COURSE SPECIFICATION:
Core Award Data

Graduate Apprenticeship in BEng (Hons) Engineering: Instrumentation, Measurement and Control

VALIDATION DATE

06 June 2018

AWARDING INSTITUTION

The Robert Gordon University

INSTITUTION OF DELIVERY

The Robert Gordon University

COURSE ACCREDITED /RECOGNISED/ APPROVED BY

None.

COURSE ACCREDITATION / RECOGNITION /APPROVAL

None.

AWARDS

Stage 1

Higher Apprenticeship in Cert HE Engineering: Instrumentation, Measurement and Control (120 credits at SCQF Level 7)

Stage 2

Higher Apprenticeship in Dip HE Engineering: Instrumentation, Measurement and Control (120 credits at SCQF Level 8)

Stage 3

Graduate Apprenticeship in BEng Engineering: Instrumentation, Measurement and Control (120 credits at SCQF Level 9)

Stage 4

Graduate Apprenticeship in BEng (Hons) Engineering: Instrumentation, Measurement and Control (120 credits at SCQF Level 10)

AWARD TYPE

Undergraduate

MODES OF STUDY

Blended Learning (Full Time)

DURATION OF COURSE

Four years

LANGUAGE OF STUDY

English

LANGUAGE OF ASSESSMENT

English

JACS CODE

H600 Electronic and Electrical Engineering

RELEVANT QAA SUBJECT GROUP

Engineering

DATE OF PRODUCTION / REVISION

10 May 2018 – Version 1

INTRODUCTION TO THE COURSE

Graduate Apprenticeships provide work-based learning opportunities for employees and have been created by Skills Development Scotland in partnership with industry and the Further and Higher education sector. Graduate Apprenticeships combine academic knowledge with work-based learning to enable students to become more effective and productive in the workplace. They provide a new way into degree-level study for individuals who are currently employed, and afford the opportunity to undertake degree study whilst working and earning for those individuals who may otherwise have sacrificed Secondary or Further education to enter full-time work. They enable employers to develop their workforce and support staff to build their skills to industry and professional standards. Since Graduate Apprenticeships are designed around the needs of industry, employers can have confidence that what staff are learning will directly contribute to the success of the business. As they are in continuing employment, students can directly apply academic learning to workplace situations, thus truly bringing their studies to life.

The BEng (Hons) Engineering: Instrumentation, Measurement and Control covers a broad variety of topics relevant to practice as a professional engineer working in instrumentation, measurement and control, process control engineering and commissioning engineering. This includes theoretical underpinning from foundation mathematics, electronics, and physics, supporting real-world considerations such as actual industry scenarios, international and industrial standards, and serves to develop lifelong learning skills that students will need to stay abreast of the rapidly evolving technologies in instrumentation

and control.

Through the work-based learning approach offered in Graduate Apprenticeships, and with the School of Engineering's close ties to industry, this course is uniquely placed to offer students industry-relevant content and real-world experience with a strong emphasis on control and metering topics. The School already benefits from a wealth of experience in delivering Online Distance Learning (ODL) courses, which will be leveraged in supporting the delivery of course content for the Graduate Apprenticeship.

This course has been designed to fully embrace the principles of work-based learning. The course will be delivered over four years with apprentices undertaking 120 credits per year over 12 months. Learning in the workplace will be used to make use of workplace tasks that the apprentice undertakes. The course embraces the principles of work-based learning throughout since all modules will include elements of learning that will be gained directly in the workplace. This encourages the student to reflect on their personal development and they are expected to use an e-portfolio to record their professional and personal development. In addition, it is anticipated that students will undertake the majority of their learning and assessment-related activities in the workplace.

Students will draw on their work-based learning experience, and be given opportunities to develop a wide range of knowledge, understanding, and skills. This is made possible through the bespoke personal learning plan each apprentice develops in collaboration with their Workplace Mentor and academic supervisor. The learning plan will outline the workplace-specific manner in which the learning outcomes for the modules will be achieved by the apprentice, with the support of their Workplace Mentor.

EDUCATIONAL AIMS OF THE COURSE

The purpose of the BEng (Hons) Engineering: Instrumentation, Measurement and Control is to provide students with a practical industry relevant qualification integrated with an understanding of general engineering, measurement principles, and classical and modern control theory, instrumentation, industrial automation sensing and measurement systems for monitoring and control and safety applications. This knowledge will be reinforced with the opportunity to develop strong personal, interpersonal, team working and project management skills enabling apprentices to become professional engineers equipped to perform effectively in the engineering workplace.

Specifically, graduates of the course will possess the following attributes:

- The ability to design, install, commission and maintain control and safety instrument systems including troubleshooting as part of a lifecycle maintenance programme including adherence to national and international standards;
- A thorough grounding in the principles, technology and practices of measurement, with an emphasis on the specification, installation, operation and asset lifecycle management of the common types of instrumentation used in industry;
- Knowledge of the range and use of analytical methods available for the design, specification, manufacture, and monitoring of instrumentation and control systems;
- The ability to apply principles of modelling, classical and modern control concepts and controller design packages in various areas of industry;
- An all-round knowledge of instrumentation and measurement systems including remote sensing, and their application, as well as current technological developments and applications to local, regional and global problems;
- The ability to design technical flow diagrams with computer-assisted engineering and

design software for plant related process control, and instrumentation systems;
- A strong theoretical understanding in measurement principles, enabling the apprentice to respond positively to technological development and innovations;
- An awareness and appreciation of the practical issues involved in the application of theoretical principles to solving real-world problems within the context of instrumentation, measurement, and control;
- The ability to utilise modern, industrially-relevant condition-monitoring and data acquisition systems.

The Graduate Apprenticeship student journey differentiates itself from the traditional course of study in that students will be employed for the entire four-year duration of their educational journey. Their employment environment affords them a unique opportunity to take full advantage of work-based learning opportunities, appreciate the relevance of theoretical learning, and open up future career opportunities with their employer. Activities within the employing organisation are coordinated to reflect the content of the modules in which students are enrolled, and are designed to provide the practical application of the theory received through academic learning. The work-based learning within the course aims to offer a new learning experience to meet the needs of both the individuals and employers. This will play a role in achieving the aspiration of the Scottish Government to see a culture of real partnership between employers and education and increasing skill levels in the workforce. This is entirely in keeping with the commitments of the University to 'provide stimulating programmes to anticipate and meet education and skills needs'; to 'strengthen partnerships further with employers and professions in design and delivery models to ensure relevant skills and capabilities' and 'to connect students and industry through enhanced work-related activities'.

LEARNING OUTCOMES

In order to assist understanding of the learner journey, the following information presents a breakdown of the principal skills and abilities which students are required to develop over the duration of the course.

Overall Learning Outcomes

The purpose of the Graduate Apprenticeship in BEng (Hons) Engineering: Instrumentation, Measurement and Control is to provide the student with graduate level expertise in modelling, classical and modern control concepts and controller design packages used in industry. In addition, the student will gain the skills to apply this knowledge to the requirements of modern organisations including an all-round knowledge of instrumentation and measurement systems including remote sensing as well as current developments and applications to local, regional and global problems.

Skills Development Scotland (SDS) produced a Framework which has formed the basis for the development of this course with each of the modules. The Mapping Document, situated at the end of this document, illustrates which module addresses each of the overarching outcomes from the Framework.

At all stages of the course students will be developed via the following general aims:

- To equip students with a range of analytical skills used in engineering applications;
- To provide students with required understanding of engineering principles to cope

adequately with technological change;

- To develop students' ability to contribute to the specification, design, testing, commissioning, modification, manufacture and maintenance of engineering systems both generally and within the context of an employer's business;
- To make students aware of the ethics, social, economic and environmental impact of engineering;
- To extend, enhance and improve the judgement of the student in decision making by extension of analytical, creative and intellectual skills;
- To develop the students' interpersonal skills to enable effective communication and team working and operate within project management roles;
- To integrate the course with students' experiential learning and training as part of an apprenticeship with their employers;
- To develop students' ability to apply principles of modelling, classical and modern control concepts and controller design packages in various areas of industry;
- To provide students with an all-round knowledge of instrumentation and measurement systems including remote sensing, and their application, as well as current technological developments and applications to local, regional and global problems;
- To develop the students' interpersonal skills to enable effective communication and team working and operate within project management roles;
- To develop students' ability to design technical flow diagrams with computer-assisted engineering and design software for plant related process control, and instrumentation systems;
- To develop students' understanding of how to manage projects (including preparing cost, human resource, material and duration estimates) for installing brand new or upgrading industrial instrumentation, measurement and control equipment efficiently, ethically and safely;
- To integrate a work-based learning culture to deepen and broaden the academic understanding within the context of employer focussed activities.

The course is designed to allow students to demonstrate developing skills on a number of themes as they progress through the modules. This is loosely based on the notion of a spiral curriculum where fundamentals are revisited at increasing levels of complexity and depth.

An example of this are the project themes that underpin many of the modules throughout the programme. In the initial stages, i.e. Stage 1 of the course, students are working under supervision whereas by Stage 3 they are interacting collegiately and by Stage 4 they are fully autonomous. This is demonstrated by successful completion of their individual project.

The following Scottish Credits and Qualifications Framework (SCQF) learning outcomes describe the characteristics of the students i.e. what a student is expected to know and be able to do if they have taken full advantage of the opportunities for learning provided by the course.

These characteristics can be identified within each stage of the course:

Stage 1: SCQF 7

Characteristic 1: Knowledge and Understanding

The student will be able to:

- Demonstrate an understanding of the basic concepts of electrostatic and electromagnetism, and select suitable solutions for design problems;
- Demonstrate an overall appreciation of the body of knowledge, main theories, concepts and principles of instrumentation, measurement and control, and ability to integrate principles and theories;
- Demonstrate an overall appreciation of the foundation theories, concepts and principles of classical and modern control theory, instrumentation, industrial automation, sensing and measurement systems for monitoring, control and safety applications;
- Understand assembly drawings and demonstrate necessary practical skills to complete an engineering build project.

Characteristic 2: Practice: Applied Knowledge, Skills and Understanding

The student will be able to:

- Use appropriate mathematical methods, electrical circuit principles and network theorems to model and analyse AC and DC electrical circuits;
- Set up and use appropriate workplace instruments to design, build, wire, test and evaluate the behaviour and performance of practical electrical/electronic circuits;
- Manipulate mathematical expressions to solve engineering problems.
- Assemble, commission and verify a control loop;
- Analyse, interpret, and produce detailed and relevant documentation for verification of a control loop;
- Write software for and construct simple interface-based microcontroller systems and observe, record, and interpret their operation.

Characteristic 3: General Cognitive Skills

The student will be able to:

- Seek, review and consolidate new knowledge and skills to develop practical solutions to a diverse range of problems;
- Describe the principles of, and analyse electric and magnetic circuits;
- Understand concepts of engineering sciences including statics, dynamics, thermofluids and chemistry;
- Practice good teamwork coordination.

Characteristic 4: Communication, ICT and Numeracy Skills

The student will be able to:

- Describe programmable logic controllers, microcontrollers, and industrial computer systems and explain their principles of operation;
- Understand and apply differential and integral calculus and select and apply appropriate calculus techniques to solve engineering problems;
- Perform appropriate mathematical operations to solve differential equations;

- Use computer algebra packages to aid in obtaining solutions to engineering problems;
- Make concise, engaging and well-structured oral presentations using relevant presentation media products.
- Use mathematics to solve engineering problems;
- Apply vectors to problems in engineering mathematics and use standard techniques of differentiation and integration and apply them to problems in engineering.

Characteristic 5: Autonomy, Accountability and Working with Others

The student will be able to:

- Keep detailed written records of a project and present information on a project in oral and visual form and carry out a product demonstration;
- Work under guidance with qualified practitioners;
- Make informed judgement on issues based on critical reflection;
- Demonstrate the ability to follow safe working procedures accurately;
- Understand the importance of applying effective work habits and leadership; providing clarity, direction and accountability and acting when necessary.

Stage 2: SCQF 8

Characteristic 1: Knowledge and Understanding

The student will be able to:

- Describe the concept of open and closed loop control, system modelling, PID control, SISO and MIMO control systems;
- Explain further embedded systems;
- Demonstrate basic principles of signal transmission and communication methods;
- Interpret electrical signal transmission systems and cable designs;
- Describe basic concepts relating to feedback control, PID and other types of controller, output responses and stability.

Characteristic 2: Practice: Applied Knowledge, Skills and Understanding

The student will be able to:

- Use sensors and physical principles of measurement, signal transmission, SCADA and IT security and telemetry;
- Apply partial differentiation techniques to problems in engineering;
- Apply Laplace transform methods to problems involving simple linear systems;
- Apply Fourier series techniques to periodic signals.

Characteristic 3: General Cognitive Skills

The student will be able to:

- Review and report on the project outcomes against a specification document;
- Document work activities to enable maintainability of the solution and ensure protection of intellectual property;
- Interpret a requirements document for an embedded control application;

- Give and receive feedback constructively applying appropriate techniques and incorporate it into their own development.

Characteristic 4: Communication, ICT and Numeracy Skills

The student will be able to:

- Perform calculations using Laplace, Fourier and Wavelet correlation;
- Be fluent in written communications and report writing with the ability to articulate complex issues;
- Calculate and understand simple statistics and probability theory;
- Solve first and second order differential equations and carry out partial differentiation;
- Apply series and transforms to engineering problems.

Characteristic 5: Autonomy, Accountability and Working with Others

The student will be able to:

- Deal with competing interests within and outside the organisation;
- Review and report on the project outcomes against the original specification document;
- Work effectively as a member of a project group, evaluate possible solutions to a problem and select the best approach;
- Understand how teams work effectively to produce engineering technology solutions and be able to work effectively with others including those of different disciplines.

Stage 3: SCQF 9

Characteristic 1: Knowledge and Understanding:

The student will be able to:

- Explain the concepts of non-linear control system modelling;
- Describe batch and semi-batch process control, sequential control, state-machines &and digital control schemes;
- Develop knowledge of analysers and be able to select and apply them;
- Follow the engineering processes and standards for the development of safe process control systems for batch and continuous processes;
- Describe the executive functions of fire and gas systems and the inter-relationship with process control systems.

Characteristic 2: Practice: Applied Knowledge, Skills and Understanding

The student will be able to:

- Identify the role and responsibilities of the project manager in different organisational settings and explain the requirements for successful team-working and the characteristics of a leader;
- Design, implement and evaluate the selected solution to a problem, produce a well-structured project and make a presentation as part of a project group;
- Critically analyse HAZID, HAZOP and LOPA outcomes and apply them to safety instrumented systems and emergency shutdown systems;
- Critically discuss the executive functions of fire and gas systems and the inter-relationship with process control systems.

Characteristic 3: General Cognitive Skills

The student will be able to:

- Be creative, self-motivated and self-aware and able to reflect on successes and failures in ways that strengthen their positive attitude and develop their self-reliance;
- Be able to evaluate the outputs from and apply insights to using personal profiling information;
- Critically appraise different instrument selection and design for measurement methodologies;
- Carry out project planning and a basic economic and environmental impact evaluation of a project.

Characteristic 4: Communication, ICT and Numeracy Skills

The student will be able to:

- Identify applicability and limitations of modelling and simulation techniques to the dynamics of processes;
- Describe and analyse a range of types of valves and actuators and their operating characteristics;
- Review and evaluate the various means by which organisations manage health and safety;
- Identify and assess risk, and explain how risk can be managed.

Characteristic 5: Autonomy, Accountability and Working with Others

The student will be able to:

- Identify preferences, motivations, strengths and limitations of other people and apply these insights to work more effectively with and to motivate others;
- Design, implement and evaluate the selected solution to a problem;
- Produce a well-structured project and present complex information as part of a project group;
- Demonstrate an understanding of the concepts and theories of human behaviour and basic psychological models, their application to team working and relevance to project management;
- Understand how teams work effectively to produce engineering technology solutions and be able to work effectively with others including those of different disciplines.

Stage 4: SCQF 10

Characteristic 1: Knowledge and Understanding

The student will be able to:

- Critically appraise the principles of operation management, quality management, quality assurance and international standards;
- Describe the application of advanced control and estimation techniques to process control systems;
- Describe and specify process simulators, fluid dynamics, fuzzy logic and artificial neural networks in control, robotics & automation control.

Characteristic 2: Practice: Applied Knowledge, Skills and Understanding

The student will be able to:

- Analyse real time data and use computer modelling to improve the efficiency of production processes;
- Analyse, design and implement digital signal processing systems;
- Select and apply appropriate control techniques to various difficult process control applications;
- Critically discuss the theoretical basis of current management thinking and the need for a scientific approach to management theory;
- Synthesise and critically evaluate solutions to engineering problems using computational intelligence based digital systems.

Characteristic 3: General Cognitive Skills

The student will be able to:

- Work with minimal guidance, identify and classify principles and complex ideas;
- Plan and manage inspection and maintenance schedules, including procurement provision;
- Critically appraise issues in managing change;
- Critically reflect on and apply the principles of business economics and project finance in a real world context.

Characteristic 4: Communication, ICT and Numeracy Skills

The student will be able to:

- Process, evaluate, interpret and graphically illustrate a wide range of data;
- Produce a well-structured final project report, incorporating and justifying all aspects of the project work and defend the work in an oral presentation;
- Demonstrate awareness of the importance of socially responsible management to an engineer's professional development; by identifying societal issues within engineering projects;
- Show understanding of a range of standards and strategies which may inform socially responsible management practice, and evaluate their relative strengths and weaknesses;
- Produce a well-structured final project report, incorporating and justifying all aspects of the project work and defend the work in an oral presentation.

Characteristic 5: Autonomy, Accountability and Working with Others

The student will be able to:

- Behave professionally and communicate effectively;
- Produce appropriate project specification, management and review documentation; maintain a logbook;
- Manage projects for installing or upgrading industrial instrumentation, measurement and control equipment;
- Describe quality management and international standards;
- Assess challenges and opportunities for initiating sustainable and socially responsible practice across the full supply chain;

- Evidence ability to communicate non-technical issues relevant to engineering clearly;
- Plan and manage a major technical engineering research project;
- Undertake a major investigative task, using initiative, imagination and creativity; carry out detailed and comprehensive critical analysis of the outcomes.

A mapping of learning outcomes is provided in the Core Award Data document.

DISTINCTIVE FEATURES OF COURSE

Robert Gordon University Graduate Apprenticeships will share institutional Graduate Apprenticeship characteristics; therefore course design will:

- optimise candidate time within the workplace;
- be flexible, enabling students to participate in the course and student experience whilst not bound to a physical campus;
- include meaningful and substantial employer engagement from the outset;
- use innovative teaching, learning and assessment methods;
- support the development of reflective practitioners, equipped to excel in their field and add value to their employers;
- ensure that the professional practice of learners is informed and enhanced by expert technical and theoretical knowledge;
- combine work-based learning, the latest thinking within the field, and work-related/ centric assessments to produce graduates equipped with valuable skills and knowledge.

The Graduate Apprenticeship model of achieving a degree through work-based learning has been designed such that:

- In contrast to the traditional student journey, Graduate Apprenticeship students will be employed for the entire duration of the course, and the course will be designed to integrate their course learning outcomes with suitable workplace projects in collaboration and partnership with their employer. The development of transferable skills will also be supported throughout the course via course content, assessment, and work-based learning.
- The course will utilise the technology investment that the University has made in lecture capture and Virtual Learning Environment (VLE) delivery providing the student with a cutting edge experience.
- Graduate Apprenticeships have been developed specifically to address government desire for programmes which support regional economic development by tackling recognised skill shortages and in furtherance of government youth strategy.
- Despite a number of initiatives to encourage wider access, there are still many young people who would rather go into employment, rather than delaying their earning potential by investing in full-time, higher education. A work-based learning degree programme makes university education available to these people by taking high level learning into the workplace.

Additionally the development of a stream of work-based learning degrees is in line with key strategic aims of the University, particularly to:

- Inspire all individuals to achieve their maximum potential and excel in the world of tomorrow.
- Enable individuals to achieve their ambitions throughout life whatever their circumstances.
- Support students and graduates to enjoy and prosper within a vibrant learning community.
- Contribute to and be an active leader in the development of the regional community.

Employers are closely involved with the specification and delivery of work-based learning activities to support the learning and development of students. Workplace Mentors appointed by the employer, and supported by the University, will work with students to create individual learning plans which outline the shadowing, observation, training, work activities and project opportunities which students will undertake in the workplace. These learning plans will be reviewed by the University to ensure that the required employer contextualisation is appropriate.

The course adopts a practical approach to developing students' professional skills; for example employing group discussion activities within course workshops to foster leadership, listening, and communication skills, and requiring students to deliver presentation and reports as a means of further refining their professional skillset. Within the work-based learning environment, students will continue their professional development as they enhance planning and negotiation skills via development of their learning plan in conjunction with their Workplace Mentor and engage in practical activities designed to further their professional skillset. The knowledge and insights gained across the University and work-based learning environment, coupled with the active role students are expected to take in planning and executing their own learning, will act to supports the students' overall professional enrichment.

The course is taught by a team of staff who have extensive industrial and commercial experience in instrumentation, engineering principles and measurement and control processes. Activities undertaken by students will be those that have direct relevance to industry, often in the workplace itself.

WHAT THE COURSE INVOLVES

The four-year Graduate Apprenticeship in BEng (Hons) Engineering: Instrumentation, Measurement and Control is an industry focused degree route, where students work full-time for a partner employer while studying towards a fully accredited degree. The course combines workplace training with a programme of education designed to meet students' career ambitions. The core curriculum is focused on applying the principles of instrumentation, measurement and control coupled with a "flipped-classroom" approach to work-based learning developed through ongoing collaboration between University staff, Workplace Mentors, and line managers in the workplace.

Students will carry out work relating to the instrumentation and control of equipment and processes in the workplace and this can contribute to credit towards the modules.

Learning support materials are provided through the VLE which includes a range of equipment such as video and distance learning technologies as well as online interaction.

Where appropriate, modules use technologies such as computer-mediated formative assessment to bring interactivity and immediacy to the teaching and learning process. Additionally, there will be opportunities for the student to attend on-campus events to allow face-to-face interaction with staff and peers, participate in group activities with peers and this will contribute to the overall student experience. Arrangements for these on-campus events will be determined in liaison/partnership with employers and stakeholders will be advised well in advance to facilitate attendance.

Staff will support students engaged in problem solving from an academic and/or theoretical perspective, while Workplace Mentors will guide students in the application of theory to workplace scenarios. University staff will undertake visits to the student's place of work in order to observe the work-based learning environment and discuss the student's progress with the Workplace Mentor.

This combination of blended academic study will allow the student to contextualise learning immediately within their workplace thereby developing their understanding and enhancing and their contribution to organisational effectiveness.

PROFESSIONAL EXPERIENCE / PLACEMENT

Students enrolled on the course are employed by a collaborating partner organisation while studying for the degree. Employers may provide a series of internal placements within their organisations as part of the student's learning plan where it would be beneficial for the student to spend time within a department other than their own to gain specialist skills and knowledge and where this can be supported by their employer.

OPPORTUNITIES FOR FURTHER STUDY

An Honours degree achieved with at least an upper second classification (2.1) will normally provide access to postgraduate and doctoral programmes in UK higher education institutions.

EXTERNAL AND INTERNAL INDICATORS OF QUALITY AND STANDARDS

In October 2016 the QAA (Quality Assurance Agency for Higher Education) issued an Interim Statement on Degree Apprenticeships confirming the final UK-wide statement will be in keeping with the existing suite of characteristics statements within Part A of the UK Quality Code for Higher Education. The QAA further state the Quality Code is a key reference point for setting the academic standards and assuring the quality of apprenticeships involving a higher education qualification. Subsequently, in May 2017 the QAA published its paper 'Quality Assuring Higher Education in Apprenticeships: Current Approaches'. This document highlights considerations for higher education providers in relation to standards and quality and extrapolates relevant guidance from the UK Quality Code. Whilst the document does not constitute formal QAA guidance, its contents have informed the University's approach to the design and delivery of all Graduate Apprenticeships.

QAA published engineering Benchmarks (2015) outlining the standards expected for the award of Honours Degrees in Instrumentation, Measurement and Control.

ACADEMIC REGULATIONS

This course is governed by the provisions of the University's Academic Regulations, which are available at **www.rgu.ac.uk/academicregulations**. In particular:

Regulation A1: Courses
Regulation A2: Admission
Regulation A3: Section 1: Student Appeals (Awards and Progression) Procedure
Regulation A3: Section 2: Student Misconduct Procedure
Regulation A4: Assessment and Recommendations of Assessment Boards

Applicants must satisfy the University's general admission requirements for undergraduate and postgraduate courses as contained in *Academic Regulation A2: Admission*, including proficiency to a minimum standard in the English language. Specific entry requirements for this course are detailed below.

Entry Requirements and Qualifications

Employment: All applicants must be employed in a full-time position, relevant to their course of study and have the right to live and work in Scotland. An applicant's employer must be committed to and involved in the provision of a suitable workplace environment, coupled with supportive workplace learning guidance and mentoring to create a suitable workplace environment in which the student will be able to obtain the necessary experience and learning outcomes. Employers must be willing to formally partner with the University via a Collaboration Agreement which sets forth the obligations of each party.

Subject specific qualifications: SQA Higher: BBBB to include Maths and either Engineering Science, Physics or Technological Studies. English at National 5 grade C or above is required if not held at Higher.

Experiential equivalencies:
First year entry: For those applicants who do not meet our Standard Course Entry Requirements, applications may be considered from those who possess 1 year of relevant work experience, where the applicant has demonstrated the development of key skills evidenced through a detailed CV.

Advanced entry: Advanced entry may be considered for those who have minimum 3 years relevant work experience and where the applicant has demonstrated the development of key skills evidenced through a detailed CV.

The above are broad standards provided to guide applicants who do not meet our Standard Course Entry Requirements, however in all cases admission decisions rest with the University and the relevance, breadth and depth of employment experience will be taken into consideration.

Alternative qualifications: Applications are welcomed from those with equivalent qualifications to those stated, including Foundation Apprenticeships (SCQF 6), SVQs/NVQs, access programmes and overseas qualifications. Applications from students with non-standard qualifications or work experience will be considered on an individual basis.

Advanced entry: Applicants who are interested in applying for advanced (or flexible)

entry will be considered on an individual basis, applications may be based upon prior education and/or professional experience. A relevant HNC or HND from one of our partner colleges will be considered for entry into Year 2 or 3. Attention is drawn to the University's process for Recognition of Prior Learning (RPL).

English language requirements: All applicants whose first language is not English are required to have an Academic IELTS (International English Language Testing System) minimum score of 6.0. Appropriate equivalents will be considered.

Course Specific Academic Regulations

Honours classification is based solely on performance in Stage 4 of the course.

Due to the sequential delivery of the modules and the scheduling of the Assessment Board, students will be allowed one re-assessment opportunity for modules 1-3 prior to the Assessment Board each year.

SOURCES OF FURTHER INFORMATION

- Further information about Degree Apprenticeships in Scotland can be found at the Skills Development Scotland Apprenticeships website:

  https://www.Apprenticeships.scot/

- The Robert Gordon University Graduate Apprenticeship information made available to employers and prospective students can be found at:

  http://www.rgu.ac.uk/business-services/graduate-Apprenticeships

- Further information about the undergraduate programme in the School of Engineering can be found at the school website:

  http://www.rgu.ac.uk/subjects/engineering

- Library resources can be accessed via the Library web portal:

  https://www.rgu.ac.uk/staff-and-current-students/library

- Advice for student about study and welfare issues is found at the Student Advice and Support portal:

  https://www.rgu.ac.uk/student-life/student-advice-and-support/student-advice-and-support

- Links to the Academic Regulations governing the course can be accessed at:

  http://www.rgu.ac.uk/academicregulations

A number of external sources were consulted in the process of curriculum development for the Graduate Apprenticeship in BEng (Hons) Engineering: Instrumentation and Control:

- Skills Development Scotland Graduate Apprenticeship subject frameworks are available at:

https://www.skillsdevelopmentscotland.co.uk/publicationsstatistics/publications/?page=1&area[]=14&order=date-desc

- For reference, the Modern Apprenticeship Program is available at:

http://www.sqa.org.uk/sqa/35912.html

EQUALITY AND DIVERSITY

A specific ambition of government and Skills Development Scotland is that Foundation, Modern and Graduate Apprenticeships will help to achieve social mobility and inclusivity. The approach taken by the University in respect of flexible admissions requirements, a commitment to helping partner employers ensure equal opportunity, study skills support for learners from the point of induction, innovative curriculum design and delivery and work-related/centric assessment is supportive of these ambitions.

The University has a strong commitment to the active promotion of equality across its functions, including its course provision. To this end the University has developed an inclusivity statement which articulates the University's desire to strive towards creating a working, learning and social atmosphere which is inclusive, harmonious and respectful of diversity. The University has also developed an equality and diversity policy and every two years publishes a mainstreaming report, including equality outcomes, which explains how the University is developing and implementing its inclusivity statement. At a course level, course leaders monitor and comment on equalities data through the annual appraisal process. Through this process any significant trends in equalities data are highlighted. Further information can be found at:

www.rgu.ac.uk/about/equality-and-diversity

All Schools have a nominated School Contact who can advise on the requirements of the course and the range of course-specific reasonable adjustments that may be made. The current School Contacts are available from:

www.rgu.ac.uk/studentservices/disability/page.cfm?pge=7853

The University's Disability and Dyslexia Service provides support for students, details of which may be found at: **www.rgu.ac.uk/disability**

NOTE

This document constitutes one of two course documents that should be read together:
Course Specification: Core Award Data
Course Specification: Student Learning Experience

CONTACT DETAILS

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In compiling this information the University has taken every care to be as accurate as possible, though it must be read as subject to change at any time and without notice. The University reserves the right to make variations to the contents or methods of delivery of courses, to discontinue, merge or combine courses, and to introduce new courses.

DETAILED COURSE STRUCTURE

Modules are delivered sequentially on an individual basis in 10-week learning blocks.

Blended Learning			
Stage 1		*CREDITS*	*LEVEL*
EN1100	Fundamentals of Engineering Practice	30	7
EN1101	Foundation Mathematics and Science	30	7
EN1103	Electrical and Electronic Design Principles	30	7
EN1104	Introduction to Industrial Control	30	7
	Total for Stage:	**120**	

Blended Learning			
Stage 2		*CREDITS*	*LEVEL*
EN2104	Linear Control Systems	30	8
EN2105	Engineering Mathematics and Signals	30	8
EN2106	Sensor Networks and Data Transfer	30	8
EN2107	Embedded Control Design Project	30	8
	Total for Stage:	**120**	

Blended Learning			
Stage 3		*CREDITS*	*LEVEL*
EN3103	Workplace-Related Group Project	30	9
EN3104	Process Control Systems	30	9
EN3105	Project and Safety Management	30	9
EN3106	Metrology and Industrial Installations	30	9
	Total for Stage:	**120**	

Blended Learning			
Stage 4		*CREDITS*	*LEVEL*
EN4103	Honours Project (Graduate Apprenticeship)	30	10
EN4104	Advanced Control Methods	30	10
EN4105	Quality Management and Industrial Standards	30	10
EN4106	Process Control and Automation	30	10
	Total for Stage:	**120**	

COURSE STRUCTURE DIAGRAM

SCQF Framework

The course structure is based on the Scottish Credit and Qualifications Framework (SCQF). The Framework comprises 12 Levels of which Levels 7-10 are directly relevant to the course, as shown below. Students generally enter University education from secondary school at Level 7 although this may not be the case for this course. Honours Degree awards are at Level 10. The table also shows:

- The credit standards required at each stage of the course;
- The number of years of study in the workplace supported by the School of Engineering to complete the award.

Structure of Graduate Apprenticeship in BEng (Hons) Engineering: Instrumentation, Measurement and Control	Award / Exit Award	Scottish Credit + Qualifications Framework	Minimum level + Credit Requirements	Number of years study to complete the course in the workplace
Stage 1	Higher Apprenticeship in Cert HE Engineering: Instrumentation, Measurement and Control	SCQF level 7	120 credits (Minimum of 90 credits at SCQF 7)	**1 (Full-time)**
Stage 2	Higher Apprenticeship in Dip HE Engineering: Instrumentation, Measurement and Control	SCQF level 8	240 credits (Minimum of 90 credits at SCQF 8)	**2 (Full-time)**
Stage 3	Graduate Apprenticeship in BEng Engineering: Instrumentation, Measurement and Control	SCQF level 9	360 credits (Minimum of 90 credits at SCQF 9)	**3 (Full-time)**
Stage 4	Graduate Apprenticeship in BEng (Hons) Engineering: Instrumentation, Measurement and Control	SCQF level 10	480 credits (Minimum of 90 credits at SCQF 10)	**4 (Full-time)**

STAGE 1		**Stage 1 Exit Award**
EN1100	Fundamentals of Engineering Practice	Higher Apprenticeship in Cert HE Engineering: Instrumentation, Measurement and Control
EN1101	Foundation Mathematics and Science	
EN1103	Electrical and Electronic Design Principles	
EN1104	Introduction to Industrial Control	
STAGE 2		
EN2104	Linear Control Systems	Higher Apprenticeship in Dip HE Engineering: Instrumentation, Measurement and Control
EN2105	Engineering Mathematics and Signals	
EN2106	Sensor Networks and Data Transfer	
EN2107	Embedded Control Design Principles Project	
STAGE 3		
EN3103	Workplace-Related Group Project	Graduate Apprenticeship in BEng Engineering: Instrumentation, Measurement and Control
EN3104	Process Control Systems	
EN3105	Project and Safety Management	
EN3106	Metrology and Industrial Installations	
STAGE 4		
EN4103	Honours Project (Graduate Apprenticeship)	Graduate Apprenticeship in BEng (Hons) Engineering: Instrumentation, Measurement and Control
EN4104	Advanced Control Methods	
EN4105	Quality Management and Industrial Standards	
EN4106	Process Control and Automation	

COURSE SPECIFICATION:
Student Learning Experience

ROBERT GORDON UNIVERSITY ABERDEEN

Graduate Apprenticeship in BEng (Hons) Engineering: Instrumentation, Measurement and Control

STUDENT LEARNING EXPERIENCE

The University's vision is to be a disruptive educational innovator, developing a distinctive university model. To achieve this ambition, the University has committed to:

- Achieve high graduate employability;
- Cultivate student success;
- Enrich the student experience;
- Drive research excellence to support stakeholders;
- Offer innovation-driven solutions;
- Prioritise societal and economic impact

The University believes a professional education starts with excellent teaching and research within a supporting environment, and is about a lifelong and sustainable approach to working and living. The University's portfolio is informed by its commercial and public sector partners, who are instrumental in helping to develop courses to ensure their relevance for the evolving economy and society. Many courses include practical experience and placements, and are professionally accredited. These contribute to the University's position as one of the UK's top universities for graduate employment, and industry connections and engagement.

By combining the best of both academic and professional worlds, the University aims to give its students the best possible start to their careers. A degree from Robert Gordon University is confirmation to a future employer that a graduate from Robert Gordon University will possess an effective blend of learning, skills and experience.

The introduction of the Graduate Apprenticeship model is a natural development of the University's philosophy to combine theory, practice and experience in developing the skills, knowledge, confidence and professional practice of its students.

The principles of work-based learning are core to the philosophy of each Graduate Apprenticeship course at Robert Gordon University. It is fundamental to the Graduate Apprenticeship courses that students have access to relevant and up-to-date theory as they approach practical workplace situations and problems. Encountering theory and practice simultaneously will enable the student to critically analyse each in conjunction with the other. This will embed a rounded knowledge base and develop the ability to question situations while seeking a range of opinions in forming solutions to challenges.

Working in conjunction with learning will also enable students to develop the soft skills necessary in an ever-changing work-place. This means that the student will develop not only the knowledge and skills required for the technical aspects of their career but also the

ability to operate in the work-place and communicate effectively with internal and external parties.

Most of the practical aspects of the course take place in the student's workplace and will therefore vary according to the nature and resources of the student's employing organisation.

In addition, the resources of the School of Engineering are available to the student and support the teaching staff attached to the course.

TEACHING AND LEARNING STRATEGY

The institutional teaching and learning strategy for Graduate Apprenticeships is characterised by a commitment to ensuring a genuine interaction between theoretical and work-based learning. This is supported by a pedagogical approach which embraces and makes use of experiential learning where experiences framed by reflection lead to learning (Schon, 1983) and andragogy where adult learners understand the need to learn something and self-direct their learning process via a negotiated learning plan. Specifically students are encouraged to identify learning opportunities, consider the learning objectives associated with these and reflect upon these experiences to consolidate and apply learning. With regard to work-based learning activities, employers are guided in the identification of suitable activities and projects, and Workplace Mentors are supported in aiding students to reflect on and capture learning from the workplace and encourage the unification of knowledge and experience from the work and university spheres.

The Learning Process: Teaching Strategy and Methods

The course curriculum is designed to deliver the skills and knowledge identified by Skills Development Scotland's framework for Engineering: Instrumentation, Measurement and Control. It has been developed as a coherent whole with an emphasis on the integration of theory, practical skills and applications. It enables the student to acquire and develop the subject knowledge and understanding necessary for successful professional employment. Close consultation with the student's employer will ensure that practical situations and projects encountered within the workplace correlate with the theoretical knowledge developed throughout the course. Opportunities for critical reflection and analysis of apparent or real disparities or conflicts between theory and practice will inform the student of the practicalities of real-world situations and form a rich basis for developing their professional practice.

These skills are developed at levels corresponding to the Scottish Credit and Qualifications Framework levels and form a progression through levels 7, 8, 9 and 10.

As the student progresses through the course they are encouraged to expand their understanding and critical appreciation of instrumentation, measurement and control.

A central feature of all Robert Gordon University Graduate Apprenticeship courses is that they promote a unified, integrated view of the subject area. Courses are designed to:

- Present a coherent underpinning of the theory and practice appropriate to the aims of the course which is further developed and applied within the work-based learning environment. This enables graduates of the course to adapt to future developments in the field.
- Reflect changes within the field and ensure that coverage is given to a selection of

emerging topics so that students are aware of likely future developments in the subject together with their potential impact.
- Integrate the delivery of teaching across thematic boundaries to highlight fundamental aspects of interconnectivity and interdisciplinarity within different areas of the syllabus.
- Integrate modes of assessment which complement the methodology of work-based learning and support the development of workplace communication skills.
- Facilitate students to exhibit competence and achievement across a number of different themes (integrated assessment).
- Encourage students to combine elements of their learning from different parts of the course and to show their accumulated and integrated knowledge and understanding of a topic or subject area (synoptic assessment).

The professionally-orientated nature of the course requires students to obtain general and specific skills, this being addressed by a combination of teaching and learning methods. These methods are built around mentored workplace learning directed, supported and extended by University guided, student-centred learning including virtual lectures, tutorials, discussion forums, workshops and private study.

Teaching and Learning Approaches

The main goal of the teaching and learning strategy for the University's Graduate Apprenticeship's is to enable students to become critical, reflective, independent learners who are active participants in the learning process and who develop the motivation and autonomy needed to take control and regulate their own educational experiences and develop the discipline of continuous professional development and life-long learning. This means that, throughout their course of study, students will begin to take more responsibility for their own acquisition of necessary skills and knowledge so that, by the end of their degree, they will be in a position to evaluate and assess their own effectiveness.

This process is driven by various objectives such as the need for constructive alignment of syllabus and learning approaches and makes use of a wide-range of appropriate delivery styles. In addition to mentored workplace learning these include conventional instructional teaching methodologies, social learning activities such as group discussion, as well as constructivist, investigative approaches such as problem-based learning and enquiry-based learning.

Delivery of course materials will be through the University's VLE. Comprehensive course notes and activities will be available for each module. Additionally, recommended reading lists supplement the resources available. Interaction with others is encouraged and achieved primarily through forums and where appropriate, video-conferencing.

MODES OF DELIVERY

Work Based Learning

The workplace forms the central learning environment for the student. It is important, however, to appreciate that whilst much learning takes place naturally in a workplace that this typically happens in an unplanned and unstructured way, with limited opportunity for reflection or consolidation of learning. For the purposes of this course there needs to be a structure in place to guide the student and ensure that learning outcomes are met. This

structure is governed by a subject framework established by Skills Development Scotland and developed into a curriculum by the University who will work closely with the student's employer to ensure that learning outcomes are achieved through correlated theory and practice. This will be expressed for the student in the form of a learning plan which will guide them through the course and help to ensure that workplace learning is supported, resourced, and planned with space and time for critical reflection and consolidation of learning.

Flexible learning materials are available both on and off campus such as textbooks, companion website, videos, formative tests and other online resources. Student will receive a minimum of one visit from the academic tutor who will discuss progress with both the student and the Workplace Mentor and will resolve any work related learning issues. In addition, the student will have a direct line of communication with the academic tutor at all times via email and the University VLE. Module material will be delivered by a mixture of lectures, tutorials and directed study. This will be primarily online and be available to study while the student is in the workplace. Overall guidance will be given on CampusMoodle where students are expected to follow their individualised learning plan supervision from a workplace mentor. When group work is required, teams are expected to develop their own code of conduct that team members will follow and choose their documentation and management standards. Students are expected to develop towards working autonomously and develop a confidence in their ability to work with others and creatively solve problems.

Workplace Mentoring

Key to the delivery and support of work based learning is the Workplace Mentor. Partner employers are required to assign a Workplace Mentor whose role will be to oversee the work based learning undertaken by the student. The University provides employers with guidance as to how appropriate Workplace Mentors should be selected, and provide Workplace Mentors with training and support via induction and ongoing liaison designed to help mentors understand the remit of their role and the activities associated with this. Workplace Mentors will have an overview of the course and its aims, will develop the student's learning plan, assign projects and in-house placements and provide feedback on work-based activities. Workplace Mentors are granted 'Affiliate Student' status enabling them to access all course learning materials via the University's VLE and they may join an online mentor forum. In addition to mentoring support for students, supplementary support may be provided by the employer, for example when subject matter experts are brought in to provide specific business or technical expertise or through access to other departments within the organisation. This enables work-based learning to reflect the range of the curriculum as the student progresses in their studies, therefore providing adequate support for the student's workplace learning on a project, placement or task basis.

Employers' Responsibilities

Partner employers commit to supporting students via the signing of a Collaboration Agreement which sets forth the obligations of the employer and the University. In supporting students, employers are obliged to provide a work based learning environment which adequately represents and reflects the students' course to ensure appropriate functional expertise, supporting infrastructure and professional and technical knowledge within the organisation. Central to this is the provision of a supportive and educative work-based learning environment which affords opportunities to learn, gain new

experiences, acquire and build competencies, and reflect on and apply learning. Additionally, employers are obliged to provide protected time to allow students to attend on-campus study days and to undertake study-related activities such as participation in online discussion forums, and access to the requisite IT hardware and software to facilitate this.

Student Role in Learning

Students are expected to be active participants in the learning process. This means that there is a requirement for students to extend their learning from formally delivered materials through wider reading, research and self-directed enquiry. As students develop over the duration of the course, they are expected to become increasingly self-directed and self-motivated, taking greater control of the study process, and defining their own personal objectives for learning. Students are encouraged to reflect regularly upon their learning and to establish a view of their own progress and development, which they triangulate with feedback from their Workplace Mentor and course delivery team. Students are expected to utilise the full range of facilities and resources available to them, for example the services and resources provided by the library.

Students are expected to document working practices they have followed. Much of the students independent learning is expected to be spent in team based situations developing elements of the problem solution via collaborative learning. Students are provided with formative and summative feedback via a variety of mechanisms, including during the meeting with their workplace mentors and online discussion forums that enable students to ask questions, exchange knowledge and engage in discussions with their peers and tutors. The students will be encouraged to reflect on theory within their workplace.

Lecture

Lectures are for the purpose of dissemination of information and the demonstration of techniques. These will usually be available via the VLE but may also be delivered face to face at RGU as part of an on-campus event.

Tutorials

Tutorials may be arranged remotely (e.g. online via the VLE) or in person. Tutorials are an opportunity to raise questions, discuss ideas and consequences and exchange experiences and lessons learned. This format is used for a wide range of activities, each suited to the particular subject. It may consist of the staff supporting students engaged in problem-solving or may consist of a series of group exercises where each group is encouraged to allocate responsibilities, allocate tasks, etc. Generally this type of teaching is used to support the lecture, clarify the material and experiment with the techniques and skills required.

On-Campus Events

It is anticipated that from time to time it will be beneficial for Graduate Apprenticeship students to meet on-campus for a variety of events. These may be group sessions where students can discuss the relationship between theory and practice through critical analysis and reflection. On-campus events will also give students the opportunity to develop their professional practice through ideas exchange with peers and academic staff and through other networking. On-campus events will be organised in consultation with employers when there is benefit to be gained for students in attending such events.

Individual Project

The student will agree a specification for this extended piece of work with their University tutor and their Workplace Mentor. The project allows the student to develop skills in planning, decision making, data collection and analysis by undertaking a major individual engineering research project and reporting the findings of the work. The work will be completed under the guidance and supervision of the student's assigned University tutor.

ASSESSMENT

A variety of assessment methods are used in this course, as deemed appropriate to the learning outcomes and subject material being assessed and the context in which the material is delivered. Assessment will be in line with the University Assessment Policy and quality assurance and will remain the responsibility of the University.

Coursework

Coursework may be used as a form of summative assessment, and within the context of Graduate Apprenticeship courses this may be work-related, for example based around a project being undertaken in the workplace, or work-centric, such as a report in response to a case study scenario where the case study is built to reflect current issues within a specific sector. Coursework may take many forms, for example reports, essays, lab reports, presentations. Coursework may also include portfolios of evidence demonstrating the application of specific skills and knowledge allowing a view to be formed of the extent to which a student has satisfied learning outcomes. The University provides students with access to ePortfolio software in order to assist students in their creation of portfolios. Where a deadline applies to a particular piece of work the student will be informed at the commencement of the relevant module. Appropriate review measures will be implemented in order to ensure that the students' coursework is individual in nature and not the result of a group effort involving co-workers and colleagues.

Work-Based Learning

Amongst the assessment tools suitable for the context of work-based learning are diary logs, student blogs, vlogs, other social media engagement, logs developed through critical analysis and reflection which can be worked up as case studies, written critical analysis of theory and practice, reports and presentations. As discussed above, portfolio work also provides an invaluable self-compiled reference resource and starting point for additional learning for the student as they progress into professional practice. Whilst the output of work-based learning may form the basis for assessment, Workplace Mentors will not be expected to play a role in the evaluation of work submitted to Robert Gordon University for summative assessment purposes.

Computer Aided Assessment

Computer-assisted assessment packages integrated into the VLE may be used for formative and/or summative assessment, to enhance student engagement and increase the speed of feedback.

Unseen Exams

Unseen exams may be used to assess students' base of knowledge and understanding.

Assessed Laboratories

Assessed laboratories may be used to assess students' knowledge, understanding and practical skills, and generally involve students undertaking an unseen practical task under closed book, supervised conditions with a fixed time constraint.

Individual Project

Projects are used in later stages as a learning vehicle and assessment process which allows students to tackle more complex problems that often require the integration of knowledge and understanding, and intellectual skills from a variety of subject areas. Students undertake a major investigative task, using initiative, imagination and creativity; carry out detailed and comprehensive critical analysis of the outcomes.

Assessment Types

Many modules use a combination of assessment types that integrate modes of assessment in order to balance the types of activity and purposes of assessment, such as formative and summative.

Where there are a number of modules that cover allied subject material, integrated assessment may be used to facilitate students to exhibit competence and achievement across a number of different themes.

At all Stages, synoptic assessments embedded into projects and other practical assignments are used to encourage students to combine elements of their learning from different parts of the course and to show their accumulated knowledge and understanding of a set of topics or a subject area.

A student's Honours Classification is based solely on performance in Stage 4 of the course.

The Assessment of Student Work

The University has developed a Grading Scheme for assessment purposes, details of which may be accessed at:

http://www.rgu.ac.uk/academicregulations

It is important to note that all grades indicated to students during the course of the academic session are provisional until confirmed by an Assessment Board. The Board consists of academic staff involved in course delivery as well as External Examiners, and a final decision is confirmed on the performance of every student for each module undertaken by them and any eligibility for an award. This is subsequently confirmed to each student in a published transcript, and may be accessed electronically on the Student Portal.

Any potential barriers to students with disabilities or specific needs are assessed by the School's Disability Coordinator who liaises with the Dyslexia and Disability Service and appropriate teaching staff to ensure that such students are not disadvantaged during an assessment. In the case of examinations, students must register by a specified deadline date to have specific examination requirements considered.

SUPPORT FOR TEACHING, LEARNING AND ASSESSMENT

The University provides a number of means of supporting teaching and learning:

- Student and mentor induction sessions
- An ongoing scheme of personal/pastoral support for students
- Ongoing liaison with mentors
- An extensive programme of student study skills delivered through the *Library* and the *Study Skills and Access Unit*
- An extensive library of learning resources
- Close collaboration with the student's employer and with industry and professional, statutory and regulatory bodies
- A dedicated VLE - *CampusMoodle,* http://campusmoodle.rgu.ac.uk/
- A commitment to knowledge exchange and technology transfer through focused research activity, which contributes to the critical underpinning for all taught courses
- On-campus activities in the state-of-the-art, purpose-built facilities and buildings

The course will have a dedicated Course Leader to support the development and the delivery of the course. Course Leaders will also act as students' Personal Tutors to support them in successfully completing the course. They will deal with students' course related and personal issues guiding them to successful completion of the course. Module Coordinators are also available to support students with course and module related issues and concerns. Dedicated administrative support will be available to deal with any queries students may have. The School of Engineering has a team of Engineering Applications Supervisors and a dedicated flexible learning lab which will be available to students during relevant periods in their studies. The School's e-learning team will also support students and staff as required.

In addition to this, students can access study support material from the Department for the Enhancement of Learning, Teaching and Access (DELTA). This is the central department that supports the Schools in implementing the University's strategic goals in teaching and learning, extending access and the student experience. Further information can be found at: **http://www.rgu.ac.uk/delta.**

Frequent informal feedback is provided to students through regular contact with academic staff and Workplace Mentors. Feedback is provided on all assessed work normally within 20 working days of submission of the work.

Provisional grades are made available electronically with final grades available electronically via the Student Portal following ratification by the Assessment Board.

MONITORING OF QUALITY AND STANDARDS

The University employs several mechanisms for evaluating and improving the quality and standards of teaching, learning and assessment, including:

- *Annual Course/Programme Appraisals* are prepared for each course and reviewed and approved by Course/Programme Management
- Course Management Teams and School Academic Boards which consider, amongst other things, feedback generated from student questionnaires
- *Institution-Led Subject Review*, involving external panel members, on a six-yearly basis to formally review its major subject provision, followed by a three year interim review to monitor progress against actions/issues raised through the review process;
- *External Examiner Annual Reports*
- Ongoing liaison with industrial/professional liaison groups

Formal Committees with responsibility for monitoring and evaluating quality and standards:

- Staff/Student Liaison Committees, or equivalent
- Course/Programme Management Teams
- School Academic Boards
- Assessment Boards
- Quality Assurance and Enhancement Committee and associated Sub-Committees

Annual Course Appraisals are reviewed and approved by the Course Management Team and the School Academic Board which meet at least once per semester. The Course Management Team considers teaching and learning issues arising from feedback generated by External Examiner Annual Reports, staff/student engagement/partnership liaison, and Student Experience Questionnaires.

FEEDBACK FROM STUDENTS

The University and RGU:Union work in partnership to create an environment which stimulates:

- the participation of students, by empowering them to proactively provide views and opinions
- a supportive learning community where students and staff engage in meaningful dialogue
- the engagement of students in the design of solutions and enhancements

This approach is underpinned by the Student Partnership Agreement which promotes the ethos of partnership at all levels of the University. Further information can be found at the Student Representation and Partnership CampusMoodle Area:

www.rgu.ac.uk/studentpartnership.

There are a variety of opportunities for students to provide feedback to the University, and to become actively involved in shaping their learning experience. These opportunities are integral to the University's approach to the quality assurance and enhancement of teaching and learning, and the holistic student experience. Mechanisms through which students are engaged and supported are:

- participation in Student Experience Questionnaires (SEQ) and the National Student Survey (NSS)
- staff/student liaison arrangements at course/programme level
- support for Student Representatives
- student representation on Institution-Led Subject Review Panels and Validations
- student representation on key University committees
- Annual meetings of the Principal with Student Representatives.

In addition, there is regular collaboration and engagement with officers of the Student Union. More detailed information on student engagement may be found at the *Student Involvement* website at: **www.rgu.ac.uk/studentinvolve.**

The course cohort will be offered the opportunity to nominate a student representative. Student School Officers take part in the School Academic Board where they can contribute to discussions. Students can raise issues with the Course Leader who will discuss concerns and recommend or action solutions as appropriate.

NOTE

This document constitutes one of two course documents that should be read together:
Course Specification: Core Award Data
Course Specification: Student Learning Experience

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Graduate Apprenticeship in BEng (Hons) Engineering: Instrumentation, Measurement and Control
Learning Outcomes - Mapping

SDS High Level Learning Outcome	Stage 1					Stage 2					Stage 3					Stage 4				
	Prac.	Fund.	Eng Maths	Fund.	Elec.	Intro Comp	Linear Con.	Eng Maths 2	Sens. Net	Emb Con	Group Pro	Proc. Con.	Proj Man.	Metr. Ind	Inst.	Project	Adv Cont.	QM & IS	PC & Aut	
Learning Outcome 1 - IMC Engineering technology																				
Foundations	x		x		x	x		x	x			x		x			x			
Industrial Practice	x			x		x	x		x	x	x		x	x		x		x	x	
Instrumentation	x					x			x	x	x		x	x		x			x	
Industrial Process control/automation						x	x		x	x	x	x		x		x	x		x	
Safety	x			x					x	x	x		x				x	x	x	
Learning Outcome 2 - Behavioural and interpersonal																				
Communications	x									x	x					x		x		
Personal attributes	x			x						x	x		x			x		x		
Professional attributes						x			x	x	x		x			x		x		
Learning Outcome 3 - Engineering project and delivery management																				
Project management approaches and methodologies	x					x				x	x		x			x		x		
Project planning										x	x		x			x		x		
Project execution										x	x		x			x				