COURSE HANDBOOK

2023/2024

Engineering Science

Final Honour School

Contents

FOREWORD

Statement of Coverage

This handbook applies to students taking the Final Honour School MEng in Engineering Science in Michaelmas Term 2023. The information in this handbook may be different for students starting in other years. A separate handbook regarding the Preliminary year of the MEng in Engineering Science degree for those starting in Michaelmas Term 2023 will be issued.

Your course handbook should be your first port of call for any minor queries concerning the course. For other issues or questions, please contact the Student Administration Office. Course handbooks are published on Canvas.

DISCLAIMER

The Examination Regulations relating to this course are available at https://examregs.admin.ox.ac.uk/. If there is a conflict between information in this handbook and the Examination Regulations, then you should follow the Examination Regulations. If you have any concerns, please contact the Student Administration Office at student.administration@eng.ox.ac.uk.

The information in this handbook is accurate as of 1st August 2023, however it may be necessary for changes to be made in certain circumstances, as explained at www.ox.ac.uk/coursechanges. If such changes are made, the department will publish a new version of this handbook together with a list of the changes and students will be informed.

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1 KEY CONTACTS IN THE DEPARTMENT

The Student Administration Office

The Student Administration Office on the 8th Floor in the Thom Building is the main location to go to if you have any general queries regarding teaching.

student.administration@eng.ox.ac.uk

01865 283263

Opening hours: Monday to Friday, 9am – 5:00pm

Student Administration staff will also be available remotely by email Monday to Friday 8:30 am – 5 pm. If your query is about exams, you should email exams@eng.ox.ac.uk.

Planning a visit?

Please email or call-in advance if you're planning to make a special trip to the Department.

Who's who?

The Student Administration Office team is managed by the Head of Student Administration and headed up by a lead academic – the Associate Head (Teaching). Details of the current Student Administration Office team and associated staff supporting teaching are listed below:

Associate Head (Teaching)
Prof Thomas Adcock,
thomas.adcock@eng.ox.ac.uk

Head of Student Administration / Disability Contact
Christine Mitchell
christine.mitchell@eng.ox.ac.uk

Undergraduate Studies Administrator
Bridie Thompson
student.administration@eng.ox.ac.uk

Details for all Academic Staff are available here:

https://eng.ox.ac.uk/people/?c=ad

Useful email addresses

Engineering Science Reception - for general queries to the Department

reception@eng.ox.ac.uk

Engineering Science IT Helpdesk – for help with IT:

thehub@eng.ox.ac.uk

https://intranet.eng.ox.ac.uk/it/

Departmental Safety Officer

Philip Paling

philip.paling@eng.ox.ac.uk

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2 IMPORTANT SOURCES OF INFORMATION

Things you'll need to look at

Engineering Science Canvas site

The most comprehensive source of information for your studies is the Engineering Science Canvas site at https://canvas.ox.ac.uk. On this site you can find details of the syllabus, lecture notes, example sheets, solutions, details of student representatives, and many other useful pieces of information.

Examination Regulations

The Examination Regulations is the authoritative document on University examinations. This document defines the components and regulations corresponding to the examinations taken in Parts A, B and C of Finals; changes to it are strictly regulated by the University to ensure you can't be disadvantaged by any changes which are made after you start your course. It is available online at https://examregs.admin.ox.ac.uk/.

The most current version of the examination regulations is always available online.

Proctors and Assessor's Memorandum

A booklet entitled The University Student Handbook is produced by the Proctors and Assessor and is handed out by colleges to new students at the start of Michaelmas Term. The booklet explains the role of the Proctors and Assessor and provides useful information about welfare, support, recreation, examinations and University regulations. It is available to download at https://www.ox.ac.uk/students/academic/student-handbook.

Important reference documents

The student portal at www.ox.ac.uk/students provides a single point of access to information, services, and resources for students. Please ensure that you are familiar with the following University policies:

- Equal Opportunities Statement for Students
- Disability
- Harassment
- Safety for Students
- Proctors and Assessor's Memorandum (The University Student Handbook)

- Computer Usage Rules and Etiquette

During your studies you might also need to consult other policy documents such as those on:

- Intellectual Property Rights which is set out in the University Statues and Regulations at https://www.ox.ac.uk/students/academic/guidance/intellectual-property
- Data Protection at https://compliance.admin.ox.ac.uk/data-protection-policy

The online version of the Examination Regulations is available at https://examregs.admin.ox.ac.uk/.

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3 DATES TO NOTE

Please see the main University website for details of specific term dates. This information is available here: https://www.ox.ac.uk/about/facts-and-figures/dates-of-term.

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4 DEPARTMENTAL INFORMATION

4.1 Opening Hours

Thom Building

The main door to the Thom Building and the Thom Building reception desk is open on weekdays between 7:45am and 6pm all year around. There is a study area on the 8th floor which is open to students. It seats approximately 40 students, with small rooms for group work and individual study carrels.

Holder Building

During weeks 1-8 of term the main doors to the Holder Building on the first floor are unlocked from 8:30am and are locked at 4:45pm. They are permanently on swipe-card access during vacations. Detailed rules governing access to the Department are included in Appendix C.

4.2 Radcliffe Science Library

The Radcliffe Science Library (RSL) http://www.bodleian.ox.ac.uk/science is the main science research library at the University. The library holds copies of all of your reading list items, and most of your engineering library research will be done using this library's resources. The library itself has recently undergone a three-year refurbishment. The RSL can be found on the corner of Parks Road and South Parks Road, which is a short walk away from the Engineering Science department. Books are available for loan from the Radcliffe Science Library and may also be available from college libraries.

There is also an online library guide ox.libguides.com/Engineering UG Projects specially prepared to help you find information for your 3rd and 4th year projects in Engineering Science.

The subject librarian responsible for Engineering Science is Alessandra Vetrugno alessandra.vetrugno@bodleian.ox.ac.uk, and she is based at the RSL. Please contact her for assistance if you have any issues or questions regarding library resources. For further information, please refer to the Departmental Information section in your Prelims Handbook available on Canvas.

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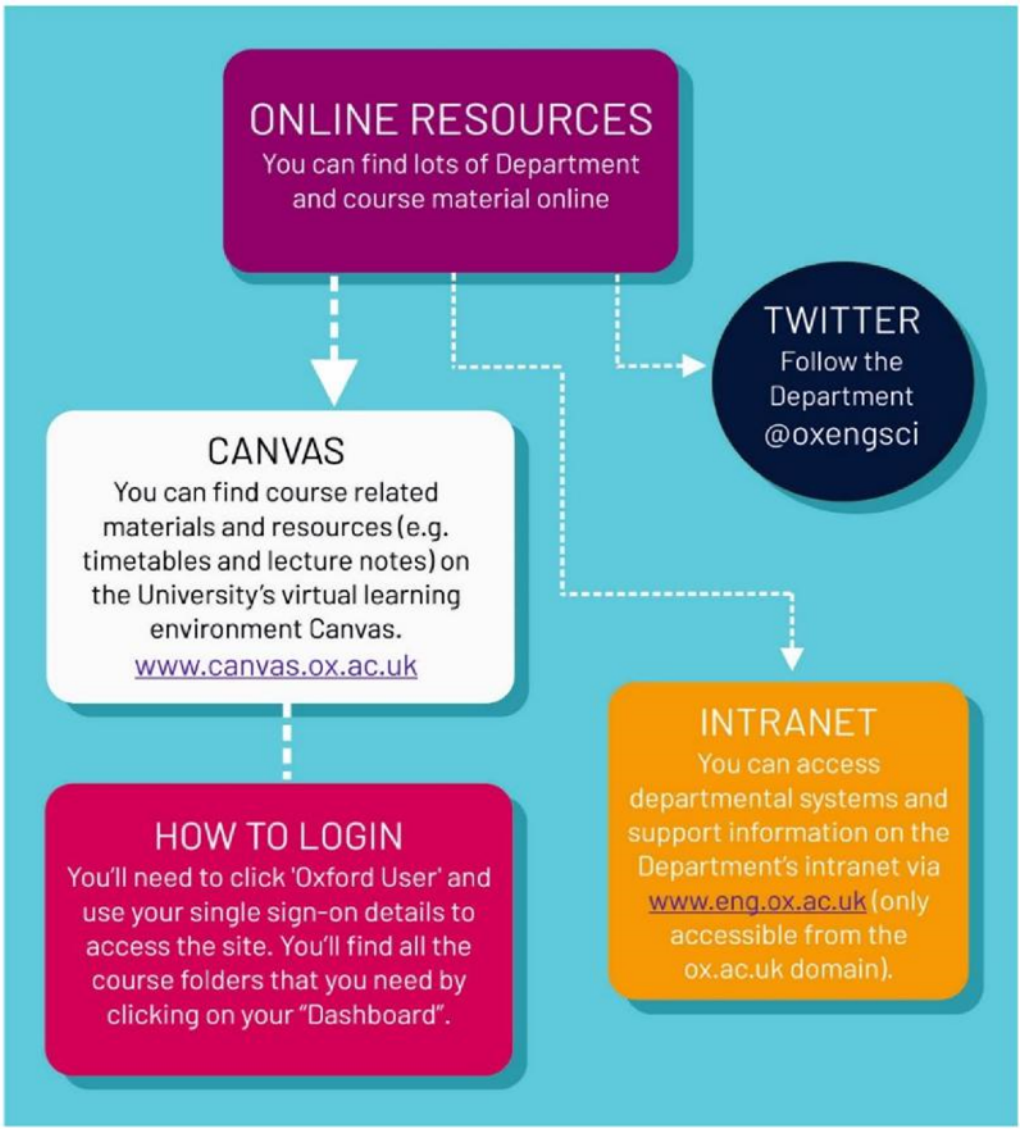
5 GENERAL INFORMATION

5.1 Communications

The Student Administration Office uses email as the main means of communication with you. It's expected that you'll check your college email account on a daily basis, at the very least. While last minute timetable changes are not frequent, get into the habit of checking your email before you set off for the Department - you could save yourself a wasted journey.



Digital display screens, along with noticeboards on the ground floor and first floor of the Thom Building, carry timetable information and other important announcements. It is essential to check these regularly.

Contacting staff

You can contact members of staff via email, phone or in person – details are available at https://eng.ox.ac.uk/people?c=ac.

5.2 Student Opportunities

Details of visits from companies to the Department, opportunities for further study, announcements by engineering related student societies etc., are posted on the Student Information Pages for students to view (http://studentinfo.eng.ox.ac.uk). The Careers Service is also an invaluable resource, right from the start of your studies. Visit www.careers.ox.ac.uk to find out more about how the Careers Service is able to assist you in improving your employability skills. The Careers Service also has a job search database called CareerConnect for internships, placements and graduate job opportunities.

If you represent a society or organisation which you feel would be of interest or benefit to engineering students, then get in touch. Simply email the text you would like to be circulated to student.administration@eng.ox.ac.uk and we may publish it accordingly. We reserve the right to refuse to include material if it is deemed inappropriate for the audience. The Editors' decision is final. Further information about skills and work experience is available here: https://www.ox.ac.uk/students/life/experience.

5.3 We Want Your Feedback!

Your opinion counts… we want to hear your feedback on lectures, examples sheets, and laboratory experiments, as well as the general quality of life in the Department. REMEMBER, the sooner you pass your comments across to us, the more likely we will be able to act on them. The teaching feedback survey is open all year round, but we will send out termly reminders to you.

Direct feedback to lecturers/tutors	You can contact academic staff directly — constructive criticism will always be welcome, and you can contact the Associate Head (Teaching) at any time.
Joint Consultative Committee (JCC)	The JCC meets once a term and provides discussion between students and staff on administrative and academic topics. You elect your committee representatives from amongst your undergraduate peers. This body has an important function in collecting and communicating opinion in an organised way.
Divisional Board	Student representatives sitting on the Divisional Board are selected

	through a process organised by the Oxford University Student Union (OUSU). Details can be found on the OUSU website along with information about student representation at the University level.
Engineering Science Confidential Reporting System (CRS)	Health and safety first! You can report practices or incidents which you think are potentially dangerous to yourself or your peers. This system helps to highlight hazardous and dangerous situations and understand what causes them. Further information is available online.
Teaching Feedback	You can give your feedback at any time during the course. We are currently in the process of changing how this is collected and you will be updated by email.
Student Barometer	Students on full-time and part-time matriculated courses are surveyed once a year on all aspects of the course (learning, living, pastoral care, and college) on this system. Previous results can be accessed by students, staff and the general public here.
National Student Survey	Final year undergraduate students are surveyed through the National Student Survey (NSS). Results from previous NSS surveys may be found at https://discoveruni.gov.uk.

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6 THE COURSE

6.1 Overview

All engineering teaching is based on a general course in Engineering Science. We offer this unified course because we believe that future engineering innovation will benefit from broad foundations as well as specialised knowledge. Links between topics in apparently diverse fields of engineering provide well-structured fundamental understanding and can be exploited to give efficient teaching. The first two years are centred on core engineering subjects, with the third and fourth years offering undergraduates the opportunity to specialise in a particular engineering discipline.

The Engineering Science course is planned by the Faculty of Engineering Science, which consists mainly of the Department's academic staff.

The information in this handbook relates to the final three years of the four year undergraduate MEng in Engineering Science degree course. The course is taught to Level 7 of the Frameworks for Higher Education Qualifications (FHEQ) guidelines. The course is taught and developed within the subject benchmark statement1 guidelines issued by the Quality Assurance Agency (QAA), the independent governing body for monitoring and advising on standards and quality in UK higher education. The University Awards Framework (UAF) provides further guidance (https://academic.admin.ox.ac.uk/university-awards-framework).

6.2 Accreditation by the Engineering Institutions

When selecting your course options after year 2, you should consider which engineering pathway you intend to take for the remainder of your degree; this decision will impact on your career and your opportunities to seek professional engineering status through the Engineering Council in the UK. There are five accredited combinations of course options or pathways, each agreed with the relevant Professional Engineering Institutions (PEI) In 2017. These are not expected to change with their 2023 review.

- Civil and Structural (ICE, ISE, CIHT and IHE)
- Electrical and information (IET)
- Mechanical (IMechE)
- Measurement & Control (InstMC)
- Chemical (IChemE)

If you're seeking membership of a PEI, you must complete one of the above pathways for your degree to be accredited; you'll be asked this information when you apply to the PEI and they'll want

to see a University transcript as evidence of papers taken and the titles of your project work. A list of the preferred papers making up each of the pathways is on Canvas in the resources section for third and fourth year options. It is your responsibility to select your options based on what matches your career choice and intended membership of one of the PEIs. If you need to, please seek advice by contacting the institution concerned, the Student Administration Office or one of the academics below who have been nominated as institution liaison officers. Good advice is to become a student member of your preferred PEI now.

Institution of Civil Engineers	Prof. M. Chatzis
Institution of Engineering and Technology	Dr. E. O'Hara
Institution of Mechanical Engineers	Prof. D.R.H. Gillespie
Institution of Chemical Engineers	Prof. N.P. Hankins
Institution of Measurement and Control (InstMC)	Vacant

6.3 Course Aims

- To provide students with a systematic understanding of the knowledgebase of Engineering Science: the ability to analyse complex issues both systematically and creatively, make sound judgements in the absence of complete data and communicate their conclusions clearly; the ability to be self-directed and innovative in tackling and solving problems; the independent learning ability required for continuing professional development.
- To provide a broad curriculum which provides state-of-the-art knowledge and practical skills in Engineering.
- To provide a learning environment that enables students of high innate ability to reach their full potential, personally and academically, so that on graduation they are free to choose from many different careers, and have the understanding, knowledge, and personal maturity to make a rapid contribution to their chosen employment or research area.
- To provide a course which meets the educational requirements of all the appropriate Engineering Institutions for Chartered Engineer status.

6.4 Course Learning Outcomes

To meet the conditions of accreditation by the Professional Engineering Institutions a degree course must have learning outcomes that satisfy established criteria across six key areas of learning. The extended syllabus for the second year A papers is given in Appendix E and for third

and fourth year courses the extended syllabus is published on Canvas – the extended syllabus provides further details on the learning outcomes for each paper; these outcomes feed directly into how the course delivers the overall learning outcomes. The following section is a statement on how the whole Engineering Science programme delivers these outcomes at the integrated Masters (MEng) level.

Science and Mathematics

The application of advanced mathematical methods to a comprehensive range of tutorial problems, underpinning the engineering principles and tools required in their solution. The scientific practice and application of mathematics in a substantial group project (3YP) and higher level individual project (4YP).

Engineering analysis

The application of engineering concepts to solve set problems in tutorial work. The collection, analysis and application of data through laboratory-based coursework (practicals), group project (3YP) and an individual research project (4YP).

Design

Lecture courses that cover the general principles of design, product development, materials, and processing. The 3YP is a substantial group design project centred on a viable product; planning the design process, evaluating the business and wider engineering context. The individual research project requires the student to engage in a series of creative design processes, build and evaluations.

Economic, legal, social ethical and environmental context

A Lecture course on 'Engineering in Society' and associated coursework and examination; includes professional and ethical responsibilities, environment, safety, management, and business practices.

Engineering practice

Laboratory work in general and particular engineering disciplines, covering a range of techniques and practice. A lecture course in the first year on Engineering Practice. The 3YP group design project requires understanding of the different roles in the engineering team. The individual project is a substantial research project, assessed by report and interview.

Additional general skills

Creativity and innovation through tutorial work and coursework modules. The group project is the setting for developing teamwork, communication and presentational skills. Foundations for lifelong learning through opportunities such as societies, seminars and broader engagement.

These are covered by the following methods:

	Lectures	Tutorials/ Classes	Practicals	DBT	CWM	3YP	4YP
Science and mathematics	✓	✓	✓	✓	✓	✓	✓
Engineering analysis	✓	✓	✓	✓	✓	✓	✓
Design	✓	✓	✓	✓	✓	✓	✓
Economic, legal, social, environmental	✓	✓	✓	✓	✓	✓	✓
Engineering practice			✓	✓	✓	✓	✓
General skills					✓	✓	✓

Accreditation: Principles of sustainability

The MEng degree in Engineering Science is expected to be re-accredited by the Professional Engineering Institutions; the first step towards full membership of one of the institutions and Engineering Chartership. The course has been designed to achieve certain thresholds of knowledge and standards of learning across key areas that satisfy the criteria set out by the accrediting institutions; including acquiring the knowledge and ability to handle broader implications of work as a professional engineer. It is especially important that the principles of sustainability (environmental, social and economic) are embedded in the teaching and learning throughout the course in lectures, tutorials, laboratories and project work.

6.5 Course Syllabus

Syllabi may be revised annually on approval of the Faculty of Engineering Science, and where appropriate, after scrutiny by the University, to safeguard the interests of those who have already started a course (for example). Any minor changes to syllabi will be finalised by the end of

September and published on Canvas. Students will be notified well in advance of any significant changes to the syllabi which may be subject to student consultation through the JCC. If you have any problems accessing the material that you need on Canvas email student.administration@eng.ox.ac.uk.

You are reminded to refer to the Prelims Handbook for general information about the Department; a copy of the Prelims Handbook can be found on Canvas. From time to time, the Student Administration Office will email you with instructions on course related matters; these instructions may require important actions with deadlines and therefore it is important that you check your emails at least once a day.

The Engineering Science course is planned by the Faculty of Engineering Science, which consists mainly of the department's academic staff. The course is taught to Level 7 of the Frameworks for Higher Education Qualifications (FHEQ) guidelines. The course is taught and developed within the subject benchmark statement guidelines issued by the Quality Assurance Agency (QAA), the independent governing body for monitoring and advising on standards and quality in UK higher education.

Lecture handouts

Lecture notes will be uploaded to Canvas prior to the lecture going live.

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7 TIMETABLES

The timetable for each term is released in 0th week and is published on the display screens on the ground floor reception area of the Thom Building. It is also on Canvas at www.canvas.ox.ac.uk.

Second year laboratory timetables are published on Canvas. Third year laboratories sessions are coordinated with your B-option courses and will be organised by the Student Administration Office; the majority of third year laboratories are in Hilary term. The timetable will also be published on Canvas, once finalised.

If you have any issues with teaching or supervision, please raise these as soon as possible so that they can be addressed promptly. Details of who to contact are provided in section 10.2 Complaints and Appeals.

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8 ASSESSMENT

8.1 Overview

To successfully pass the MEng in Engineering Science, you must pass four sets of University Examinations: Preliminary Examinations (Prelims) at the end of your first year, and three further sets of examinations of the Final Honour School (Finals or FHS) at the end of each subsequent year. These are public examinations and differ from collections you may sit periodically in college to help you and your tutors to assess your progress. You will also have to pass practical work (assessed coursework).

A useful guide to examinations, including how to prepare and enter for examinations is available at https://www.ox.ac.uk/students/academic/exams?wssl=1.

Examiners are appointed independently from among the teaching staff and are formally independent but are required to make the examination reflect the content of the lecture courses and their accompanying tutorial example sheets. Information about examining conventions for engineering papers is given below.

Past examination papers and reports from internal examiners are available on Canvas at https://canvas.ox.ac.uk/courses/25741.

Results of examinations are published via the student self-service pages.

All members of the University are required to wear academic dress with subfusc clothing when attending any in-person university examination, i.e., dark suit with dark socks, or a dark skirt with black stockings or trousers with dark socks and an optional dark coat, black shoes, plain white collared shirt, a black tie or white bow tie.

8.2 Examination Regulations

The Examination Regulations are published online at https://examregs.admin.ox.ac.uk/.

8.3 Examination Conventions

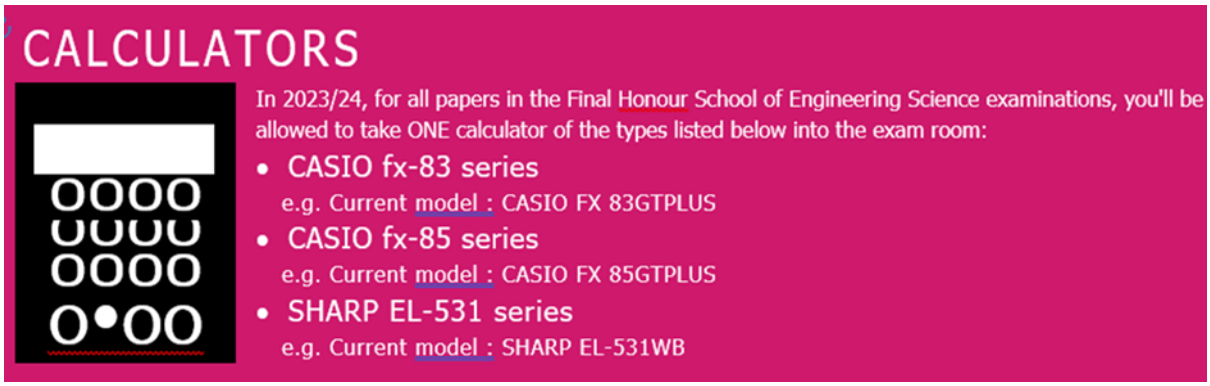
The formal procedures determining the conduct of examinations are established and enforced by the University Proctors. Undergraduates should read the section on examinations in the 'Proctors and Assessor's Memorandum'. The formal syllabus requirements are set out in the Examination Regulations.

Examination conventions for the Honour School of Engineering Science are approved on an annual basis and examination conventions for 2023/24 will be made available to candidates on Canvas as soon as they have been approved. This is normally no later than one whole term prior to the examination.

It must be stressed that to preserve the independence of the examiners, candidates are not allowed to make contact directly about matters relating to the content or marking of papers.

Any communication must be via the Senior Tutor of your college, who will, if he or she deems the matter of importance, contact the Proctors. The Proctors in turn communicate with the Chair of Examiners.

8.4 Calculators in Engineering Examinations



Please note:

- The restriction on the use of calculators applies to in-person examinations only. For all laboratory, project and tutorial work, you are free to use any calculator.
- You are encouraged to buy one of the permitted calculators early.
- The permitted list will be updated annually as new models are introduced or old models are discontinued. It is hoped that models can be retained on the list long enough that you need only buy one such calculator during the course.

8.5 Plagiarism

If you find yourself under pressure as the deadline approaches for submission of coursework (laboratory write-ups, engineering and society assignments, project reports), you might be tempted to cheat by copying from a book, a published article, or even the work of one of your friends. This is not clever, nor is it harmless. It is a serious offence called plagiarism.

In The University Student Handbook, there are clear guidelines issued regarding the issue of plagiarism in section 7.7. It states that:

> "You must read the Proctors' Disciplinary Regulations for University Examinations, which make clear that
>
> - you must indicate to the examiners when you have drawn on the work of others, using quotation marks and references in accordance with the conventions of your subject area
> - other people's original ideas and methods should be clearly distinguished from your own
> - the use of other people's words, illustrations, diagrams etc. should be clearly indicated regardless of whether they are copied exactly, paraphrased or adapted
> - material you have previously submitted for examination, at this University or elsewhere, or published, cannot be re-used – including by drawing on it without referencing it, which constitutes 'autoplagiarism' – unless specifically permitted in the special Subject Regulations.

Failure to acknowledge your sources by clear citation and referencing constitutes plagiarism.

The University's description of plagiarism should be read carefully. That description includes a link to the University's online course about understanding what plagiarism is, and how to avoid it. You are strongly advised to complete the online course.

In recent years, the examiners have uncovered several instances of plagiarism in relation to engineering coursework. All cases were referred to the Proctors who imposed heavy penalties on the offenders.

Additional information

For information about good academic practice and how to avoid plagiarism, please refer to the University's website at: https://www.ox.ac.uk/students/academic/academicpractice.

8.6 Prizes

Each year, the Department awards prizes to students for excellent performance in examinations or assessments. Many of these prizes are sponsored by external donors or by engineering institutions.

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9 PRACTICAL COURSEWORK

9.1 Introduction

Practical coursework continues throughout the remainder of your degree; A paper laboratories and coursework modules in the second year, B-option laboratories, and the group design project in year 3, and the individual research project in the final year.

Project and design work have a special function in training engineers to make things function. Projects can promote the development of a fundamental engineering attitude which cannot be conveyed in any other way. This is the awareness that engineers are concerned with, not merely with obtaining correct answers to calculations but with taking creative and responsible decisions, based upon all available knowledge.

The special importance of practical work is reflected in the accreditation requirements of the Professional Engineering Institutions. They specify what practical work a course must include if it is to be accredited. To meet these requirements, satisfactory performance in the laboratory is an essential part of the Oxford course.

9.2 Safety

There are always risks associated with the operation of equipment. Undergraduates are not permitted to work in laboratories or workshops unsupervised.

A risk assessment is completed for each laboratory experiment and will be included with the associated paperwork and will also be displayed in the laboratory in which the experiment is being undertaken. You should read the risk assessment before the laboratory and identify the hazards before starting an experiment. If you come late to a laboratory and miss an essential safety briefing, or if you disobey safety rules, you may be refused access to equipment. You will be required to complete a risk assessment for your fourth year project, which is an important learning experience in addition to be a Health and Safety requirement; the Professional Institutions as part of our course accreditation require all students to have completed a risk assessment. If you are using chemicals for your project, then COSHH assessments are also required.

The guidance notes for undergraduates on health and safety are contained in Appendix A and a talk by the Departmental Safety Officer will provide clear instructions for your project at the start of your fourth year.

Guidance notes for what to do in the event of an attack by an armed person are in Appendix D.

9.3 Assessment of Practical Coursework

Formal regulations for laboratory work are set out without detail in the 'Examination Regulations'. Within this framework, the Faculty of Engineering Science must specify detailed requirements for each part of the course.

All engineering laboratory work is compulsory (including Coursework Modules) and is assessed on a continuous basis, with the marks counting towards a student's final score. The labs are normally scheduled for a 5-hour session, with the intention being that the average student should be able to complete the lab in 4 hours.

9.4. General Protocols for Assessment in Engineering Laboratories

These protocols for second and third laboratory work have been agreed by the Engineering Science Faculty. Protocols for the assessments of your project work will be confirmed at the start of each academic year and published on Canvas.

Marking Scale:

The labs are assessed on a scale of 0-5, and the marking is intended to be done within the timetabled lab slots. There are no '+', '-' or fractional marks.

The marking scale from 0-5 will be allocated as follows:

5 Marks	This is broadly equivalent to a distinction/1st. These are for students who are well prepared for the lab and show intelligent understanding when interrogated about their work.
4 Marks	The mark that the majority of students will obtain for work that is essentially correct and complete.
3 Marks	The mark for work that is either incomplete or incorrect or required a lot of help.
2 Marks	The mark for work that is both incomplete and incorrect.
1 Mark	Did little more than attend the lab and make some attempt at recording activities.
0 Marks	Non-attendance

Attendance:

It is the responsibility of the student to ensure that their presence is recorded in the register by a demonstrator before the start of the lab. Students who arrive later than 10 minutes after the start will be penalised by 1 mark. You are expected to arrive within the first 5 minutes, and the 10 minute rule is a concession.

Additional Assessment Regulations:

- No-shows because of certified justifiable reasons (e.g. medical) will be allowed to attend in another empty lab slot, if available, or (as always) to appeal to the Proctors for exemption. Late arrivals (beyond 30 minutes), without prior permission or agreement by the lab organiser that there are exceptional circumstances, may be refused access to the lab.
- Planned absences: If you wish to attend an outside event (e.g. job interview, funeral, award of a prize), then you should contact the Lab Organiser [copying the message to your tutor and the Deputy Administrator (Academic)], normally at least a week in advance so as to obtain an alternative slot. If you can arrange a swap with another student, so much the better, but inform the Lab Organiser.
- There is only a single opportunity for the work to be marked and signed-off. In other words, you cannot do additional work after a 'first marking' in order to try and attain an improved mark.
- If any dispute about marking cannot be resolved by the Senior Demonstrator present, then it should be referred to the Lab Organiser, or failing that the Associate Head (Teaching).

9.5 Reports on Laboratory Exercises

The reports that you will be required to write will be on a very diverse range of activities, so it is difficult to give more than very general advice. For any activity, advice is often given at the time. The following is offered here:

- Untidiness when recording test results on a pro-forma is sometimes unavoidable but aim at a good standard of presentation. After all, you might want to show it to someone in the hope of making a good impression. If that is not the case with the one you are doing now, it might be with a later one, so practice now.
- Spelling and grammar are important.
- Levels of explanation should normally be such that another reasonably competent undergraduate in your own year, and reading the same subject, should be able to understand it. Record in such a way that if you referred to it again a year later you would be able to make sense of what you wrote.
- If you are reporting decisions you took, give reasons for them. 'Reasons' do not necessarily have a mathematical basis, even in engineering. 'Because it seemed more elegant' or 'because it was readily available' are perfectly respectable reasons for choosing between alternatives that are otherwise technically acceptable.

- There should be a 'conclusion', and it should match the object of the exercise. For instance, if the exercise is to produce a working such-and-such, then the conclusion should state to what extent, and how well, it did work.
- Try to make your reports readable and interesting. Extraneous information, if it must be included, can go in Appendices.

9.6 Project Work

Project and design work forms a major part of the Engineering courses. In Final Honours School you will be expected to undertake two major projects — a group one in your third year (3YP) and an individual project in your fourth year (4YP). Students on the EEM pathway will undertake a 3YP requiring an enhanced business case and have the option of taking a 24-week industrial placement as a substitute to the 4YP.

Students are advised to take note of new University regulations on the use of third-party proofreaders when working on their project reports, please see https://academic.admin.ox.ac.uk/policies/third-party-proof-readers.

The University's policy states for assessments under 10,000 words, which applies to the individual student's contribution to the 3YP report, that no third-party proof-reading is permitted (except by the supervisors).

Projects differ from laboratory class exercises in that the objective is defined but the details of the task are not. Instead, time is allowed for initiative and individual creative thinking. The final product is either a piece of engineering equipment that works, or a full technical report, or both. In all cases the necessary specialist information and equipment are made available and appropriate supervision is offered, but the role of the supervisor or demonstrator is to help and encourage rather than to control what is done. You are expected to exercise initiative and engineering judgement, and to make appropriate use of all relevant knowledge from the preceding parts of the course.

To assist with the projects there is a Teaching and Design Support Group (TDSG) and the University has appointed Visiting Professors in the Principles of Engineering Design.

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10 STUDENT LIFE AND SUPPORT

10.1 Help and Advice

It's possible that at some point during your time here, you may run into a problem. It could be that your work gets on top of you. You might have health problems or difficulties with your personal life. All of these things can stop you from enjoying your time at Oxford and prevent you from studying effectively.

If you do get into difficulties, the main thing to remember is that, although it may not feel like it, you are unlikely to be the only person to have had a particular problem, and many people are available to offer advice and support.

Do ask for help if you need it - don't struggle on and wait for the problem to go away of its own accord.

Who to contact?

In your college

The natural person for you to turn to first is your college tutor. They can help you if you're having a work crisis, maybe by rescheduling tutorials or offering extra help on a part of the course you are finding difficult. Your tutor may also be able to help with non-academic problems, but if you don't feel able to turn to them, there are many alternatives within the college community, such as the Senior Tutor, JCR Welfare Officers, Chaplain, Nurse, Doctor, and Tutor for Women. Your college handbook or website will also be a useful source of information on who to contact and what support is available through your college.

In the Department

In the Department, your first port of call for any problems concerned with teaching provision should be the Student Administration Office on the 8th floor of the Thom Building (ask to speak to one of the Undergraduate Studies Officer). Staff with a particular responsibility for undergraduate issues are:

Professor Ronald Roy	Head of Department
Professor Thomas Adcock	Associate Head (Teaching)
Christine Mitchell	Head of Student Administration
Bridie Thompson	Undergraduate Studies Administrator
Julia Hemprich	Undergraduate Studies Officer
Jane Fallaize	Undergraduate Studies Officer
Dr Joanna Rhodes	Head of Finance and Administration

At University level

At University level, you can seek advice and counselling from:

- The University Counselling Service (270300)
- Nightline: Listening and Information Service (270270)
- OUSU Student Advice Helpline (280440) or www.ox.ac.uk/students/welfare

Harassment

The University condemns harassment as an unacceptable form or behaviour and has an advisory system to help people who think they are being harassed. Harassment includes any unwarranted behaviour directed towards another person which disrupts that person's work or reduces their quality of life.

Further information and guidance is available at https://intranet.eng.ox.ac.uk/hr/bullying-and-harassment/departmental-bullying-and-harassment-advisors/.

The Department of Engineering Science has a team of Bullying and Harassment advisors. At present these are Professor Harvey Burd, Karen Bamford, Daniel Eakins, Caroline Brown, John Coull, David Gillespie, Laura O'Mahony, Nicholas Hawes, Grahame Faulkner, Wendy Poole, and Jarlath Brine; any of whom may be consulted in relation to matters of harassment.

Equality and Diversity

Information about the University's Equality and Diversity Unit can be found at https://edu.admin.ox.ac.uk/.

Disabilities

If you have any form of disability, we strongly encourage you to disclose this to Christine Mitchell, Head of Student Administration, in order that we can make provision for you. Furthermore, your college will advise you of your Disability Contact who will be pleased to talk to you in the strictest

confidence. Students who have already declared a disability will be contacted by the Disability Advisory Service by early Michaelmas Term to discuss their specific needs.

Students with a disability may also find useful advice and guidance on the University of Oxford Disability Office web page at https://www.ox.ac.uk/students/welfare/disability.

Mobility issues

If you experience mobility issues due to illness or injury (even if only temporary), please report this to the Department Safety Officer, Philip Paling (philip.paling@eng.ox.ac.uk). This is so that appropriate help can be arranged at a local level which will be available in the event of an emergency evacuation.

10.2 Complaints and Appeals

Complaints and academic appeals within the Department of Engineering Science

The University, the MPLS Division and the Department of Engineering Science all hope that provision made for students at all stages of their course of study will make the need for complaints (about that provision) or appeals (against the outcomes of any form of assessment) infrequent.

Nothing in the University's complaints procedure precludes an informal discussion with the person immediately responsible for the issue that you wish to complain about (and who may not be one of the individuals identified below). This is often the simplest way to achieve a satisfactory resolution.

Many sources of advice are available within colleges, within faculties/departments and from bodies like Student Advice Service provided by OUSU or the Counselling Service, which have extensive experience in advising students. You may wish to take advice from one of these sources before pursuing your complaint. General areas of concern about provision affecting students as a whole should be raised through Joint Consultative Committees or via student representation on the faculty/department's committees.

Complaints

If your concern or complaint relates to teaching or other provision made by Department of Engineering Science, then you should raise it with the Associate Head (Teaching) who will attempt to resolve your concern/complaint informally. If you are dissatisfied with the outcome, then you may take your concern further by making a formal complaint to the University Proctors.

The procedures adopted by the Proctors for the consideration of complaints and appeals are described on the Proctors' webpage (https://academic.web.ox.ac.uk/complaints), the Student Handbook University Student Handbook 2023/24 | University of Oxford and the relevant Council regulations (https://www.ox.ac.uk/students/academic/regulations).

If your concern or complaint relates to teaching or other provision made by your college, you should raise it either with your tutor or with one of the college officers or Senior Tutor (as appropriate). Your college will also be able to explain how to take your complaint further if you are dissatisfied with the outcome of its consideration.

Academic appeals

An academic appeal is defined as a formal questioning of a decision on an academic matter made by the responsible academic body.

For undergraduate or taught graduate courses, a concern which might lead to an appeal should be raised with your college authorities and the individual responsible for overseeing your work. It must not be raised directly with examiners or assessors. If it is not possible to clear up your concern in this way, you may put your concern in writing and submit it to the Proctors via the Senior Tutor of your college.

Please remember regarding all the academic appeals that:

- The Proctors are not empowered to challenge the academic judgement of examiners or academic bodies.
- The Proctors can consider whether the procedures for reaching an academic decision were properly followed; i.e. whether there was a significant procedural administrative error; whether there is evidence of bias or inadequate assessment; whether the examiners failed to take into account special factors affecting a candidate's performance.
- On no account should you contact your examiners or assessors directly.

10.3 Policies and Regulations

The University has a wide range of policies and regulations that apply to students. These are easily accessible through the A-Z of University regulations, codes of conduct and policies available on the Oxford Students website at https://www.ox.ac.uk/students/academic/regulations.

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11 THE SECOND YEAR COURSE (PART A)

11.1 Teaching and Learning

11.1.1 Overview

In a similar way to your Preliminary year, second year teaching is delivered by the following elements: lectures, tutorials and laboratory work. When planning your study in relation to the lecture courses and examples sheets, remember that they are the lecturer's personal, and inevitably abbreviated exposition of a subject, and cannot be expected to tell you everything about it. Attending lectures and working through example sheets provide a base from which your own understanding can be developed; they are the beginning of your study, not the end.

Many lecturers hand out notes to accompany their lectures and these will also be available electronically on Canvas along with reading lists. These are no substitute for your own notes, written as you yourself master the material. This mastery requires more time: you will need to read from textbooks, and you should certainly make your own notes. Students who have declared a disability are encouraged to discuss their specific needs with the Department Disability Contact (Head of Student Administration).

11.2 The Second Year & Part A Examinations – Teaching methods

Work in the second year will be arranged around the syllabus for the four written papers examined in June of the second year, as outlined above. A sample syllabus for these papers is available in the Appendices of this Handbook.

Paper	Term	Faculty Teaching	College Teaching	Written (WP) or Coursework (C)	Core or Option	Comment
		Lectures	Classes/ Tutorial			
A1 Mathematics	MT	16	4	WP	C	
	HT	16	4			
	TT	0	0			
A2 Electronic and Information Engineering	MT	18	5	WP	C	
	HT	12	3			
	TT	0	0			
A3 Structures, Materials and Dynamics	MT	16	4	WP	C	
	HT	16	4			
	TT	0	0			
A4 Energy Systems	MT	12	3	WP	C	
	HT	20	5			
	TT	0	0			

A5 Practical Work		C	C	
Structural & Materials Laboratory	5 hours across Michaelmas term			Continuous assessment marked throughout the year
Dynamics Laboratory	5 hours across Michaelmas term			
Instrumentation & Control Laboratory	5 hours across Hilary term			
Communications Laboratory	5 hours across Michaelmas term			
Electrical Machines Laboratory	5 hours across Hilary term			
Thermofluids Laboratory	5 hours across Michaelmas and Hilary terms			

You will not normally be required to submit your Engineering Practical Work. However, the examiners may request practical work from some candidates. Such candidates will be named in a list posted by the day of the last written examination.

11.3 Assessment

The below table denotes the set of examinations you must complete at the end of your second year (the first year of Final Honours School). As with Prelims, these examinations are public and will likely be held at Examination Schools. Examination timetables are published online by Examination Schools approximately 5 weeks before your first exam. You will also have to pass the A5 Engineering Practical Work element of the course. For further details please refer to the annually updated Examinations Conventions which will be published on Canvas at the start of each academic year. In cases of inconsistent information, the Examination Conventions and the online Examination Regulations for the FHS in Engineering Science will be the definitive reference.

YEAR	PART	Item	Written Exam Duratio	Examination Units (EU)
2	PART A	A1 Mathematics A2 Electronic 8 Information Engineering A3 Structures, Materials and Dynamics A4 Energy Systems	3 hours 3 hours 3 hours 3 hours N/A	1 1 1 1
Total Number of Examination Units in Part A				4.5 (out of 10 combined units in Part A and Part B)

11.4 Practical Coursework

Students in their second year of study are expected to continue with laboratory (practical coursework) exercises. Please see the relevant section in this handbook and your Prelims handbook for details of safety procedures and writing reports etc.

11.4.1 Timetabling and Attendance

Second year timetables are scheduled centrally by the Student Administration Office, and students are assigned to each lab session – usually so that each experiment can be conducted in pairs. It is your responsibility to find out in advance the time and location of your labs by checking the lab timetable available on Canvas. Lab apparatus and resources tend to be fully used, and it may not be possible to reschedule a missed lab session. If you fall ill, it is important to notify the lab organiser directly and try to rearrange. If, however, this is not possible then you should obtain medical evidence as soon as possible, ensuring that it states which laboratory session has been affected – this evidence is usually provided by your college doctor or nurse. Notification of such matters must be referred to the Examiners by your college Senior Tutor and channelled through the Proctors' Office. For specific advice on this process please contact your college office.

The particular lab assessment protocol for 2nd Year (A paper) labs is as follows:

a) Lab instructions include preparatory reading (or from specified and easily available sources, of not more than one hour for an average student) in case the lab occurs ahead of the lecture. No other preparatory work is expected.
b) The assessed work will be a "basic write-up": the student's completion of a pro-forma consisting of a questionnaire concerning their results and interpretation and conclusions,

Please see the relevant section in the handbook for details on how labs are assessed and corresponding marking scales.

11.4.2 Coursework Modules

Coursework modules (or CWMs) are designed for you to study subjects directly related to engineering specialisms. This is so that you can investigate which pathway you might be interested in taking in the third and fourth year. These modules are delivered over the course of the last few weeks of Trinity term following A paper exams and are not assessed by exams – further details of these are available in the practical work section of the handbook.

Previous examples of CWMs include Fluid Mechanics, Mobile Robots, Biomedical Engineering and Lego Football. A list of available CWMs is typically circulated to second year students by the Student Administration Office towards the end of Hilary term.

Coursework Modules (CWMs) are assessed by a small piece of individual work in format to be decided by the CWM organiser, for example:

- A short report (e.g., 2-4 page design proposal or pro-forma)
- Presentation

The assessment will be in two parts: 0-4 for attendance (100% attendance = 4 marks, less for unexcused partial attendance); 0-5 for assessed work as outlined in the general section of the handbook.

11.5 EEM Pathway

At the end of your second year, you will be invited to apply for the Engineering, Entrepreneurship and Management pathway, delivered collaboratively between the Engineering Science Department and Saïd Business School. EEM students graduate with a MEng Engineering Science degree, but this pathway allows you to specialise in business and management not covered in the general engineering syllabus options (delivered in the third and the fourth year). The skills taught

on this pathway will be attractive to future employers, and beneficial to students who wish to become entrepreneurs.

For students on the EEM pathway, the Department has reduced the number of B-option papers from 5 to 4 to balance the workload across Michaelmas and Hilary terms, and students must take the half paper B2E1 Engineering in Society (Ethics, Safety & Risk, Sustainability) and B2E2 Engineering, Management and Strategy. EEM students can also take a 24-week industrial placement between their third and fourth year rather than completing a 4YP.

More information on this pathway will be available to students in Trinity term. There is currently a cap on numbers, and successful transfer to the pathway is dependent upon the quality of a written essay on an entrepreneurship theme, track record on examinations and a letter of support from your college tutor.

11.6 EUROP AND EUIF

Engineering Undergraduate Research Opportunities Programme (EUROP)

Many universities run programmes to enable Engineering undergraduates to engage with research groups at an early stage within the undergraduate degree. We have a similar scheme that will be funded by the department out of its research overheads.

The scheme will be open to all MEng undergraduates in the second and third years of their degree and will involve you spending a period of 8 weeks within any research group in the department. You will be paid at the standard rate (£11.35/hour, subject to annual increase) for a 40-hour week over this period and there will be up to £400 available for each of you to spend on consumables for the project; your supervisor will need to cover any additional costs.

If you are interested in applying, then we recommend that you talk to your college tutor about research topics in which you would be interested, so that they can recommend potential academic supervisors for you to approach. You should also read the research pages on the department website, so that you can get a clear idea of what is happening in the department.

More information is available on Canvas.

Engineering Undergraduate Innovation Fund (EUIF)

Thanks to the generosity of the late Jeremy Griffiths and Fozmula Ltd, the Department of Engineering Science has a small fund to support research and educational projects undertaken by undergraduate students. Such projects could include, but not be limited to, entering & participating in student & design competitions, developing/building prototypes, and other

extracurricular activities deemed of academic value by the administration committee. The intention is to encourage innovation, alongside the EUROP scheme and the 3D printing laboratory.

The Fund will be administered by the Associate Head of Department (Teaching), Director of Third Year Studies and Director of Fourth Year Studies. Applications should be made to the Associate Head of Department (Teaching) at any time, with an explanation of the project and a breakdown of costs (applications should not exceed two pages in length). Awards are unlikely to exceed £250 and undergraduate students will be eligible to receive support from the fund on only one occasion as lead applicant.

More information is available on Canvas.

11.7 Looking Ahead to the Third Year

Whilst you may not find that the work is more difficult as you transition from second to third year, you may potentially discover that the volume of work vastly increases as you enter the third year. This is normal, but it is something to bear in mind whilst you study in the second year – it is better to learn good habits now rather than later.

Second year counts towards progression in fourth year!

Crucially, your second year marks have an effect on your progression into the fourth year and your final degree classification, so do not treat this year lightly. If you find that you are struggling with your workload, then speak to your college tutor and/or seek out additional help.

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12 THE THIRD YEAR COURSE (PART B)

12.1 Selecting your B paper options

At the end of your second year in Trinity term, you will be invited to choose your B paper options. This is the first year of the course in which you are able to diversify and choose options based on your interests. The options encompass a broad range of engineering specialisms, including Biomedical, Civil, Chemical, Control, Electrical, Information and Mechanical papers.

A comprehensive syllabus will be issued by the Student Administration Office, and a paper on the best B paper options to take for specific accreditation will also be made available so that you are fully informed of all third year choices. Further queries on accreditation need to be sent to the departmental liaison officers, who are listed in the general section of the handbook.

You are entitled to change your options both up until the examination entry deadline (this is usually in December) and before your Trinity term examinations (although you will be subject to a fee for changing your options after the entry deadline). It is also sensible to inform the Student Administration Office of any changes to your options, so that they can let appropriate academic staff know and keep accurate records.

12.2 Selecting your 3YP

At the same time as being invited to select your B paper options, you will be asked to rank your 3YP choices. Details about 3YPs – along with further information about B paper options - are presented by the Director of Third Year Studies in early Trinity term. There are usually around 9-10 different group projects for the 3YP, and these are organised by a small team – between 2 or more supervisors – of academics in different subject areas. Some projects are developed for and directly related to accreditation pathways. Information regarding 3YP choices will then be passed on to the Director of Third Year Studies for allocation. Students will be notified of their allocation before Michaelmas term.

12.3 Teaching and Learning

12.3.1 Overview

In keeping with your first two years at Oxford, teaching for the third year is delivered using the following mechanisms: lectures, tutorials (B2 topics and B-option tutorials), laboratory work, and project work (3YP and B1). All lectures for the undergraduate course will be pre-recorded and released.

In your third year you may have in each week up to about ten lectures, two tutorials, two hours of group work and one laboratory session of five hours. Ideally, each set of about four lectures would be closely followed by a time of private study with a set of examples to work through, followed by a tutorial and any relevant laboratory experiments. The third year timetable is very tight, and consequently it may be necessary for students to complete laboratory experiments ahead of the lectures.

Please bear in mind that the lecture notes and example sheets are the lecturer's own exposition of the subject and cannot tell you everything about it. These are the beginning of your study and should form the basis for your own notes; taken as you attend lectures and read books. As in previous years, all lecture notes, example sheets and laboratory notes will be made available electronically on Canvas.

Students who have declared a disability are encouraged to discuss their specific needs with the Department Disability Contact (Head of Student Administration).

Third Year Tutorials

Unlike your first two years, tutorials for B-option papers are organised directly by the department. Tutorials will become intercollegiate and will be based both at colleges and within the department. This teaching is designed to provide you with individual supervision, continuing the personalised teaching you have already experienced. Lecturers will still produce example sheets for tutorials as in previous years, but teaching will be delivered by a centralised team of B paper tutors. B paper collections will also be coordinated by the Director of Third Year Studies in Trinity term. Students are expected to submit their tutorial work in advance or attendance at the tutorial is not guaranteed.

The Department welcomes your feedback on anything related to B paper teaching, but any contact with the Director of Third Year Studies should be sent through the Student Administration Office in the first instance.

EEM Teaching

Teaching for the EEM pathway is organised and delivered by the Department. EEM students will take B2E1 Engineering in Society (Ethics, Safety & Risk) and B2E2 Entrepreneurship, Management and Strategy, and take 4 optional B papers instead of 5.

12.4 Course Structure

Work in the third year will be arranged around the syllabus for the above written papers, project, and laboratory work.

YEAR	PART	ELEMENT	WRITTEN PAPER (WP) OR COURSEWORK (C)	CORE OR OPTIONS
3	B	B Papers (choose 5 options)	WP	O
		B1 Engineering Computation	C	C
		B2 Engineering in Society	WP	C
		B3 Group Design Project (3rd Year Project)	C	C
		B4 Engineering Practical Work	C	C
3	B (EEM Pathway)	B Papers (choose 4 options)	WP	O
		B1 Engineering Computation	C	C
		B2E1 Engineering in Society (Ethics, Safety and Risk, Sustainability)	WP	C
		B2E2 Entrepreneurship, Management and Strategy	WP	C
		B3E Group Design Project (3rd Year Project)	C	C
		B4 Engineering Practical Work	C	C

Engineering Science students in the third year will be required to take five optional written B papers from a list published annually and, in addition, B2 Engineering in Society. You will also be required to take three coursework subjects, as shown in the below above. The extended syllabus for these papers is available on Canvas.

12.5 Assessment

The below table denotes the set of examinations you must complete in Trinity term at the end of your third year. As with your previous examinations, these exams are public and will likely be held at Examination Schools. Timetables are published by Examination Schools approximately 5 weeks before your first exam and no later than 2 weeks in advance. You will also need to pass the coursework elements of the course, which are outlined underneath the table.

YEAR	PART	ASSESSMENT	WRITTEN EXAM DURATION	EXAM UNITS (EU)
3	PART B	B1 Engineering Computation	N/A	0.5
		B2 Engineering in Society	3 hours	1
		B3 Group Design Project	N/A	1
		B4 Engineering Practical Work	N/A	0.5
		Five Optional B Papers	1.5 hours each	0.5 × 5 = 2.5
3	PART B (EEM PATHWAY)	B1 Engineering Computation	N/A	0.5
		B2E1 Engineering in Society (Ethics, Safety and Risk, Sustainability)	1.5 hours	0.5
		B2E2 Entrepreneurship, Management and Strategy	3 hours	1
		B3E Group Design Project (E)	N/A	1
		B4 Engineering Practical Work	N/A	0.5
		Four B option papers	1.5 hours each	0.5 x 4 = 2
Total Number of Examination Units in Part B				5.5 (out of 10 combined units

B1 Engineering Computation Project

This element consists of a report on a mini project. The project task will be the solution of an engineering problem requiring the use of advanced numerical techniques and require a significant amount of program coding.

Submission for this element is done through the approved online submission system. Further guidance will be made available by the B1 Project Coordinator, but please note that this is a formal assessment and as such there will be penalisations for late submission without an appropriate Mitigating Circumstances claim. For further details please read the Examination Conventions.

B3 Group Design Project

This element consists of a report on your personal contribution to a design project undertaken as part of a small group of undergraduates. Further information about third year projects can be found in Appendix F.

Submission for this element is done through the approved online submission system. Further guidance will be made available in Hilary term of your third year, but please note that this is a formal

assessment and as such there will be penalisations for late submission without an appropriate Mitigating Circumstances claim. For further details please read the Examination Conventions.

B4 Engineering Practical Work

Paper B4 is completed as a series of labs based on your B option papers as a form of continuous assessment. Information regarding the allocation process for your B-option paper laboratory sessions is available later on in this handbook. You will not normally be required to submit your engineering practical work. However, the examiners may request practical work from some candidates; such candidates will be named in a list posted by the day of the last written examination in Finals Part B.

12.6 Practical Coursework

You are expected to continue with laboratory work into your third year. The guidelines explained in your Prelims handbook on presentation on a pro-forma, safety procedures etc. are still relevant in your third year.

Preparatory lab reading and particular assessment depends on each individual B lab. If you have any questions regarding this then please speak to the lab organiser directly. Please see the relevant section in the handbook for details on how labs are assessed and corresponding marking scales.

12.6.1 Laboratory Timetabling

Laboratory timetables are scheduled centrally by the Student Administration Office and are published on Canvas by the end of Michaelmas term. These labs mostly run throughout Hilary term, and you will receive an email from the Student Administration Office at the end of Michaelmas inviting you to sign-up for your labs.

Unless otherwise specified, you will need to attend only one lab session per B option – options that have two separate half-lab sessions will be indicated on the timetable. It is your responsibility to ensure that you are signed up for all of your lab sessions, and to rearrange any sessions as necessary – either by swapping with another student or contacting the lab organiser directly. Only in exceptional or emergency circumstances should you contact the Student Administration Office regarding any issues with rearranging lab sessions – it is best to do this directly with the lab organiser.

There are a lot of B labs to fit into the 8 week teaching term and so the chance of lab sessions clashing is high. Whilst the Student Administration Office endeavours to minimise risks, there is no guarantee of avoiding clashes due to timetabling and room booking constraints. Once the

timetable has been set, there is very little room or opportunity to change or create additional sessions. If you have any questions regarding this, please speak to the Student Administration Office directly. You are advised to sign-up to your labs as early as possible.

As in previous years, if you are unable to attend a lab due to illness and are unsuccessful in rearranging a lab, then it is pertinent to obtain medical evidence as part of an application for mitigating circumstances. Such evidence is usually accessed through your college doctor or nurse, and notification of such matters should be referred to the Examiners through your college Senior Tutor and the Proctors' Office. For specific advice on this process please speak to your college office directly.

12.7 Exchange Programme Opportunities

To prepare for a global engineering career, there is no substitute for experiencing different cultures first-hand. The Department of Engineering Science at Oxford currently offers opportunities for up to five undergraduate students each year, per exchange partner, to participate in an exchange year in the Faculty of Engineering at a partner institution during the whole of the fourth year.

Why participate in an exchange?

An exchange provides you with an opportunity to experience, in depth, the culture of another country whilst studying, and to make new friends and connections. Students who have participated in exchanges may also be more attractive to potential employers. It demonstrates that you are flexible, self-reliant, and can adapt quickly to the unfamiliar and to different cultures. Many students who have participated on an exchange also say that it has helped them to mature as a person.

We currently run exchange programmes with:

- Princeton University, USA
- The National University of Singapore (NUS)

Both of these institutions offer world-class teaching and learning opportunities and have been consistently ranked highly in the global rankings.

What will I do when I am on exchange?

You will live, study, and be assessed in the same way that students at your exchange partner will be. This means that the way you are taught, and assessed, in the fourth year, will be different from the way you would be taught and assessed at Oxford. To make the most of your experience, it is

best to be open to, and tolerant of, different cultures, an autonomous learner, and have the resilience to cope with adapting to a different way of studying and living.

What support will I receive while I am on exchange?

As well as the support you will still receive from Oxford, our exchange partners have comprehensive systems in place which will provide advice and guidance to you before you even arrive in their country. They will provide advice on tuition fees, living costs, and any additional costs such as health insurance.

Once you are studying at an exchange partner, you will also normally be assigned an academic mentor who will keep track of your academic performance on a semester-by-semester basis. Information on exchanges available to third years are communicated via email directly to eligible students and the relevant information published on Canvas.

12.8 Looking Ahead to the Fourth Year

No candidate can progress to Part C unless he or she has been adjudged worthy of at least second-class honours by the examiners in Parts A and B together at the first attempt.

A candidate who passes Parts A and B together but fails to be adjudged worthy of at least second-class honours at the first attempt, or who is adjudged worthy of at least second class honours in Parts A and B together, but who does not enter or withdraws from Part C, is able to leave with a Bachelor of Arts in Engineering Science (Pass or Honours with the classification obtained in Parts A and B together, as appropriate). Moreover, all candidates must also pass B1, B4 and B3 or B3E in order to get their degree.

"I'm confused...."

There is a flowchart in the examination conventions published on Canvas that demonstrates this process. If you have any questions, please contact the Student Administration Office.

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13 THE FOURTH YEAR COURSE (PART C)

13.1 Selecting your C paper options

At the end of your third year — in either Trinity term or during the summer vacation — you will receive an email from the Student Administration Office inviting you to select your options for your fourth year. This year allows you to build on the specialisms you began in the third year, and as such all fourth year options represent a broad spectrum of engineering specialisms.

A complete syllabus will be issued and uploaded to Canvas, as well as a paper that outlines specific options for accreditation. As in your third year, any specific queries on accreditation should go directly to the relevant academic lead, listed in the general section of the handbook.

Please be aware that whilst you are allowed to change your options up until and after the examination entry deadline, changing your options after the deadline will incur a fee. It is appreciated if you change your options that you inform the Student Administration Office so that they can keep up-to-date records and notify relevant members of staff. This is also important for generating TMS reports.

13.2 Selecting your 4YP

In Hilary term of your third year, you will receive notification from the Student Administration Office inviting you to choose your 4YP as part of the assessment for your final year by accessing the 4YP site. The site lists all available projects, and includes an overview of the project, details of the supervisor and broad subject area(s): Biomedical, Chemical, Civil, Electrical, Energy, Mechanical and Thermofluids. Projects might lie between subject areas; in which case, they will be listed with a Primary and a Secondary area.

There are broadly three types of projects: Student-initiated, Closed or Open. In a Student-initiated project, you would get in touch early with a supervisor, suggesting an idea for a project. If the supervisor is interested, you and the supervisor can fine-tune it together and introduce it in the 4YP site. In this case, the student who has initiated the project automatically gets this allocation. Closed projects are initiated by supervisors, who can then choose a student (if (s)he is interested) to take it. Most projects are in the Open category. Supervisors initiate these but do not intervene in their allocation to students. In this case, you will be allowed to choose six projects, in order of preference. The allocation process is carried out by the Director of Fourth Year Studies, who runs an algorithm aiming to allocate the highest possible choices to all students, within the conditions

set by Faculty (e.g. maximum number of students allocated to a single supervisor.) The allocation process is completed in Trinity term.

Any queries regarding the 4YP process should be sent to the Student Administration Office in the first instance.

13.3 Teaching and Learning

13.3.1 Overview

In your final year, some C Papers will replace the tutorials by intercollegiate classes which are organised by and delivered in the department. The pattern remains as one example sheet for every four lectures, but the material will be taught by specialists in the field. There are no labs in the fourth year.

When planning your study in relation to the lecture courses and examples sheets, remember that they are the lecturer's personal, and inevitably abbreviated exposition of a subject, and cannot be expected to tell you everything about it. This is especially important to remember now in the class system. Therefore, attending lectures, working through example sheets and writing your own notes are as important now as ever – these will provide the basis for which you start to prepare for your revision.

As in previous years, all example sheets and lecture handouts will be made available on Canvas. Again, students who have declared a disability are encouraged to discuss their specific needs with the Department Disability Contact (Head of Student Administration).

Classes

In a departure from previous teaching methods, classes will replace some tutorials. These classes are much bigger, with a maximum of 50 students per class, this means they involve significantly less one-to-one teaching. The classes will be longer than the tutorials, up to two hours, and you will be taught by the lecturers, rather than college tutors. There is subsequently even more opportunity to expand on your independent study skills and to learn directly from academic staff who specialise in the field – acquiring and improving upon your knowledge gained from your previous three years of study. Fourth year teaching is coordinated by the Student Administration Office in collaboration with the Director of Fourth Year Studies.

The department welcomes your feedback on anything related to C paper teaching, but any contact with the Director of Fourth Year Studies should be sent through the Student Administration Office in the first instance.

EEM Pathway

Students on the EEM pathway will either be able to complete an internal 4YP (more details about the specifics of project work in the fourth year are listed later in this handbook) or a 24 week placement in industry. This placement is arranged in the term leading up to the fourth year, with the intention of completing the placement in July to December of your final year. Such placements are approved by the Associate Head (Teaching). More specific information regarding the EEM placement procedure is available on Canvas.

Fourth year EEM teaching will be delivered at the Saïd Business School (SBS), should students select the EEM specific paper option. Students will receive details of classes and learning resources directly from SBS.

13.4 Course Structure

The table below gives an outline of the fourth year of MEng Engineering Science:

YEAR	PART	ELEMENT	WRITTEN PAPER (WP) OR COURSEWORK (C)	CORE OR OPTIONS
4	C	C Papers (choose 6 options, or 4 if you are also taking the EEM elective) 4th Year Project	WP C	O C

The fourth year is devoted to specialist topics and a project which are assessed in the Part C examination at the end of the fourth year. You also work on a project to produce a report.

13.5 Assessment

The below table shows the distribution of assessment for the fourth year. Timetables will be published by Examination Schools approximately 5 weeks before the date of your first exam. You will also need to pass the coursework element, which is worth half of your examinable units for the year, as indicated below.

YEAR	PART	ASSESSMENT	WRITTEN EXAM DURATION	EXAM UNITS (EU)
4	PART C	Six Optional C Papers Fourth Year Project	1.5 hours each N/A	3 3
	PART C (EEM)	Four Optional C Papers Entrepreneurship and Innovation Fourth Year Project	1.5 hours each 3 hours N/A	2 1 3
Total Examination Units in Part C				6 (out of 16 in Final Honour School)

Fourth Year Project (4YP)

Projects in the fourth year are normally undertaken by individual undergraduates, but sometimes a team of two or three may divide a larger exercise between them. This element gives you the opportunity to complete original research in your chosen area of engineering, and the opportunity to work closely with experts in the field. Further information about fourth year projects can be found in Appendix F.

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14 LOOKING AHEAD TO GRADUATION

Following successful completion of your Trinity term examinations in your fourth year, you will have officially finished your degree – congratulations! The Final Honour School Board of Examiners will meet to agree your marks and your final degree classification (as specified in your corresponding Examination Conventions) during the summer. Following this, your classification and marks will be issued to you and you will shortly thereafter be invited to register for and attend at your graduation ceremony.

The Careers Service is also an invaluable resource, especially as you progress into the final years of your degree. Visit www.careers.ox.ac.uk to find out more about how the Careers Service is able to assist you in improving your employability skills. The Careers Service also has a job search database called CareerConnect for internships, placements, and graduate opportunities.

The Department wishes you all the very best for your future plans – whether as an engineer in industry, continuing your studies as a postgraduate student, or in an entirely different career. Please engage with the Oxford Engineering Alumni society and stay in touch.

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APPENDIX A: HEALTH AND SAFETY

Introduction

In England and Wales, everyone has a 'duty of care' under Common Law both to themselves and others. Each one of us must take reasonable care of our own health and safety and that of others who may be affected by our acts and omissions. Further, under Statute Law in Great Britain, everyone has a duty to co-operate with their employer, in this case the department, so far as is necessary to enable the department to comply with its duties under the Health and Safety at Work Act 1974. Undergraduates, as visitors to the department, do not have the same responsibilities under Sections 7 and 8 of the Act. However, as visitors, you will be expected to comply both with the spirit of the law and, when the occasion demands, the letter. To this end, the department has a basic set of safety rules that apply to all undergraduates and these are listed below.

Departmental safety rules for undergraduates

1. Undergraduates may use apparatus in laboratories only when supervised and within normal working hours, for the following purposes:
    a. Programmed experiments as timetabled, under the direct supervision of the laboratory organiser and which satisfy current safety regulations.
    b. Programmed experiments outside timetabled hours (see Access Hours and Lone working information in Appendix B) by specific permission of the organiser of the relevant laboratory class which satisfy current safety regulations, and which are directly supervised. Fourth year undergraduate students working on project work may be granted access outside these hours following completion of an extended access permit.
    c. Project work by arrangement between the project supervisor, the staff member responsible for safety in the relevant laboratory and the staff member responsible for the apparatus required providing all necessary risk assessments under current safety regulations have been completed before the project work starts.
    d. For the purposes other than programmed experiments or project work by permission of:
        i. the member of staff responsible for the safety in the relevant laboratory or,
        ii. the Administrator or,

iii. the head of the relevant workshop providing all necessary risk assessments under current safety regulations have been completed before the work starts.

2. Outside normal working hours, undergraduates may use apparatus only if there is a specific reason for which approval is granted by the Head of Department or Associate Head (Teaching). This use must be in the presence of a member of staff. Such approval is currently granted for supervised access to computing facilities only.
3. Machine tools in the Staff/Student Workshop may be used only when supervised by an authorised person or by the technician in charge. The technician must be satisfied that the undergraduate is competent to operate the required machinery safely. The technician in charge has full authority to refuse anyone the use of machine tools if evidence of competency cannot be provided.
4. Except by permission of the member of staff responsible, undergraduates are not permitted to enter research laboratories, staff offices, stores, workshops, roof areas, service areas, photographic darkrooms, reception areas (except public spaces), or any room displaying a specific hazard warning notice. Except in the case of fire, undergraduates will not access the seventh floor balcony of the Thom Building.
5. Each practical and experimental exercise will provide more detailed safety requirements. All undergraduates will be expected to abide by these additional specific safety requirements and act on them accordingly.
6. It is an offence under law for anyone to intentionally interfere with or misuse anything provided in the interests of health, safety and welfare. It is also an offence not to use any personal protective equipment (PPE) provided in the interests of health and safety. PPE must be maintained in good order and you have a duty to report any PPE that is damaged or if it does not suit your needs. Report the fact to your supervisor or member of staff responsible for the laboratory or workshop.

NB: Any student experiencing mobility problems due to injury/illnesses (even if only temporarily) should advise the Department Safety Officer, Philip Paling (philip.paling@eng.ox.ac.uk), of their situation. This is so that appropriate help can be arranged which will be readily available in the event of an emergency.

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APPENDIX B: DEPARTMENT OF ENGINEERING SCIENCE – ACCESS AND LONE WORKING

This table provides guidance for undergraduates, postgraduates and members of staff. Detailed guidance is available on the department's health & safety intranet page at this link: https://intranet.eng.ox.ac.uk/health-safety/

Category/ Hours	Core Hours 08:00-18:00	Non-Core Hours Monday to Friday 18:00-22:00	Weekends 08:00 - 22:00	Late Working 22:00 – 08:00	Departmental closed periods e.g., Easter, Christmas, and Bank Holidays outside term
Undergraduate	Access allowed from 08:00 – 18:00, 0-10th week inclusive (Hilary and Michaelmas Terms) and 0-8th week inclusive (Trinity Term). Undergraduates are allowed to remain until 18:00 apart from the 8th floor study area where access is allowed until 19:00	Access requires Extended Hours Permit & Risk Assessment	Access requires Extended Hours Permit & Risk Assessment	No access	No access
Postgraduate & Staff Members (Academic, Research Assistants, Support Staff)	Access allowed	Access allowed	Permitted for office-based work only	Permitted for office-based work only	Permitted for office-based work only

Note: Core hours for IBME are 08:00 – 18:00 (Monday to Friday)

Lone Working

Lone working (other than for solely office-based activities) is only permitted for students and staff subject to a Risk Assessment by their Line Manager or Supervisor. In all cases arrangements for summoning assistance in the event of an accident should be established and this information communicated to all relevant persons.

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APPENDIX C: ACCESS TO DEPARTMENTAL BUILDINGS

1. Undergraduate Students are permitted to use the main entrances to the Thom (including 8th floor study area) and Holder Buildings in the Keble Triangle between the hours of 08:00hrs and 18:00hrs during the following periods:
    a. Weeks 0th -10th (inclusive) in the Michaelmas and Hilary terms
    b. Weeks 0th – 8th of the Trinity term
2. This permission is granted for the purposes of attending lectures and other course related meetings, visiting the 8th floor study area and undertaking work related to Third Year Projects (3YP) or Fourth Year Projects (4YP).
3. This permission is granted on the strict condition that the only activities that can be undertaken are desk based, e.g. computer analysis of data, literature reviews or writing up of results but not the use of mechanical, electrical or chemical equipment and materials which would in other circumstances require the Undergraduate Student to be supervised in its use.
4. In certain circumstances and under conditions set by the Departmental Safety Officer (DSO), this access permission can be extended to allow activities by the Undergraduate Student which involve tests and experiments using mechanical, electrical or chemical equipment and materials which are deemed by the DSO to be hazardous to health and safety. The minimum condition will normally be that the Undergraduate Student is supervised by a competent person (usually a member of academic staff).
5. If an Undergraduate Student applies for extended access permission to undertake activities of the nature described in clause 4, the application must include a full description to enable the DSO to fully assess the risk and determine whether the activity can be allowed and, if so, the precautions that need to be taken and the supervision that will be required. At the discretion of the DSO extended access to nominated areas may then be permitted for a short, specified period under clearly defined conditions.
6. This permit, together with a current University Identity Card, must be carried at all times within the department, and produced upon request. Any Undergraduate Student that is unable to meet these requirements will be asked to immediately leave the department premises.
7. IMPORTANT NOTE: Random checks on undergraduate students present in the department during the periods and hours listed in Clause 1 will be conducted by the Head of Finance and Administration and the DSO. Students found to be not complying with the

conditions of issue of the extended access permission or undertaking works or activities that have not been specifically authorised (including the manner in which this authority was given) will have their extended access permission withdrawn and the Head of Department notified.

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APPENDIX D: GUIDANCE IN THE EVENT OF AN ATTACK BY AN ARMED PERSON OR PERSONS

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1. Be prepared and stay calm

The purpose of this guidance is to alert and not to alarm – it is not being provided in response to any specific information. Although students are asked to be mindful and alert, please do not be overly concerned. You are asked to carry on with your day-to-day life as normal.

In the event of an incident, quickly determine the best way to protect yourself.

2. Evacuate

- If it is possible to do so safely, exit the building or area immediately
- Have an escape route in mind (Fire Exit signs are a good point of reference)
- Evacuate regardless of whether others agree to follow
- Help others, if possible
- Prevent others from entering the area of danger
- Do not attempt to move wounded people
- When you are safe, call 999 and ask for the police

3. Hide

- If evacuation is not possible, find a place to hide where the offender is less likely to find you
- If you are in a room/office, stay there
- If you are in a corridor, get into a room/office
- Lock the door and blockade it with furniture
- Silence your mobile phone and remain quiet
- Turn off the lights and draw any blinds
- Hide out of view and behind something solid (desk or cabinet)
- If it is possible to do so safely, call 999 and ask for the police

4. Inform

If you contact the police, provide the following information:

- Location of and the number of offenders
- Any physical descriptions of the offenders

- Number and type of weapons used by the offenders
- Number and potential victims at the location
- Your location

STAY SAFE

Further information and advice is available from Oxford University Security Services on 01865 (2) 72944 or security.control@admin.ox.ac.uk

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APPENDIX E: EXPANDED SYLLABUS FOR PART A 2023

Paper A1: Mathematics

Linear Algebra

Linear simultaneous equations: matrix rank and nullity; the echelon form; subspaces, including kernels; the possible solutions of Ax = 0; the general solution of Ax = b; matrix and vector norms; ill-conditioning.

Methods of matrix decomposition. Diagonalisation of symmetric and asymmetric matrices. Applications to vibrations of linear systems and normal modes. Matrix exponentials.

Iterative methods for solution of Ax = b when A is square (e.g., Jacobi, Gauss-Seidel), including discussion of norms and errors; eigenvalue computation (power and Rayleigh methods).

Partial Differential Equations

Physical origin and significance of different PDEs and types of boundary conditions; solution of Laplace, diffusion and wave equations via separation of variables and Laplace Transforms; application of boundary and initial conditions; engineering examples from electrodynamics, mechanics, and heat and mass transfer.

Waves: characteristic solutions; wave propagation; travelling and standing waves; phase and group velocities; dispersion, attenuation and evanescence; reflection and transmission.

Statistics and Probability

Concept of probability. Expectation. Conditional probability and Bayes' theorem. Discrete distributions: binomial and Poisson. Continuous distributions: exponential and normal. Limiting cases, Central Limit Theorem, simple functions of probability distributions. Sampling: estimation of mean and standard deviation, error analysis. Introduction to risk analysis. Hypothesis testing.

Time-Frequency Analysis

Complex Fourier series: evaluation of complex coefficients for periodic functions; inversion relationship; the idea of spectra.

Fourier transform: derivation of transform from the complex Fourier series; inverse transform; convolution integral; impulse response functions; proof and use of duality; convolution and Parseval's theorems.

Introduction to sampling and reconstruction, including the Nyquist theorem and aliasing. Introduction to random processes.

Vector Calculus

Vector theorems: Gauss' and Stokes' theorems and evaluation of integrals over lines, surfaces and volumes (in Cartesian, cylindrical and spherical coordinates); derivation of continuity equations and Laplace's equation.

Paper A2: Electronic and Information Engineering

Introduction to Control Theory

Introduction to feedback and its properties. Stability and performance of closed-loop systems. The Nyquist diagram as an analysis tool, gain and phase margins and the prediction of closed-loop behaviour.

The specification of control system feedback performance, the trade-off between disturbance rejection and sensitivity to sensor noise, model information and gain. The design and implementation of PI, PD and PID controllers. Introduction to continuous time state space systems: transfer functions, relationship between poles and eigenvalues and impulse response.

Fast-sampling digital systems, zero-order hold. Effect of sample rate on control systems. Converting differential equations to difference equations. The z-transform, conversion between difference equations and z-transform transfer functions. Introduction to discrete time state space systems. Obtaining the discrete model of a continuous system plus zero-order hold from a continuous (Laplace) transfer function or state space system. Properties of z-transforms. Mapping from s-plane to z-plane. Significance of pole positions. Discrete time system specifications. Introduction to discrete time state space systems.

Sensing, Signals and Communications

Sensors and signal conditioning. Interference avoidance, differential and instrumentation amplifiers. Sources of noise and noise reduction by bandwidth limitation.

Transmission lines: Maxwell's equations, derivation of capacitance and inductance for e.g. co-axial cable, reflections at boundaries. Optical Fibres: numerical aperture, single mode, and multi-mode. Wireless transmission. Maxwell's equations for a plane wave; Dispersion; free space impedance; reflection at a boundary; boundary conditions for E and H; Antennas; gain, types, link budget. Sources of noise, noise figure and temperature, figures of merit.

Modulation, demodulation (coherent detection), ASK, QAM, modulated bandwidth. Sampling and signal recovery, PAM, PCM systems, TDM (time division multiplexing), intro to information theory, channel efficiency. Trade-off between bit error rate and bandwidth for different coding schemes. System examples: mobile phones, digital terrestrial television, digital subscriber lines, Internet.

Introduction to Computer Engineering

The von Neumann architecture; the organisation of CPU; opcodes; the execution of instructions by register transfers; basic I/O; addressing modes; transfers between memory and CPU; assembly language.

Programming languages, from assembly through C to Python; structured programming and its basic elements; algorithms and complexity; the application of structured programming to algorithms in Python.

Paper A3: Structures, Materials and Dynamics

Elastic Analysis of Structures

Use of matrix methods to solve simple redundant elastic frames.

Structural Failure

Failure of structures: Elastic and plastic bending. Plastic moment. Upper bound analysis of beams and frames. Lower bound checks. Instability. Definition of stability in terms of energy. Buckling of struts – Euler and Rayleigh approaches; imperfections.

Mechanics of Materials

Equilibrium and compatibility. Elastic stress analysis. Applications of elasticity theory to axisymmetric problems including thick-walled cylinders; thin plates with holes. Elastic stress concentrations.

First yield and hardness testing, von Mises criterion for multiaxial stress states. Examples of determination of principal stresses and first yield using von Mises. Stress intensity approach to fracture; linear elastic fracture mechanics. Relationship between SIF and energy release rate. Approximate 1-D determination of yield size in plane stress and plane strain.

Experimental determination of fracture toughness. Design for strength. Mechanisms of fatigue failure; nucleation and growth of fatigue cracks. Safe life and damage tolerant approaches. High and low cycle fatigue and reversed plasticity with reference to Basquin, Coffin Manson, Goodman and Miner rules. Fatigue crack growth, threshold and Paris Regimes. Facture in pressure vessels,

leak before break and failsafe design. Materials selection on the basis of fracture and fatigue failure. Case studies in structural integrity.

Dynamics of Machines

Kinematics: Velocity and acceleration; motion in rotating frames of reference. Dynamics: Angular momentum (general definition), rigid body motion with rotation and translation. Mechanisms: general principles and classification; instantaneous centres, velocity and acceleration analysis (vector diagrams and basic computational analysis); dynamic force analysis (inertia forces; dynamically equivalent masses; application to crank-slider force unbalance, torque output and flywheel size); Gears: simple, compound, and epicyclic gear trains (velocity and torque ratios).

Mechanical Vibrations

Single DOF mechanical vibrations; free and forced vibration, transient response, effect of damping. Modelling of mechanical systems, use of standard results, applications in mechanical engineering. Vibrations of undamped two and three DOF systems.

Paper A4: Thermofluids and Energy Systems

Applied Fluid Mechanics

Navier-Stokes equations. Introduction to potential theory. Complex flow solution through the superposition of potential, stream function of velocity fields. Introduction to the irrotational vortex, circulation and the determination of lift. Moment of momentum. Turbomachinery, radial and axial machines, non-dimensional performance characteristics and design metrics.

Electromagnetic Fields for Energy Conversion and Electrical Motors, Generators and Drivers

Integral forms of Maxwell's equations. Electromagnetic induction, Faraday's law, Lenz's law, inductance, stored energy. Inductors and single phase transformers: construction, magnetic circuits, properties of magnetic materials, and concept of reluctance. Equivalent circuits. Forces on moving charges, forces between wires and fields.

Fundamental principles of electro-mechanical conversion using DC machines: as an example: Permanent magnet trapezoidal flux synchronous machines and drive circuits. Awareness of major machine types: synchronous, induction/asynchronous, switched reluctance.

Power Electronics and Electrical Power Networks:

Simple switch-mode DC-DC converters. Steady state design equations. Comparison to linear voltage regulators. The half-bridge as a general controllable voltage source. Single phase inverters: pulse width modulation, output filters. DC bus architecture. Rectification: diode bridge circuits.

Power factor. Power flow across a reactance. Balanced three-phase AC theory. Transmission-distribution structure of conventional grids. Thermal generation and synchronous machine inertia. Challenges of integrating renewable generation. Overview of future grid challengers.

Thermodynamics

Introduction to the second law

Second law and corollaries, reversible processes, thermodynamic temperature scale and entropy. Equivalence of thermodynamic and ideal gas temperature scales. Second law and cycles. Definition of isentropic efficiency and its application to steam and gas turbine cycles.

Applications of the second law

Heat exchanger analysis and design. Use of temperature vs. enthalpy plots in heat exchanger and cycle design. Ideal and practical refrigeration systems. Concept of thermodynamic equilibrium; general conditions for equilibrium. Gibbs free energy; equilibrium of mixtures and chemical potential. The Clausius-Clapeyron equation; phase (liquid-vapour) equilibrium of ideal binary mixtures. Chemical reaction equilibrium and the equilibrium constant.

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APPENDIX F: THIRD AND FOURTH YEAR PROJECTS

1. Third Year Project

You are strongly advised to read and understand the online Regulations, and the Examination Conventions; in case of inconsistent information these two documents are the definitive record. Additional information relating to the EEM group project will be published on Canvas; the expected learning outcomes are published in the extended syllabus. The main features of your third-year project work will be as follows:

The design project is intended to provide you with experience of, and insight into, the engineering design process. Your objective is to produce, by the Wednesday of fourth week of Trinity Term of your third year, reports in the form of detailed design proposals. These proposals will contain sufficient engineering detail, together with costings and market and sustainable development evaluations, to enable the senior managers of a prospective manufacturing company to evaluate the engineering and economic feasibility of your design. Students on the EEM pathway are required to produce reports with approximately 50% dedicated to the business case.

- The design exercise will be a "paper" one. As is common in industry, the depth and detail with which you will be able to pursue your design will be constrained by the limited time available, and you will have to work efficiently and enthusiastically to get your final design reports ready by Trinity Term.
- At the discretion of your supervisors, you will probably be divided into design teams and be given some freedom to organise the management of your team and the distribution of tasks to individuals within the team. This is a deliberate part of the exercise and effective team working is an important element of a successful project.
- Each project will have a supervision team consisting of academic staff, members of the Design and Project Group, Research Assistants and Technicians as appropriate. The Visiting Professors of Engineering Design may also participate. They are there to provide guidance and technical advice, but don't expect them to do your design for you!
- The students and supervisors for each project will meet on a weekly basis, at a time published by the Student Administration Office. The supervision team will provide the design briefs, and other material relevant to individual projects, and will help you plan an overall timetable for your project.
- You will give progress presentations to your project group from time to time. Expect to receive and give constructive criticism.

- Final reports will take the form of a documented design proposal. They may either be written individually, or as a collaborative team report, as agreed with your supervisors. In team reports, the contribution of each author must be clearly identified (typically by an explanation at the beginning and by putting names on the contents page and at the top of each page of the report). Each student contribution is limited by the Examination Regulations to a maximum of 30 pages (including all diagrams, photographs, references and appendices).
- You will make a final presentation of your design proposal on a date set by the project co¬ordinator in Trinity Term. This will take the form of the technical and marketing presentation (business presentation for EEM) you would give to the design and production managers of the company you are convincing to manufacture and market your design. An evaluation of your presentation will be entered on your assessment form by your supervisors. One of the Examiners will be present to assess your presentation.

2. Fourth Year Project

Projects in the fourth year are normally undertaken by individual undergraduates, but sometimes a team of two or three may divide a larger exercise between them. The work usually involves significant original design and construction, or original research, and is done in close consultation with a nominated supervisor from the academic staff. Topics are usually selected from lists published in Hilary term of your third year. It is sometimes possible to do a project on an idea of your own, but this is dependent on finding an academic supervisor.

The expectation is that students and supervisors will normally meet on a weekly basis, at a time arranged by individual project supervisors. Students are required to submit an interim report and attend an interim interview with an academic (not your project supervisor) who has knowledge of your research area. This normally happens during week 8 or 9 in Michaelmas Term. You will also have a final interview with an examiner in either week 5 or 6 of Trinity Term which will form part of your assessment.

The fourth year project report contributes 50% to Finals Part C and must not exceed 50 pages in length (including all diagrams, photographs, references and appendices); for further details refer to the online Regulations, and Examination Conventions. The supervisor is expected to:

- Discuss in detail the student's outline for the report.
- Look carefully at a single draft of the report, making reasonably detailed comments and constructive suggestions on both the content and style (including grammar), and give guidance on the overall structure of the report. The comments should be sufficient for the

student to make appropriate improvements to their drafts and attend to any major problems.

- Supervisors will not provide comment on drafts for which feedback has already been provided.

3. Project Reports: Declaration of Authorship and IMG forms

Declaration of Authorship

When you submit your project reports you will be required to confirm that the work is your own by ticking the dedicated box.

SpLD IMG form

If you have a specific learning difficulty that you would like the examiners to be made aware of, it is your responsibility to ensure that you attach an IMG form to all your exam scripts and submitted assessments. Students must receive permission from the Disability Advisory Services (DAS) to use an IMG form.

Further information about the 2D form can be found here.

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