Royal Holloway, University of London
Course specification for an undergraduate award
BENG ELECTRONIC ENGINEERING (HH61)

Section 1 – Introduction to your course

This course specification is a formal document, which provides a summary of the main features of your course and the learning outcomes that you might reasonably be expected to achieve and demonstrate if you take full advantage of the learning opportunities that are provided. Further information is contained in the University prospectus, and in various handbooks, all of which you will be able to access online. Alternatively, further information on the University's academic regulations and policies can be found here. Further information on the University's Admissions Policy can be found here.

Your degree course in BEng Electronic Engineering provides progressive structures in which you are able to broaden your knowledge and understanding, and appropriate skills in Electronic Engineering enabling you to graduate ready for employment in industry. The course contains a combination of mandatory modules in Electronic Engineering introducing you to the theoretical knowledge and practical skills relevant to professional practice, with a range of stage three specialist options such as renewable energy systems, smart transportation, voice and music technologies, human factors and healthcare engineering.

The structure in stage one and two encourages you to work in teams, and in stage three to develop your own interests through informed choice among specialist options. In stage three you will be required to produce an individual project from conception through to production. Your degree courses at Royal Holloway, University of London, will be delivered over three years, each of which normally involves modules to the value of 120 credits (which is equivalent to 60 ECTS credits[1]).

While Royal Holloway keeps all the information made available under review, courses and the availability of individual modules, especially optional modules are necessarily subject to change at any time, and you are therefore advised to seek confirmation of any factors which might affect your decision to follow a specific course. In turn, Royal Holloway will inform you as soon as is practicable of any significant changes which might affect your studies.

The following is a brief description for some of the most important terminology for understanding the content of this document:

Degree course – May also be referred to as 'degree programme' or simply 'programme', these terms refer to the qualification you will be awarded upon successful completion of your studies.
Module – May also be referred to as 'course', this refers to the individual units you will study each year to complete your degree course. Undergraduate degrees at Royal Holloway comprise a combination of modules in multiples of 15 credits to the value of 120 credits per year. On some degree courses a certain number of optional modules must be passed for a particular degree title.

[1] The European Credit Transfer and Accumulation System (ECTS) is a learner-centred system for credit accumulation and transfer. ECTS credits reflect the total workload required to achieve defined learning outcomes and their associated workload, including teaching hours and guided independent study. 15 UK credits is equivalent to 7.5 ECTS. 30 UK credits is equivalent to 15 ECTS. Further details on ECTS can be found within the ECTS User Guide 2015.

Section 2 – Course details			
Date of specification update	April 2024	**Location of study**	Egham Campus
Course award and title	BEng Electronic Engineering	**Level of study**	Undergraduate
Course code	3034	**UCAS code**	HH61
Year of entry	2027/28	**Language(s) of Tuition**	English
Awarding body	Royal Holloway, University of London		
Department	Physical Sciences and Engineering	**Other departments involved in teaching the course**	N/A
Mode(s) of attendance	Full-time	**Duration of the course**	3 years
Accrediting Professional, Statutory or Regulatory Body requirement(s)	Institution of Engineering and Technology. In order to receive a degree accredited by the IET, students need to pass the modules designated as mandatory non-condonable in section 3.1 and have a maximum of 30 credits of condonable fails at the end of their studies. Students who do not meet the requirements for an IET accredited degree at the end of stage three, will normally exit with a BEng in Electronics.		
Link to Coursefinder for further information:	https://www.royalholloway.ac.uk/studying-here/	**For queries on admissions:**	https://royalholloway.ac.uk/applicationquery

Section 3 – Degree course structure					
3.1 Mandatory module information **The following table summarises the mandatory modules which students must take in each year of study**					
Year	**Module code**	**Module title**	**Credits**	**FHEQ level**	**Module status (Mandatory Condonable MC or Mandatory Non-Condonable MNC)**
1	EE1000	Embedded Systems Creative Team Project 1	30	4	MC
1	EE1010	Programming in C++	15	4	MC
1	EE1020	Electronic Circuits and Components	15	4	MC
1	EE1030	Communications engineering	15	4	MC
1	CS1840	Internet Services	15	4	MC
1	EE1110	Mathematics for Engineers 1	15	4	MC
1	EE1120	Mathematics for Engineers 2	15	4	MC
2	EE2000	Embedded Systems Creative Team Project 2	30	5	MC
2	EE2010	Software Engineering	15	5	MC
2	EE2020	Signals, Systems and Communications	15	5	MC
2	EE2040	Control Engineering	15	5	MC
2	EE2060	Electronic Materials and Devices	15	5	MC
2	EE2070	Analogue Electronic Systems	15	5	MC
2	EE2080	Professional and Sustainable Engineering	15	5	MC
3	EE3000	Individual Project	30	6	MNC
3	EE3010	Digital Signal Processing Design	15	6	MC

3	EE3030	Principles of Engineering Management	15	6	MC
3	EE3070	Digital Systems Design	15	6	MC
3	EE3080	Advanced Communication Systems	15	6	MC

This table sets out the most important information for the mandatory modules on your degree course. These modules are central to achieving your learning outcomes, so they are compulsory, and all students on your degree course will be required to take them. You will be automatically registered for these modules each year. Mandatory modules fall into two categories: 'condonable' or 'non-condonable'.

In the case of mandatory 'non-condonable' (MNC) modules, you must pass the module before you can proceed to the next year of your course, or to successfully graduate with a particular degree title. In the case of mandatory 'condonable' (MC) modules, these must be taken but you can still progress or graduate even if you do not pass them. Please note that although Royal Holloway will keep changes to a minimum, changes to your degree course may be made where reasonable and necessary due to unexpected events. For example: where requirements of relevant Professional, Statutory or Regulatory Bodies have changed and course requirements must change accordingly, or where changes are deemed necessary on the basis of student feedback and/or the advice of external advisors, to enhance academic provision.

3.2 Optional modules

In addition to mandatory modules, there will be a number of optional modules available during the course of your degree. Although Royal Holloway will keep changes to a minimum, new options may be offered or existing ones may be withdrawn. For example, where reasonable and necessary due to unexpected events, where requirements of relevant Professional, Statutory or Regulatory Bodies (PSRBs) have changed and course requirements must change accordingly, or where changes are deemed necessary on the basis of student feedback and/or the advice of External Advisors, to enhance academic provision. There may be additional requirements around option selection; please contact the Department for further information.

In stage 3 you must choose 30 credits of optional modules at FHEQ level 6 (EE30XX, IY3XXX or CS3XXX).

Section 4 - Progressing through each year of your degree course

For further information on the progression and award requirements for your degree, please refer to Royal Holloway's Academic Regulations.

Progression throughout the year/s is monitored through performance in summative or formative coursework assignments. Please note that if you hold a Student Visa and you choose to leave (or are required to leave because of non-progression) or complete early (before the course end date stated on your CAS), then this will be reported to UKVI.

All first year undergraduate students are required to take and pass the non-credit bearing Moodle-based Academic Integrity module SS1001 in order to progress into the second year of study (unless their course includes the alternative mandatory SS1000 module). The pass mark for the module assessment is stated in the on-line Academic Integrity Moodle module. Students may attempt the assessment as often as they wish with no penalties or capping. Students who meet the requirements for progression as stipulated in the University's Undergraduate Regulations (Section: Conditions for progression to the next stage) but fail to pass the Moodle-based Academic Integrity module will not be permitted to progress into their second year of academic study at the University.

Part-time study – a stage may be spread over two years of study; in each part-time year you will follow modules to the value of 60 credits.

Stage 1a (Year 1)
EE1110 Mathematics for Engineers 1
EE1120 Mathematics for Engineers 2
EE1020 Electronic Circuits and Components
CS1840 Internet Services

Stage 1b (Year 2)
EE1000 Embedded Systems Creative Team Project 1 (Term 1)
EE1000 Embedded Systems Creative Team Project 1 (Term 2)
EE1010 Programming in C++
EE1030 Communications Engineering

Stage 2a (Year 3)
EE2010 Software Engineering
EE2060 Electronic Materials and Devices
EE2070 Analogue Electronic Systems
EE2080 Professional and Sustainable Engineering

Stage 2b (Year 4)
EE2000 Embedded Systems Creative Team Project 2 (Term 1)
EE2000 Embedded Systems Creative Team Project 2 (Term 2)
EE2020 Signals, Systems and Communications
EE2040 Control Engineering

Stage 3a (Year 5)
EE3010 Digital Signal Processing Design
EE3030 Principles of Engineering Management
EE3070 Digital Systems Design
EE3080 Advanced Communication Systems

Stage 3b (Year 6)
EE3000 Individual Project (MNC)
+30 credits of optional modules

Section 5 – Educational aims of the course

The aims of this course are:

- to engage you imaginatively in the process of learning through creative hands-on group and individual project based activities, enabling you to develop independent critical thinking and judgement;
- to encourage you to appreciate how electronic engineering is the heart of many systems used on a daily basis, including mobile communications, computers, transport systems, energy systems, medical applications, domestic appliances, TV, radio, music studios and gaming devices;
- to equip students with the technical knowledge, practical skills and confident verbal and written communication abilities that are key to successful industrial team working in electronic engineering;
- to produce graduates that fully meet the demands required for employment in industry;
- to develop an understanding of working in groups ;
- to prepare you to present reasoned verbal and written arguments in a confident manner; gain experience in the application of creativity in solving engineering problems;
- to encourage an awareness of environmental and social issues, investigating new materials and using them in ways that have a beneficial effect on humanity.

Section 6 - Course learning outcomes

In general terms, the courses provide opportunities for students to develop and demonstrate the following learning outcomes. (*Categories – Knowledge and understanding (K), Skills and other attributes (S), and Transferable skills (*)*)

Course learning outcome	Level 4	Level 5	Level 6
1: Apply knowledge of science, mathematics, and engineering principles. Select and apply appropriate analytical tools to engineering problems. (1*, 2*)	1.4.1: Implement scientific and mathematical processes using programming tools. 1.4.2: Use a range of mathematical and statistical techniques to solve engineering problems.	1.5.1: Analyse complex mathematical problems related to signals, systems, and communications engineering. 1.5.2 Select suitable analytical tools to solve problems in analogue electronics and control engineering.	1.6.1: Design complex mathematical solutions to engineering problems in digital signal processing design. 1.6.2: Evaluate appropriate analytical tools to solve complex problems in communications systems.

	1.4.3: Apply analytical techniques to fundamental engineering problems.		
2: Analyse engineering problems using relevant tools, technical literature and computational techniques to solve complex problems (3, 4*)	2.4.1: Apply relevant computational techniques to solve engineering communication problems. 2.4.2: Use relevant technical literature relevant to internet services and communication technology.	2.5.1: Differentiate relevant technical literature related to electronic materials and devices. 2.5.2: Select appropriate computational techniques for the analysis of problems in sustainable engineering showing an awareness of their limitations.	2.6.1: Determine relevant tools and techniques to solve complex digital system designs. 2.6.2: Evaluate computational tools to solve complex problems in digital signal processing.
3: Design integrated solutions for complex problems that meet a combination of societal needs (5*, 6)	3.4.1: Develop integrated solutions to complex engineering specifications using relevant technologies. 3.4.2: Integrate original engineering solutions showing an awareness of health and safety, and commercial matters.	3.5.1: Select and apply original solutions to meet customer needs in team project work. 3.5.2 Integrate different sub-systems to solve complex problems in analogue electronic systems.	3.6.1: Create integrated solutions to complex engineering problems though the major individual project. 3.6.2: Design solutions for complex problems in digital signal processing and communication systems technology.
4: Evaluate the environmental, societal and ethical impact of solutions to complex problems and minimise adverse impacts (7*, 8)	4.4.1: Reflect on environmental, societal and ethical impact of solutions to problems encountered in engineering project development.	4.5.1: Evaluate environmental, societal, ethical impact and lifecycle of solutions to problems in professional and sustainable engineering.	4.6.1: Reflect on the environmental, societal and ethical impact during the major individual project. 4.6.2: Evaluate the product lifecycle within the major individual project.
5: Assess risks and uncertainty, making reasoned choices informed by professional codes of conduct. Adopt a holistic and proportionate approach to the mitigation of risks (9, 10)	5.4.1: Reflect on potential risks using a risk management approach within the team project context.	5.5.1: Identify potential risks using a risk management approach within the team project context.	5.6.1: Evaluate and mitigate risk and effects of uncertainty in engineering management. 5.6.2: Reflect on the cyber-security risks inherent in internet connected devices in information security.
6: Function effectively as an individual, and as a member or leader of a team. Adopting an inclusive approach to engineering practice and recognise the benefits of supporting equality, diversity and inclusion. (11, 16*)	6.4.1: Show responsibility and self-awareness when working as a member of a team. 6.4.2: Demonstrate an inclusive approach to teamwork and recognise diversity among peers.	6.5.1: Assess yourself and your peers fairly when working as a member of a team in software engineering. 6.5.2: Recognise the diverse needs of a team and integrate inclusivity among peers in team project work.	6.6.1: Critique your own work in context of the team whilst solving problems in engineering.

7: Use practical laboratory and workshop skills to investigate complex problems. Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations. (12, 13)	7.4.1: Undertake practical laboratory work to show knowledge of electronic engineering circuits. 7.4.2: Select appropriate electronic devices and equipment to solve electronic and communications engineering problems.	7.5.1: Select appropriate components and tools in practical lab work to solve complex engineering problems. 7.5.2: Differentiate specific electronic materials and devices and be aware of their limitations.	7.6.1: Evaluate and judge effective application of materials and equipment during the major individual project. 7.6.2: Design experiments to investigate complex problems in the major individual project using practical technologies and processes whilst identifying their limitations.
8: Apply knowledge of quality management and continuous improvement. Apply knowledge of engineering management principles, in a commercial context, project and change management. (14, 15)	8.4.1: Show project solutions improvements during creative team project development.	8.5.1: Demonstrate quality management and continuous improvement in the software engineering development cycle.	8.6.1: Evaluate engineering management principles and processes in a commercial context. 8.6.2: Reflect on the process of continuous improvement in the major individual project.
9: Communicate effectively on complex engineering matters with technical and non-technical audiences. Plan and record self-learning and development as the foundation for lifelong learning/CPD. (17*, 18)	9.4.1: Use logbooks and formal reports to communicate complex engineering problems. 9.4.2: Engage with the professional bodies to develop a foundation for lifelong learning.	9.5.1: Develop effective communication of complex engineering problems through combination of oral presentations and formal reports. 9.5.2: Demonstrate and plan professional development through ethical case studies and formal reports.	9.6.1: Generate a coherent structured formal report on complex engineering matters within the major individual project. 9.6.2: Create a professional logbook of progress throughout the year as a record of self-learning.

Section 7 - Teaching, learning and assessment
Teaching and learning on your course is closely informed by the active research of staff, particularly in the areas of Electronic Engineering. In general terms, the course provides an opportunity for you to develop and demonstrate the learning outcomes detailed herein. Teaching and learning is mostly by means of lectures; seminars; study groups; essay consultations; oral presentations and guided independent study. Assessment of knowledge and understanding is typically by formal examinations, coursework, examined essays, translation exercises, online tests and exercises, oral presentations and the dissertation or long essay. In addition, students may be involved in workshops and may produce various forms of creative or editorial work. Contact hours come in various forms and may take the form of time spent with a member of staff in a lecture or seminar with other students. Contact hours may also be laboratory or, studio-based sessions, project supervision with a member of staff, or discussion through a virtual learning environment (VLE). These contact hours may be with a lecturer or teaching assistant, but they may also be with a technician, or specialist support staff. The way in which each module on your degree course is assessed will also vary. Assessments designated as 'summative' will receive a mark which will count towards your overall mark for the module, and potentially your degree classification, depending on your year of study. On successful completion of the module you will gain the credits listed. More detailed information on modules, including teaching and learning methods, and methods of assessment, can be found via the online Royal Holloway Curriculum Catalogue. The accuracy of the information contained in this document is reviewed regularly by the university, and may also be checked routinely by external agencies.

Section 8 – Additional costs
There are no single associated costs greater than £50 per item on this degree course.
These estimated costs relate to studying this particular degree course at Royal Holloway. General costs such as accommodation, food, books and other learning materials and printing etc., have not been included, but further information is available on our website.

Section 9 – Indicators of quality and standards	
QAA Framework for Higher Education Qualifications (FHEQ) Level	4-6
Your course is designed in accordance with the FHEQ to ensure your qualification is awarded on the basis of nationally established standards of achievement, for both outcomes and attainment. The qualification descriptors within the FHEQ set out the generic outcomes and attributes expected for the award of individual qualifications. The qualification descriptors contained in the FHEQ exemplify the outcomes and attributes expected of learning that results in the award of higher education qualifications. These outcomes represent the integration of various learning experiences resulting from designated and coherent courses of study.	
QAA Subject benchmark statement(s)	http://www.qaa.ac.uk/quality-code/subject-benchmark-statements
Subject benchmark statements provide a means for the academic community to describe the nature and characteristics of courses in a specific subject or subject area. They also represent general expectations about standards for the award of qualifications at a given level in terms of the attributes and capabilities that those possessing qualifications should have demonstrated.	

Section 10– Intermediate exit awards (where available)		
You may be eligible for an intermediate exit award if you complete part of the course as detailed in this document. Any additional criteria (e.g. mandatory modules, credit requirements) for intermediate awards is outlined in the sections below.		
Award	**Criteria**	**Awarding body**
BEng in Electronics	To be awarded a BEng Electronic Engineering accredited by the IET you must meet the specific award requirements set out in the undergraduate academic regulations. In summary, this means that by the end of your degree course in BEng Electronic Engineering you must have either passed 360 credits or have passed 345/330 credits and have condoned fails in the remaining 15/30 credits. If you do not meet these requirements but otherwise meet the University's standard requirements for an honours award, you will be eligible for a BEng Electronics as an exit award.	Royal Holloway, University of London

Diploma in Higher Education (DipHE)	Pass in 210 credits of which at least 90 must be at or above FHEQ Level 4 and at least 120 of which must be at or above FHEQ Level 5	Royal Holloway and Bedford New College
Certificate in Higher Education (CertHE)	Pass in 120 credits of which at least 90 must be at or above FHEQ Level 4	Royal Holloway and Bedford New College