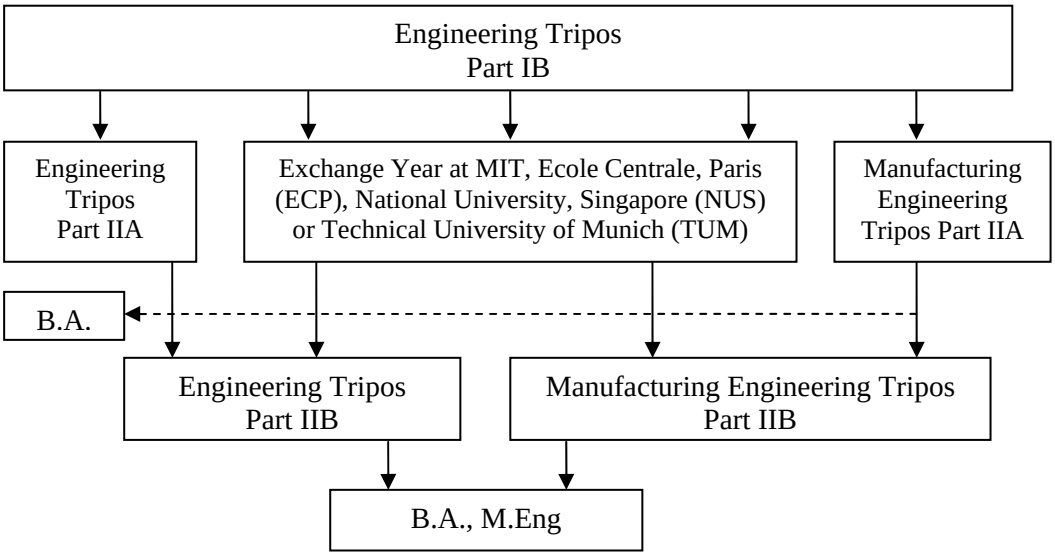
OPTIONS:
Third and Fourth-Year Courses Offered by the Engineering Department

This document is also available from the Undergraduate Teaching Homepages at: **http://www.eng.cam.ac.uk/teaching** (as are current syllabuses for the courses mentioned herein). Any updates to the paper version issued in January 2012 will be made on the Web version.

After Part IB of the Engineering Tripos students may, within the Faculty of Engineering, choose to study Part II of the Engineering Tripos or the Manufacturing Engineering Tripos. The opportunity also exists for a number of CUED students reading for the Engineering Tripos to spend their third year at the Massachusetts Institute of Technology or Ecole Centrale Paris, returning to Cambridge for their fourth year.



Much of the administration of the third and fourth-year courses within the Department is based on an on-line web/database system called COMET (Cambridge Online Management of Engineering Teaching). **In the Easter term, from Friday 18th May 2012, you must log on to COMET and make a provisional choice of your 3rd year course preference (Engineering IIA, MET IIA, or exchange). All students are required to make a provisional choice of Part IIA Engineering Area and modules – for MET and exchange students these are as a 'backup'.**

You will have the opportunity to update your modules during the long vacation, and again when you return in October. Module choices must be finalised by Wednesday 10th October 2012 for your Michaelmas modules, and Wednesday 23rd January 2013 for your Lent modules. COMET will check that your selection is valid and will offer suggestions if it is not.

1. ENGINEERING TRIPOS PART IIA

LECTURES AND EXAMINATION PAPERS

- Students choose **ten** modules from those listed below.
- **Five** modules are to be completed in each of the Michaelmas and Lent terms.
- Most third-year modules (preceded by numeral 3) have 16 lectures and 3 hours of small-group supervisions completed in one term (either Michaelmas or Lent). These are examined by an exam of 1.5 hour duration held early in the Easter term. However, some Group A courses are double modules that run throughout both the Michaelmas and Lent terms and are each examined by a 3 hour examination.
- Group S are Part IIB modules (thus preceded by numeral 4) available to Part IIA students.
  [Note 1: Those shown here are provisional; confirmed list to be published in May.
  Note 2: There are no supervisions or separate coursework for fourth-year modules.]
- Group I modules are modules imported from departments outside CUED.
- No student may include more than two modules from the combination of Groups I and S in his/her total.

COURSES IN PART IIA *(Note: Modules listed here are provisional until confirmed by the Faculty Board in May.)*

Group A: Energy, Fluid Mechanics and Turbomachinery
3A1 Fluid mechanics I (double module)
3A3 Fluid mechanics II (double module)
3A5 Thermodynamics and power generation
3A6 Heat and mass transfer

Group B: Electrical Engineering *
3B1 Radio frequency electronics
3B2 Integrated digital electronics
3B3 Switch-mode electronics
3B4 Electric drive systems
3B5 Semiconductor engineering
3B6 Photonic technology

Group C: Mechanics, Materials and Design
3C1 Materials processing and design
3C5 Dynamics
3C6 Vibration
3C7 Mechanics of solids
3C8 Machine design
3C9 Fracture mechanics of materials and structures

Group D: Civil, Structural and Environmental Engineering
3D1 Geotechnical engineering I
3D2 Geotechnical engineering II
3D3 Structural materials and design
3D4 Structural analysis and stability
3D5 Water engineering
3D7 Finite element methods
3D8 Building physics and environmental geotechnics

Group E: Management and Manufacturing
3E1 Business economics
3E2 Marketing
3E3 Modelling risk
3E5 Human resource management
3E6 Organisational behaviour and change
3E10 Operations Management for engineers

Group F: Information Engineering
3F1 Signals and systems
3F2 Systems and control
3F3 Signal and pattern processing
3F4 Data transmission
3F5 Computer and network systems
3F6 Software engineering and design

Group G: Life Sciences
3G1 Introduction to molecular bioengineering
3G2 Mathematical physiology
3G3 Introduction to neuroscience
3G4 Medical imaging and 3D computer graphics
3G5 Biomaterials

Group I: Imported modules
3I1 Data structures and algorithms (CST)

Group M: Multidisciplinary modules
3M1 Mathematical methods

Group S: Modules shared with Part IIB 2012/13
4C4 Design methods
4D16 Construction and Management
4M12 Partial differential equations & variational methods
4M16 Nuclear power engineering

* NB Module 3B7, Present and future energy systems, will not run in 2012-13, but is expected to return as a 4th year module in 2013-14.

2. LIMITATIONS ON THE CHOICE OF MODULES: ENGINEERING AREAS

At least **six** modules from your total of ten must fall within one of the Engineering Areas defined by the Faculty Board of Engineering. These are:

1. **Mechanical Engineering**
2. **Energy, Sustainability and the Environment**
3. **Aerospace and Aerothermal Engineering**
4. **Civil, Structural and Environmental Engineering**
5. **Electrical and Electronic Engineering**
6. **Information and Computer Engineering**
7. **Electrical and Information Sciences**
8. **Instrumentation and Control**
9. **Engineering for the Life Sciences**

Details of which modules are likely to be included in each of these areas for 2012/13 are provided in Section 3 of this handout, with provisional inclusion of new modules where appropriate. A definitive list for 2012/13 will be available to you in the Easter term prior to you making your provisional selection on COMET. In both the third year and the fourth year, the list of modules available will be subdivided into approximately twenty sets. Lectures and examinations for each set will be timetabled at the same time. Details of clashing sets for both years will be published in the Easter term. You are not permitted to take more than one module from any clashing set.

It would also be sensible to discuss with your Director of Studies before choosing a very eclectic mix of courses, in case a lack of overlap makes the workload unusually high.

The title of the Engineering Area for which you are qualified will appear on each of your third and fourth-year transcripts. In some cases, you may be qualified for more than one Engineering Area, so you will need to make an explicit choice. It is likely – although not essential – that your Engineering Area at Part IIB will be the same as that at Part IIA.

Associated with each of the Engineering Areas is a Part IIA **Engineering Area Activity** which you must complete as part of your coursework programme. More details of these, and of the other elements of Part IIA coursework, both practicals and projects, will be issued at the start of the Michaelmas term.

The Easter term of your third year starts with module examinations. For the remainder of the term, you will undertake two projects selected from a wide range of topics, including Foreign Language projects (currently Chinese, French, German, Spanish and Japanese). A list of those offered for 2011/12 is available on the Third-Year Undergraduate Teaching Homepage. These **Third-Year Projects** do *not* have to be in your Engineering Area.

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3. ADVICE ON ENGINEERING AREAS AND MODULE CHOICES

Your Director of Studies should be your first port of call, but if he/she specialises in an Engineering Area very different to the one you wish to study, the following staff will be happy to provide advice:

Engineering Area	**Co-ordinator**	**email**
1. Mechanical Engineering	Professor JA Williams	jaw@eng
2. Energy, Sustainability and the Environment	Professor N Collings	nc@eng
3. Aerospace and Aerothermal Engineering	Professor WN Dawes	wnd@eng
4. Civil, Structural and Environmental Engineering	Dr FA McRobie	fam@eng
5. Electrical and Electronic Engineering	Dr A Flewitt	ajf@eng
6. Information and Computer Engineering	Professor RW Prager	rwp@eng
7. Electrical and Information Sciences	Professor JM Maciejowski	jmm@eng
8. Instrumentation and Control	Professor JM Maciejowski	jmm@eng
9. Engineering for the Life Sciences	Dr ML Oyen	mlo29@eng

[NB: queries about Manufacturing Engineering can be addressed to Dr W O'Neill (wo207@eng.ac.uk). See also Section 6.]

Engineering Area: 1. MECHANICAL ENGINEERING

Number and title of module		Notes
3A1	Fluid mechanics I (double module)	
3A3	Fluid mechanics II (double module)	3A1 useful
3A5	Thermodynamics and power generation	
3A6	Heat and mass transfer	
3B4	Electric drive systems	
3C1	Materials processing and design	
3C5	Dynamics	
3C6	Vibration	3C5 useful
3C7	Mechanics of solids	
3C8	Machine design	
3C9	Fracture mechanics of materials and structures	
3D3	Structural materials and design	
3D7	Finite element methods	
3D8	Building physics and environmental geotechnics	
3F1	Signals and systems	
3F2	Systems and control	
3G2	Mathematical physiology	
3G4	Medical imaging and computer graphics	
3G5	Biomaterials	
3M1	Mathematical methods	
4C4	Design methods	
4M12	Partial differential equations and variational methods	
4M16	Nuclear power engineering	

Students intending to qualify in this Engineering Area **must include at least six** of the modules listed above. Mechanical Engineering covers a very broad field: the main areas are mechanics, fluid dynamics, thermodynamics, materials, and design, but topics in control and instrumentation are also relevant. Many students will choose to specialise either in the "dry" side of the subject (mechanics, materials, design) or the "wet" side (fluids and thermodynamics), but combinations of courses can be found to suit many different career paths, some of which cut across this divide. It would be prudent to discuss with the Engineering Area Coordinator before choosing a very eclectic mix of courses, in case a lack of overlap makes the workload unusually high.

Engineering Area Activity: Design and performance of a portable motor-generator set ***or*** Engineering failure analysis ***or*** Wind tunnel tests ***or*** Performance and characteristics of gas engines.

Engineering Area: 2. ENERGY, SUSTAINABILITY AND THE ENVIRONMENT

Number and title of module		Notes
3A1	Fluid mechanics I (double module)	
3A3	Fluid mechanics II (double module)	3A1 useful
3A5	Thermodynamics and power generation	
3A6	Heat and mass transfer	
3B4	Electric drive systems	
3D5	Water engineering	
3D8	Building physics and environmental geotechnics	
4M16	Nuclear power engineering	

Students intending to qualify in this Engineering Area **must include at least six** of the modules listed above.

Power generation and environmental engineering are central to the advancement of a sustainable future in developed and emerging economies. Energy engineering and sustainability are broad interdisciplinary subjects. This Engineering Area offers the opportunity to draw together modules across electrical, mechanical and civil engineering, under-pinned by fluid mechanics and thermodynamics. For example, 3A1 introduces incompressible fluid flows, and 3A5 focuses on power generation in gas and steam turbine plants, and fuel cells. But in parallel, thermofluids may be studied in other application areas, such as buildings and infrastructure (3D5 and 3D8, complemented by Part IIB modules such as Architectural Engineering and Sustainable Development). Across Part IIA and IIB, this Engineering Area enables students to study the whole power industry and associated technologies (fossil fuel, nuclear and renewable energy).

Engineering Area Activity: Wind tunnel tests ***or*** Performance and characteristics of gas engines ***or*** Design and performance of a portable motor-generator set.

Engineering Area: 3. AEROSPACE AND AEROTHERMAL ENGINEERING

Part IIA Core Modules

Number and title of module		**Notes**
3A1	Fluid mechanics I (double module)	
3A3	Fluid mechanics II (double module)	3A1 useful
3A5	Thermodynamics and power generation	
3A6	Heat and mass transfer	

Part IIA Companion modules

Number and title of module		**Notes**
3B1	Radio frequency electronics	
3B2	Integrated digital electronics	
3C1	Materials processing and design	
3C5	Dynamics	
3C6	Vibration	3C5 useful
3C7	Mechanics of solids	
3C9	Fracture mechanics of materials and structures	3C7 assumed
3D3	Structural materials and design	
3D4	Structural analysis and stability	3D3 useful
3D7	Finite element methods	
3F1	Signals and systems	
3F2	Systems and control	
3M1	Mathematical methods	

Students intending to qualify in this Engineering Area **must include both 3A1 and 3A3, plus two Part IIA Core or Companion modules.** Many will take all 4 Core modules.

Aerospace and Aerothermal Engineering is an interdisciplinary blend of subjects ranging from fluid mechanics, thermodynamics, structures, instrumentation, control, electronics and design to manufacturing. In essence, Aerospace Engineering is concerned with flight and Aerothermal Engineering with the associated propulsion systems. In the past, development in these fields has been driven by technological issues. In the future, environmental concerns, minimising noise and pollution, and relentless pressure on design and manufacturing turnaround time will force novel solutions and paradigm shifts.

A good understanding of fluid mechanics is essential in both fields. A secure grasp of the fundamentals equips students with the ability and confidence to innovate and develop novel solutions to familiar problems and to understand and maybe manage wholly new issues. 3A1 introduces the dynamics of incompressible fluid flow and is an essential foundation course. High speed flows demand an understanding of compressibility effects and these are discussed in 3A3. 3A5 focuses on the applications of thermodynamics to power generation with emphasis on gas and steam turbine plant, and fuel cells. 3A6 addresses the important topic of heat transfer and mass transfer, with applications.
The essential interdisciplinary nature of the subject is reflected in the diversity of the recommended companion modules drawn from across the spectrum of the department’s teaching. This diversity increases in Part IIB.

Engineering Area Activity: Wind tunnel tests ***or*** Performance and characteristics of gas engines ***or*** Design and performance of a portable motor-generator set.

Engineering Area: 4. CIVIL, STRUCTURAL AND ENVIRONMENTAL ENGINEERING

Number and title of module		Notes
3D1	Geotechnical engineering I	3D2 useful
3D2	Geotechnical engineering II	3D1 assumed
3D3	Structural materials and design	
3D4	Structural analysis and stability	3D3 useful
3D5	Water engineering	
3D7	Finite element methods	
3D8	Building physics and environmental geotechnics	
3C7	Mechanics of solids	
3C9	Fracture mechanics of materials and structures	3C7 assumed
4616	Construction and Management	

Students intending to qualify in this Engineering Area **must include at least six** of the modules listed above. Students should note that there are many other synergies between these modules, which will make them easier if they are taken as a group – for instance module 3D2 will help to provide further clarification of material presented in 3D1.

Intending Civil, Structural or Environmental Engineers are advised to study the broadest possible range of these courses, and to take all or almost all of the above modules. Most structures rest on the ground, and therefore need foundations. Vehicles rely on pavements, runways or rails as their foundations, which are strongly influenced by environmental conditions such as groundwater. Engineers working with architects need to rise to the challenge of sustainable design using novel materials in striking configurations, and providing congenial internal environments with high energy-efficiency. Those devising major schemes need to understand the issues of brownfield development, flood risk, infrastructure management, and the creation and utilisation of underground space for transport, for example. And those engineers working in resource management may need to understand aquifers and oil reservoirs, or the offshore winds, waves and currents that determine the design of offshore power facilities including windfarms.

Engineering Area Activity: Surveying (2½ day course in Cambridge at the end of either Michaelmas or Lent term).

NB: Module 4D16 is on the list as a shared module for 2012/13. It will not be available in your fourth year in 2013/14.

Engineering Area: 5. ELECTRICAL AND ELECTRONIC ENGINEERING

Number and title of module		Notes
3B1	Radio frequency electronics	
3B2	Integrated digital electronics	
3B3	Switch-mode electronics	
3B4	Electric drive systems	
3B5	Semiconductor engineering	
3B6	Photonic technology	

Students intending to qualify in this Engineering Area **must include all six** of the modules listed above.

Electrical and Electronic Engineering covers the range of topics which best represents the current trends in circuits, devices and systems for hardware implementations. Module 3B1 introduces the circuit and system design aspects of electronics which operate at radio frequency and are essential in applications such as mobile communications. It also covers advanced circuit concepts used in analogue electronics. 3B2 covers digital circuit and system design together with their implementation in integrated circuits. 3B3 covers the circuits in which transistors operate not only as ON/OFF switches, but where both input and output parameters can vary linearly. Such circuits are particularly relevant for power conditioning. 3B4 covers the operation and design of electrical energy transfer for the drive of motion/actuation systems. 3B5 covers principles of solid state electronic devices ranging from the underlying semiconductor physics to the operating characteristics and design of advanced transistors. 3B6 covers the design principles of systems and devices which operate in the optical frequencies (photonics), and also includes the principles of optical fibre communications.

Engineering Area Activity: Design of a CD Player.

Engineering Area: 6. INFORMATION AND COMPUTER ENGINEERING

Number and title of module		Notes
3F1	Signals and systems	
3F2	Systems and control	
3F3	Signal and pattern processing	3F1 assumed
3F4	Data transmission	3F1 assumed
3F5	Computer and network systems	
3F6	Software engineering and design	
3I1	Data structures and algorithms (CST)	
3G4	Medical imaging and 3D computer graphics	
3M1	Mathematical methods	

Students intending to qualify in this Engineering Area **must include at least six** of the modules listed above.

Information and Computer Engineering covers the digital representation and processing of signals and systems. It extends from the theory of signals and systems, through to the manipulation of data via computer programs. In addition to all of the information modules, this professional area includes modules from the Computer Science Tripos. Candidates for this area whose main interests are signals, control and communications will include 3F1 to 3F5. Those candidates with an interest in computer systems will focus more on 3F4 to 3F6 and will also consider the Computer Science option 3I1. Candidates with a strong interest in control should also consider “Instrumentation and Control” as an alternative.

Engineering Area Activity: Design of a CD Player.

Engineering Area: 7. ELECTRICAL AND INFORMATION SCIENCES

Number and title of module		Notes
3B1	Radio frequency electronics	
3B2	Integrated digital electronics	
3B3	Switch-mode electronics	
3B4	Electric drive systems	
3B5	Semiconductor engineering	
3B6	Photonic technology	
3F1	Signals and systems	
3F2	Systems and control	
3F3	Signal and pattern processing	3F1 assumed
3F4	Data transmission	3F1 assumed
3F5	Computer and network systems	
3F6	Software engineering and design	
3G4	Medical imaging and 3D computer graphics	
3M1	Mathematical methods	

Students intending to qualify in this Engineering Area **must include at least eight** of the modules listed above.
Electrical and Information Sciences covers a very broad area. The B modules cover a wide range of electronic circuits and devices, whilst the F modules cover the digital representation and processing of signals, and the manipulation of data in computers. A student in this area will be seeking to gain a broad overview of systems from the signals that flow through them to the hardware platforms that implement them. Although many students will choose to do mostly B modules or mostly F modules depending on their inclination towards the electrical or information side, students who prefer to specialise exclusively in one or the other should consider one of the other B/F engineering areas, as described above.

Engineering Area Activity: Design of a CD Player.

Engineering Area: 8. INSTRUMENTATION AND CONTROL

Number and title of module		Notes
3B1	Radio frequency electronics	
3B2	Integrated digital electronics	
3B5	Semiconductor engineering	
3B6	Photonic technology	
3C5	Dynamics	
3C6	Vibration	3C5 useful
3F1	Signals and systems	
3F2	Systems and control	
3F3	Signal and pattern processing	3F1 assumed
3F4	Data transmission	3F1 assumed
3F5	Computer and network systems	
3F6	Software engineering and design	
3G4	Medical imaging and 3D computer graphics	
3M1	Mathematical methods	

Students intending to qualify in this Engineering Area **must include 3F1 or 3F2 and at least five** other modules from the list above. Students are strongly advised to take both 3F1 and 3F2.

Instrumentation and Control covers a range of topics which are important to the monitoring and control of modern systems. B modules cover basic circuits and device technology and F modules cover the representation, capture and manipulation of signals. The C modules cover the relevant engineering aspects of mechanical systems.

Engineering Area Activity: Design of a CD Player ***or*** Performance and characteristics of gas engines

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Engineering Area: 9. ENGINEERING FOR THE LIFE SCIENCES

Number and title of module		Notes
3G1	Introduction to molecular bioengineering	
3G2	Mathematical physiology	
3G3	Introduction to neuroscience	
3G4	Medical imaging and 3D computer graphics	
3G5	Biomaterials	
3C7	Mechanics of solids	
3D7	Finite Element Methods	
3F1	Signals and systems	
3F3	Signal and pattern processing	

Students intending to qualify in this Engineering Area **must include at least 6** of the modules listed above and must take **at least three modules from 3G1, 3G2, 3G3, 3G4 & 3G5**.

There is a growing need for a more integrated approach to the understanding of biological systems, providing many opportunities for the application of engineering to clinical and life sciences. Engineering for the Life Sciences is a rapidly growing field encompassing the use of engineering tools to solve problems in medicine and biology as well as new quantitative approaches to biological systems based on engineering principles.

The modules particularly focus on the application of Mechanics and Information Processing to the Life Sciences. The module section allows those who wish to specialise in Mechanics and the Life Sciences to take modules such as 3G1, 3G2, 3G4, 3G5, 3C7 & 3D7 and those who wish to specialise in Information Processing and the Life Sciences to take modules such as 3G1, 3G2, 3G3, 3G4, 3F1 & 3F3. For those who would like a broad training in both mechanics and information processing a combination of the above modules can be selected.

Engineering Area Activity: Bioengineering: bread making

4. ADVICE ON OTHER MODULES IN YOUR THIRD YEAR

GROUP E Management and Manufacturing (NB This is **not** an Engineering Area)

Number and title of module		Number and title of module	
3E1	Business economics	3E5	Human resource management
3E2	Marketing	3E6	Organisational behaviour and change
3E3	Modelling risk	3E10	Operations management

Engineering management covers a range of topics relating to the main business processes of the engineering firm and to the economic, technological, social and industrial context within which it operates. The third-year courses provide an introduction to key areas of economics, operations and people management, while the fourth-year courses address broader issues such as strategy, technology management and entrepreneurship. These topics, most of which can be taken without prerequisite as stand-alone modules, complement those from other branches of engineering.

GROUP M (Multidisciplinary)

Module 3M1 (Mathematical methods) covers linear algebra, optimisation and stochastic processes, topics that complement many module combinations in Part II, particularly for mechanical, design and information engineering.

GROUPS I (Imported) and S (Shared with Part IIB)

Group I modules are offered from time to time by Departments other than Engineering.

Group S modules give you the flexibility of taking some 4th year topics of interest in your third year. Please note that some Shared modules are offered only in alternate years and thus may not be available to you in your fourth year. **(Remember that there are no supervisions for 4th year modules.)**

RESTRICTIONS IN CHOICE OF OTHER MODULES (in Part IIA and IIB)

In Part IIA, no student may include more than two modules from the combination of Groups I and S in his/her total. Furthermore, the number of management modules is limited to a maximum of **two**. Management includes all 3Ex modules, and related Shared modules offered in some years by other subject groups (e.g. 4D16 Construction & Management).

In Part IIB, a similar restriction will apply, but extended to include other non-technical modules – a maximum of **three** modules may be taken from the following:

- all 4Ex modules, and some imported modules (currently 4I1 and 4I7)
- management modules offered in some years by other subject groups (eg 4D16)
- all Language modules (currently 4M1, 4M2, 4M3, 4M4)

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5. OUTLINE OF FOURTH-YEAR COURSES WITHIN ENGINEERING PART IIB

Students choose eight modules from a list of eighty or so. Each module may have up to 16 lectures, or equivalent work, and (with a few exceptions) is scheduled to be either wholly within the Michaelmas Term or wholly within the Lent Term. There are no supervisions for fourth-year modules. Fourth-year modules may be assessed wholly by coursework, wholly by examination, or by a combination of the two (25% CW, 75% exam). All module examinations are held in the first three weeks of the Easter term.

The list of modules is once again subdivided into Groups A-G, I and M, with the addition of Group R (Research).

Group A	Energy, fluid mechanics and turbomachinery
Group B	Electrical engineering
Group C	Mechanics, materials and design
Group D	Civil, structural and environmental engineering
Group E	Management and manufacturing
Group F	Information engineering
Group G	Engineering for the life sciences
Group I	Imported modules (from other courses in the University)
Group M	Multidisciplinary modules
Group R	Research modules (available to certain undergraduates)

GROUPS I, M and R

Group I modules are offered by Departments other than Engineering. **Group M** includes, amongst others, the **Surveying Field Course** (which takes place in the summer vacation preceding the fourth year), **mathematical modules**, and **foreign language modules** (which lead on from language skills developed in the third year Easter term Foreign Language Projects). **Group R** modules are of interest principally to those wishing to pursue a career in research and acceptance on these is normally restricted to those who have gained a Class I result in Part IIA.

University regulations require that for each undergraduate a minimum number of modules, currently four from the total of eight, fall within one of the Engineering Areas defined by the Faculty Board of Engineering. These will be confirmed during the preceding Easter term but are likely to be as follows:

1. **Mechanical Engineering**
2. **Energy, Sustainability and the Environment**
3. **Aerospace and Aerothermal Engineering**
4. **Civil, Structural and Environmental Engineering**
5. **Electrical and Electronic Engineering**
6. **Information and Computer Engineering**
7. **Electrical and Information Sciences**
8. **Instrumentation and Control**
9. **Engineering for the Life Sciences**

The number of modules in each of Groups A-G will be not less than six and not more than eleven, although the number and the topics covered may vary slightly from year to year. Syllabuses and a provisional summary (including current sets, pre-requisites and mode of assessment) for those being offered during 2011/12 may be viewed from the Fourth-Year Undergraduate Teaching Homepages http://www.eng.cam.ac.uk/teaching/index-iib.htm. Information for 2012/13 will be made available here in the Easter term (and for 2013/14 in Easter term 2013).

FOURTH-YEAR PROJECTS

Each student must undertake a major final-year project on which work proceeds over the whole of the year. 3/7 of the credit at Part IIB is associated with the project and 4/7 with the module examinations or assessed coursework.

Several hundred possible project titles are posted on the web towards the end of the Lent term. Third-year students can choose from the suggested titles or make a proposal (as early as possible in the Lent term) for a project of their own invention. Project preferences are entered into the computer early in the Easter term and allocations are determined before the end of that term.

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6. MANUFACTURING ENGINEERING TRIPOS

MET aims to prepare students to operate professionally as broadly-based leaders for business and technology, by giving them a thorough grounding in management and manufacturing technology, together with an understanding of the full range of activities from market analysis through product design and production, to sales and distribution.

MET is an integrated two year course. The number of places is limited to forty-four, and selection is based on interview and previous academic performance. There will be an **'Open Afternoon' on Wednesday 9th May** for you to find out more (details will be sent to you nearer the time), and there is a **"Meet the METs" lunch on Thursday 9th February in LR4, 1-2pm** following the MET Options talk.

In **MET IIA**, students take ten modules covering the following areas:

- Materials processing technology
- Production machines and systems
- Design
- Operations management
- Industrial engineering
- Organisational behaviour
- Managing people and business
- Financial and management accounting
- Industrial economics, strategy and governance
- Contemporary issues in manufacturing

The modules are complemented by a structured set of industrial visits and a business skills development programme. In addition, students undertake three pieces of integrated coursework, which are a CAD/CAM exercise, a Production Game and the Major Project. Students work on the Major Project in small groups. They research the market for a product, prepare a design and manufacturing plan, and finally a business plan, for a company or division based on that

product. The Major Project involves external consultants, and each group is advised on its business plan by a local bank manager.

The structure of the **MET IIB** course is very different from a standard undergraduate course. Teaching takes the form of intensive modules with a significant proportion of visiting industrial lecturers.

Module topics span the full range of technical and managerial areas and cover:

- Manufacturing technologies and materials
- Manufacturing systems and automation
- Asset management
- Technology and innovation management
- People management
- Finance
- Strategy and marketing
- Enterprise
- International manufacturing
- Policy
- Sustainable manufacturing

You also take part in an extended group project in the Robot Laboratory involving the design and build of an automated system. To illustrate the modules and to give you the opportunity to apply your knowledge, you spend three periods of two weeks working in pairs on real problems in leading industrial companies throughout Britain. At the end of each project, your team makes a formal presentation to the company, with a full written report a few days later. Finally, you undertake a seven-week individual project, again aimed at addressing a significant industrial problem. Modules are interspersed with industrial visits (both in the UK and abroad) which are used to reinforce the taught material.

Queries about Manufacturing Engineering can be addressed to Dr W. O'Neill (wo207@eng.cam.ac.uk)

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7. ACCREDITATION OF CAMBRIDGE COURSES BY THE ENGINEERING INSTITUTIONS

All students are encouraged to become Student or Affiliate members of one or more of the Professional Institutions.

(a) ENGINEERING TRIPOS

Subject to certain conditions, the Cambridge MEng degree is accredited by the major Engineering Institutions below, each of which has a CUED Liaison Officer who can advise on Institution membership, provide application forms etc:

ICE	Institution of Civil Engineers	Dr RA Fenner	raf37@eng
IStructE	Institution of Structural Engineers	Dr CJ Burgoyne	cjb@eng
IET	Institution of Engineering and Technology	Dr RA McMahon	ram1@eng
IMechE	Institution of Mechanical Engineers	Prof JA Williams	jaw@eng
RAeS	Royal Aeronautical Society	Prof WN Dawes	wnd@eng
InstMC	Institute of Measurement and Control	Prof JM Maciejowski	jmm@eng
IHT	Institution of Highways and Transportation	Dr CJ Burgoyne	cjb@eng
IPEM	Institute of Physics and Engineering in Medicine	Dr GM Treece	gmt11@eng

CONDITIONS:

ALL Institutions: Students must complete two management modules (those in Group E plus '4I1 Strategic Valuation') during the final two years of the MEng course.

IHT, ICE and IStructE: The MEng is accredited with the same requirement of 2 management modules being taken in Part II. For the purposes of accreditation, '4D16 Construction and management' (offered 12/13 but not running 13/14) can be counted as one of your 2 management modules.

RAeS, IMechE and IET: The MEng is accredited for all Engineering Areas.

InstMC: The MEng is accredited for the Instrumentation and Control Engineering Area. Other Engineering Areas are also accredited provided that at least two of the following modules are taken:

- 3F1 Signals and systems
- 3F2 Systems and control
- 4F1 Control systems design
- 4F2 Robust multivariable control
- 4F3 Nonlinear and predictive control

IPEM The MEng is accredited for students who take the "Engineering for the Life Sciences" Engineering area in both Part IIA and Part IIB.

(b) MANUFACTURING ENGINEERING TRIPOS

The MEng degree is accredited by the IMechE and the IET.

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8. CME: CAMBRIDGE-MIT EXCHANGE PROGRAMME

In July 2000 the University signed an agreement with the Massachusetts Institute of Technology to form the Cambridge MIT Institute. The primary goal of CMI was to undertake joint educational and research initiatives that would improve entrepreneurship, productivity and competitiveness in the UK.

MIT has separate Departments representing the major professional engineering activities and this year the exchange will involve the Departments of Electrical Engineering and Computer Science, the Department of Civil and Environmental Engineering, the Department of Mechanical Engineering and the Department of Aero-Astro Engineering. It is possible for exchange students to study courses outside their home department including some offered by the Sloan School of Management and Harvard.

Cambridge students taking part in this exchange return to the UK with an MIT transcript with details of their course grades and are able the following year to continue with Part IIB of the Engineering Tripos just as if they had remained in Cambridge for their third year except that they do not have a 'class' at the end of year 3. Students are required to be 'deemed to have deserved honours' on the recommendation of this Department in order to be of standing to take Part IIB or MET IIB.

Participating students will not be liable for any additional tuition fees by virtue of taking part in the Exchange. Each will receive a non-means-tested bursary to help cover the additional travelling and living expenses.

The Fall Semester of the MIT academic year begins in September and to participate students must be able to travel to Boston at the end of August. The Spring Semester begins in early February and finishes mid May although all Cambridge exchange students are expected to be at MIT, or participating in an MIT-organised project, during the Independent Activity Period (IAP) throughout January.

More details on the exchange are available from: http://www.eng.cam.ac.uk/DesignOffice/cme and http://web.mit.edu/cmi/ue and which include downloadable application forms and an 'expression of interest' form. Completed forms should be submitted to your College referees and the CME administrator (pmc47@eng.cam.ac.uk) in the CUED teaching office, respectively by Monday 30 January. Decisions will be announced by email at the end of term or shortly thereafter.

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9. STUDENT EXCHANGE WITH ECOLE CENTRALE PARIS

We offer two or three places to spend an academic year at the Ecole Centrale Paris (ECP) in place of Part IIA of the Engineering Tripos or MET Part I. Students taking part in the exchange will take a selection of modules from the second year options offered at ECP. The exchange will be available for students wishing to study materials, structures, fluids, heat engineering, energy, aeronautical engineering, process engineering and electrical engineering. Nearly all teaching at ECP is conducted in French and so students wishing to participate in the exchange should have a good level of the language. Extra tuition (including a one week residential language course at Vichy) may be available to help students prepare.

At the end of the year abroad, the Cambridge students will be graded in the French system and, provided they achieve the equivalent of a 3rd class honours pass, they will be able to return to Cambridge to take Part IIB or MET Part IIB.

The academic year at Ecole Centrale starts in September and finishes in June. The exchange will run under the framework of the Erasmus scheme from the European Union. Students will not have to pay any additional fees to take part in the exchange, and will receive a non-means tested monthly allowance to cover additional travelling and living expenses.

Students interested in this exchange should contact Casimir d'Aneglo at the Language Unit as soon as possible and not later than 17th February to discuss their language ability. An application form, which should be completed by Friday 16th March, is available from www.eng.cam.ac.uk/teaching/ecp. Further information on the Ecole Centrale can be obtained from http://www.ecp.fr. You are also welcome to discuss the exchange program further with the Coordinator for the ECP Exchange, Dr Alex Kabla (akl61@cam.ac.uk).

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10. STUDENT EXCHANGE WITH NATIONAL UNIVERSITY, SINGAPORE

For the academic year 2012/13 we plan to offer up to two places for Engineering or Manufacturing Engineering students to spend the third year of their degree at the National University of Singapore (NUS). Singapore is widely considered as 'soft landing' into Asia and provides a great introduction into technological innovations occurring in the region.

Cambridge students participating in the Exchange Programme spend their third year in Singapore instead of doing Part IIA or MET Part IIA. The course at NUS starts in July and ends in May of the following year. Exchange students will be assessed at NUS (by a combination of examinations, coursework and project work) and, subject to a satisfactory performance (i.e., the equivalent to a Cambridge third-class honours or above) will be deemed to have deserved honours at Part IIA. Note that, as with students participating in the MIT or Ecole Centrale exchanges, students do not receive a degree classification for their third year.

Students applying for the exchange programme:

- must be available from mid July, when the course starts, until it finishes in May of the following year.
- should normally have obtained at least a II.1 at Part IA of the Engineering course and be expected to do likewise at Part IB.
- should be open to experiencing a different culture and different style of education.
- should not normally be natives of Singapore or of a country with a closely related culture. This is because the exchange would not represent an 'international experience' to the same extent for such students.

Courses at NUS are given in English so there is no linguistic requirement for the exchange. If you are interested in applying for the exchange you should contact the NUS coordinator, Dr Gopal Madabhushi (mspg1@cam.ac.uk) to register your interest and complete and submit the application form that is available on the web at http://www.eng.cam.ac.uk/teaching/nus/ by **Friday 16th March**. Note that your application must be signed by your Director of Studies and by the Senior Tutor of your college so that they are aware of your plans. Students will be selected on the basis of their ability and the extent to which they would be likely to benefit from the exchange. They will be informed of the outcome of their application early in the Easter Term.

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11. STUDENT EXCHANGE WITH THE TECHNICAL UNIVERSITY OF MUNICH

We offer two or three places to spend an academic year at the Technical University of Munich (TUM) in place of Part IIA of the Engineering Tripos or MET Part IIA. Students taking part in the exchange will take courses from the faculties of Electrical Engineering, Mechanical Engineering, or Civil Engineering and Surveying at Munich. Much of the teaching at TUM is conducted in German so students wishing to participate in the exchange should have a good level of the language. Extra tuition (including a two-week preparatory course in Munich before the start of the first semester) may be available to help students prepare.

At the end of the year abroad, the Cambridge students will be graded in the German system and, provided they achieve the equivalent of a 3rd class honours pass, they will be deemed to have deserved honours in Part IIA. They will then return to Cambridge to take Engineering Part IIB or Manufacturing Engineering Part IIB. They will have a Munich transcript rather than a Cambridge tripos result to describe their performance during the third year of their studies.

The academic year at TUM starts in late September and finishes in July. The exchange will run under the framework of the Erasmus scheme from the European Union. Students will not have to pay any additional fees to take part in the exchange, and will receive a non-means tested monthly allowance to cover additional travelling and living expenses.

Students interested in this exchange should contact Casimir d'Angelo at the Language Unit as soon as possible and not later than 17th February to discuss their language ability. An application form, which should be completed by Friday 16th March, is available from www.eng.cam.ac.uk/teaching/tum. Further information about the Technical University of Munich is available from www.eng.cam.ac.uk/teaching/tum. You are also welcome to discuss the exchange program with the Coordinator for the TUM Exchange, Dr Janet Lees (jml2@eng.cam.ac.uk).

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12. TIMETABLE OF TALKS

To be given to second year students by the different subject groups on choices for the third and fourth years.

All talks are in LT0. The Exchanges Fair, Meet the METs Lunch and Electrical Lunch are in LR4.

Friday 27th January	1.00	**Exchanges Fair in Lecture Room 4** **MIT** – Dr Peter Long + former students **ECP** – Dr Alex Kabla, Mr Casimir d'Angelo, Steven Brown (?) + former students **NUS** – Dr Gopal Madabhushi, Prof Victor Shim + former students **TUM** – Dr Janet Lees, Prof Richard Prager
Thursday 9th February	1.00	**Options for Part II of the Engineering Tripos** **(Prof Richard Prager,** Deputy Head of Department, Teaching)
		Manufacturing Engineering and "Meet the METs" lunch
	1.05	**Dr Bill O'Neill**
	1.20	**Words from a student**
	1.25	**Lunch in LR4**
Tuesday 14th February	2.00	**Civil, Structural and Environmental Engineering** (**Allan McRobie,** et al)
	2.30	**Mechanical and Materials Engineering** (**Prof Jim Woodhouse**)
	3.00	**Fluid Mechanics, Thermodynamics and Energy** (**Prof Holger Babinsky**, et al)
Tuesday 21st February	1.00	**Electrical Engineering** (**Dr Tim Wilkinson,** et al)
	1.30	A chance to meet the module leaders and graduate students in Electrical and Electronic Engineering, with a light lunch provided.
	2.10	**Engineering Management** **(Dr Claire Barlow)**
	2.30	**Engineering for the Life Sciences** **(Dr Graham Treece)**
	3.00	**Information Engineering** **(Professor Jan Maciejowksi)**

teaching-office@eng.cam.ac.uk
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