Engineering Tripos, part IIB: Notice concerning Engineering Areas

Students choose eight modules from a list of eighty or so. Each module may have up to 16 lectures, or equivalent work, and is scheduled to be either wholly within the Michaelmas Term or wholly within the Lent Term (with the exception of a small number of vacation modules). 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% coursework, 75% exam). All module examinations are held in the first three weeks of the Easter Term.

The Engineering Areas are defined by the Faculty Board of Engineering in the following documents. To qualify in a particular Engineering Area, you must take a minimum number of modules falling within that area. The Engineering Area for your modules and project do not have to be the same.

New for 2015-16: You may find your module choice enables you to qualify in more than one area. You may do this; you do not have to choose between them. Alternatively, you may choose modules which do not allow you to qualify in any single area, in which case you will register for Engineering.

For advice on Engineering Areas and module choices, your Director of Studies should be your first port of call.

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Part IIB Engineering Area requirements: Mechanical Engineering

Students intending to qualify in this Engineering Area in Part IIB must include at least **four** of the modules listed.

Number	Title	Notes
4A2	Computational Fluid Dynamics	M1
4A3	Turbomachinery I	M7
4A7	Aerodynamics	M3
4A9	Molecular Thermodynamics **(not running 2015-16)**	M6
4A10	Flow Instability	L6
4A12	Turbulence and Vortex Dynamics	L3
4A13	Combustion and IC Engines	L5
4B13	Electronic Sensors and Instrumentation	L2
4B19	Renewable Electrical Power	M2
4C2	Designing with Composites	M5
4C3	Electrical and Nano Materials	M6
4C4	Design Methods	M2
4C5	Design Case Studies	L4
4C6	Advanced Linear Vibrations	M4
4C7	Random and Non-linear Vibrations	M8
4C8	Applications of Dynamics	L1
4C9	Continuum Mechanics	M7
4C15	MEMS: Design **(not running 2015-16)**	L6
4C16	Advanced Machine Design	L9

4D6	Dynamics in Civil Engineering	L2
4D17	Plate and Shell Structures	M3
4F1	Control System Design	M6
4F7	Digital Filters and Spectrum Estimation	M8
4G4	Biomimetics	L7
4G5	Molecular Modelling	M14
4G6	Cellular and Molecular Biomechanics	M10
4I5	Nuclear Materials	L16
4I10	Nuclear Reactor Engineering	M13
4I11	Advanced Fission and Fusion Systems	L10
4M6	Materials and Processes for Microsystems (MEMS)	M1
4M12	Partial Differential Equations and Variational Methods	L11
4M16	Nuclear Power Engineering	L11
4M17	Practical Optimization	M19
4M20	Robotics **(NEW 2015-16)**	M12

Advice

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 for students to discuss this with the Engineering Area Coordinator before choosing a very eclectic mix of courses, in case a lack of overlap makes the workload unusually high.

Specialist advice can be obtained from the Mechanical Engineering Coordinator whose details can be found on the IIA Mechanical Engineering Area webpage.

Part IIB Engineering Area requirements: Energy, Sustainability and the Environment

Students intending to qualify in this Engineering Area in Part IIB must include at least **four** of the modules listed.

Number	Title	Notes
4A2	Computational Fluid Dynamics	M1
4A3	Turbomachinery	M7
4A9	Molecular Thermodynamics **(not running 2015-16)**	M6
4A13	Combustion and IC Engines	L5
4B14	Solar Electronic Power: Generation and Distribution	M4
4B19	Renewable Electric Power	M2
4D13	Architectural Engineering	M12
4D14	Contaminated Land and Waste Containment	M1
4D15	Sustainable Water Engineering	L4
4I5	Nuclear Materials **(not running 2015-16)**	L16
4I7	Electricity and Environment	L7
4I10	Nuclear Reactor Engineering	M13
4I11	Advanced Fission and Fusion Systems	L10
4M14	Sustainable Development	M13
4M15	Sustainable Energy	L8
4M16	Nuclear Power Engineering	L11
4M18	Present and Future Energy Systems	M5

Advice

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, with application areas ranging from power generation in gas and steam turbine plants, to fuel cells and

renewable energy technologies, to buildings and infrastructure.

Specialist advice on this Engineering Area can be obtained from the Coordinator whose details can be found on the IIA Energy, Sustainability and the Environment Engineering Area webpage.

Part IIB Engineering Area requirements: Aerospace and Aerothermal Engineering

Students intending to qualify in this Engineering Area in Part IIB must include one of the following combinations in their selection of modules:

- *either* **four** Part IIB core modules,
- *or* **three** Part IIB core modules + two Part IIB companion modules.

Core modules

Number	Title	Notes
4A2	Computational Fluid Dynamics	M1
4A3	Turbomachinery I	M7
4A4	Aircraft Stability and Control	M10
4A7	Aerodynamics	M3
4A9	Molecular Thermodynamics **(not running 2015-16)**	M6
4A10	Flow Instability	L6
4A12	Turbulence and Vortex Dynamics	L3
4A13	Combustion and IC Engines	L5
4A15	Aeroacoustics (**returned 2015-16)**	M9

Companion modules

Number	Title	Notes
4B13	Electronic Sensors and Instrumentation	L2
4C2	Designing with Composites	M5
4C4	Design Methods	M14
4C5	Design Case Studies	L4
4C6	Advanced Linear Vibrations	M4
4C7	Random and Non-linear Vibrations	M8
4C9	Continuum Mechanics	M7
4C15	MEMS: Design **(not running 2015-16)**	L6
4F1	Control System Design	M6
4F2	Robust and Non-linear Control	L9
4F3	Optimal and Predictive Control	L3

Advice

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.

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.

Specialist advice on this Engineering Area can be obtained from the Coordinator whose details can be found on the IIA Aerospace and Aerothermal Engineering Area website.

Part IIB Engineering Area requirements: Civil, Structural and Environmental Engineering

Students intending to qualify in this Engineering Area in Part IIB must include at least **four** of the modules listed.

Number	Title	Notes
4D4	Construction Engineering	L8
4D5	Foundation Engineering	L5
4D6	Dynamics in Civil Engineering	L2
4D7	Concrete Structures **(moved from MT to LT for 2015-16)**	L10
4D8	Pre-stressed Concrete **(reintroduced 2015-16)**	L11
4D10	Structural Steelwork	M5
4D13	Architectural Engineering	M12
4D14	Contaminated Land and Waste Containment	M1
4D15	Sustainable Water Engineering	L4
4D16	Construction Management **(not running 2015-16)**	M9
4D17	Plate and Shell Structures	M3
4M9	Surveying Field Course	LV1
4M14	Sustainable Development	M13
4M15	Sustainable Energy	L8
4M18	Present and Future Energy Systems	M5
4M19	Advanced Building Physics	M14

Advice

Intending Civil, Structural or Environmental Engineers are advised to study the broadest possible range of relevant courses.

NB. Module 4D16 'Construction and management' can be counted as one of your two management modules for the purposes of accreditation by the Institution of Structural Engineers.

Specialist advice on this Engineering Area can be obtained from the Coordinator whose details can be found on the IIA Civils Engineering Area website.

Part IIB Engineering Area requirements: Electrical and Electronic Engineering

Students intending to qualify in this Engineering Area in Part IIB must include at least **four** of the modules listed.

Number	Title	Notes
4B2	Power Micro Electronics	M8
4B5	Nanotechnology	M10
4B6	Solid State Devices and Chemical/Biological Sensors	L3
4B7	VLSI Design, Technology and CAD	L1
4B11	Photonic Systems	M9
4B13	Electronic Sensors and Instrumentation	L2
4B14	Solar-Electronic Power: Generation and Distribution	M4
4B19	Renewable Electrical Power	M2
4B20	Display Technology	L6
4B21	Analogue Integrated Circuits	M3
4C3	Electrical and Nano Materials	M6
4C15	MEMS: Design **(not running 2015-16)**	L6
4F5	Advanced Communications and Coding	M7
4M6	Materials and Processes for Microsystems (MEMS)	M1
4M20	Robotics **(New 2015-16)**	M12

Advice

Electrical and Electronic Engineering covers the range of topics which best represent the current trends in circuits, devices and systems for hardware implementations.

Specialist advice on this Engineering Area can be obtained from the Coordinator whose details can be found on the IIA Electrical and Electronic Engineering Area website.

Part IIB Engineering Area requirements: Information and Computer Engineering

Students intending to qualify in this Engineering Area in Part IIB must include at least **four** of the modules listed.

Number	Title	Notes
4F1	Control System Design	M6
4F2	Robust and Non-linear Systems and Control	L9
4F3	Optimal and Predictive Control	L2
4F5	Advanced Communications and Coding	M7
4F7	Digital Filters and Spectrum Estimation	M8
4F8	Image Processing and Image Coding	L3
4F10	Statistical Pattern Processing	M9
4F11	Speech and LanguagePprocessing	L1
4F12	Computer Vision and Robotics	M2
4F13	Machine Learning	M11
4M17	Practical Optimization	M14
4M20	Robotics **(New 2015-16)**	M12

Advice

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 with a strong interest in control should also consider 'Instrumentation and Control' as an alternative.

Specialist advice on this Engineering Area can be obtained from the Coordinator whose details can be found on the IIA Information and Computer Engineering Area website

Part IIB Engineering Area requirements: Electrical and Information Sciences

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

Number	Title	Notes
4B2	Power micro electronics	M8
4B5	Nanotechnology	M10
4B6	Solid state devices and chemical/biological sensors	L3
4B7	VLSI design, technology and CAD	L1
4B11	Photonic systems	M9
4B13	Electronic sensors and instrumentation	L2
4B14	Solar-electronic power: generation and distribution	M4
4B19	Renewable electrical power	M2
4B20	Display technology	L6
4B21	Analogue integrated circuits	M3
4C3	Electrical and nano materials	M6
4C15	MEMS: design **(not running 2015-16)**	L6

4F1	Control system design	M6
4F2	Robust and non-linear control	L9
4F3	Optimal and predictive control	L2
4F5	Advanced Communications and Coding	M7
4F7	Digital filters and spectrum estimation	M8
4F8	Image processing and image coding	L3
4F10	Statistical pattern processing	M9
4F11	Speech and language processing	L1
4F12	Computer vision and robotics	M2
4F13	Machine learning	M11
4M6	Materials and processes for microsystems (MEMS)	M1
4M12	Partial differential equations and variational methods	L11
4M17	Practical optimization	M14
4M20	Robotics **(NEW 2015-16)**	M12

Advice

Electrical and Information Sciences covers a very broad area. The B modules cover a wide range of electronic circuits and devices, while 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.

Specialist advice on this Engineering Area can be obtained from the Coordinator whose details can be found on the IIA Electrical and Information Sciences Engineering Area webpage

Part IIB Engineering Area requirements: Instrumentation and Control

Students intending to qualify in this Engineering Area in Part IIB must include at least **four** of the modules listed.

Number	Title	Notes
4B11	Photonic systems	M9
4B13	Electronic sensors and instrumentation	L2
4C6	Advanced linear vibrations	M4
4C7	Random and non-linear vibrations	M8
4C15	MEMS: design **(Not running 2015-16)**	L6
4F1	Control system design	M6
4F2	Robust and non-linear control	L9
4F3	Optimal and predictive control	L2
4F5	Advanced Communications and Coding	M7
4F7	Digital filters and spectrum estimation	M8
4F8	Image processing and image coding	L3
4F10	Statistical pattern processing	M9
4F11	Speech and language processing	L1
4F12	Computer vision and robotics	M2
4F13	Machine learning	M11
4M20	Robotics **(NEW 2015-16)**	M12

Advice

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

Students intending to qualify in this Engineering Area in Part IIB must include at least **four** of the modules listed.

Specialist advice on this Engineering Area can be obtained from the Coordinator whose details can be found on the IIA Instrumentation and Control Engineering Area website

Part IIB Engineering Area requirements: Bioengineering

Students intending to qualify in this Engineering Area must include at least **four** of the modules listed **of which at least two must be G modules**.

Number	Title	Notes
4G1	Mathematical Biology of the Cell	L6
4G2	Biosensors	L5
4G3	Computational Neuroscience	L4
4G4	Biomimetics	L7
4G5	Molecular Modelling	M14
4G6	Cellular and Molecular Biomechanics	M10
4C4	Design Methods	M2
4C5	Design Case Studies	L4
4C9	Continuum Mechanics	M7
4F8	Image Processing and Image Coding	L3
4F11	Speech and language processing	L1
4F12	Computer Vision and Robotics	M2
4F13	Machine Learning	M11
4I8	Medical Physics	L10

Advice

Bioengineering 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.

Specialist advice on this Engineering Area can be obtained from the Coordinator whose details can be found on the IIA Bioengineering Engineering Area webpage.

Part IIB Engineering Area requirements: Engineering (New for 2015-16)

Students intending to qualify in this Engineering Area in Part IIB may choose any set of modules subject to the restrictions given in COMET.

Source URL (modified on 29-09-15): https://teaching15-16.eng.cam.ac.uk/content/engineering-tripos-part-iib-notice-concerning-engineering-areas