BEng (Hons) Communication Systems

Programme Specification

Primary Purpose:
Course management, monitoring and quality assurance.

Secondary Purpose:
Detailed information for students, staff and employers. Current students should refer to the related Course Handbook for further detail.

Disclaimer:
The University of Portsmouth has checked the information given in this Programme Specification and believes it to be correct. We will endeavour to deliver the course in keeping with this Programme Specification but reserve the right to change the content, timetabling and administration of the course whilst maintaining equivalent academic standards and quality.

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Programme Specification

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1. Named Awards

Communication Systems

2. Course Code (and UCAS Code if applicable)

H645 / C2183S

3. Awarding Body

University of Portsmouth

4. Teaching Institution

University of Portsmouth

5. Accrediting Body

IET UK-SPEC (Partial CEng)

6. QAA Benchmark Groups

Engineering

7. Document Control Information

Update May 2014

8. Effective Session

2014-15

9. Author

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10. Faculty

Faculty of Technology

11. Department

School of Engineering

12. Educational Aims

Communication systems are vital to modern society. From land and mobile phones, radio and TV broadcasting to the internet and satellite-based services, they facilitate the communication of speech, video and data signals for business, personal life, entertainment and leisure.

The first year of this degree covers analogue and digital electronics, programming, mathematics, engineering science and business. The following years lead to specialisation in more advanced subjects such as data networks and security, digital signal processing, VHDL and FPGA systems and advanced electronic systems.

An optional industrial placement year (in the UK or abroad) provides the opportunity to put acquired knowledge and ideas into practice, providing first-hand experience of industry and commerce. It can also lead to the first professional registration of EngTech.

During the final year there will be an opportunity to carry out an individual project on a specific in-depth task, which could be undertaken in industry or abroad. The school's telecoms laboratory with an RF anechoic chamber and analogue, digital and computer facilities provide a hands-on approach to learning in all subjects, supported by a dedicated teaching team.

Analytical, problem-solving and design abilities will open up a wide range of employment opportunities in areas such as terrestrial and satellite broadcasting, professional electronics, defence and mobile telecommunications.

These courses are accredited by the Institution of Engineering and Technology (IET), leading to Chartered Engineer status. Students who demonstrate upper second class potential or better at the end of year 2 (level 5) are normally offered a transfer to the parallel MEng course.

13. Reference Points

The major reference points were University of Portsmouth Curriculum Framework, the University policy on Key Skills, subjectBenchmark Statements, Framework for Higher Education Qualifications (FHEQ), QAA UK Quality Codefor Higher Education and University of Portsmouth Policy on Placement Learning. In particular the programme has been designed with the QAA's Engineering benchmark and the Engineering Council's UK-SPEC in mind.

The core elements of the engineering benchmark, interpreted in the context of electronic and communications engineering, are:

Underpinning Science and Mathematics (US): Knowledge and understanding of scientific principles and methodology appropriate to electronic and communications engineering, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current, and future developments and technologies; with particular reference to principles governing: analogue circuits and systems; digital and microprocessor systems, including hardware description languages; analogue and digital telecommunication systems; data communications and network systems. Knowledge and understanding of mathematical principles and methods appropriate to electronic design, with particular reference to methods required in analogue electronics, telecommunications and signal processing. Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own discipline.

Engineering Analysis (E): Understanding of engineering principles and the ability to apply them to analyse key engineering processes; ability to identify, classify and describe the performance of systems and components through analytical methods and modelling techniques; ability to apply quantitative methods and computer software to electronic engineering problems; understanding of and ability to apply a systems approach to engineering problems in such areas as analogue circuits and systems; digital and microprocessor systems, including hardware description languages; analogue and digital telecommunication systems, network systems.

Design (D): Creation and development of an economically viable product or system to meet a defined need. Knowledge, understanding and skills to: identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues; understanding of customer and user needs; identify and manage cost drivers; use creativity and innovation; ensure fitness for purpose for all aspects of the problem and manage the design process.

Economic, Social and Environmental Context (S): Knowledge and understanding of commercial and economic context of engineering processes; knowledge of management techniques which may be used to achieve engineering objectives, sustainable development; awareness of the framework of relevant legal requirements including personnel, health, safety, and risk (including environmental risk) issues; understanding of the need for a high level of professional and ethical conduct in engineering.

Engineering Practice (P): Solution of engineering problems to meet specified technical requirements as well as time and resource constraints. Knowledge of characteristics of particular equipment, processes, or products; workshop and laboratory
skills; engineering project management methods, including planning, monitoring, control and reporting; use of technical literature and other information sources; awareness of nature of intellectual property and contractual issues; understanding of appropriate codes of practice and industry standards; awareness of quality issues; ability to work with technical uncertainty.
Electronic design practices, including: electronic components and data sheets; use of laboratory instruments and equipment; pcb design, fabrication, assembly and test; design and proving of analogue and digital circuits.

The abbreviations in parentheses are used for cross reference purposes in the learning outcomes.

14. Learning Outcomes

A. Knowledge and Understanding of:

1. Telecommunications, data communication and networking, analogue, digital and microprocessor systems and related design techniques, digital signal processing, broadcast systems, RF engineering (US, E, D, P).
2. Appropriate mathematical methods. (US)
3. The role of computing and simulation in the solution of problems, including hardware description languages. (D, P, E)
4. Practical design of electronic and information systems. (D, P)
5. The business context of engineering: commercial, legal, contractual and statutory frameworks. (S)
6. Professional and ethical responsibility. (S)
7. (Sandwich placements) Engineering practice and the roles of engineers in industry.

Learning and Teaching Strategies and Methods

Knowledge (1, 2, and 3) is acquired through lectures, design projects, experimental work and computer laboratory work. Directed reading, study guides, tutorial questions, worked examples and design problems support individual learning. Practical design considerations (4) are learned through lectures, project work, practical exercises and simulations. The business, industrial, and professional contexts (5, 6) are mainly understood through lectures, engineering applications and group project. Sandwich students (7) learn through experience and observation on an industrial placement for one year.

Assessment

Testing of core knowledge is through a mix of unseen examinations, assignment work and tests (some of which are computer based).
Project and laboratory work are assessed by observation, logbooks and submission of reports.

B. Cognitive (Intellectual or Thinking) Skills, able to:

1. Select and apply appropriate knowledge of electronic, communication and network principles to model and analyse systems. (US, E, P)
2. Select and apply appropriate mathematical methods to model and analyse electronic systems. (E)
3. Select and apply computer-based design and simulation techniques. (P, E)
4. Design, build and test systems and subsystems to meet specified requirements. (D, P)
5. Assess electronic and computer systems from commercial and statutory viewpoints, including assessment of risks. (S)
6. Solve problems in a systematic and manageable manner. (P)

Learning and Teaching Strategies and Methods

Intellectual and analytical skills (1, 2) are developed through lectures, design and experimental work, case studies and worked examples. The ability to apply knowledge to achieve viable solutions (3, 4, and 6) is acquired through design projects and simulations. Assessment of electronics from a

commercial standpoint (5) is developed through business and application focussed lectures, and through the group project.

Assessment

Cognitive skills are assessed through examination, assignment work and project reports.

C. Practical (Professional or Subject) Skills, able to:

1. Use standard and specialist laboratory instruments, conduct experiments and report on them. (P)
2. Apply relevant mathematical methods in developing solutions to problems in electronic communications. (US, E)
3. Use computer-based simulation, design and software development tools. (D, E)
4. Design, construct, test and evaluate electronic circuits and systems. (D, P, E)
5. Search a range of sources for information pertinent to technical and professional tasks. (P)
6. Plan, manage and undertake a significant engineering project, taking into account constraints. (D,P, S)

Learning and Teaching Strategies and Methods

Experimental and project work are used to develop skills in using laboratory instrumentation (1) and in the design of circuits (4). Analytical and design exercises develop the ability to apply mathematics appropriately. Use is made of CAD systems to synthesize and evaluate complex designs (3). The ability to research, plan and manage project work (5, 6) is acquired through individual projects and group projects.

Assessment

Laboratory work, simulation work and projects are generally assessed by submission of logbooks, reports and by observation.

D. Transferable (Graduate and Employability) Skills, able to:

1. Manipulate and present information. (D, S)
2. Analyse scientific information in the solution of problems. (US, E)
3. Use information technology to handle text and data and for simulation and design. (E, D)
4. Develop solutions in a creative manner, sometimes based on inadequate information. (D, P)
5. Communicate effectively in a variety of formats. (D, S)
6. Work effectively as an individual and as part of a team to achieve goals. (D, S)
7. Communicate in a foreign language (where languages are studied as a second year option).

Learning and Teaching Strategies and Methods

The emphasis is generally on learning through individual and team-based practical and project work, through written reports and through verbal presentations (1, 2, 3, and 5). Scientific and mathematical techniques (1, 2) and familiarity with IT systems (3) are fundamental to the nature of the course. Problem solving (4) is developed through laboratory sessions and group and individual projects. Teamwork (6) is particularly developed in group project work.

Assessment

These skills are particularly assessed through individual and group design activities and projects and their associated reports and verbal presentations. The abilities to solve problems are also assessed in assignments and examinations.

15. Course Structure, Progression and Award Requirements

This is a 3 year full-time or 4 year sandwich course. It runs in parallel with an MEng course with the same title, and there are transfer opportunities between the BEng (Hons) and MEng courses at the end of year 2 (level 5).

The course consists of a mix of lectures, experimental work and design projects. It makes extensive use of the School's computer suites and electronics laboratories. Whilst the majority of units have a focus on electronic engineering and related technologies, two business oriented units cover oral and

written communications, group working, product design, ethics and environmental responsibility in a commercial context.

The course consists of 20-credit taught units, where each year consists of 120 credits. During the final year of the course there is a year long, 40-credit, project, which may be carried out within the School or in industry. Scheduled small group tutorials ensure that contact is maintained between students and their personal tutors.

The course is highly career-focused, owing to its technical content and opportunities to develop analytical and design skills. Practical work involves the use of hardware and software systems that are widely used in industry and this familiarity eases the transfer of graduates into employment. The content of the course is periodically discussed with our Industrial Advisory Board. Career education and guidance is specifically provided in a first year business focussed unit. The School has an Industrial Liaison Officer whose particular role is to maintain contact with employers, although most staff maintain good industrial and research links. The industrial placement, which is usually taken between the second and final year of a sandwich course is strongly recommended, and the School has a number of exchange arrangements, which provide overseas industrial placements.

16. Employability Statement

The course is accredited (partial CEng) by the Institution of Engineering and Technology (IET) Careers material at level 4 is derived from that produced centrally by the University's careers service. Alongside this, students are introduced to commercial and business topics throughout the course to provide the employment context for their studies. Students are also expected to build and maintain a professional development record, which reflects the professional development guidelines (www.pd-how2.org) of four key professional bodies. It includes the University's personal development profiling activities, but, more importantly, builds a clear evidence base for the student's technical and professional competence. The requirements of PDR are delivered within the two business units, ENG400, Writing and research in the workplace and ENG500, Group design project. It is also supported as part of the small group tutorial system.

The optional sandwich year is highly career focused and students are given help in identifying placements through the Student Placement and Employability Centre and through the School's Industrial Liaison Officer.

The School operates an Industrial Advisory Board (IAB)

17. Support for Student Learning

The Course is managed by a Course Leader who is responsible for all aspects of course design and delivery across all years of study.

- Extensive induction programme introduces the student to the University and their course.
- Students are visited during the placement year, and required to maintain a logbook of work experiences gained.
- Each student has a personal tutor, responsible for pastoral support and academic guidance.
- University support services include careers, financial advice, housing, counselling etc.
- The Academic Skills Unit (ASK).
- The Additional Support and Disability Advice Centre (ASDAC).
- Excellent laboratory, computer and network suites.
- Excellent library facilities.
- The University of Portsmouth has consistently been awarded an excellent rating for student support and guidance in a number of Quality Assurance Agency inspections.
- Student course and unit handbooks provide information about the course structure and University regulations etc.
- Key Skills opportunities are incorporated into all units.

- Feedback is provided for all assessments.
- Personal Development Planning (PDP) for all awards.

18. Admissions Criteria

A. Academic Admissions Criteria

Standard University rules apply but in addition a UCAS tariff of 260-300 points, to include 2/3 A levels in Mathematics and Science/Technology subjects. Grade “C” or higher in GCSE Mathematics and English.

Other qualifications are accepted including access courses and equivalent overseas awards.

B. Disability

The University makes no distinction in its admissions policy with regard to disability and will endeavour to make all reasonable adjustments in order to make it possible for students to study at Portsmouth on a course of their choice.

19. Evaluation and Enhancement of Standards and Quality in Learning and Teaching

A. Mechanisms for Review and Evaluation

- Course Leader’s Annual Standards and Quality Evaluative Review.
- Head of School’s Annual Standards and Quality Evaluative Review.
- Unit and Course Level student feedback considered at Board of Studies.
- Unit Assessment Board consideration of student performance for each programme.
- Annual Standards and Quality Reports to Board of Studies, including consideration of Subject and Award External Examiner Reports.
- Monitoring of work placements against programme learning outcomes by Industrial Liaison Officer and visits from personal tutor.
- Periodic Programme Review.
- Student Representatives and Student/Staff Consultative Committees.
- National Student Survey.
- Staff Performance and Development Review.
- Peer Review and Development Framework.
- Faculty Learning and Teaching Committee.

B. Responsibilities for Monitoring and Evaluation

- Unit Co-ordinators for unit content and delivery.
- Course Leader for day-to-day running of course.
- Student Voice Co-ordinator to oversee student surveys, student representation and their involvement in quality assurance and enhancement.
- Board of Studies with overall responsibilities for operation and content of course.
- Head of School.
- Associate Dean (Academic).
- Associate Dean (Students).
- Quality Assurance Committee.
- Unit, Award and Progression Board of Examiners.

C. Mechanisms for Gaining Student Feedback

- Student Representation on Board of Studies.
- Student Staff Consultative Committees.

- Unit and Course level student feedback questionnaires.
- University participates in external student surveys, eg National Student Survey (NSS), Postgraduate Research Experience Survey (PRES) and International Student Barometer (ISB).

D. Staff Development Priorities

- Academic staff undertake activities related to research, scholarship, teaching and learning and student support and guidance.
- Annual staff performance and development reviews match development to needs.
- Managers undertake a variety of management development programmes.
- All academic staff encouraged to seek Higher Education Academy membership.
- Academic staff new to teaching required to undertake Initial Professional Development Programme (iPROF).
- Support Staff are encouraged to attend short courses in areas such as minute taking, and specific IT packages.
- The School is an IET Academic Partner

20. Assessment Strategy

The students are exposed to a wide variety of assessment methods at all levels, encompassing such methods as traditional closed-book examinations, open-book examinations, computer based tests, video and oral presentations, programming and design projects, reports, on-line course work in a Wiki based environment, and laboratory experiments. In many areas of the curriculum - encompassing both hardware and software related assessment, and particularly in areas of electronics project based learning - the students are also assessed via log book records of their activities. This has the advantages of developing the students' professional practice, encouraging early and continuous engagement with the subject material, and affording opportunities for informal feedback on their work. The students also undertake assessment as individuals, in pairs, or in small groups as appropriate to the nature of the material being assessed.

There is a significant amount of practical work in the course, and the culmination of the students learning results in the final year individual project.

21. Assessment Regulations

Standard university rules apply (see Assessment and Regulations).

Interpretation of Marks in Classification
Standard university rules apply. The Academic Regulations must be consulted for a full description It is an IET accreditation requirement that, where final year units are passed after referral or repeat assessment, the mark obtained at the original attempt must be used in determining the degree classification. The School has Academic Council Approval for this variation to normal University regulations.

Placement Year
The School has Academic Council approval to manage and assess the optional placement year as a 40-credit level 5 unit. These credits are additional to those required for a full-time award and are assessed on a pass/fail basis.

22. Role of Externals

Subject External Examiners who will:

- oversee unit assessment and usually attend Unit Assessment Boards;
- review unit assessment strategy;
- sample assessment artefacts;
- present report to Unit Assessment Boards.

Award External Examiners (usually also a Subject External Examiner) who will:

- oversee and attend Award/Progression Boards;
- scrutinise and endorse the outcomes of assessment;
- ensure that the standard of the award is maintained at a level comparable with that of similar awards elsewhere in the United Kingdom.

23. Indicators of Standards and Quality

A. Professional Accreditation/Recognition

The course is accredited for CEng under UK-SPEC by the Institution of Engineering and Technology (IET).

B. Periodic Programme Review (or equivalent)

The School of Engineering was the subject of a periodic programme review for the provision which was previously in the Department of Electronic and Computer Engineering, on 11th December 2012. The outcome was that the curriculum was confirmed as being fit for purpose and the annual monitoring and review processes were found to be effective.

C. Quality Assurance Agency

QAA Institutional Audit, December 2008, 'broad confidence' (for full report see QAA Institutional Audit: University of Portsmouth 2008).

D. Others

The University of Portsmouth has Investors in People recognition.
The School of Engineering is an IET Academic Partner

24. Other Sources of Information

Other sources of information may be found in

- Course Approval Document.
- Student Handbook.
- University of Portsmouth Curricula Framework.
- University of Portsmouth Undergraduate Prospectus.
- Assessment Regulations.
- University of Portsmouth (http://www.port.ac.uk/) and (http://www.port.ac.uk/departments/academic/eng/) website.
- Course Unit Tables

Unit Assessment Map

UNITS						COURSEWORK				EXAMINATION			
Level	Name	Code	Credit	Delivery	Core/ Option	Total %	Type of Artefact	Duration/ Length	Weighting %	Total %	Open/ Closed	Duration (hrs)	Weighting %
4	Writing and research in the workplace	ENG400 U21383	20	YR	C	100%	Peer Review		30%				
							Portfolio	3000 words	70%				
4	Mathematical Principles	ENG410 U21384	20	YR	C	30%	CBT		30%	70%	Closed	1.5hr	70%
4	Engineering sciences	ENG411 U21385	20	YR	C	20%	Design/Build Experiment Report	Demonstrated in weeks 22-24 1000 words	20%	80%	Open	1.5hrs	80%
4	Introduction to algorithms and programming	ENG421 U21387	20	YR	C	50%	Coursework	1500 words together	25%	50%	Closed	1hr	50%
							Coursework		25%				
4	Introduction to Analogue Circuits	ENG430 U21388	20	YR	C	40%	Autumn Laboratory		17%	60%	Closed	1.5hr	60%
							Spring Laboratory		17%				
							Logic Probe design, make and test		6%				
4	Principles of Digital Systems	ENG431 U21389	20	YR	C	40%	PBL	Continuously assessed design projects	40%	60%	Closed	1.5hrs	60%
5	Group design project	ENG500 U21399	20	YR	C	100%	Peer Review		20%				
							Group Design Portfolio	4000 words	80%				
5	Engineering Mathematics	ENG510 U21400	20	YR	C	100%	Supervised Coursework		100%				
5	Analogue Analysis and Design	ENG530 U21402	20	YR	C	40%	PBL		20%	60%	Closed	2hrs	60%
							PBL		20%				
5	Microcontrollers and Programmable Logic	ENG531 U21403	20	YR	O	40%	PBL	Continuously assessed	40%	60%	Closed	2hrs	60%

5	Data Networks, Protocols and Analysis	ENG541 U21391	20	YR	C	30%	CBT 1 (TB1)		10%	70%	Closed	2hrs	70%
							CBT 2 (TB2)		20%				
5	Analogue and Digital Communications	ENG543 U21392	20	YR	C	20%	Coursework	3hr Lab	10%	80%	Open	2hrs	80%
							Coursework	3hr Lab	10%				
5	Network simulation and design techniques	ENG555 U21398	20	YR	O	70%	Coursework	3000 words	70%	30%		20mins	30%
5	IWLP	IWLP various	20	YR	O								
5	Placement Learning	WBL540	40	YR	O	100%	Coursework (Project)	5000 words					
6	Individual Bachelor's project	ENG600 U21399	40	YR	C	100%	Project	8000 – 10000 words	100%				
6	Advanced Electronic Systems	ENG630 U21413	20	YR	C	40%	Laboratory Exercises	9 weeks	20%	60%	Closed	2hrs	60%
							Supervised Coursework	1 hr	20%				
6	VHDL and FPGA Systems	ENG631 U21414	20	YR	C	100%	PBL Coursework	2000 words	40%				
							PBL Coursework	2000 words	60%				
6	Transmission Techniques and Broadcasting	ENG641 U21416	20	YR	C	20%	Laboratory Exercise	3 hr	10%	80%	Closed	2hrs	80%
							Laboratory Exercise	3 hr	10%				
6	Digital Signal Processing	ENG642 U21417	20	YR	C	40%	CBT	1hr	20%	60%	Closed	2hrs	60%
							Laboratory Experiments	Continuously Assessed	20%				

Unit Learning Outcomes Map[1]

UNITS						LEARNING OUTCOMES																						
Level	Name	Code	Credit	Delivery	Core/ Option	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6
4	Writing and research in the workplace	ENG400 U21383	20	YR	C					Y	Y											Y		Y		Y		Y	
4	Mathematical Principles	ENG410 U21384	20	YR	C		Y						Y						Y										
4	Engineering sciences	ENG411 U21385	20	YR	C																								
4	Introduction to algorithms and programming	ENG421 U21387	20	YR	C			Y									Y			Y					Y	Y			
4	Introduction to Analogue Circuits	ENG430 U21388	20	YR	C	Y			Y			Y	Y	Y	Y		Y	Y	Y	Y	Y	Y		Y	Y	Y	Y		Y
4	Principles of Digital Systems	ENG431 U21389	20	YR	C	Y			Y			Y			Y		Y	Y			Y	Y			Y		Y		Y
5	Group design project	ENG500 U21399	20	YR	C				Y	Y	Y				Y	Y	Y	Y		Y	Y	Y		Y	Y	Y	Y	Y	Y
5	Engineering Mathematics	ENG510 U21400	20	YR	C		Y						Y						Y										
5	Analogue Analysis and Design	ENG530 U21402	20	YR	C	Y						Y	Y		Y		Y	Y	Y		Y				Y				
5	Microcontrollers and Programmable Logic	ENG531 U21403	20	YR	O	Y		Y				Y		Y	Y		Y	Y		Y	Y				Y				
5	Data Networks, Protocols and Analysis	ENG541 U21391	20	YR	C	Y						Y	Y						Y	Y		Y			Y				Y
5	Analogue and Digital Communications	ENG543 U21392	20	YR	C	Y	Y					Y	Y					Y	Y						Y				
5	Network simulation and design techniques	ENG555 U21398	20	YR	O	Y		Y	Y	Y		Y		Y	Y	Y		Y	Y	Y	Y				Y				

[1] A = Knowledge and Understanding; B = Cognitive (Intellectual) Skills; C = Practical (Subject Specific) Skills; D = Transferable Skills

5	IWLP	IWLP various	20	YR	O																								D7
5	Placement Learning	WBL540	40	YR	O						A7																		
6	Individual Bachelor's project	ENG600 U21407	40	YR	C	Y			Y						Y		Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y
6	Advanced Electronic Systems	ENG630 U21413	20	YR	C	Y	Y		Y			Y	Y		Y			Y	Y						Y				
6	VHDL and FPGA Systems	ENG631 U21414	20	YR	C	Y		Y				Y		Y	Y			Y		Y					Y	Y			
6	Transmission Techniques and Broadcasting	ENG641 U21416	20	YR	C	Y			Y			Y	Y				Y								Y				
6	Digital Signal Processing	ENG642 U21417	20	YR	C	Y	Y	Y				Y	Y	Y					Y					Y	Y				