on activity using [Lego Mindstorms](#). For the first week, students work in groups of three to design and build a simple electro-mechanical device, based around a number of sensors and actuators. The exercise is open-ended and fun, giving an immediate awareness of the integrated nature of real-world engineering, involving software, mechanical and electrical components, teamwork, and communication skills.

There are ten timetabled hours in the [lab & coursework schedule](#), but students may wish to allow extra time during the evenings and weekend. Team allocations will be posted on Moodle on Wednesday 6 October 2016. The Lego lab handout (issued at the introductory lecture) includes instructions on how to sign on to Moodle. All students should do this, and browse the project documentation on the Moodle site, during the afternoon of Wednesday 6 October 2016. All groups present their devices, with prizes for the best systems, demonstrated to the whole year at the end of week 2.

Drawing

Each timetabled drawing session, both morning and afternoon, begins with a lecture to outline the material that will be covered in the following practical class. The Michaelmas term exercises introduce the basic principles of projection theory. The interpretation and making of mechanical drawings, including CAD, are practised in the Lent and Easter terms.

Students are expected to attend both the lecture and the following practical class. Work set for each drawing class **must** be handed in at the end of each session. Students should avoid commitment to other afternoon activities on the one day a fortnight when they are scheduled to attend drawing classes (see the lab & coursework schedules). Supervisions should be timetabled to avoid afternoon lab sessions.

Most of the equipment required for the practical drawing sessions is provided. See [additional course costs](#) for details of the drawing equipment that students are expected to have.

Exposition

The communication of technical information is developed through the [exposition course](#) which aims to improve students' presentation, discussion and writing skills. Students' lab reports on the **statics experiment** are critically reviewed during these sessions. In addition, each student is required to give a short (10-15 minute) talk on technical material and to take part in a debate on a current technical topic, or other appropriate activity. The topics chosen are at the discretion of the group leader. The good practice initiated during the exposition exercises is developed throughout the course, whenever students write laboratory or project reports, essays or give oral presentations on their project work.

Engineer in society, principles of design, product design project and dimensional analysis

Eight lectures are given on the role of the [engineer in society](#), in which the wider issues that influence technical decision making are discussed. Students' assimilation of the lecture material and their reading around the subject is assessed through a report. There are also eight lectures on the principles of design, assessed through the [product design project](#). The principles of [dimensional analysis](#) are covered in four lectures at the start of term followed by two experiments (and questions may be set on this topic in the Part IA examinations).

NB. Attendance at **all** these lectures is necessary for students to complete their coursework satisfactorily.

Computing and microprocessors

The Michaelmas Term part of the course involves 12 activities for self-study, and each activity has exercises to be completed. All the material and documentation for the course will be made available online, through the course Moodle page. Support sessions in the DPO will run on Mondays and Tuesdays of week 2, 3, 5 and 6. Students can sign-up to these sessions from the course Moodle page (or simply go the DPO during the sessions and see if there is an available slot). The exercises for *at least* the first six activities must be completed by week 4 and will be checked at a sign-up *assessment* session, and the remainder must be completed by the second *assessment* sign-up session in week 7. In each assessment session, all students are required to book (as a lab group) a slot for a 15-minute long session. Students will be asked to demonstrate their code and answer a few questions to make sure they understand the course content.

The Lent Term activity is a group exercise, with students working in pairs. Each student takes charge of writing part of a software solution. A modular design and unit testing are required to ensure that the two parts work together correctly.

Microprocessors and learning how to program them are introduced through a series of labs in the Easter term.

The computing course is examined in Paper 4 Mathematical Methods. An open-ended long vacation exercise (the "**Mars lander**") aims to keep computing skills fresh for Part IB.

Structural design project

Creative thinking and synthesis are fostered in design projects. All students undertake a Structural Design Project. Working in pairs, they design, manufacture and test a metal structure to carry given loads at minimum cost. The structures are tested to destruction in ascending order of 'cost'. After the test, recommendations are made on how the design might be improved. Assessment is by the quality of the tested product, the quality of the drawings and the individual reports.

Integrated electrical project

In the integrated electrical project, students work in pairs to design, build and test an AM radio. This project brings together design software and working with electrical components to integrate many topics in the lecture courses on linear circuits and electronics. The project begins with a timetabled lecture for all students towards the end of Michaelmas term, and has a concentrated period of laboratory activity in the Lent Term.

Product design exercise

The students' assimilation of the material covered in the eight lectures on the principles of design is tested through a product design project where they are asked to design a device to meet a specified need. In addition to a brief report, students present their solutions in person to an audience which includes a designer from industry.

Outline of coursework activities

Term	Coursework	No. of timetabled 2-hour (morning) lab sessions + afternoons
Michaelmas	Lego Mindstorms Dimensional analysis Statics experiment Exposition	5 (2 or 3 in afternoons) 2 1 8

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Term	Coursework	No. of timetabled 2-hour (morning) lab sessions + afternoons
	Computing	Support sessions mornings and afternoons in weeks 2, 3, 5 and 6. Assessment sign-up sessions in weeks 4 and 7.
Christmas Vacation	Report on 'the engineer in society'	
Michaelmas, Lent and Easter	Drawing Structural design project Integrated electrical project	9 + 9 afternoons 5 + 5 afternoons 5 + 4 afternoons
Lent and Easter	Microprocessors Computing Experiments	2 + 1 afternoon 2 + 2 afternoons 13
Easter Vacation	Product design project	

Outline of experiments (Lent/Easter terms)

Students undertake 13 experiments during the Lent term and the first three weeks of the Easter term. The topics on which these experiments are based are listed below. Some experiments are 'short'. These straightforward experiments aim to give students experience of important techniques and phenomena. Each task is completed and signed up in the two-hour morning period assigned to it. 'Long' experiments normally require two hours in the laboratory to complete the investigation and record the results, with an extra two hours on writing-up and drawing conclusions, and a subsequent sign-up session.

Associated paper	Experiment number and title	Long or short
Mechanics:	1. Kinematics of plane mechanism	L
	7. Vibration	S
	8. Energy and power	S
Thermofluids:	2. Gas engine	L
	9. Turbocharger	S
	10. Inviscid fluid flow	S
Structures:	3. Elastic beams	L
Materials:	4. Plasticity and fracture	L
	11. Non-destructive testing	S
Electrical and information:	12. Iron-cored transformer	S
	13. AC Power	S
	14. Combinational logic	S
	15. Sequential logic, memory and counting	S

Coursework credit

Coursework in Engineering includes lab work and projects, plus a number of other marked assignments.

Coursework for standard credit at Part I

In Parts IA and IB, all coursework is for standard credit, which means that once students achieve a satisfactory standard in the various groups of activities the associated marks are capped at the qualifying level. Students who fail to reach the qualifying marks, or who fail to attend or hand in certain coursework, will have the shortfall deducted from their total in the Tripos. The marks available and qualifying marks are shown in the Faculty Board [Part IA](#) and [Part IB](#) coursework credit notices.

The standard credit scheme has been designed to encourage students to attend coursework sessions punctually, to complete each laboratory-based activity within an appropriate time to a satisfactory standard so as to achieve the main objectives of the activity, and to submit any written work for marking within a specified timescale.

The system aims to help students by discouraging them from spending an inordinately long time on any one coursework activity, at the expense of other aspects of their study. It also encourages innovation in design work, as there is not an undue loss of marks for a less successful outcome.

The majority of students are expected to gain the qualifying standard.

Rearranging coursework & allowances

Students are expected to make every effort to attend timetabled coursework sessions and meet coursework deadlines. If a student believes this may not be possible, they should first read '[Rearranging coursework & allowances: general rules](#)'.

Plagiarism avoidance: expectations of all students

The range of penalties for cheating in University examinations and coursework includes disqualification from the BA and MEng degrees. Ignorance of the seriousness of plagiarism will **not** be an acceptable defense.

The University's Discipline Regulation 6 states: "No candidate shall make use of unfair means in any University examination. Unfair means shall include plagiarism* and, unless such possession is specifically authorised, the possession of any book, paper or other material relevant to the examination. No member of the University shall assist a candidate to make use of such unfair means."

* plagiarism is defined as submitting as one's own work, irrespective of intent to deceive, that which derives in part or in its entirety from the work of others without due acknowledgement.

To ensure that you understand what constitutes plagiarism and how to avoid it through good academic practice you are required to read:

- the University's [statement on plagiarism](#);
- the Department's guidance on [distinguishing between cooperation & cheating](#), which includes links to sources of further information and support.

If you do not fully understand the information in these documents you must seek clarification at the **earliest opportunity** from your Director of Studies or supervisor.

All work submitted electronically may be subjected to checking for plagiarism using Turnitin text-matching software

software. You are required to:

- read the [terms and conditions of use for Turnitin text-matching software](#).

Progression through the Engineering Tripos

A summary of the results that students must obtain to continue with the next part of the course is available [at this link](#). Formal and detailed information about progression requirements is contained in [Statutes and Ordinances](#).

Industrial qualification

The deadline by which [industrial experience](#) must be completed and confirmatory documents submitted is Wednesday 10 February 2016.

For details of firms offering work experience or to make an appointment with the Industrial Experience Coordinator see the [Industrial Experience website](#).

Accreditation of the MEng

All students are encouraged to become student or affiliate members of one or more of the professional engineering institutions, and hopefully later become full members. [This link contains details of the accreditation of the Cambridge Engineering degree](#).

Prizes, Scholarships and Awards

There are a large number of Prizes, Scholarships and Awards available: some are awarded for excellent performance on the course, others are open competitions (in particular, note the [Head of Department's Annual Design Competition](#)). Details of all prizes and awards are on the [CUED Prizes and Scholarships webpage](#).

Additional course costs

[This link](#) describes any additional costs that students will be expected to pay to complete the course.

Feedback from students

We are keen to hear what students think of the courses that we give, and so encourage students to [complete the online survey](#) and [vote for the 'best' lecturer](#). They can also use the ['Fast Feedback' to send messages anonymously](#).

Dyson Centre for Engineering Design

The Dyson Centre for Engineering Design will be opening during the Michaelmas term, providing a modern design-and-make space at the heart of the Trumpington Street site. More details are available [here](#).

The vision is to provide a modern workspace for engineering students to develop their creativity and enthusiasm for

engineering, providing a home not only for the design, build and test projects that are a core activity within the undergraduate teaching programme but also for the extracurricular student-led projects and the school outreach schemes. The large projects will have bases here, but the aim is also to provide facilities for students to explore individual or small-group projects.

Students will be able to come together to think, exchange ideas, design, experiment, and build. They will have access to facilities for prototyping and making, using traditional hand- and machine-tools and also modern computer-controlled machinery, 3D printers and laser cutters.

Inclusive teaching

The Equality Act (2010) requires higher education institutions to take positive steps to make their education accessible to disabled students and to make 'reasonable adjustments' to provision to ensure that disabled students are not disadvantaged. Disabilities may include physical or mental impairments: the majority of these students have specific learning difficulty (SpLD) in the form of dyslexia. Cambridge University Disability Resource Centre has some standard recommendations for appropriate academic support for such students. Further provision may be required in particular cases.

In an organisation of our size and complexity, individual variations in provision are potentially disruptive. However, many of the suggested adjustments are just good educational practice, so represent things we should be doing anyway as a Department that takes pride in the excellence of its teaching. Indeed, we already follow many of the recommendations (e.g. provision of cribs). The approach we have adopted is therefore to aim to have inclusive standard procedures for all teaching activities. Students are expected to make use of available resources to suit their needs, and to contact staff themselves (e.g. lecturers, lab leaders) if additional material is required.

The syllabus pages will give you lecturer details for part [IA](#) and part [IB](#) lecturers. Lab leader details can be found here for [IA](#) and [IB](#).

Contact details of part II lecturers can be found on the relevant syllabus pages.

Any enquiries should be addressed to the [CUED Director of Undergraduate Education](#).

The following recommendations have been agreed by the Faculty Board (12 November 2012):

- Electronic versions of handouts should be made available on-line 24h in advance of lectures or other teaching sessions (e.g. labs). [This allows students who do have special requirements to produce their own customised hard copy if they wish: e.g. single-sided; large format; non-white background].
- Filled-in versions of notes should be made available on-line after lectures.
- Recording lectures (audio) is often recommended to students as a learning aid. They must sign an agreement to use the recording only for their own personal study, and acknowledging IP and copyright. The agreement form can be found [here](#), and students are asked to provide the Teaching Office with a copy. Lecturers are asked to consent to their lectures being recorded under these conditions. A list of students who have completed agreement forms can be made available on request.
- In labs, instruction should be provided in both written and verbal form.
- Lecturers should remember to pay attention to 'signposting' e.g. statement a start of each lecture of what is being covered; tracking progression throughout lecture; summary of main teaching points at end.
- All staff should make particular effort to put new vocabulary into context and explain new concepts. It is helpful to provide some repetition.

In 2016-2017, the department is trialing a lecture capture system for IA and IB. More information will be added to this guide in due course.

Undergraduate Teaching Office contact details

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The Undergraduate Teaching Office organises and oversees the provision of undergraduate courses, projects and teaching activities. The Office is located on the office floor of the Baker building.

Individual contact details of Undergraduate Teaching Office staff are as follows:

[Dr Claire Barlow](#), **Deputy Head of Department (Teaching)**, tel: (3)32627

[Dr Alexandre Kabla](#), **Director of Undergraduate Education**, tel: (3)32883

[Alison Burgess](#), **Administrative Officer**, tel: (3)32619

Sonia looks after examinations and much of the teaching administration, including TODB, teaching allocations and timetabling. Her normal days in the office are Tuesday, Wednesday and Thursday but she is contactable by email every day.

[Madeline McKerchar](#), **Administrative Officer**, tel: (7)62423

Madeline looks after Faculty Board and Teaching Committee, and will be in the office Mondays, Wednesdays (morning only) and Fridays.

[Mary Wilby](#), **Senior Administrator (Teaching Office)**, tel: (3)32704

Teaching Office Manager

[Sally Kwong](#), **Administrator**, tel: (3)32807

Supports examinations, TODB, the Faculty Board and room bookings.

[Klara Cichovska](#), **Administrator (Teaching Office)**, tel: (3)32625

Production and distribution of examples papers, Teaching Office enquiries.

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