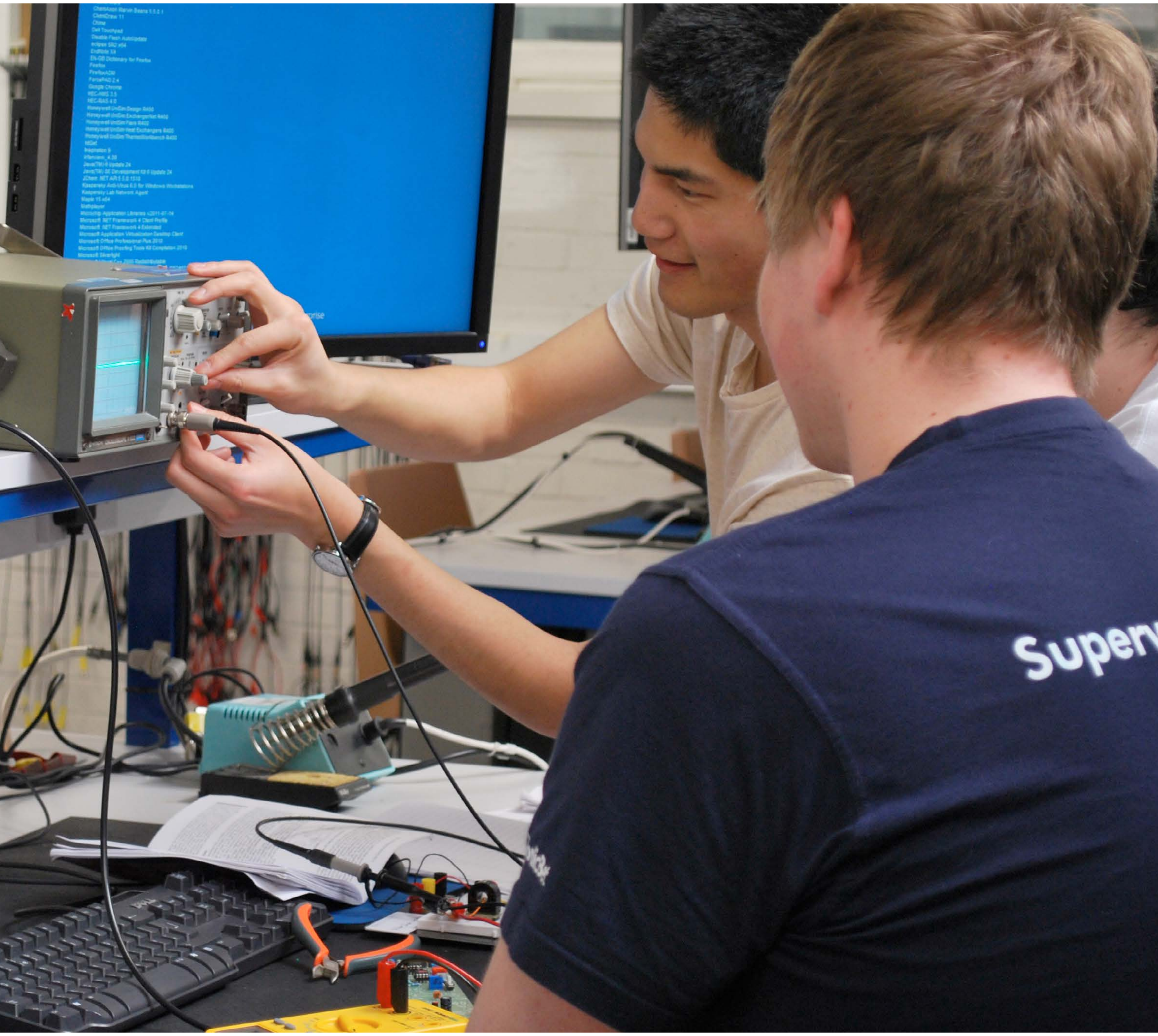
THE UNIVERSITY *of* EDINBURGH
School of Engineering

THE SCHOOL *of* ENGINEERING at The University of Edinburgh



Course Guide

For UCAS Applicants

Electronics and Electrical Engineering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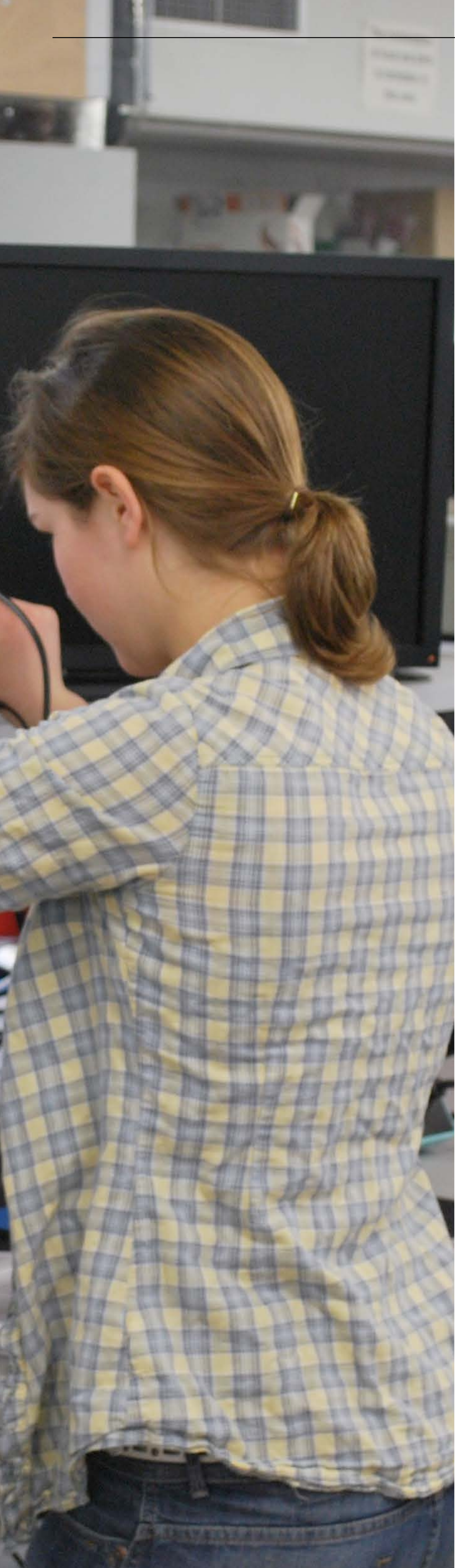

The first part of the document lists the modules undertaken in each of the degree programmes. The second part of the document gives short descriptions of each of these modules.

A list of companies which have hosted industrial placements can be found towards the end of the document.

Prospective students should refer to the Undergraduate degree finder on the University website (http://www.ed.ac.uk/) to find out more about studying at the University of Edinburgh.

The modules and programmes described in this document are meant as a guide only and therefore you might find when you are undertaking the degree programme the modules are different from that stated in this document.

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Electronics and Electrical Engineering (BEng)

Degree Type: **Single** UCAS Code: **H600**

Year of Programme	Course	Credit
1	Engineering 1	20
	Electrical Engineering 1	20
	Engineering Mathematics 1A	20
	Engineering Mathematics 1B	20
	Further courses	40
2	Analogue Circuits 2	10
	Microelectronics 2	10
	Electronics Project Laboratory 2A	10
	Power Engineering 2	10
	Digital System Design 2	10
	Signals and Communication Systems 2	10
	Electronics Project Laboratory 2B	10
	Engineering Software 2	10
	Industrial Management 1	20
	Engineering Mathematics 2A	10
	Engineering Mathematics 2B	10
3	Analogue Circuits 3	10
	Digital System Design 3	10
	Power Electronics and Machines 3	10
	Engineering Design Analysis & Manufacturability 3	10
	Engineering Software 3	10
	Digital Systems Laboratory 3	10

Year of Programme	Course	Credit
3	Electromagnetics 3: Signal Transmission	10
	Microelectronics 3	10
	Power Systems 3	10
	Control and Instrumentation Engineering 3	10
	Signal and Communication Systems 3	10
	Analogue Mixed Signal Laboratory 3	10
4	BEng Electronics and Electrical Engineering Project 4	40
	Professional Issues for Engineers 4	10
	SELECT 70 CREDITS FROM:	
	Analogue Electronics (Circuits) 4	10
	Digital Signal Analysis 4	10
	Digital Communications 4	10
	Power Systems and Machines 4	10
	Microelectronic Device Principles 4	10
	Power Electronics 4	10
	Digital System Design 4	10
	Digital Systems Laboratory	10
	Power Conversion 4	10
	Analogue Electronics (Project) 4	20
	Electromagnetics 4: RF Engineering	10
	Introduction to Bioelectronics 4	10
	Biosensors 4	10

* Options will be confirmed in the course handbook

Electronics and Electrical Engineering (MEng)

Degree Type: **Single** UCAS Code: **H601**

Years 1, 2 & 3 are the same as Electronics and Electrical Engineering (BEng) H600

Year of Programme	Course	Credit
4	Professional Issues for Engineers 4	10
	MEng Electronics and Electrical Engineering Project Phase One (External/Internal)	20
	20 CREDITS FROM:	
	Group Design Project (Hydropower Scheme)	20
	Group Design Project (Potable Water Supply)	20
	Group Design Project (Design of Micro-systems)	20
	Group Design Project (The Passive House)	20
	Group Design Project (Power Station with Carbon Capture and Storage)	20
	70 CREDITS FROM:	
	Analogue Electronics (Circuits) 4	10
	Digital Signal Analysis 4	10
	Digital Communications 4	10
	Power Systems and Machines 4	10
	Microelectronic Device Principles 4	10
	Power Electronics 4	10
	Digital System Design 4	10
	Digital Systems Laboratory	10
	Power Conversion 4	10

Year of Programme	Course	Credit
4	Analogue Electronics (Project) 4	20
	Electromagnetics 4: RF Engineering	10
	Introduction to Bioelectronics 4	10
	Biosensors 4	10
5	MEng Electronics and Electrical Engineering Project Phase Two (External/Internal)	60
	60 CREDITS FROM:	
	Analogue Electronics (Project) 5	20
	Electronic Product Design and Manufacture 5	20
	Electronic/Electrical Engineering System Design 5	20
	Sigma Delta Data Converters 5	20
	Embedded Mobile and Wireless Systems (EWireless) 5	20
	Biosensor Instrumentation 5	10
	Imaging Techniques in Biomedicine 5	10
	Power Systems Engineering 5	20
	Advanced Wireless Communications 5	10
	Advanced Coding Techniques 5	10
	Lab-on-Chip Technologies	10

* Options will be confirmed in the course handbook

† Entry to 4th year MEng normally requires an average of at least 55% in third year

Electrical Engineering with Renewable Energy (BEng)

Degree Type: **Single** UCAS Code: **H6H2**

Year of Programme	Course	Credit
1	Engineering 1	20
	Electrical Engineering 1	20
	Engineering Mathematics 1A	20
	Engineering Mathematics 1B	20
	Further courses	40
2	Analogue Circuits 2	10
	Microelectronics 2	10
	Electronics Project Laboratory 2A	10
	Power Engineering 2	10
	Signals and Communication Systems 2	10
	Digital System Design 2	10
	Electronics Project Laboratory 2B	10
	Engineering Software 2	10
	Industrial Management 1	20
	Engineering Mathematics 2A	10
	Engineering Mathematics 2B	10
3	Fundamentals of Mechanical Engineering for Renewable Energy 3	10
	Sustainable Energy: Principles and Processes 3	10
3	Analogue Circuits 3	10
	Digital System Design 3	10
	Power Electronics and Machines 3	10
	Engineering Design Analysis & Manufacturability 3	10
	Electromagnetics 3: Signal Transmission	10
	Power Systems 3	10
	Control and Instrumentation Engineering 3	10
	Signal and Communication Systems 3	10
	Analogue Mixed Signal Laboratory 3	10
	Engineering Software 3	10
4	Power Systems and Machines 4	10
	Power Electronics 4	10
	Power Conversion 4	10
	Professional Issues for Engineers 4	10
	Sustainable Energy Technologies 4	10
	Mechanical Engineering Group Project 4	20
	Engineering Project Management 4	10
	BEng Electrical Engineering Project 4	40

* Options will be confirmed in the course handbook

Electrical Engineering with Renewable Energy (MEng)

Degree Type: **Single** UCAS Code: **H6HF**

Years 1, 2 & 3 are the same as Electrical Engineering with Renewable Energy (BEng) H6H2

Year of Programme	Course	Credit
4	Professional Issues for Engineers 4	10
	Power Electronics 4	10
	Power Systems and Machines 4	10
	Power Conversion 4	10
	Group Design Project (Hydropower Scheme)	20
	Sustainable Energy Technologies 4	10
	Engineering Project Management 4	10
	Supply Chain Management 4	10
	MEng Electronics and Electrical Engineering Project Phase One (External/Internal)	20
	10 CREDITS FROM:	20
4	Digital System Design 4	10
	Analogue Electronics (Circuits) 4	10
5	Power Systems Engineering 5	20
	Marine Energy 5	10
	Wind Energy 5	10
	Modern Economic Issues in Industry 5	10
	Solar Energy Conversion 5	10
	MEng Electronics and Electrical Engineering Project Phase Two (External/Internal)	60

* Options will be confirmed in the course handbook

† Entry to 4th year MEng normally requires an average of at least 55% in third year

Electronics and Electrical Engineering with Management (BEng)

Degree Type: **Single** UCAS Code: **H6N2**

Year of Programme	Course	Credit
1	Engineering 1	20
	Electrical Engineering 1	20
	Engineering Mathematics 1A	20
	Engineering Mathematics 1B	20
	Further courses	40
2	Industrial Management 1	20
	Techniques of Management	20
	Analogue Circuits 2	10
	Electronics Project Laboratory 2A	10
	Digital System Design 2	10
	Power Engineering 2	10
	Microelectronics 2	10
	Signals and Communication Systems 2	10
	Engineering Mathematics 2A	10
	Engineering Mathematics 2B	10
3	Manufacturing Information Systems (MIS) 3	10
	Marketing Technical Products 3	10
	Analogue Circuits 3	10
	Power Electronics and Machines 3	10
	Power Systems 3	10
3	Analogue Mixed Signal Laboratory 3	10
	Digital Systems Laboratory 3	10
	Digital System Design 3	10
	Engineering Design Analysis & Manufacturability 3	10
	Microelectronics 3	10
	Signal and Communication Systems 3	10
	Control and Instrumentation Engineering 3	10
4	BEng Electronics and Electrical Engineering Project 4	40
	Digital Signal Analysis 4	10
	Power Systems and Machines 4	10
	Microelectronic Device Principles 4	10
	Power Electronics 4	10
	Professional Issues for Engineers 4	10
	10 CREDITS FROM:	
	Digital System Design 4	10
	Analogue Electronics (Circuits) 4	10
	20 CREDITS FROM:	
	Engineering Project Management 4	10
	Operations Management 4	10
	Supply Chain Management 4	10

* Options will be confirmed in the course handbook

Electronics and Electrical Engineering with Management (MEng)

Degree Type: **Single** UCAS Code: **H6NF**

Years 1, 2 & 3 are the same as Electrical Engineering with Management (BEng) H6N2

Year of Programme	Course	Credit
4	Digital Signal Analysis 4	10
	Power Systems and Machines 4	10
	Microelectronic Device Principles 4	10
	Power Electronics 4	10
	Professional Issues for Engineers 4	10
	MEng Electronics and Electrical Engineering Project Phase One (External/Internal)	20
	20 CREDITS FROM:	
	Group Design Project (Hydropower Scheme)	20
	Group Design Project (Potable Water Supply)	20
	Group Design Project (Design of Micro-systems)	20
	Group Design Project (The Passive House)	20
	Group Design Project (Power Station with Carbon Capture and Storage)	20
4	10 Credits from:	
	Digital System Design 4	10
	Analogue Electronics (Circuits) 4	10
5	Modern Economic Issues in Industry 5	10
	Technology and Innovation Management 5	10
	MEng Electronics and Electrical Engineering Project Phase Two (External/Internal)	60
	40 CREDITS FROM:	
	Power Systems Engineering 5	20
	Advanced Wireless Communications	10
	Advanced Coding Techniques	10
	Embedded Mobile and Wireless Systems (EWireless) 5	20

* Options will be confirmed in the course handbook

† Entry to 4th year MEng normally requires an average of at least 55% in third year

Electrical and Mechanical Engineering (MEng)

Degree Type: **Combined** UCAS Code: **HHH6**

Year of Programme	Course	Credit
1	Engineering 1	20
	Mechanical Engineering 1	20
	Electrical Engineering 1	20
	Engineering Mathematics 1A	20
	Engineering Mathematics 1B	20
	Further Courses	20
2	Dynamics 2	10
	Fluid Mechanics 2	10
	Engineering Thermodynamics 2	10
	Structural Mechanics 2A	10
	Industrial Management 1	20
	Engineering Mathematics 2A	10
	Engineering Mathematics 2B	10
	Analogue Circuits 2	10
	Digital System Design 2	10
	Power Engineering 2	10
	10 CREDITS FROM*:	
	Electronics Project Laboratory 2A	10
	Electronics Project Laboratory 2C	10
3	Dynamics 3	10
	Fluid Mechanics (Mechanical) 3	10
	Thermodynamics 3	10
	Professional Issues for Mechanical Engineers 3	10
	Analogue Circuits 3	10
	Power Electronics and Machines 3	10
	Power Systems 3	10
	Control and Instrumentation Engineering 3	10
	Solid Mechanics 3	10
	Digital System Design 3	10
	Engineering Software 3	10
4†	Industrial/European Placement 4	60
	10 CREDITS FROM*:	
	Power Electronics 4	10
	Power Systems and Machines 4	10
	30 CREDITS FROM*:	
	Dynamics 4	10
	Engineering Project Management 4	10
4†	Energy Systems 4	10
	Fluid Mechanics (Mechanical) 4	10
	Finite Element Methods for Solids and Structures 4	10
	20 CREDITS FROM*:	
	Group Design Project (Hydropower Scheme)	20
	Group Design Project (Potable Water Supply)	20
	Group Design Project (Design of Micro-systems)	20
	Group Design Project (The Passive House)	20
	Group Design Project (CO2 Capture Plant)	20
5	Mechanical Engineering MEng Individual Project 5 ‡	40
	Power Systems Engineering 5	20
	40 CREDITS FROM*:	
	Computational Fluid Dynamics 5	20
	Materials Engineering 5	20
	Materials Engineering 5	20
	Current Methods in Fire Safety Engineering 4	10
	Dynamics 4	10
	Energy Systems 4	10
	Engineering Project Management 4	10
	Fluid Mechanics (Mechanical) 4	10
	Fire Science and Fire Dynamics 4	10
	Sustainable Energy Technologies 4	10
	Power Electronics 4	10
	Power Systems and Machines 4	10
	Finite Element Methods for Solids and Structures 4	10
	10 CREDITS FROM*:	
	Analogue Electronics (Circuits) 4	10
	Power Conversion 4	10
	10 CREDITS FROM*:	
	Digital System Design 4	10
	Marine Energy 5	10
	Wind Energy 5	10
	Engineering in Medicine 5	10
	Thin-Walled Members and Stability 4	10
	The Finite Element Method 5	10
	Oil and Gas Systems Engineering 5	10

* A handbook giving details, as well as restrictions on choice of courses, will be available for students entering the programme to facilitate forward planning.

† Entry to 4th year MEng normally requires average of at least 55% in third year.

‡ For the award of Honours a minimum mark of 40% must be attained in the Mechanical Engineering MEng Individual Project 5.

Electrical and Mechanical Engineering (BEng)

Degree Type: **Combined** UCAS Code: **HH36**
Years 1, 2 & 3 are the same as Electrical and Mechanical Engineering (MEng) HHH6

Year of Programme	Course	Credit	Year of Programme	Course	Credit
4	Mechanical Engineering Group Project 4	20	4	Energy Systems 4	10
	BEng Electrical and Mechanical Engineering Project 4 ‡	40		Fluid Mechanics (Mechanical) 4	10
	10 CREDITS FROM*:			Finite Element Methods for Solids and Structures 4	10
	Power Electronics 4	10		20 CREDITS FROM*:	
	Power Systems and Machines 4	10		Digital System Design 4	10
	30 CREDITS FROM*:			Analogue Electronics (Circuits) 4	10
	Dynamics 4	10		Power Conversion 4	10
	Engineering Project Management 4	10			

*A handbook giving details, as well as restrictions on choice of courses, will be available for students entering the programme to facilitate forward planning.

‡ For the award of Honours a minimum mark of 40% must be attained in the BEng Electrical and Mechanical Engineering Project 4.

Electronics and Software Engineering (BEng)

Degree Type: **Single** UCAS Code: **GH66**

Year of Programme	Course	Credit
1	Informatics 1 - Computation and Logic	10
	Informatics 1 - Functional Programming	10
	Informatics 1 - Object-Oriented Programming	10
	Informatics 1 - Data and Analysis	10
	Engineering 1	20
	Electrical Engineering 1	20
	Engineering Mathematics 1A	20
	Engineering Mathematics 1B	20
2	Informatics 2B - Algorithms, Data Structures, Learning	20
	Informatics 2C - Introduction to Computer Systems	10
	Informatics 2C - Introduction to Software Engineering	10
	Analogue Circuits 2	10
	Electronics Project Laboratory 2A	10
	Digital System Design 2	10
	Signals and Communication Systems 2	10
	Probability	10
	Electronics Project Laboratory 2B	10
	Engineering Mathematics 2A	10
	Engineering Mathematics 2B	10
3	Analogue Circuits 3	10
	Signal and Communication systems 3	10
	Software Engineering with Objects and Components	10
	Software Testing	10
	further courses	10
	SELECT A TOTAL OF 80 CREDITS USING THE FOLLOWING OPTIONS	
	Between 10 and 30 credits from:	
	System Design Project	20
	Computer Science Large Practical	10
	Software Engineering Large Practical	10
	Select between 10 and 40 credits from 3rd year Informatics Options. (See page 14)	10-40

Year of Programme	Course	Credit
3	Analogue Mixed Signal Laboratory 3	10
	Digital System Design 3	10
	Digital Systems Laboratory 3	10
	Electromagnetics 3: Signal Transmission	10
	Engineering Design Analysis & Manufacturability 3	10
	Microelectronics 3	10
4	Select 40 credits from 2 options below:	
	Honours Project (Informatics)	40
	BEng Electronics and Electrical Engineering Project 4	40
	10 CREDITS FROM:	
	Human-Computer Interaction (Level 11)	10
	Software Architecture, Process, and Management (Level 11)	10
	Software Testing	10
	Software Engineering with Objects and Components	10
	Secure Programming	10
	Elements of Programming Languages	10
	Further courses	10
	SELECT A TOTAL OF 60 CREDITS USING THE FOLLOWING OPTIONS	
	20 – 30 credits from E&SE Informatics Options delivered in Year 4 (See page 15)	
	30 – 40 credits from:	
	Microelectronic Device Principles 4	10
	Power Electronics 4	10
	Power Systems and Machines 4	
	10	
	Digital Communications 4	10
	Digital System Design 4	10
	Digital Signal Analysis 4	10
	Analogue Electronics (Circuits) 4	10
	Analogue Electronics (Project) 4	20
	Digital Systems Laboratory	10
	Electromagnetics 4: RF Engineering	10

* Options will be confirmed in the course handbook

Electronics and Software Engineering (MEng)

Degree Type: **Single** UCAS Code: **GHP6**

Years 1, 2 & 3 are the same as Electronics and Software Engineering (BEng) GH66

Year of Programme	Course	Credit
4	MEng Electronics and Electrical Engineering Project Phase One (External/Internal)	20
	Select 10 credits from:	
	Human-Computer Interaction (Level 11)	10
	Software Architecture, Process, and Management	10
	Software Testing	10
	Software Engineering with Objects and Components	10
	Secure Programming	10
	Elements of Programming Languages	10
	Further courses	10
	SELECT A TOTAL OF 80 CREDITS USING THE FOLLOWING OPTIONS	
	40-50 credits from:	
	Microelectronic Device Principles 4	10
	Power Electronics 4	10
	Power Systems and Machines 4	10
	Digital Communications 4	10
	Digital System Design 4	10
	Digital Signal Analysis 4	10
	Analogue Electronics (Circuits) 4	10
	Analogue Electronics (Project) 4	20

Year of Programme	Course	Credit
4	Digital Systems Laboratory	10
	Electromagnetics 4: RF Engineering	10
	30-40 credits from E&SE Informatics Options delivered in Year 4 (See page 14)	
5	MEng Electronics and Electrical Engineering Project Phase Two (External/Internal)	60
	Select 20 credits from 2 options below:	
	Analogue Electronics (Project) 5	20
	Electronic Product Design and Manufacture 5	20
	Further courses	10
	SELECT A TOTAL OF 30 CREDITS USING THE FOLLOWING OPTIONS	
	20-30 credits from E&SE Informatics Options delivered in Year 5. (See page 15)	
	0-10 credits from	
	Biosensor Instrumentation 5	10
	Imaging Techniques in Biomedicine 5	10
	Power Systems Engineering 5	20
	Advanced Wireless Communications 5	10
	Advanced Coding Techniques 5	10

* Options will be confirmed in the course handbook

† Entry to 4th year MEng normally requires an average of at least 55% in third year

Computer Science and Electronics (BEng)

Degree Type: **Single** UCAS Code: **GH46**

Year of Programme	Course	Credit
1	Informatics 1 - Computation and Logic	10
	Informatics 1 - Functional Programming	10
	Informatics 1 - Object-Oriented Programming	10
	Informatics 1 - Data and Analysis	10
	Engineering 1	20
	Electrical Engineering 1	20
	Engineering Mathematics 1A	20
	Engineering Mathematics 1B	20
2	Informatics 2B - Algorithms, Data Structures, Learning	20
	Informatics 2C - Introduction to Computer Systems	10
	Informatics 2C - Introduction to Software Engineering	10
	Analogue Circuits 2	10
	Electronics Project Laboratory 2A	10
	Digital System Design 2	10
	Signals and Communication Systems 2	10
	Probability	10
	Electronics Project Laboratory 2B	10
	Engineering Mathematics 2A	10
	Engineering Mathematics 2B	10
3	Analogue Circuits 3	10
	Signal and Communication systems 3	10
	Select 100 credits from the following collections	
	10 TO 30 CREDITS FROM:	
	System Design Project	20
	Computer Science Large Practical	10
3	Select between 20 and 60 credits from 3rd year Computer Science Options. (See page 14)	20-60
	20 to 50 credits from Electronics level 9 courses	20-50
	Further courses	10
4	40 CREDITS FROM:	
	BEng Electronics and Electrical Engineering Project 4	40
	Honours Project (Informatics)	40
	SELECT A TOTAL OF 80 CREDITS USING THE FOLLOWING OPTIONS	
	30-50 CREDITS FROM:	
	Microelectronic Device Principles 4	10
	Power Electronics 4	10
	Power Systems and Machines 4	10
	Digital Communications 4	10
	Digital System Design 4	10
	Digital Signal Analysis 4	10
	Analogue Electronics (Circuits) 4	10
	Analogue Electronics (Project) 4	10
	Digital Systems Laboratory	10
	Electromagnetics 4: RF Engineering	10
	30-50 credits from E&CS Informatics Options delivered in Year 4. (page 14)	
	Further courses	10

* Options will be confirmed in the course handbook

Electronics and Computer Science (MEng)

Degree Type: **Single** UCAS Code: **GHK6**
Years 1, 2 & 3 are the same as Computer Science and Electronics (BEng) GH46

Year of Programme	Course	Credit
	Phase One (External/Internal	
4	MEng Electronics and Electrical Engineering Project	
	Phase One (External/Internal)	20
	Further courses	10
	SELECT A TOTAL OF 90 CREDITS USING THE FOLLOWING OPTIONS	
	40-50 credits from:	
	Microelectronic Device Principles 4	10
	Power Electronics 4	10
	Power Systems and Machines 4	10
	Digital Communications 4	10
	Digital System Design 4	10
	Digital Signal Analysis 4	10
	Analogue Electronics (Circuits) 4	10
	Analogue Electronics (Project) 4	10
	Digital Systems Laboratory	10
	Electromagnetics 4: RF Engineering	10
	40 and 50 credits from E&CS Informatics Options delivered in Year 4. (See page 14)	

Year of Programme	Course	Credit
5	MEng Electronics and Electrical Engineering Project	60
	Phase Two (External/Internal)	
	20 CREDITS FROM:	
	Analogue Electronics (Project) 5	20
	Electronic Product Design and Manufacture 5	20
	Further courses	10
	SELECT A TOTAL OF 30 CREDITS USING THE FOLLOWING OPTIONS	
	20-30 credits from E&CS Informatics Options delivered in Year 5. (See page 14)	
	0-10 credits from	
	Biosensor Instrumentation 5	10
	Imaging Techniques in Biomedicine 5	10
	Power Systems Engineering 5	20
	Advanced Wireless Communications 5	10
	Advanced Coding Techniques 5	10

* Options will be confirmed in the course handbook

3rd Year Informatics Options

Course	Credit	Course	Credit
Algorithms and Data Structures	10	Database Systems	10
Computer Architecture	10	Logic Programming	10
Computer Design	10	Operating Systems	10
Computer Communications and Networks	10	Software Engineering with Objects and Components	10
Computer Security	10	Software Testing	10
Compiling Techniques	10		

4th / 5th Year Computer Science & Electronics and Electronics & Computer Science Informatics Options

Course	Year	Credit	Course	Year	Credit
Accelerated Natural Language Processing	5	20	Introduction to Theoretical Computer Science	4	10
Adaptive Learning Environments 1 (Level 11)	5	10	Introductory Applied Machine Learning	4	10
Advanced Topics in Foundations of Databases	5	20	Machine Learning & Pattern Recognition (Level 11)	4/5	10
Advanced Vision (Level 11)	5	10	Machine Learning Practical	5	10
Algorithmic Game Theory and its Applications	4/5	10	Machine Translation (Level 11)	5	10
Algorithms and Data Structures	4	10	Music Informatics	5	10
Applied Databases	5	10	Natural Language Understanding (Level 11)	5	10
Automated Reasoning (Level 11)	4/5	10	Neural Computation	5	10
Automatic Speech Recognition	5	10	Neural Information Processing	5	10
Bioinformatics 1	5	10	Parallel Architectures (Level 11)	4/5	10
Bioinformatics 2	5	10	Parallel Programming Languages and Systems (Level 11)	4/5	10
Compiler Optimisation (Level 11)	4/5	10	Probabilistic Modelling and Reasoning	5	10
Compiling Techniques	4	10	Reinforcement Learning	5	10
Computational Cognitive Neuroscience	5	10	Robot Learning and Sensorimotor Control	5	10
Computational Complexity	4/5	10	Robotics: Science and Systems	5	20
Computer Algebra	4/5	10	Secure Programming	4/5	10
Computer Animation & Visualisation (Level 11)	4/5	10	Semantic Web Systems	5	10
Computer Graphics (Level 11)	4/5	10	Social and Technological Networks	4/5	10
Computer Networking (Level 11)	4/5	10	Software Architecture, Process, and Management (Level 11)	4/5	10
Computer Security	4	10	Software Engineering with Objects and Components	4	10
Database Systems	4	10	Software Testing	4	10
Distributed Systems (Level 11)	4/5	10	System Level Integration Practical	4	10
Elements of Programming Languages	4	10	Text Technologies for Data Science	5	10
Embedded Systems	4/5	10	Topics in Cognitive Modelling (Level 11)	5	10
Extreme Computing	4/5	10	Topics in Natural Language Processing	5	10
Human-Computer Interaction (Level 11)	4/5	10	Types and Semantics for Programming Languages	4/5	10
Introduction to Quantum Computing	4/5	10			

4th and 5th Year Electronics & Software Engineering Informatics Options

Course	Year	Credit
Accelerated Natural Language Processing	5	20
Adaptive Learning Environments 1 (Level 11)	4/5	10
Advanced Topics in Foundations of Databases	5	20
Advanced Vision (Level 11)	4/5	10
Agent Based Systems (Level 10)	4	10
Algorithmic Game Theory and its Applications	4/5	10
Algorithms and Data Structures	4	10
Applied Databases	5	10
Automated Reasoning (Level 11)	4/5	10
Automatic Speech Recognition	4/5	10
Bioinformatics 1	5	10
Bioinformatics 2	5	10
Compiler Optimisation (Level 11)	4/5	10
Compiling Techniques	4	10
Computational Cognitive Neuroscience	5	10
Computational Cognitive Science	4	10
Computational Complexity	4/5	10
Computer Algebra	4/5	10
Computer Animation & Visualisation (Level 11)	4/5	10
Computer Graphics (Level 11)	4/5	10
Computer Networking (Level 11)	4/5	10
Computer Security	4	10
Database Systems	4	10
Distributed Systems (Level 11)	4/5	10
Elements of Programming Languages	4	10
Embedded Systems	4/5	10
Extreme Computing	4/5	10
Human-Computer Interaction (Level 11)	4/5	10
Intelligent Autonomous Robotics (Level 10)	4	10
Introduction to Quantum Computing	4/5	10
Introduction to Theoretical Computer Science	4	10
Logic, Computability and Incompleteness	4	10
Machine Learning & Pattern Recognition (Level 11)	4/5	10
Machine Learning Practical	4/5	10
Machine Translation (Level 11)	4/5	10
Music Informatics	5	10
Natural Language Understanding (Level 11)	4/5	10
Neural Computation	5	10
Neural Information Processing	5	10
Parallel Architectures (Level 11)	4/5	10
Parallel Programming Languages and Systems (Level 11)	4/5	10
Probabilistic Modelling and Reasoning	5	10
Reinforcement Learning	5	10
Robot Learning and Sensorimotor Control	5	10
Robotics: Science and Systems	5	20
Secure Programming	4/5	10
Semantic Web Systems	4/5	10
Social and Technological Networks	4/5	10
Software Architecture, Process, and Management (Level 11)	4/5	10
Software Engineering with Objects and Components	4	10
Software Testing	4	10
Speech Processing (Hons)	4	10
System Level Integration Practical	4	10
Text Technologies for Data Science	4/5	10
Theories of Mind (Philosophy Hons)	4	10
Topics in Cognitive Modelling (Level 11)	4/5	10
Topics in Natural Language Processing	4/5	10
Types and Semantics for Programming Languages	5	10

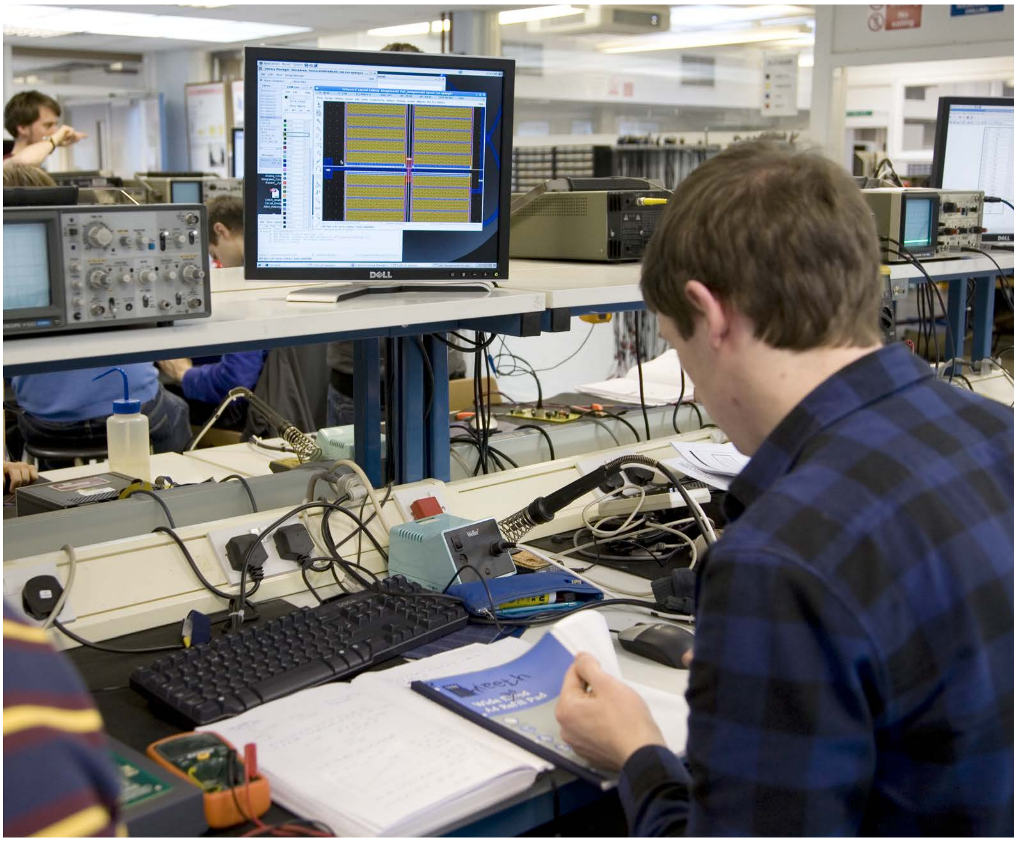
Electronics and Electrical Engineering

What is Electronics and Electrical Engineering?

Electrical Engineering is about using technology to enhance the standard of living for everyone. At one end of the scale it covers the production and distribution of electricity to homes, business and industry, while at the other it covers ever more complex and clever devices on "chips", the building block of nearly all electronic systems.

The subject is based upon the simple principles of electronics, but takes it to more exciting levels such as the production of sensors; developing and improving communications and computation with high speed technology; control of mechanical systems; and production of reliable power sources, from renewable generation to converting supplies for use in consumer electronics. This is by no means an exhaustive list of the coverage of electronics and electrical engineering, and in today's world it is hard to find an area of industry, business or pleasure that has not benefited from the efforts of electronics and electrical engineers.

A good electronics and electrical engineer will understand how basic electronic circuits operate, and will be able to connect the blocks together in a system that can meet our needs. In today's world, many problems requiring electronics and electrical engineering solutions are very complex - to solve these problems electronics and electrical engineers work together with other engineers, as well as specialists in other relevant disciplines, for example medicine. This team-based approach has produced amazing results, for example in medicine alone: monitors that can be worn during a normal working day and analysed later; portable ultrasonic scanners; magnetic resonance imaging (MRI) scanners that can see individual cells within the body; pills that can analyse the body from inside; and ultrasonic scalpels that can operate on a patient without opening them up.



Why study Electrical Engineering at Edinburgh?

Staff in the School of Engineering have been at the leading edge of some of the most interesting advances in Electronics and Electrical Engineering. We work with companies at the forefront of technologies such as mobile communications, device fabrication, digital and nalogue design, power generators and distributors, and electronic banking. Our close contact with industry ensures that our teaching is relevant and up to date, as well as providing potential sponsors for industrial placements. Electronics and Electrical Engineering at Edinburgh has been awarded the highest possible ratings for both teaching and research. In the most recent QAA HE subject review of Engineering we were awarded the top grade of "commendable" in all categories. The latest Research Excellence Framework recognised the excellence of our staff, placing our School 1st in the UK for research in Engineering.

Students applying for an Electronics and Electrical Engineering degree will find that there is a great deal of flexibility in our courses, and that they can tailor their final degree into the area that suits them best. Joint degrees that allow you to study more than one subject are also available.

What does the degree involve?

In first year, students studying for an Electronics and Electrical Engineering degree will cover the basics of electronic circuits. In second year, they will build on this knowledge by studying more advanced analogue and digital circuits, semiconductor devices, power systems and an introduction to signal processing and communication theory. At the same time they will learn structured computer programming (a vital skill for engineers). In later years they will study a selection of subjects such as digital communications, electromagnetics, microelectronic devices, circuit theory, advanced integrated systems, power systems, signal analysis, and digital system design. All students take three subjects during each of the first two years, and a single subject in later years. The exact details are discussed with the student's Personal Tutor but the usual choices are as follows: The first year course will involve Engineering, Mathematics and one other subject selected from a long list that includes, for example, Computer Science, Physics, Economics, History of Art, Astronomy and French. Note that joint honours students must take the "other half" of their degree, e.g. Electronics and Computer Science students must take Computer Science as their third subject.

"It was important to me that the Electronics course at the University of Edinburgh was career orientated. The breadth of the scope in the early years means that you gain the skills that can harness nearly any path in Engineering. I particularly enjoyed the individual and group projects, including a group project designing an MEMS accelerometer to measure vibration for a jet engine! The University has many links with industry, and helped me get a placement for seven months with ST Microelectronics in Edinburgh where I developed a Computer Vision system for a CMOS Image Sensor. My placement led to a job with the same company when I graduated, and now I work on image quality tuning and system integration with several major mobile phone manufacturers" - **Recent Electrical Engineering graduate**

Second year students must take courses in Mathematics (where the teaching is shared between electrical engineers and mathematicians) and Electrical Engineering. They must then take a further full course or two half courses. The usual choices involve courses in Business Studies or languages but others are possible. Students taking joint honours degrees must take a course in their other subject. Electrical and Mechanical Engineering joint honours students, for example, must take second year Mechanical Engineering courses.

Third, fourth and fifth years: The exact details depend on the particular degree chosen, but all include a programme of lectures from leading UK industrialists, individual design project exercises and, in the final year(s), a major individual project (which will involve either commercial work or work on a research project).

Further details of what is studied on each particular degree programme can be found on the web, or can be obtained from the School on request.

What can I study Electronics and Electrical Engineering with?

If students wish to study across two subjects through to the end of their course they can do so with a joint degree. We offer two: Electronics and Computer Science and Electrical and Mechanical Engineering, and Electronics and Software Engineering. These degrees combine 50% of the material studied by Electronics and Electrical Engineering students with 50% of the other subject. The specific modules studied are tailored to give the appropriate mix of subjects to the joint degree selected. Alternatively, students can study 'Electronics and Electrical Engineering with Management' where approximately 20% of the course addresses management issues.

What sort of teaching and assessment methods are used?

Students are taught through lectures, tutorials and practical work. The lecture format allows for the efficient and interactive transfer of information from lecturer to student, while small group tutorials allow for individual questioning and explanations. Practical work is spread throughout the course, making up 20% of the first year's assessment, but rising to 50% in the final year when the student's knowledge increases.

Classes can be large in first year when lectures are being given on a subject common to many student groups. For example, first year Mathematics lectures can contain nearly 200 students. However, these lectures are followed by tutorials with between 10 and 15 students per staff member. In later years, when students are becoming more specialised, lectures may be given to groups of as few as 20 students.

Are there any opportunities to study abroad?

The Erasmus scheme has allowed a number of our MEng students to carry out their major project in a European university, working on a research project. Others have worked with an overseas company on a commercially-based project. There are also well-established links with the University of Pennsylvania and the California Institute of Technology (as well as links with other US universities), under which students can study for one year in the United States, and a similar scheme with Carleton University in Ottawa, Canada.

Are there any links with industry and commerce?

The Institution of Engineering and Technology re-accredit our degrees on a regular basis, for the maximum possible time, giving them the top possible grades in every category. We have very strong links with industry through our scholarships scheme and our industrially sponsored MEng degrees (through a major industrial project). Students doing internal projects often help us with our industrially sponsored research. In addition to this, the Industrial Advisory Board works in partnership with us to keep our courses relevant for the needs of today's graduates.

Are there any bursaries or scholarships available?

All UK applicants who have obtained all 'A' grades in their qualifications will be given a scholarship when they take up an offer of a place on an Electronics and Electrical Engineering course at Edinburgh (UCAS codes starting with H6). The scholarship is funded by industry and is provided for first to third years in the course. Students in fourth and fifth year will have the opportunity to apply for Industrial MEng projects which include paid work in the summer between third and fourth year, as well as a seven month project within the company. students who are well qualified, such as those on the scholarship scheme, are highly likely to be offered industrial projects if they wish to apply for one. Electronics students can apply to IET Diamond Jubilee Scholarship schemes, as well as the UK Electronic Skills Foundation scheme, for which the University of Edinburgh is one of the sixteen partner universities.

What can I do after my degree?

A degree in an Electronics and Electrical Engineering subject gives graduates a very wide choice of careers - for example, the requirement for engineers in the communications and power generation industries is far from being met at present, and these shortages are certain to continue for some time. While one of the first job destinations for our graduates is the design industry in the UK, many other employment opportunities exist in areas such as broadcasting, telecommunications, Government research establishments and academic institutions. The extension of information technology into all forms of business, commerce and health care opens up further opportunities for those who, at any point in their career, decide to take up employment in these new areas. Some of our graduates have found employment in the financial sector and find the training they have been given at Edinburgh invaluable.

What are admissions staff looking for?

Applicants must have Mathematics to Higher or A Level standard, and it is desirable to have studied Physics or Technological Studies up to this level as well. Physics is a requirement for the Electrical and Mechanical Engineering degree programmes. All applicants who are made an offer to study this subject will be invited to visit us. A visit will enable you to see the environment in which you may be spending the next few years of your life, as well as the opportunity to discuss any particular questions in a one-to-one session with a lecturer. Visitors usually get to see many other areas of the University, including student accommodation. Students with strong

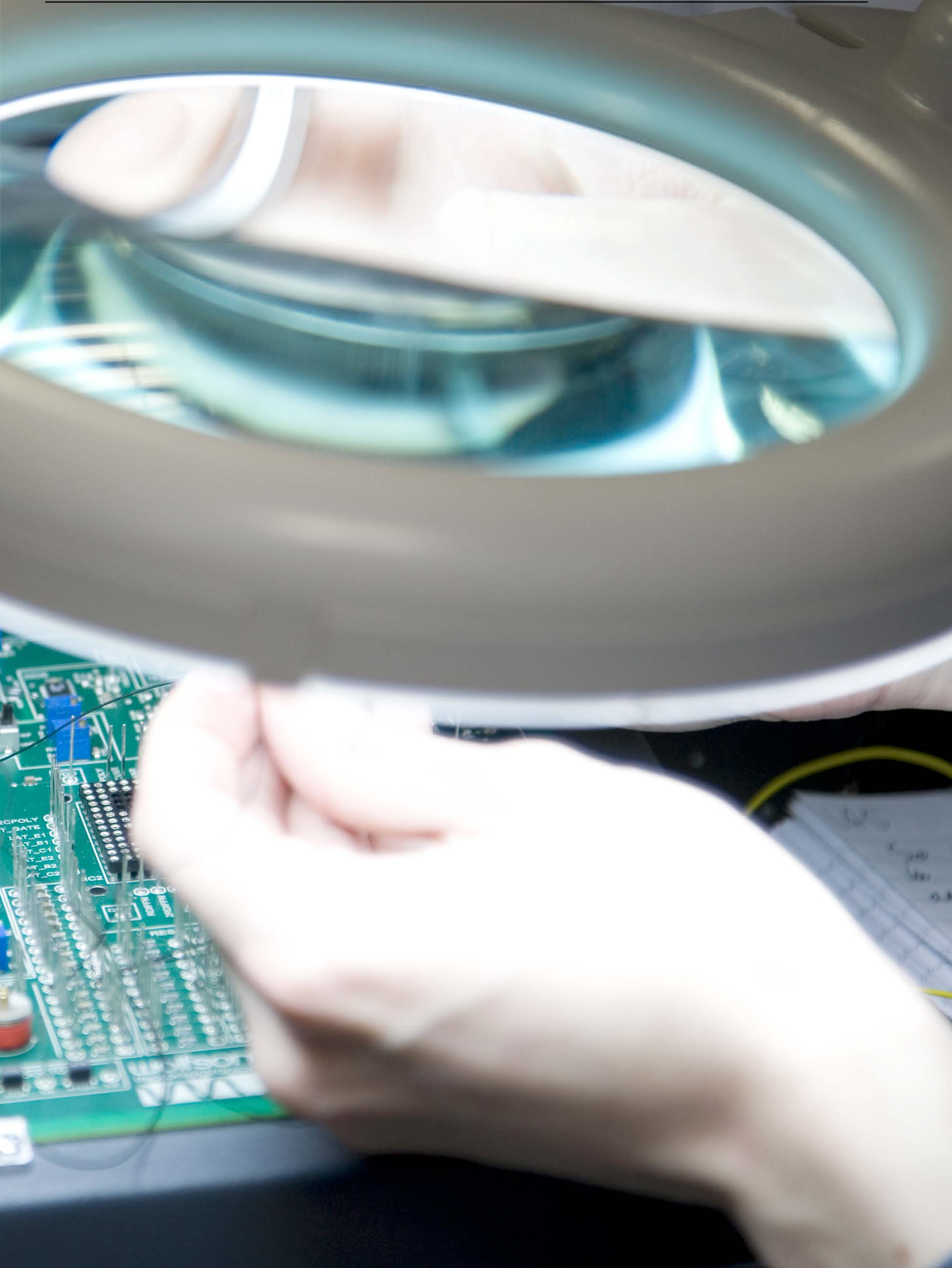
A Levels or Advanced Highers (or equivalent) may be given the option of starting at second year, thus completing a BEng in only three years or an MEng in four years. We encourage applications for the MEng rather than the BEng whenever possible. At present, an MEng degree is the simplest route to ensuring that you will be eligible for professional qualification as a Chartered Engineer after appropriate experience in industry. BEng graduates will need to undertake further study before they can attain such status. In practice the ability to change to, or continue on the MEng programme depends on performance during the third year.

How do I find out more?

For further information or to arrange a visit, please contact:

Recruitment and Admissions Officer School of Engineering, The University of Edinburgh, Faraday Building, King's Buildings Edinburgh, EH9 3JL

Tel: 0131 650 7352 Email: ugenquiries@eng.ed.ac.uk Web: **www.eng.ed.ac.uk**



1st Year

Engineering 1

Lectures = 3 hours per week, tutorials = 1 hour per week; laboratory sessions = 3 hours per week. Taught in Semester 1

An introduction to the engineering profession, including aspects of Chemical, Civil, Electrical and Mechanical Engineering. This course will demonstrate, through lectures and case studies, how Engineers with different specialist background can each contribute to the solution of complex engineering problems.

Engineering Mathematics 1A

Lectures = 3 hours per week; Tutorials = 1 hour per week

This course covers:

- Basic rules of algebra and algebraic manipulation, suffix and sigma notation, binomial expansion, parametric representation, numbers and errors.
  Functions, graphs, periodicity; polynomials, factorization, rational functions, partial fractions, curve sketching. The circular, hyperbolic and logarithmic functions and their inverses. Implicit functions, piecewise functions, algebraic functions.
- Sequences and series; permutations and combinations, Binomial theorem. Polynomials and their roots, partial fractions.
- Complex numbers: Cartesian, polar form and de Moivre's theorem; connection with trigonometric and hyperbolic functions; the complex logarithm; loci.
- Basic vector algebra; scalar product, vector product, triple product and geometry.
- Matrices, inverses and determinants, linear equations and elimination.
- Rank, eigenvalues, eigenvectors, symmetric matrices.

Prerequisites: A-Grade at Higher Mathematics OR B-Grade at A-level Mathematics OR equivalent.

Engineering Mathematics 1B

Lectures = 4 hours per week; Tutorials = 1 hour per week

This course covers:

AP's, GP's, limits, power series, radius of convergence.

-Basic differentiation: rate of change, simple derivatives, rules of differentiation, maxima/minima. Derivatives of powers, polynomials, rational functions, circular functions. Chain rule. Differentiation of exponential and related functions, differentiation of inverse functions, parametric and implicit differentiation, higher derivatives. Partial differentiation, directional derivatives, chain rule, total derivative, exact differentials. L'Hopital's rule. Taylor &©s Theorem and related results. Maclaurin series.

- Basic integration: anti-derivatives, definite and indefinite integrals.
- Fundamental Theorem of Calculus. Substitution. Area, arc-length, volume, mean values, rms values and other summation applications of integration. Integration by parts. Limits and improper integrals.
  Differential equations. General and particular solutions, boundary values.
- Separable differential equations. First order linear differential equations with constant coefficients.

Prerequisites: A-Grade at Higher Mathematics OR B-Grade at A-level Mathematics OR equivalent.

Electrical Engineering 1

Lectures 3 hours per week; tutorials and laboratory sessions = 4 hours per week. Taught in Semester 2

An introduction to Electrical Engineering (Circuit Analysis, a.c. Theory, Operational Amplifiers, Electromagnetism, Semiconductor Devices).

Prerequisites : Prior attendance at Engineering 1 or (in special circumstances) prior attendance at another half-course.

Mechanical Engineering 1

Lectures 3 hours per week; tutorials and laboratory sessions = 4 hours per week. Taught in Semester 2

This is an introduction to the principles of Mechanical Engineering. The topics covered include: Analysis of Static Structures, Stress and Strain, Dynamic Analysis of Bodies in Simple Linear and Rotational Motion, Energy Conversion. Practical work includes measurement techniques and the construction of machines such as engines and gearboxes.

Informatics 1 - Computation and Logic

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week. Taught in Semester 1

The goal of this strand is to introduce the notions of computation and specification using finite-state systems and propositional logic. Finite state machines provide a simple model of computation that is widely used, has an interesting meta-theory and has immediate application in a range of situations. They are used as basic computational models across the whole of Informatics and at the same time are used successfully in many widely used applications and components. Propositional logic, similarly is the first step in understanding logic which is an essential element of the specification of Informatics systems and their properties.

Informatics 1 - Functional Programming

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week. Taught in Semester 1

An introduction to the concepts of programming, using a functional programming language. Students learn to solve small-scale problems succinctly and at an abstract level without being bogged down in details.

Informatics 1 - Object-Oriented Programming

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week. Taught in Semester 1

This course presents a conceptual and practical introduction to object oriented programming, exemplified by Java. As well as providing a grounding in the use of Java, the course will cover general principles of programming in imperative and object oriented frameworks. After completing the course successfully, students will be able to develop programs that support experimentation, simulation and exploration in other parts of the Informatics curriculum (e.g. the capacity to implement, test and observe a particular algorithm).

Informatics 1 - Data and Analysis

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week. Taught in Semester 1

An introduction to collecting, representing and interpreting data across the range of informatics. Students will learn the different perspectives from which data is used, the different terminology used when referring to them and a number of representation and manipulation methods. The course will present a small number of running, illustrative examples from the perspectives of hypothesis testing and query formation and answering.

2nd Year

Analogue Circuits 2

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This lecture course introduces theoretical and practical concepts in Analogue Circuit design. The role of feedback in active circuits is emphasised and illustrated with reference to operational amplifiers. It is shown how to design simple, but practical, bipolar amplifiers to a given specification. Bode and Nyquist diagrams are introduced and applied to the frequency compensation of op-amps and the analysis and design of first

order active filters. An important aim of the course is to provide the theoretical background required by the analogue project lab.

Microelectronics 2

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

The objective of the course is to introduce the concepts underlying device operation and fabrication. Students will gain an appreciation of the basic semiconductor properties relevant to device operation and fabrication, and an understanding of the operation of the pn junction diode and transistors, together with their properties, such as I-V characteristics.

Electronics Project Laboratory 2A

Laboratory sessions = 3 hours per week.

The students will design and analyse the analogue and digital sampling components for a speech digitiser circuit. The students will also undertake self-learning material that introduces them to the use of MATLAB software. The basic syntax of MATLAB is introduced, along with data plotting and scripting techniques for basic problem solving.

Power Engineering 2

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This is an introduction course to the techniques and equipment used in the generation, transmission, distribution and utilisation of electrical power. It gives a basic understanding of how a power system operates and the problems facing electricity utilities. The design and main operating features of different types of motors and generators are also covered.

Signals and Communication Systems 2

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course aims to introduce students to the fundamentals of Signal Processing, Communication, and Information Theory. The course aims to provide an insight into time domain and frequency domain analysis of continuous-time signals, and provide an insight into the sampling process and properties of the resulting discrete-time signals. The course then introduces the students to basic communication modulation techniques, as well as probability theory for analysing random signals. At the end of the module students will have acquired sufficient expertise in these concepts to appreciate and analyse physical-layer communication signals.

Digital System Design 2

Lectures 2 hours per week; tutorials and laboratory sessions = 2 hours per week.

This is an introduction to digital electronic circuits and systems. The lectures presume a basic knowledge of the current/voltage properties of resistors, capacitors and MOS transistors and some simple properties of number. Starting with the creation of the discrete binary abstraction from continuous voltage/time circuits, the lectures cover the representation of information in simple codes and sequences of codewords, and the definition and design of logic gate networks and modules for processing such information. Simple tools and techniques are used to study the principles of analysis and design at the transistor, logic gate, registertransfer and algorithmic levels of organisation. By following alternative synthesis design flows in a top-down design process, the features of implementation fabric and their influence on the design process is revealed.

Electronics Project Laboratory 2B

Laboratory sessions = 3 hours per week.

The students will design, build and test a printed circuit board for the speech digitiser circuit developed in the project laboratory 2A course.

The fundamental characteristics of the digital signal abstraction are investigated along with the properties of basic logic function gates. Using a progressive modular approach, simple arithmetic and control function hardware is constructed and its performance measured and analysed.

The laboratory lays the foundation for measurement, analysis and interpretation of the performance of digital systems studied in later years. The content is directly linked to the course Digital System Design 2.

Electronics Project Laboratory 2C

Laboratory sessions = 3 hours per week.

The students will design and analyse the analogue and digital sampling components for a speech digitiser circuit.

The fundamental characteristics of the digital signal abstraction are investigated along with the properties of basic logic function gates. Using a progressive modular approach, simple arithmetic and control function hardware is constructed and its performance measured and analysed.

The laboratory lays the foundation for measurement, analysis and interpretation of the performance of digital systems studied in later years. The content is directly linked to the course Digital System Design 2.

Engineering Software 2

Lectures 2 hours per week; tutorials and laboratory sessions = 4 hours per week.

Through the teaching of the important elements of an imperative programming language, and exercises making use of those features in a modular programming style, students develop knowledge and skills with which to analyse and solve engineering problems by application of numerical analysis techniques.

Industrial Management 1

Lectures 3 hours per week; tutorials sessions = 4 per semester

Industrial Management 1h is run by the Business School for students in the College of Science and Engineering. The course is designed to assist non-specialist students to acquire understanding of business organisations and management processes, and their relevance in complementing technical skills. The course is designed both to be self-contained for those who do not intend to study the subject further, and to complement Techniques of Management for Scientists and Engineers and other business courses that may be undertaken within Science and Engineering for accreditation purposes.

Engineering Mathematics 2A

Lectures 2 hours per week; tutorials sessions = 5 hours per semester.

This course introduces ordinary differential equations, transforms and Fourier series with applications to engineering. Linear differential equations, homogeneous and non-homogeneous equations, particular solutions for standard forcings; Laplace transforms and applications; standard Fourier series, half range sine and cosine series, complex form; convergence of Fourier series, differentiation and integration of Fourier series. Introduction to Partial Differential Equations.

Engineering Mathematics 2B

Lectures 2 hours per week; tutorials sessions = 5 hours per semester.

This course is in two parts, taught simultaneous with one lecture per week.

The first part, mathematical methods, covers: Multivariate integration and vector calculus for engineering. Gradient, tangent plane, normals; Scalar and vector fields; divergence and curl; conservative fields and potential; vector differential identities; simple applications from properties of continua and electromagnetism. Repeated multiple integration (change of order of integration); integration in non-cartesian coordinates, Jacobian; line integrals (link to potential and work); surface integrals (flux); divergence, Green's and Stokes' theorems; applications and physical interpretations;

The second part, quantitative methods, covers: descriptive statistics and the presentation of statistical data; probability theory; discrete and continuous probability density functions; hypothesis testing (including 1-way ANOVA); regression and experimental design.

Techniques of Management

Lectures 3 hours per week; tutorials and laboratory sessions = 2 hours per week.

This is a course in management which may be taken in combination with Industrial Management 1. The course includes tuition on the use of spreadsheets generally and makes use of these in practical sessions to cover, in a 'hands on' manner, topics such as: forecasting, discrete event simulation, simulation analysis, linear programming, budgeting, costing, book-keeping and financial reporting.

Informatics 2B - Algorithms, Data Structures, Learning

Lectures 3 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course presents key symbolic and numerical data structures and algorithms for manipulating them. Introductory numerical and symbolic learning methods provide a context for the algorithms and data structures. To make the presented ideas concrete, the module will extend the student's skills in Java and Matlab. Examples will be taken from all areas of Informatics.

Informatics 2C - Introduction to Computer Systems

Lectures 3 hours per 2 weeks; tutorials and laboratory sessions = 1 hour per 2 weeks.

This course is concerned with the design, implementation and engineering of digital computer systems. It offers an introduction to the internal structure of digital computers.

Informatics 2C - Introduction to Software Engineering

Lectures 3 hours per 2 weeks; tutorials and laboratory sessions = 1 hour per 2 weeks.

This course gives an overview of the engineering of software systems. It introduces the main activities and concerns of industrial and commercial software engineering, and enables students to go beyond programming towards software engineering in their own work.

Probability

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per 2 weeks.

An introduction to probability; no prior knowledge is required.

Dynamics 2

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course aims to provide a basic understanding of the Laws of Newtonian Mechanics for bodies and systems of bodies in plane motion, and to achieve proficiency in their use in conjunction with kinematic principles for a range of mechanical engineering applications.

Fluid Mechanics 2

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hours per 3 weeks.

The student should develop an awareness of the qualitive behaviour of fluids in typical situations so that models of problems can be set up for solution. The course's objectives are to:

1. Produce quantitative solutions for models derived from some useful applications in the fields of measurement and pipe flow;

2. Establish enough theoretical background to enable the range of validity of these basic solutions to be understood; and to

3. Provide a starting point with respect to terminology and theory for more advanced study in subsequent years.

Engineering Thermodynamics 2

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course provides a basic grounding in the principles and methods of Classical Thermodynamics. It concentrates on: understanding the thermodynamic laws in relation to familiar experience; phase change, ideal gas and flow processes; using sources of data like thermodynamic tables and charts; application of the basic principles to the operation of various engine cycles.

Structural Mechanics 2A

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course describes the basic principles of Structural Mechanics, focusing on one-dimensional beam members.

Industrial Management 1

Lectures 3 hours per week; tutorials sessions = 4 per semester.

Industrial Management 1h is run by the Business School for students in the College of Science and Engineering. The course is designed to assist non-specialist students to acquire understanding of business organisations and management processes, and their relevance in complementing technical skills. The course is designed both to be self-contained for those who do not intend to study the subject further, and to complement Techniques of Management for Scientists and Engineers and other business courses that may be undertaken within Science and Engineering for accreditation purposes.

3rd Year

Analogue Circuits 3

Lectures 2 hours per week; tutorials and laboratory sessions = 3 hours per week.

This course aims to build on the material presented in second year and to give the students an intuitive feel for the basic building blocks of analogue circuits. To teach how to analyse and design discrete and integrated bipolar junction transistor (BJT) and CMOS based analogue circuits.

Digital System Design 3

Lectures 2 hours per week; tutorials and laboratory sessions = 3 hour per week.

Digital System Design 3 aims to build on the material presented in the second year and enhance students understanding and design skills of combinational and sequential digital circuit design techniques. To introduce the concepts and techniques for datapath and FSM design.

Power Electronics and Machines 3

Lectures 2 hours per week; tutorials and laboratory sessions = 1.5 hours per week.

The Electrical Machines part of the course provides students with a good understanding of the construction and steady state performance of induction motors and generators.

The Power Electronics part of the course introduces students to the basic power electronic devices and converter circuits used to process electrical power. Students are introduced to some of the wide range of applications where power electronic systems are currently used. The laboratory brings together both the machines and power electronics aspects of this course.

Engineering Design Analysis & Manufacturability 3

Lectures 2 hours per week; tutorials and laboratory sessions = 1.5 hours per week.

Introduction to a quantitative approach in:

electronic product design, product manufacture, the link between design & manufacture and design & analysis of experiments.

Engineering Software 3

The study of imperative stored program control architecture and application in an embedded environment. An initial series of exercises teaching principles and techniques is followed by an application project phase.

Digital Systems Laboratory 3

Directed and independent learning 9 hours per week.

The aim of this lab course is to produce students who are capable of developing synchronous digital circuits from high level functional specifications and prototyping them on to FPGA hardware using a standard hardware description language.

Electromagnetics 3: Signal Transmission

Lectures 2 hours per week; tutorials and laboratory sessions = 2 hours per week.

This course aims to introduce the basic physical phenomena that give rise to electromagnetic waves and to build an understanding of their mathematical formulation as Maxwell's equations. The course will include a revision of vector calculus as required for the derivation of Maxwell¿s equations. To apply this understanding to the analysis and design of practical wave-propagating structures - both waveguides and transmission lines.

Fluid Mechanics (Mechanical) 3

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course addresses four, broad areas of fluid mechanics. The aims are: 1. To develop and apply the concepts introduced in Fluid Mechanics 2 to engineering applications in turbomachinery and flow measurement; 2. To introduce and apply to concepts of similarity and scaling within fluid mechanics; 3. To introduce the Navier Stokes equation and demonstrate its use in simple flows; 4. To review flow measurement devices / techniques, from industrial machines to modern, laser-based methods.

Fundamentals of Mechanical Engineering for Renewable Energy 3

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

The course will introduce fundamental concepts from mechanical engineering that will facilitate understanding and quantitative analysis of renewable energy systems. This will include concepts from the fields of dynamics, thermodynamics, fluid statics/dynamics as well as structural mechanics.

Microelectronics 3

Lectures 2 hours per week; tutorials and laboratory sessions = 2 hours per week.

The objective of this module is to give students an in-depth analysis of semiconductor devices, focussing on the MOS transistor, fabrication technology and simple MOS circuits. A computer simulation exercise that backs up this course will be run.

Power Systems 3

Lectures 1 hours per week; tutorials and laboratory sessions = 3 hours per week.

Students are introduced to the analysis of power systems in per-unit and absolute values using single-line diagram representations of balanced and unbalanced power supply systems, and perform load-flow and short-circuit studies. They are exposed to the analysis of the fundamental techno-economic issues in the design of large power systems, involving long term planning, mixed fuel resource/energy scheduling and power system plant investment appraisal.

The Power System Group Design Project brings together all aspects of the above modules.

Control and Instrumentation Engineering 3

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This is a first course in the design and analysis of instrumentation and control systems. The course starts with an introduction to instrumentation, covering the basics of sensor technology and measurement techniques, including the characteristics and real-world limitations of transducers as well as their interfacing with the control system. It then goes on to introduce Control Theory, providing a basic understanding and building the mathematical background for the modelling, design and analysis of linear single-input single-output feedback systems. It then introduces the concept of stability as well as the available methods for its assessment. It develops the analytical tools for the design of appropriate controllers to improve system performance. It allows students to appreciate the interdisciplinary nature and universal application of control engineering. Finally it introduces modern approaches including application of artificial intelligence to control systems.

The course also has a hands-on laboratory (3 hours in total split into 2 sessions) which allows the students to get practical experience in working with a dynamic system and designing a simple controller.

Signal and Communication Systems 3

Lectures 2 hours per week; tutorials and laboratory sessions = 3 hours per week.

This course aims builds on Signals and Communication Systems 2 (SCEE08007) to introduce students to the fundamentals of discrete-time signal processing and communications. In the first half, the course considers discrete-time analysis techniques, gaining insights in both time-domain and frequency domain. Infinite duration signals are assumed. The second half course then considers baseband communications and information theory.

Analogue Mixed Signal Laboratory 3

Directed and independent learning 9 hours per week.

This course is an exercise in analogue circuit design. The exercise is to design and realise the circuitry to display a television signal as a picture on a standard oscilloscope.

The exercise is designed to use knowledge gained by students in the earlier years of their course and aims to act a "structured project" to act as an introduction to the more open ended type of final year project work carried out in the fourth and fifth years. Until this point in the course the students experience is largely of analysis of circuits supplied to them. In this exercise they are expected to synthesise their own designs and realise their own circuitry.

The exercise is assessed in three stages. Firstly the students are required to produce a report in the form of a service document aimed at a service technician who is required to fault-find their design. This necessitates a circuit diagram for their design along with a PCB layout diagram and a components list. A further requirement is a brief description of the circuit and its function. Secondly the quality of the picture displayed by the final design is assessed and marked. Assessment is based on the sharpness of the picture, the contrast, sync. stability and the ramp linearity. Thirdly the physical layout and construction of the circuit is assessed for neatness and logical organisation and finally the quality of the fabrication and construction of the PCB is assessed. The criteria used for assessing the exercise are described in an appendix to the manual that is issued to each participant.

Dynamics 3

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

The course is designed to allow students to achieve competence in the methods of dynamic analysis for lumped parameter linear systems, covering dynamic response and vibration analysis and, their uses in engineering applications.

Thermodynamics 3

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

The course presents thermodynamics as a real world subject and insists that there is a pattern to working with thermodynamics which is summarised as Principles, Properties, Processes. This pattern is applied to a variety of machines and devices including turbines, reciprocating compressors, nozzles, power cycles, air conditioning systems and cooling towers. A final separate section introduces the basic ideas of heat transfer.

Professional Issues for Mechanical Engineers 3

Lectures 1 hour per week; tutorials and laboratory sessions = 3 hour per week.

This course covers a range of issues and activity associated with mechanical engineering practice. These include legal issues and knowledge of real world activity through engineering applications, guest lectures and industrial visits.

Solid Mechanics 3

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

To give a basic understanding of structural modelling and stress analysis to the student to check design work for strength and stability, to check stress existing designs and to investigate failure problems.

Sustainable Energy Group Design Project 3

Lectures, Approx 12 hours per week; tutorials and laboratory sessions = 1.4 hours per week.

This course aims to give students experience of tackling an engineering design problem in the area of renewable / sustainable energy, with all the uncertainties of the real world, personal interactions and time management.

Sustainable Energy: Principles and Processes 3

Lectures 1 hour per week; tutorials and laboratory sessions = 2 hours per week.

This course aims to establish a basic understanding of global patterns of energy use and systems of energy supply, in the context of their sustainability: social, environmental and economic. It is structured so as to familiarise students with the wide range of literature on sustainability, and will develop independent study and analysis skills.

More specifically;

1. To provide an overview the world's energy resources, and the current patterns of the production and use of energy.
2. To examine the current world energy picture in the context of sustainability.
3. To present strategies for more sustainable supply, and to consider the constraints on expansion of supply.
4. To discuss future sustainable energy scenarios
5. To develop an appreciation of the global nature of the issues, and an accompanying appreciation of the need for local variations to be understood and accounted for
6. To develop a realisation of the intricacy and complexity of sustainable energy issues; to gain ability to critically appraise information in the sector, and to detect and reject over-simplified assertions and/or solutions.

Manufacturing Information Systems (MIS) 3

Lectures 1 hour per week; tutorials and laboratory sessions = 2 hours per week.

The course introduces the principles of a 'Product Lifecycle' and assesses the implications of advanced enterprise-wide information systems for the organisation of product development and beyond. By drawing on original case study materials, video resources, and industrial guest speakers, the course explores the philosophies of Product Lifecycle Management and Product Data Management and examines the interactions between information technologies, organisation and product data.

Marketing Technical Products 3

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week..

The course is divided into three main sections. The first provides the student an understanding of the key dynamics related to bringing technical products to the markets (W1-4). The second provides students with a practical guide on how to start up a company, including invited talks given by entrepreneurs and representatives of funding bodies (W5-7). Finally, in the third section (W8-10), a number of case studies are discussed, concerning among others innovative product development in integrated software systems and aspects of entering emerging markets.

The course is practice based and project oriented. Students in small groups will be asked to develop their own product development plan based on a product idea of their own. The plan should address aspects such as: how to demonstrate your product? How to segment your user base? How to manage the transfer of your technology to the market? How to deal with business analysts and other market actors? How to start up a company around a product idea? What funding to look for? How to enter emerging markets with your product?

System Design Project

Lectures, 5 lectures in Semester 2; tutorials and laboratory sessions = 5 hours per week.

The System Design Project is intended to give students practical experience of (a) building a large scale system (b) working as members of a team. The project involves applying and combining material from several courses to complete a complex design and implementation task. At the end of course each group demonstrates its implemented system and gives a formal presentation to an audience of the students, supervisors, and visitors from industry.

Computer Science Large Practical

Lectures, Aprox 1 hour per week;

The Computer Science Large Practical exposes students to the problems that arise with the design and implementation of large scale computer systems, and to methods of coping with such problems. Students will gain experience in how to:

* Design clearly and coherently structured systems
* Choose the appropriate means of implementation
* Discover and use relevant information
* Schedule their work load
* Present their work in a clear and concise way.

Software Engineering with Objects and Components

Lectures 1.5 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course provides an introduction to the design and implementation of software systems using object-oriented techniques. The techniques we consider are oriented to creating component based designs. The course will review basic object-oriented techniques and how they support the creation of component based designs. We also consider the high level modelling of systems as a means of supporting the Software Engineering process. Here we study the Unified Modelling Language (UML), which provides programming language independent notations for design.

Software Testing

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This module is intended to provide in-depth coverage of software testing further to develop the introductory material covered in Informatics 2C - Software Engineering. The goal of the course is to provide students with the skill to select and apply a testing strategy and testing techniques that are appropriate to a particular software system or component. In addition the student will become a capable user of test tools; will be able to assess the effectiveness of their testing activity; and will be able provide evidence to justify their evaluation. The course will be supported by two practical exercises involving the development of appropriate tests and the application of a range of testing tools. This course is based on the IEEE Software Engineering 2004 Software Testing syllabus.

4th Year

BEng Electronics and Electrical Engineering Project 4

The BEng Electronics and Electrical Engineering project is a practical research or design exercise which will give the student experience in applying knowledge and understanding gained in earlier study, as well as increasing the student's competence in a particular area of Electronics and Electrical Engineering. The objective output of a project is a novel design, or empirical knowledge, the extent of attainment of which forms part of the overall assessment. However, skills and attitudes appropriate to the professional engineer, developed in pursuit of the objective output, are just as important and are given corresponding weight in the assessment.

Professional Issues for Engineers 4

Lectures 1 hour per week; tutorials sessions = 5 hours during the semester.

Professional engineers must be aware of the economic, social and environmental context of engineering. This course aims to give students an appreciation of some important issues that are complementary to the technical knowledge and skills necessary for a professional engineer. Lectures will be given by visiting experts as well as members of staff.

Analogue Electronics (Circuits) 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course introduces students to the important analogue circuits of active filters, sine wave oscillators, relaxation oscillators, switched capacitor circuits and phase-locked loops. The aim is to present and instil the principles of circuit operation and the essential circuit analysis and design techniques to enable students to understand and design the simpler variants of the above circuits and to be capable of extending their understanding to more complex variants.

Digital Signal Analysis 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

Students will study the theory, and the practical application, of statistical analysis to signals and systems described by random processes. The topic will be approached from both time and frequency domains with an emphasis on studying the effect that analysis tools have on the resulting analysis. The course provides in-depth coverage of the discrete Fourier transform, and its role in spectrum estimation, as well as the design of finite impulse response filters, and their role in signal identification. In particular, issues such as resolution and dynamic range of an analysis system are dealt with, to give students an appreciation of how to apply the theory to engineering problems.

Digital Communications 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

The aim of this course is to provide students with a thorough understanding of how information theory relates to the design of digital communications systems and to provide the knowledge and skills to perform design calculations on these systems. Students will use standard mathematical methods to model and analyse digital communication systems and predict performance metrics such as received SNR and expected bit error ratio.

Power Systems and Machines 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course provides students with a good knowledge and understanding of: the steady state performance of induction machines; the transient behaviour and control of synchronous machines; power system protection equipment; principles of overcurrent protection of power systems and machines; operation and protection of distributed generators. A number of relevant technical and engineering aspects of the analysis of steady state and transient performance of electrical machines and power supply systems will be considered in the context of operation, protection and control of power supply systems with distributed generation, including their application during the system design and operational stages.

Microelectronic Device Principles 4

Lectures 2 hours per week; tutorials and laboratory sessions = 3 hours per week.

The aim of this course is to provide a understanding of the physics, fabrication technology and operation of (a) a range of advanced micro technologies and (b) contemporary electronic information displays.

Power Electronics 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course introduces students to the design of power electronic circuits for low power applications. It concentrates primarily on power supplies for electronic circuits, and covers the operation and design of the most common power supply circuit topologies. Also included in this course are the design of the magnetic components required in such applications, and the design of the feedback control circuit. Students are introduced to the main characteristics of power semiconductor devices and their drive requirements. A continuous theme throughout this course is designing circuits for ¿worst case¿ conditions, and taking into account commercial requirements as well as practical realities such as device and circuit imperfections.

Digital System Design 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course is lecture based and is taken by all students taking the forth year of electronics and/or electrical engineering degree in Semester 2. It comprises one 22 lecture module with 8 tutorials. It is assessed 100% by examination. The course covers: Computer Architecture (from a hardware perspective); Components of Computers; Microprocessor Design; and Parallel Computing Architectures.

Digital Systems Laboratory

Laboratory sessions = 3 hours per week, Directed and independent learning 6 hours per week.

This lab aims to produce students who are capable of developing hardware-software digital systems from high level functional specifications, and prototyping them on to FPGA hardware using a standard hardware description language and software programming language.

Power Conversion 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course introduces students to power electronic converters for high power systems and their use in a variety of renewable energy systems (solar PV, wind, wave and tidal power), and in power systems (FACTS, HVDC). Machine drives, including 4 quadrant operation control of both dc and induction machines are also covered. Different types of electrical generators used for renewable energy conversion are studied, including switched reluctance machines, permanent magnet generators and linear generators.

Analogue Electronics (Project) 4

Lectures 2 hours per week; tutorials and laboratory sessions = 6 hours per week.

The aim of this module is to give students more hands-on experience of analogue design. It is a half-way house between discrete component design and fully custom integrated circuit design. Working with real hardware, the only way to learn about real analogue problems, will not be easy, and the practical work is likely to be very testing. However, exposure to the real problems that will be presented by using the custom chip designed specifically for this course will take the students? understanding of analogue work to a new level.

Electromagnetics 4: RF Engineering

Lectures, Aprox 3.5 hours per week; Directed and independent learning 6 hours per week.

This course draws heavily on the Electro-magnetics material taught in third year and aims to introduce the student to some of the techniques that are used at RF and microwave frequencies. Overall it is intended to give students an appreciation and insight into the problems of RF and microwave design.

Introduction to Bioelectronics 4

Lectures, Aprox 2 hours per week; Directed and independent learning 7 hours per week.

Bioelectronics involves the application of electronic engineering principles to biology, medicine, and the health sciences. An important part of this is the development of the communication interface between biological materials (cells, tissue and organs) and electronic components. This Course introduces the biochemical, biophysical and physiological concepts that are of relevance to bioelectronics, and will also serve to provide introductory material that will be extended in other courses in the MEng programme in Electronics with Bioelectronics (specifically those in Biosensors and Biosensor Instrumentation).

Biosensors 4

Lectures, Aprox 2 hours per week; Directed and independent learning 7 hours per week.

This course provides instruction in the basic science and engineering concepts required to understand the design and application of biosensors. These are defined as self contained integrated devices capable of providing analytical information, using a biological recognition element in conjunction with a secondary transduction element. Different biosensor systems are explored, ranging from electrochemical devices, through to optical or thermal systems.

Instruction is also given in the general principles of sampling and analysis, statistical presentation and manipulation of data. This module serves as an introduction to some of the biosensors and measurement techniques covered in the semester 2 course Biosensors & Instrumentation.

MEng Electronics and Electrical Engineering Project Phase One (Internal)

The M.Eng. Electronics and Electrical Engineering project is a substantial piece of practical research, or industrial design, which will give the student experience in applying knowledge and understanding gained in earlier study, as well as increasing the student's competence in a particular area of Electronics and Electrical Engineering. The objective output of a project is a novel design, or empirical knowledge, the extent of attainment

of which forms part of the overall assessment. However, skills and attitudes appropriate to the professional engineer, developed in pursuit of the objective output, are just as important and are given corresponding weight in the assessment. The project will be structured into two phases, with two defined work packages but the two phases are closely and integrally related. Each phase appears as a separate course.

MEng Electronics and Electrical Engineering Project Phase One (External)

The M.Eng. Electronics and Electrical Engineering project is a substantial piece of practical research, or industrial design, which will give the student experience in applying knowledge and understanding gained in earlier study, as well as increasing the student's competence in a particular area of Electronics and Electrical Engineering. The objective output of a project is a novel design, or empirical knowledge, the extent of attainment of which forms part of the overall assessment. However, skills and attitudes appropriate to the professional engineer, developed in pursuit of the objective output, are just as important and are given corresponding weight in the assessment. The project will be structured into two phases, with two defined work packages but the two phases are closely and integrally related. Each phase appears as a separate course.

Group Design Project (Hydropower Scheme)

This project is intended to introduce students to multidisciplinary planning and design through the full design, specification and evaluation of a small-hydro scheme. The project should develop creative thinking, team skills, and an improved understanding of other disciplines.

Group Design Project (Potable Water Supply)

This project is intended to introduce the students to multidisciplinary planning and design. The project should develop creative thinking, team skills and an improved understanding of other disciplines and how they come into play in a multidisciplinary project.

Interdisciplinary teams from several Engineering backgrounds (e.g. Civil, Chemical, Mechanical and Electrical Engineering) will arrive at a detailed design of a Water Treatment Plant set in a particular context, i.e. geographical position, population and with a given raw water quality. The aim is to work as a team and provide a detailed design and economic cost of the water treatment plant including: raw water delivery, water treatment, sludge treatment, potable water supply to the delivery point and treated water storage at that point.

Group Design Project (Design of Micro-systems)

Lectures 3 hours per week;directed and independent learning aprox 14 hours per week.

This project is intended to introduce students to multidisciplinary planning and design. The project should develop creative thinking, team skills, and an improved understanding of other disciplines.

Group Design Project (The Passive House)

Lectures 3 hours per week;directed and independent learning aprox 14 hours per week.

This project is intended to introduce students to multidisciplinary planning and design. The project should develop creative thinking, team skills, and an improved understanding of other disciplines.

Interdisciplinary teams will arrive at a detailed design for a sustainable (energy- and carbon-neutral) passive house. The course reflects rapidly-emerging trends in Building Services such as intelligent building control, passive heating, lighting and ventilation, all set in the context of increasingly stringent statutory requirements for energy use and savings.

Group Design Project (Power Station with Carbon Capture and Storage)

Lectures 3 hours per week;directed and independent learning aprox 14 hours per week.

This project is intended to introduce students to multidisciplinary planning and design. The project should develop creative thinking, team skills, and an improved understanding of the other disciplines involved in delivering CCS schemes and the interactions that will be required between them within the full CCS chain. Interdisciplinary teams will arrive at a detailed design for a power plant that could use CO2 capture. The course reflects rapidly emerging trends in power plant and environmental engineering allowing students to develop their ability to tackle 'real world' problems where a broad range of, sometimes competing, design requirements must be taken into account.

Mechanical Engineering Group Project 4

Directed and independent learning approx. 15 hours per week.

The Group Project is concerned with gathering, critically analysing and presenting a coherent body of information on an engineering-related topic. The group is allocated a theme and each member of the group is assigned a topic relevant to the theme. The students, operating as a group, are required to research the theme, developing a body of interrelated knowledge and an understanding of their topics. This is accomplished primarily through investigation of the published literature, and by making contact with industry and other organisations. The objective is to collect, distil, analyse and present in a logical fashion, a summary of the information collected.

BEng Mechanical Engineering Project 4

Directed and independent learning approx. 33 hours per week.

During their final year students undertake a significant piece of project work under the supervision of a member of the academic staff within the School. The duration of the project depends on the specific degree programme, but will normally span a period of several months. Students are encouraged to generate their own project outline, subject to approval from the School's Teaching Committee; alternatively students may choose to develop a project from a list of titles supplied by a member of the academic staff. Projects may also be carried out in collaboration with industry. The project is advanced through deployment of accepted engineering and research practices.

Dynamics 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

The Dynamics 4 course provides an understanding of core aspects of advanced dynamic analysis, dealing with system modelling, dynamic response and vibration analysis, structural dynamics both in the linear and non-linear regimes, wave propagation and the dynamics of continuous and multi-degree of freedom systems. The main objective os to obtain an understanding and appreciation of the potential and limits of analytical solutions and the value of these in underpinning modern computer methods for simulating dynamic structural response.

Engineering Project Management 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

Project Management is the application of management principles to deliver a project in accordance with predetermined objectives for time, cost & quality. This course will consider these principles in the management of all types of engineering project, with respect to the project's life-cycle, the parties involved, planning, estimating, team and people management, contract strategy, contractor selection and contract management.

Energy Systems 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

The course applies the principles and techniques of thermodynamics to a variety of energy conversion systems including power plant, combined heat and power systems and heat pumps. It provides an introduction to the engineering of fossil fuelled and nuclear power stations. It surveys the UK/international energy scene.

Fluid Mechanics (Mechanical) 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course introduces concepts that go beyond the 'one-dimensional' treatment of flows in ME2 Fluid Mechanics. The linking theme is the generation of fluid forces on the surfaces of structures, typified by the lift and drag forces on an aerofoil.

Finite Element Methods for Solids and Structures 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

The finite element method (FEM) (also called finite element analysis or FEA) originated from the need to solve complex problems in solid mechanics. FEM is used to obtain approximate numerical solutions to a variety of equations of calculus. Today it is used in a wide range of disciplines. This course is an introduction to FEA as applied to elasticity problems in solid and structural mechanics. The mathematical equations are developed using the virtual work basis of FEM and this is used to develop equations for one, two and three dimensional elements. As FEA is a computational tool this course includes practical exercises using the commercial package ABAQUS. A number of tutorials involving hand calculations are provided to aid understanding of the technique.

Honours Project (Informatics)

This is a major project and is intended to allow students to demonstrate their ability to organise and carry out a substantial piece of work. The project involves both the application of skills learnt in the past and the acquisition of new skills. Typical areas of activity will be: gathering and understanding background information; solving conceptual problems; design; implementation; experimentation and evaluation; writing up.

Industrial/European Placement 4

As an integral part of the MEng degree programme, students undertake an industrial or overseas academic placement consisting of six to eight months of full time engineering work, occupying the period from January to September of 4th Year.

The nature of the work the students do can vary enormously. In an industrially based placement, the host company will normally provide the student with a project (or projects) which will be started and completed during the placement period; alternatively the student will be assigned to an ongoing project and will be expected to make a significant contribution to that project. In a placement at an overseas academic institution, students are presented with a substantial research based project and expected to develop this project within the constraints of the accepted practices of the institution in which they are working.

Onus is placed on the student to secure the placement, although supporting advice is provided by members of the School and by the University Careers Service.

Supply Chain Management 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course focuses mainly on the materials management topics of operations management. Its goal is to help students become effective managers in today's competitive, global environment. This is because many of the students who take this course will progress to become managers in manufacturing (and service) organisations in a variety of functional areas. Students should gain an understanding of what material managers do and realise that materials management is a highly complex activity and involves many business functions.

Sustainable Energy Technologies 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course aims to provide an introduction to the engineering principles and designs underpinning key sustainable / renewable energy technologies. It is structured to familiarise students with an analytical toolkit to allow them to independently appraise such technologies and their role in the energy system.

5th Year

Modern Economic Issues in Industry 5

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course aims to develop an understanding of economic principles and apply them to current industrial issues. Topics covered include investment, Pricing, sustainability and the EU.

Technology and Innovation Management 5

Lectures 2 hours per week; Directed and independent learning approx. 7 hours per week.

In an increasingly competitive and fast changing economic climate innovation represents a key route for organisations that want to survive and prosper. This course addresses the area of the management of technological innovation with a critical perspective on the key role of technology giving rise to new knowledge, products and processes. In so doing, it provides students with a clear understanding and appreciation of innovation dynamics both within and across organisational boundaries. The course draws from state of the art science, technology and innovation literatures in which Edinburgh has longstanding strengths. By making extensive use of in-depth case study materials, the course analyses opportunities and challenges related to creating, sustaining and managing innovation with a specific focus on technology-based organisations.

MEng Electronics and Electrical Engineering Project Phase Two (Internal)

The M.Eng. Electronics and Electrical Engineering project is a substantial piece of practical research, or industrial design, which will give the student experience in applying knowledge

and understanding gained in earlier study, as well as increasing the student's competence in a particular area of Electronics and Electrical Engineering. The objective output of a project is a novel design, or empirical knowledge, the extent of attainment of which forms part of the overall assessment. However, skills and attitudes appropriate to the professional engineer, developed in pursuit of the objective output, are just as important and are given corresponding weight in the

assessment. The project will be structured into two phases, with two defined work packages but the two phases are closely and integrally related. Each phase appears as a separate course.

MEng Electronics and Electrical Engineering Project Phase Two (External)

The M.Eng. Electronics and Electrical Engineering project is a substantial piece of practical research, or industrial design, which will give the student experience in applying knowledge and understanding gained in earlier study, as well as increasing the student's competence in a particular area of Electronics and Electrical Engineering. The objective output of a project is a novel design, or empirical knowledge, the extent of attainment of which forms part of the overall assessment. However, skills and attitudes appropriate to the professional engineer, developed in pursuit of the objective output, are just as important and are given corresponding weight in the assessment. The project will be structured into two phases, with two defined work packages but the two phases are closely and integrally related. Each phase appears as a separate course.

Analogue Electronics (Project) 5

Lectures 1 hour per week; tutorials and laboratory sessions = 6 hours per week.

This course will extend the student's knowledge of analogue integrated circuit design to a variety of common blocks found in mixed-signal systems.

1. To extend the student's proficiency and understanding of the design flow for analogue and mixed-signal circuits using industry-standard computer-aided design tools.
2. To advance design knowledge of common analogue circuits used within mixed-signal systems.
3. To carry out a design project of an integrated circuit block from specifications to layout and verification using state-of-the-art CAD tools.

This course will prepare the student for work within a design team involving interaction between analogue and digital design engineers.

Electronic Product Design and Manufacture 5

Tutorials and laboratory sessions = 5 hours per week, Directed and independent learning approx. 13 hours per week.

The objective of this course is to provide students with a methodical approach to product design which breaks the process down into sequential steps and emphasizes the concept that design cannot be carried out in isolation from the manufacturing process, where quality and reliability are essential to economic success.

Sigma Delta Data Converters 5

Lectures 1 hour per week; tutorials and laboratory sessions = 3.5 hours per week.

This course will equip the student with an understanding of sigma-delta data converters at a theoretical and practical level. The coursework makes a link between the digital signal processing concepts of sigma delta conversion and implementation in integrated circuit hardware.

The course will briefly review the basics of discrete-time signals and systems, before looking at block diagrams and circuit implementations of modulator structures. Saturation, stability and limit cycle behaviour of modulator loops will be described and related to circuit structure. Non-ideal behaviour of modulators such as noise, matching, finite gain and settling will be related to circuit level implementations.

The course will be illustrated throughout with MATLAB, Simulink and Cadence Verilog A examples linking to laboratory sessions and a design exercise issued at the start of semester.

Embedded Mobile and Wireless Systems (EWireless) 5

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

The course will explain the architecture of advanced wireless and Mobile systems making use of embedded processor. The course will also enable the students how to design and develop such systems targeting new applications.

BioSensor Instrumentation 5

Lectures 2 hours per week; tutorials and laboratory sessions = 0.5 hours per week.

The Biosensor Instrumentation course examines the methods used to interface sensors for biological and biomedical applications with electronics. One focus will be on transducers, meaning devices which convert information from one form of energy to another. In this case the final form for the information will be an electrical signal but the transducers themselves could be optical, mechanical, etc., and operate in a number of different ways (eg., capacitive, potentiometric, photonic). The objective is to build upon the knowledge the students will have gained in the 4th year introductory courses on bioelectronics and biosensors but with more of an electronics and electrical engineering focus. This course will also go beyond sensing to look at methods of actuation for closed loop "smart" systems. Examples from the state of the art in biosensor research will be provided and a number of guest lectures from active researchers in this field will provide context. Students will undertake a "horizon scanning" research exercise to investigate the industrial and research potential of a specific type of biosensor. This will be assessed by both formal reports and a presentation given to and marked by the whole class.

Lab-on-Chip Technologies

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This module will outline the basic concept of devices that integrate one or several laboratory functions on a single chip, and how they can offer advantages specific to their application. Such advantages include: low fluid volumes that lead to lower reagent costs and smaller biological samples for diagnostic purposes; faster analysis and response times that also provide better process control; the ability through parallel processing to provide high-throughput screening; and inherent low fabrication costs that make disposable chips economically viable. The influence of the scaling-down of dimensions on the physico-chemical behaviour of fluids and chemical reactions will also be covered. Current applications of lab-on-chip devices will be given.

Power Systems Engineering 5

Lectures 2 hours per week; tutorials and laboratory sessions = 2 hours per week.

This course provides students with a good theoretical knowledge and understanding of power system analysis and operation, including hands-on power system modelling experience. Operation of electricity generation, transmission and distribution systems with increasing renewable content will be analysed using iterative methods for solving network power flow equations and simulated in a power-flow simulation software package (PowerWorld). The basic principles of power system economics (main regulatory regimes and pricing principles) will be analysed in order to combine power system analysis and economic appraisal, providing an insight and ability to estimate future developments. Technical and economic implications of transition to a low-carbon energy systems will be discussed.

Advanced Wireless Communications 5

Lectures 3 hours per week.

This course will cover the current topics of interest in Advanced Wireless Communications.

1. The wireless channel
2. Point-to-point communication: detection, diversity and channel uncertainty
3. Cellular systems: multiple access and interference management
4. Capacity of wireless channels
5. Multiuser capacity and opportunistic communication
6. MIMO I: capacity and multiplexing architectures
7. MIMO II: diversity-multiplexing trade-off and universal space-time codes

Practical examples of the above concepts are presented throughout the course.

Advanced Coding Techniques 5

Directed and independent learning approx. 10 hours per week.

This course will cover the current topics of interest in Advanced Coding Techniques. In particular information theory fundamentals related to source coding and its extension to channel capacity are studied. Rate-distortion theory and quantisation for uncorrelated and correlated signals are of particular interest.

Syllabus:

1. Scalar quantisation,
2. Asymptotic quantisation theory,
3. Vector quantisation,
4. Rate-distortion theory,
5. Channel capacity evaluations.

Practical examples of the above concepts are presented throughout the course.

Marine Energy 5

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

The seas and oceans appear to offer opportunities for the long term, cost effective, generation of energy. Waves and tidal currents represent high density energy resources which, in the case of the tides, are highly predictable in form. The wave resource, whilst not predictable in a true sense, is more easily forecast than is the wind. The engineering difficulties associated with effective exploitation of the marine resources are considerable, however. This course will guide the students through the process of understanding the resources and how to best develop and apply techniques for exploitation.

Wind Energy 5

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

Wind energy is the fast growing renewable source for electricity generation. The objective of this course is to present a broad overview of the technology covering aspects such as the history of wind turbine development, the characteristics of the wind and its impact on site selection, and the design, manufacture, and operation of modern wind turbines. The course has a practical flavour, drawing on examples from the wind turbine engineering and development sectors. The political and economic implications of wind energy are explored in the final lecture.

Modern Economic Issues in Industry 5

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course aims to develop an understanding of economic principles and apply them to current industrial issues. Topics covered include investment, Pricing, sustainability and the EU.

Solar Energy Conversion 5

Lectures 2 hours per week; tutorials and laboratory sessions = 0.5 hours per week.

This course presents and assesses the fundamentals of solar energy conversion. It starts with a discussion of the resource and the mechanisms of its propagation through the atmosphere up to the point of conversion. It then discusses the various conversion processes (solar heating/cooling, concentrated thermal power generation and the photovoltaic phenomenon). The state-of-the-art of each of these technologies is then discussed, including their market and economic aspects.

The course includes a project, for which the students working in groups, undertake the design and dimensioning of a solar energy conversion system. Their results are submitted as a group report and presented at a poster session during the last lecture of the term.

Mechanical Engineering MEng Individual Project 5

During their final year students undertake a significant piece of project work under the supervision of a member of the academic staff within the School. The duration of the project depends on the specific degree programme, but will normally span a period of several months. Students are encouraged to generate their own project outline, subject to approval from the School's Teaching Committee; alternatively students may choose to develop a project from a list of titles supplied by a member of the academic staff. Projects may also be carried out in collaboration with industry. The project is advanced through deployment of accepted engineering and research practises.

Fire Science and Fire Dynamics 4

Lectures 2 hours per week; tutorials and laboratory sessions = 3 hours per week.

This course is intended to provide the knowledge required for quantitative fire hazard analysis. Physical and chemical behaviour of combustion systems as well as the impact of fire on structures and materials will be addressed. The student will acquire skills for quantitative estimation of the different variables of fire growth. Basic principles of fire dynamics will be used to provide analytical formulations and empirical correlations that can serve as tools for design calculations and fire reconstruction. Focus will be given to the scientific aspects of fire but some basic features of fire safety engineering will be also developed.

Sustainable Energy Technologies 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course aims to provide an introduction to the engineering principles and designs underpinning key sustainable / renewable energy technologies. It is structured to familiarise students with an analytical toolkit to allow them to independently appraise such technologies and their role in the energy system.

Computational Fluid Dynamics 5

Lectures 1 hour per week; tutorials and laboratory sessions = 2 hours per week.

This module introduces CFD by means of a set of lectures covering the background physics and mathematics, together with practical assignments that use commercial CFD software to solve flow problems. The need for error control and independent validation of results is stressed throughout. Although particular software (Star-CCM+) is used for the assignments, the underlying themes of the module are generic.

Advanced Dynamics and Applications 5

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course follows from previous courses on dynamics (D3 and D4). It aims to provide the students with an advanced understanding on linear and non-linear dynamic systems for a range of applications from micro- to macro-structures. The course covers the dynamic behaviour of micro-mechanical systems (Module I), non-linear dynamic behaviour of materials and impulsive loading of structures (Module II). Teaching/learning will be focused on specific devices (i.e., micro-beams, plates and membranes) and target applications (i.e., industrial accidents, civil and military protection systems, etc.) The coursework for Module II will be the design of a specific protection system or analysis/discussion of a real case accident scenario.

Fire Safety Engineering 4

Lectures 2 hours per week.

This course introduces the student to the principles of design for the fire safety engineering of various infrastructures, mainly buildings. A variety of different aspects of design are discussed (including: flammability, detection & alarm, smoke management, fire suppression, fire resistance, egress, etc.), with particular attention to systems of classification and design applications. The course distinguishes between ‘prescriptive’ and ‘performance-based’ approaches to design, with an emphasis on the appropriate application and use of codes and standards; references will be made to more advanced methods and opportunities to use engineering analysis approaches in fire safety engineering though training on use of advanced models is outside the scope. It is intended that the course will enable the student to carry out a simple fire safety engineering design in a critical manner with due consideration to any limitations, uncertainties or conservatisms which may be present.

Engineering in Medicine 5

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course will give an introduction to the applications of engineering within medicine. This will be a wide ranging course which will provide participants with knowledge of the essentials of musculoskeletal systems of the body and the principal biomedical devices developed for these systems. Current best practise and future developments will be studied with particular focus on where engineering can make a particular impact.

Thin-Walled Members and Stability 4

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

The two segments of this course introduce advanced elements of the theory of structures. The first provides an introduction to the behaviour and algebraic analysis of thin-walled structural members; the second covers the stability of structural elements and their analysis.

The Finite Element Method 5

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

The finite element method is an indispensable tool for engineers in all disciplines. This course introduces students to the fundamental theory of the finite element method as a general tool for numerically solving differential equations for a wide range of engineering problems. Field problems described by the Laplace, and Poisson equations are presented first and all steps of the FE formulation are described. Specific applications in heat transfer and flow in porous media are demonstrated with associated tutorials. The application of the method to elasticity problems is then developed from fundamental principles. Specific classes of problems are then discussed based on abstractions and idealisations of 3D solids, such as plane stress and strain, Euler-Bernoulli and Timoshenko beams and Kirchoff and Mindlin-Reissner plates and shells. Time dependent problems and time integraton schemes are presented. Special topics such as multiple constraints, mixed formulations and substructuring are introduced. Finite element formulation for incompressible flow problems is introduced through discretisations of Euler and Navier-Stokes equations.

Oil and Gas Systems Engineering 5

Lectures 2 hours per week.

The course introduces students to the science, technology and practice of oil and gas systems engineering, the quintessence of petroleum extraction and fossil fuel production. Onshore as well as offshore reservoir and surface phenomena, production methods and equipment are analysed quantitatively with emphasis on chemistry, geology, operations and economics and the design aspect is covered by relevant team coursework.

3rd Year Informatics Options

Algorithms and Data Structures

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

The course aims to provide general techniques for the design of efficient algorithms and, in parallel, develop appropriate mathematical tools for analysing their performance. In this, it broadens and deepens the study of algorithms and data structures initiated in INF2. The focus is on algorithms, more than data structures. Along the way, problem solving skills are exercised and developed.

Computer Architecture

Lectures 2 hours per week; tutorials and laboratory sessions = 3 hours per week.

Computer architecture is about optimising the design of computer hardware and software under constraints of time, cost and power consumption. Over the years, improvements in technology and advances in computer architecture have resulted in huge increases in computer performance. This course examines the fundamentals of high-performance computer architecture and looks at how the interface between hardware and software (architecture and compiler) influences performance.

Computer Design

Lectures 2 hours per week; tutorials and laboratory sessions = 3 hours per week.

This course provides an introduction to the fundamental concepts of the different ways computers can be analysed and designed. The course does not look at the differences between machines with different types of instruction set, nor does it cover design techniques for extracting maximum performance from computers - these aspects of computer hardware are covered in the Computer Architecture course. The issues and techniques covered in the Computer Design course are relevant to the design of all computers, regardless of their particular architecture.

The course is partitioned into three sections. The short first section revises the design of combinational and sequential logic. The second section demonstrates how to analyse and design systems of the complexity of a simple CPU or I/O controller. The third section of the course covers the design of a complete computer capable of executing assembly code programs and different control strategies for performing I/O.

Computer Communications and Networks

Lectures 2 hours per week. Directed and independent learning approx. 8 hours per week

This is an introductory course on Computer Communications and Networks, focusing on fundamental concepts, principles and techniques. The course will introduce basic networking concepts, including: protocol, network architecture, reference models, layering, service, interface, multiplexing, switching and standards. An overview of digital communication from the perspective of computer networking will also be provided. Topics covered in this course include: Internet (TCP/IP) architecture and protocols, network applications, congestion/flow/error control, routing and internetworking, data link protocols, error detection and correction, channel allocation and multiple access protocols, communication media and selected topics in wireless and mobile networks. This course will also give hands-on experience in network programming using the socket API.

Computer Security

Lectures 2 hours per week. Directed and independent learning approx. 7 hours per week

Computer Security is concerned with the protection of computer systems and their data from threats which may compromise integrity, availability, or confidentiality; the focus is on threats of a malicious nature rather than accidental. This course aims to give a broad understanding of computer security. Topics include security risks, attacks, prevention and defence methods; techniques for writing secure programs; an overview of the foundations for cryptography, security protocols and access control models.

Compiling Techniques

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course describes the phases of a modern programming language compiler with an emphasis on widely-used techniques. The course project will require students to implement a complete compiler for a simple educational programming language, targeting an abstract machine such as the JVM.

Database Systems

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

Databases are essential to maintaining the information base in almost all modern business enterprises and to electronic commerce. They are also becoming increasingly important as a fundamental tool in much scientific research. Some knowledge of databases is now essential in any of these areas. The study of databases draws on several areas of computer science: logic, algorithms, programming languages and operating systems.

This course is an introduction to the principles underlying the design and implementation of databases and database management systems. It will cover the languages that have been developed for relational databases, their implementation and optimisation. It will also introduce some recent developments in databases including object-oriented, object-relational systems, semistructured data and the relationship between databases and XML. The bare essentials of transaction processing will also be covered.

Logic Programming

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course describes the connection between Horn clause logic and computation via programming. The reference point for the course is the Prolog programming language - a principal aim being to develop students' programming expertise through experience in typical applications. The course is divided into two interacting sections: a theory section and a programming section.

Operating Systems

Lectures 2 hours per week. Directed and independent learning approx. 8 hours per week.

This course provides an introduction to the design and implementation of general purpose multi-tasking operating systems. It concentrates on the kernel aspects of such systems with the emphasis being on concepts which lead to practical implementations. Throughout the course reference is made to a number of significant actual operating systems (Linux, Windows variants etc.) to illustrate real implementations.

Software Engineering with Objects and Components

Lectures 1.6 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course provides an introduction to the design and implementation of software systems using object-oriented techniques. The techniques we consider are oriented to creating component based designs. The course will review basic object-oriented techniques and how they support the creation of component based designs. We also consider the high level modelling of systems as a means of supporting the Software Engineering process. Here we study the Unified Modelling Language (UML), which provides programming language independent notations for design.

Software Testing

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This module is intended to provide in-depth coverage of software testing further to develop the introductory material covered in Informatics 2C - Software Engineering. The goal of the course is to provide students with the skill to select and apply a testing strategy and testing techniques that are appropriate to a particular software system or component. In addition the student will become a capable user of test tools; will be able to assess the effectiveness of their testing activity; and will be able provide evidence to justify their evaluation. The course will be supported by two practical exercises involving the development of appropriate tests and the application of a range of testing tools. This course is based on the IEEE Software Engineering 2004 Software Testing syllabus.

Introduction to Theoretical Computer Science

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

This course introduces the fundamental concepts of the theory of computer science: what does `computing' mean? Are all `computers' basically the same? Can we tell whether our programs are `correct' - and what does `correct' mean, anyway? Can we solve problems in reasonable time, and can we tell whether we can?

The course concentrates primarily on conceptual understanding, but adds enough detail to allow students to go on to further courses, and illustrates how the fundamental concepts are reflected throughout the discipline.

Introductory Applied Machine Learning

Lectures 2 hours per week; tutorials 4 hours per semester.

Since the early days of AI, researchers have been interested in making computers learn, rather than simply programming them to do tasks. This is the field of machine learning. The main area that will be discussed is supervised learning, which is concerned with learning to predict output, given inputs. A second area of study is unsupervised learning, where we wish to discover the structure in a set of patterns; there is no output 'teacher signal'.

The primary aim of the course is to provide the student with a set of practical tools that can be applied to solve real-world problems in machine learning, coupled with an appropriate, principled approach to formulating a solution.

Elements of Programming Languages

Lectures 2 hours per week; tutorials and laboratory sessions = 1 hour per week.

Programming languages are unique forms of communication that play a dual role: not only as ways for programmers to instruct machines, but as ways for programmers to talk to each other about computation. Paradoxically, they are among the most permanent features of the computing landscape (Fortran, for example, is still widely used 60 years since its invention), and among the most energetic and innovative, with new programming languages introduced every few months, often aiming to simplify Web programming, parallel, or distributed computing.

Although few computer scientists will ever design a new, general-purpose language like Java or C++, all computer scientists need the ability to learn new languages quickly, recognise and use (or avoid misusing) common language features, and even design new domain-specific languages for restricted problem domains. The design of programming languages involves many subtle choices and tradeoffs among performance, convenience, and elegance. This course covers the essential programming structures for managing data and controlling computation, as well as abstractions that facilitate decomposing large systems into modules. The course also covers pragmatics of programming languages, including abstract syntax, interpretation and domain-specific language implementation. You will not learn how to use any one language, but instead you will learn the basic elements you need to understand the next 700 programming languages, or even design your own.

Secure Programming

Lectures 1.6 hours per week; tutorials and laboratory sessions = 1.6 hours per week.

This course studies the principles and practices of secure programming. Secure programming means writing programs in a safe fashion, to avoid vulnerabilities that can be exploited by attackers. It also means using security features provided by libraries, such as authentication and encryption, appropriately and effectively. A range of programming platforms will be considered, ranging from low-level (e.g. Android OS), through web programming (e.g., JavaScript and Python) to high-level large-scale languages (e.g., Java). New and emerging language-based security mechanisms will be examined, including ways of specifying and enforcing security policies statically and dynamically (e.g., to enforce access controls or information flow policies).

Human-Computer Interaction

Lectures 2 hours per week, Directed and independent learning approx. 8 hours per week.

The design and implementation of efficient, effective and user friendly computer systems, including software objects and physical internet-enabled things, depends upon understanding both the technology and its users. Only then can designers be confident that these information appliances will be properly matched to the skills, knowledge and needs of their users. The study of Human-Computer Interaction (HCI) seeks to combine perspectives and methods of enquiry drawn from disciplines such as Interaction Design, Psychology and Sociology with the tools, techniques and technologies of Computer Science to create an approach to design which is both relevant and practical.

Software-Architecture, Process, and Management

Lectures 2 hours per week. Directed and independent learning approx. 8 hours per week.

This course considers the many ways in which development and maintenance of large software systems differs from that of small systems. It discusses the high level architectural decisions that may control the complexity of such systems, and the architectural degradation that leads to legacy systems. It considers the processes by which large systems can be developed and the role of managers in planning and guiding development, predicting and mitigating risks, and improving quality.

4th and 5th YEAR Informatics Options

Details of these courses can be found at this web page:

http://edin.ac/1QAv0PA

Note: The modules and programmes described in this document are meant as a guide only and therefore you might find when you are undertaking a degree programme the modules are different from that stated in this document.

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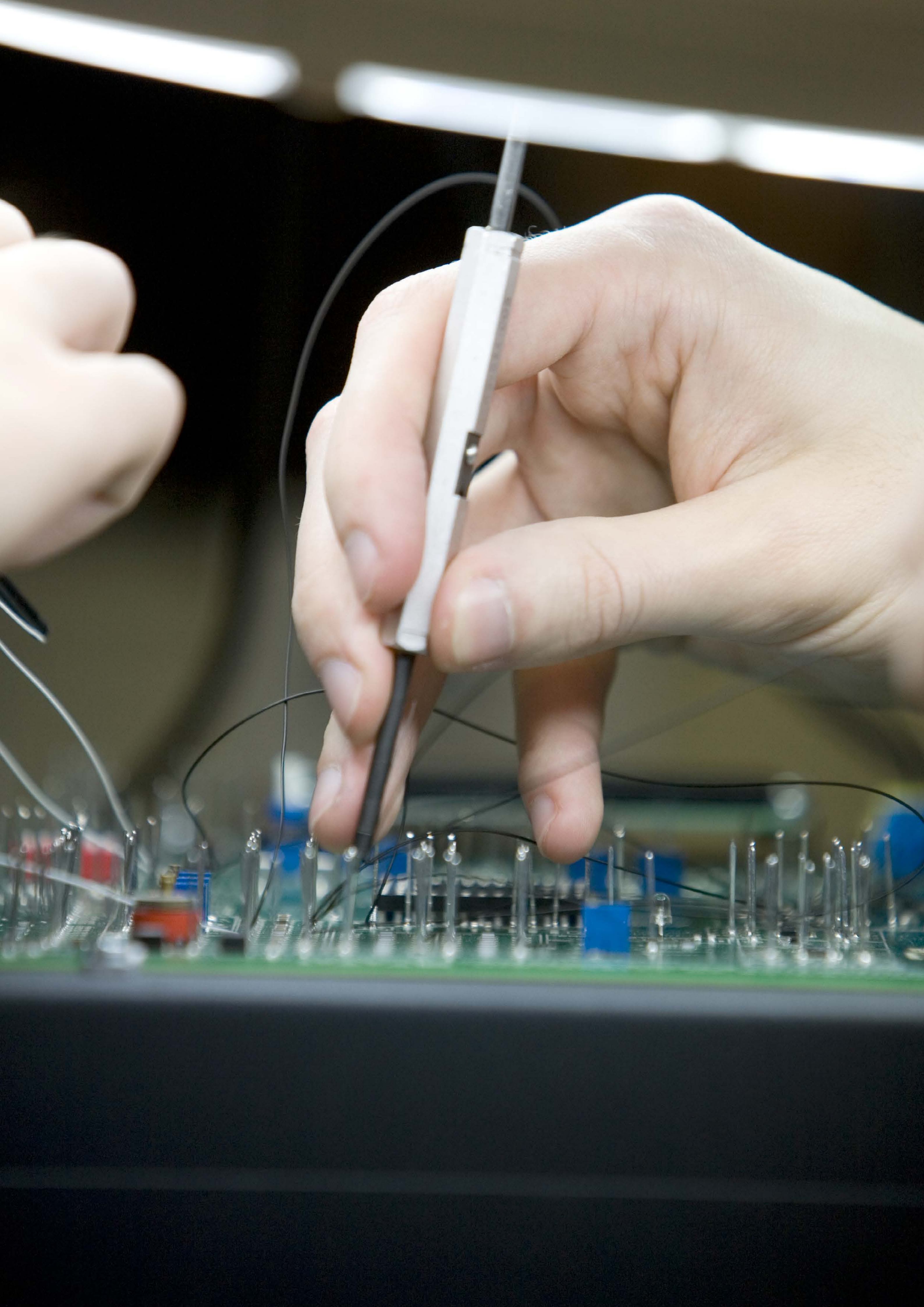
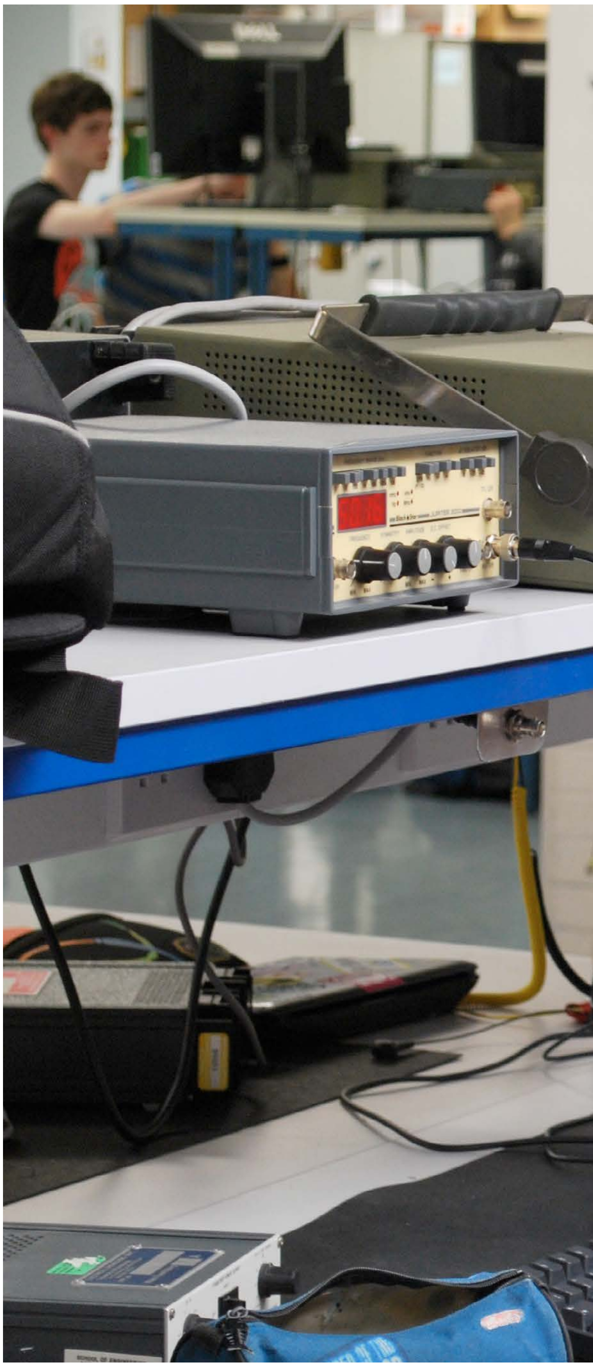
Spacelabs Healthcare

We also have links with UKESF scholarship companies found at:
http://www.ukesf.org/scholarship-scheme/sponsoring-companies





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