

**Engineering**  
**Pre-Masters in Engineering (Engineering systems)**  
**Pre-Masters in Engineering (Oil and Gas)**

**SCQF 10**

Version	Current Version	1.1	February 2018
	Prior Version/s		

**PATHWAY/s**

<b>Pathway Type</b>	<b>Postgraduate</b>			
<b>Pathway Areas</b>	<b>Engineering</b>			
Pathways/s	Engineering			
University SITS Code/s	-	-	-	-
College Navigate Code/s	<b>PENG</b>	-	-	-
Pathway Provision	College: SCQF Level/s		<b>10</b>	
	University: SCQF Level/s		<b>11</b>	

Awarding University	Robert Gordon University
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Awards by Pathway	Degree awards	SCQF Award Level
	MSc Drilling and Well Engineering*	11
	MSc Oil and Gas Engineering*	11
	MSc Petroleum Production Engineering*	11
	MSc Offshore Engineering Systems**	11
	MSc Solar Energy Systems**	11

\* Pre- masters in Engineering (Oil and Gas):

- ILS005 ILSC
- PG1006 Maths for Engineering and Sciences
- PG 1008 Introduction to Oil and Gas

\*\* Pre-masters in Engineering (Engineering Systems):

- ILSC005 ILSC
- PG 1006 Maths for Engineering and Sciences
- PG1007 Engineering Systems

Exit pathway awards to be named as follows:

- Pre-Masters in Engineering (Drilling and Well Engineering)
- Pre-Masters in Engineering (Oil and Gas Engineering)
- Pre-Masters in Engineering (Petroleum Production Engineering)
- Pre-Masters in Engineering (Offshore Engineering Systems)
- Pre-Masters in Engineering (Solar Energy Systems)

College Status	Affiliate College
College Location	Garthdee Road, Aberdeen
University Location	Garthdee Road, Aberdeen
University School/s	School of Engineering
Rationale	<p>The partnership between the College and Robert Gordon University facilitates the acquisition of an Postgraduate degree by international students who, because of their previous educational experience, are not normally able to gain direct access to the University's degree courses. The pathway has therefore been developed to deliver the following:</p> <ol style="list-style-type: none"> <li>1. Ensure that international students have a dedicated period of time, in a familial and safe setting, to adjust to and acquire the skills to prepare for further studies within a western learning environment.</li> <li>2. To satisfy the University's quality protocols, which in turn are directed by the QAA Subject Benchmark requirements, for articulation purposes.</li> <li>3. Facilitate access to a pathway leading to a University degree award.</li> <li>4. Protect the entry tariff of the University to its degree courses and ensure that the University does not need to lower its entry tariff in order to increase its international student population.</li> <li>5. Widen access and participation in higher education in line with the University's internationalisation agenda.</li> <li>6. Commit to the provision of best practice customer service and student experience for international students.</li> <li>7. Facilitate effective and efficient, low risk public/private partnership in line with the University's strategic mission and vision.</li> <li>8. Enhance the global reach of the University into previously untapped markets and market segments.</li> <li>9. Add resource, human and financial, to the University's marketing process.</li> <li>10. Facilitate access to a global recruitment process.</li> <li>11. Assist in the diversification of the student body.</li> <li>12. Make available the benefits derived from access to Navitas' global reach and corporate marketing arm.</li> </ol>
Educational Aims	<p>The programme, Pre-Masters in Engineering, has been devised in accordance with Navitas UK general educational aims along with those formulated for the College, see CPR QS9, and the nominated outcomes desired by RGU School of Engineering, to impart a high quality of education in the disciplines required.</p> <p>The educational aims of the programme are to:</p> <ol style="list-style-type: none"> <li>1. Prepare students, who would not normally be considered qualified, to an appropriate standard for entry into the RGU Engineering Master's degree courses direct at SCQF Level 11.</li> <li>2. To offer each individual an educational pathway that augments opportunities for professional employment and development in Engineering and related subject areas at both a national and international level.</li> <li>3. Develop in students a fundamental knowledge that can demonstrate an understanding of the skills and appropriate techniques that can be applied to a variety of engineering problems, so as to support their transfer into SCQF Level 11 of the prescribed degree schemes.</li> <li>4. Develop an appreciation and desire to learn based on competent intellectual and practical skills building to a set of transferable skills that will support them in all aspects of their future academic studies/careers and assist informed decision making.</li> <li>5. Ensure that students have attained the prescribed level of inter-disciplinary language competence described as Level B2 'Independent User' by the Council of Europe, see Common European Framework of Reference for languages: Learning, teaching assessment 2001, Council of Europe, CUP, Cambridge, p. 24, Table 1. Common Reference Levels: global scale.</li> <li>6. Ensure that students have attained the prescribed level of inter-disciplinary language competence to a minimum pass mark of in the ACL accredited module Interactive Learning Skills and Communication, and therein a minimum 6.5 IELTS equivalent.</li> </ol>
<b>PROGRAMME</b>	
Title	Pre-Masters in Engineering
SCQF	10

Credit Points	60	
Duration of Study	One (1) semester	
Weeks of Study	Ten (10) weeks	
Mode of Study	Full-time	
Mode of Delivery	Face to Face	
Notional Hours	600	
Contact Hours	180	
Directed Study Hours	120	
Self-directed Study Hours	300	
Delivery Model	Standard Delivery Model (SDM)	
Language of Delivery	Delivery	English
	Assessment	English
	Council of Europe	Common language reference level B2 Independent User
	ACL Accreditation	Interactive Learning Skills and Communication
Learning Outcomes	<p><b>Generic:</b> All modules have a set of Generic Learning Outcomes (LOs) attached to them, see relevant Module Descriptors (MDs). These provide a basic set of core transferable skills that can be employed as a basis to further study and life-long learning. They are delivered using an interdisciplinary and progressive approach underpinned by the relevant Interactive Learning Skills and Communication (ILSC) module, to build these core skills within the context of subject-specific learning. Incorporated in these core skills are the key themes of relationship-management, time-management, professional communication, technological and numerical understanding and competency.</p> <p><b>Specific:</b> Module-based LOs are described as Specific LOs and combine to make up the Intended LOs of the programme/stage of study.</p> <p><b>Intended:</b> Each programme/stage of study incorporates a set of Intended LOs to define the wider academic-based knowledge and skills acquisition. These key areas are described and tabled below:</p>	
	<b>A</b>	<b>Knowledge and Understanding</b>
	1	Define and critically assess arguments and evidence from a range of academic sources
	2	Recall and explain approaches to effective critical reading at postgraduate level
	3	Apply a full range of research methodologies and research methods for postgraduate level study.
	4	Demonstrate techniques and forms of effective and clear communication expressed in a variety of academic and professional settings in accordance with Level B2 'Independent User' as described by the Council of Europe, see benchmarking documentation of this document for reference.
	5	Apply the ethics of research and the process of undertaking research
	6	Describe basic electrical theory, methods of electrical power generation and equipment utilised in the production of electrical power generation.
	7	Understand fundamental geological concepts that will allow students to explain how hydrocarbon accumulations occur and how different reservoirs are formed
	8	Provide an understanding of the physical and chemical nature of oil and gas and its use.
	9	Display a basic understanding of the roles of and within governments and companies concerning the upstream petroleum industry
	10	Have acquired the fundamental specialist vocabulary that will allow them to successfully communicate these concepts with industry participants
	11	Gain a general understanding of well construction and production processes
	12	Be capable of describing key systems and components of drilling and production facilities
	<b>B</b>	<b>Cognitive/Intellectual Skills</b>
1	Ability to distinguish between a 'good' and a 'poor' argument and justify conclusions using appropriate terminology	

Teaching Methods  
and Strategies

2	Ability to define and explain bias
3	Ability to plan and construct an effective argument
4	Ability to understand and evaluate the credibility of various types of evidence, inclusive of qualitative and quantitative approaches
5	Ability to select, synthesise and critically assess information from a variety of written sources to reach informed conclusions
6	Make full use of library and e-learning search (catalogue and bibliographic) resources.
7	Ability to effectively retain and communicate knowledge and understanding of topics covered in the module in a comprehensive manner under timed conditions without re-course to learning aids.
8	Demonstrate a critical approach to knowledge commensurate with postgraduate level study.
9	Formulate and test subject-specific statements, hypotheses and arguments.
10	Apply basic research techniques to sourcing and selecting appropriate data and literature
11	Carry out basic operations on complex numbers and calculate their powers and roots.
12	Perform calculations using the vector differential operators grad, div and curl and apply these to problems in engineering.
13	Solve first and second order ordinary differential equations by algebraic methods and apply Laplace transform methods to problems involving simple linear systems.
14	Derive and apply solutions of partial differential equations by separation of variables and Fourier series.
15	Calculate and understand simple descriptive and summary statistics, and apply elementary probability theory to problems in engineering.
16	Analyse the performance of wide range of energy systems and apply basic optimisation tools
17	Evaluate the fundamentals of energy conversion
18	Evaluate techniques and procedures used in thermal processes and heat generation
19	Evaluate the energy efficiency of electric drives and inverter-motor interactions
20	Compare the performance of different energy storage technologies
<b>C</b>	<b>Practical Skills</b>
1	Develop organisational skills for deadline submission.
2	Proficiently use techniques and technology in the collation, interpretation and presentation of data in oral and written formats.
3	Source, read, assimilate, evaluate, utilise and reference any literature relevant to the topic.
<b>D</b>	<b>Transferable Skills</b>
1	Practice and illustrate the importance of self-study and reliance; this involves cultivating and developing a responsibility within each student to take cognizance for their own learning, initiative, effective time-management and self-discipline within the academic and professional environments.
2	Apply basic research and referencing techniques to all aspects of study, information collation, information presentation and formulation of academic opinion.
3	Select, read, digest, summarise and synthesise information material in a variety of forms, both qualitative and quantitative (text, numerical data and diagrammatic) and in an appropriate manner to identify and determine key facts/themes, relevancy and assessment of problems and identification and implementation of solutions.
4	Ability to arrange and communicate effectively, both orally and in writing, qualitative and quantitative information.

Acquisition of Intended LOs is via a combination of small group lectures, small group-based tutorials and labs, and individual work and summative examination.

	<p>Additional support is provided through the provision of small peer-led tutorial group work and of individual tutorial support. College module-specific subject specialists will deliver modules.</p> <p>Students will be closely monitored and appraised according to College policies and regulations (CPRs).</p> <p>Students will be encouraged to interface regularly with noted platforms in College, Robert Gordon University library and independent environments, to develop an understanding of the use of different e-learning facilities for research.</p> <p>Students are encouraged throughout the stage of study to undertake independent study both to supplement and consolidate what is being taught/learned and to broaden their individual knowledge and understanding of the subject.</p> <p>Communication skills are central to all teaching, class/lab-based learning and self-directed study; these are tested throughout all assessment practices. Students are encouraged to explore and develop variety of communication skills, underpinned by the ILSC module.</p> <p>There is a combination of formative assessment at the end of key assignments / projects through regular and periodic progress reviews. Assessments will encompass production of portfolios, summative (closed-book) examinations and summative coursework along with written assignments, in-course assessments/tests, computer-based coursework and tests, project reports, presentations and practical assessments.</p> <p>Feedback is given to all students on work produced and, where appropriate, confirmed in individual appraisal events associated with modules and specifically ILSC. Additional interviews are made with the tutor and/or the College academic services to evaluate and discuss any emerging learning issues and therein students options.</p>
Assessments	<p><u>Summary:</u> The programme is compliant with both the generic assessment regulations of Navitas UP Europe and those of the College, see CPR QS9.</p> <p>Each module within the programme/stage of study has an associated Module Descriptor (MD) which will be provided to students at the beginning of their studies. These documents offer generic information on the Aims and Specific LOs of the subject/s under study, basic references and notional contact requirements. They also include topics/subject areas of study and outlines of the assessment events.</p> <p>In-course written, reading, listening and oral assessment is built in to all modules through general interaction between tutors and students, student peer review and small group tutorials or individual tutorials/appraisals. Modes of assessment include essay/report writing, oral presentation (group or individual, and poster), portfolio, and e-based, in-class exercises/tests.</p> <p>All written assessments must follow certain criteria in style and submission as noted in the relevant Module Documents and Student Guides. This form of assessment is considered fundamental to a student's ability to communicate ideas and evidence with clarity, relevance and logic in a planned and organised manner. Plain writing style, syntax and grammar are core skills that can be enhanced to support the maturing of individual students' composition and thus academic proficiency.</p> <p>Oral presentations, whether part of formal or informal assessment practice, are encouraged within all modules as they promote, among others, transferable skills and can identify those students who may be plagiarising material. It is advised, however, that they should not make up more than 60% of the final module mark unless as part of the learning rationale. Oral group presentations should ideally contain no more than five (5) students, unless specific reasoning is applied. Each member, irrespective of their role, should be awarded the same mark unless where obvious differentiation arises, for management of this process see CPR QS9. This form of expression should not be allocated more than fifty (50) minutes per group, with less than a 30% weighting. Time limits must be upheld by tutors so as to ensure all students have the same opportunity to perform. Furthermore, tutors ought to notify students as to the materials available to them before preparation takes place.</p> <p>Final summative examination normally adheres to closed-book, invigilated, timed conditions and takes place during allocated exam periods of a programme. It represents a more abstract measure of a</p>

	<p>student's achievement of the Specific LOs associated with a module. It is utilised as a key measure of quality in teaching standards.</p> <p>Successful completion of a module is based on attaining the required overall pass grade prescribed. The assessment mode for a given module is based on the desired Specific LOs, their expressions can be found in the relevant MD.</p> <p>Where a student has a special need or disability, appropriate steps must be taken by the College, academic staff and/or internal/external invigilators to ensure that the need is recognised and a justified outcome identified, see CPR QS9.</p> <p>Students must pass all modules at the prescribed grade in order to progress to the next stage of their educational continuum.</p>																																																																						
Moderation	See CPR QS9 – moderation is applied to each main assessment of a module; the main assessment is that with the highest weighting; moderation is inclusive of the instruments of assessment and scripts; scripts are moderated from a 30% sample taken from the highest, lowest and borderline percentiles.																																																																						
Progression Criteria	See CPR QS9 – summary: minimum overall pass mark of 60% to be achieved in each module with a minimum pass mark of 35% in assessments weighted 30% or over of a module assessment regime; with the exception of the ILS005 module which requires a minimum pass mark of 65% overall, as well as in specified assessment events.																																																																						
Failure to Progress	See CPR QS9 – summary: where a student fails a module assessment, they have the opportunity to re-sit that assessment; if the student fails the re-sit assessment then they are deemed to have failed the module; on failure of the module a student may re-take the entire module, at full cost; failure of a student to meet the Progression Criteria on the re-take of a module will result in referral to the College Learning and Teaching Board for a student management decision. The University will not be incumbent to progress students who fail.																																																																						
Associated Documentation	<p>Module Descriptors (MDs) as follows: MD/PG1006; MD/PG1007; MD/PG1008; MD/ILS005</p> <p>Associated teaching aids for a module as required</p> <p>Associated Student Handbook</p> <p>College Policies and Regulations (CPRs)</p> <p>Academics (tutors) – with appropriate qualifications, experience and abilities.</p> <p>Guest speakers – relevant industries as requested by the College.</p>																																																																						
Human Resource	Lectures/classes and small group tutorials are held in the ICRGU class rooms, seminar rooms and dedicated IT laboratories; students are encouraged to use RGU's library and e-learning facilities for self-directed study; students are encouraged to use their private IT facilities where possible; field-trips will be taken as required.																																																																						
Built Environment	College Moodle and University Moodle; Library																																																																						
E-learning	RGU library																																																																						
Programme Framework	<table border="1"> <thead> <tr> <th colspan="7"><b>Pre-Masters in Engineering</b></th> </tr> <tr> <th colspan="7"><b>Core Modules</b></th> </tr> <tr> <th><i>Contact Hrs/Week</i></th> <th><i>College Module Code</i></th> <th><i>Module Name</i></th> <th><i>Credit Points</i></th> <th><i>Pass Mark %</i></th> <th><i>Exam %</i></th> <th><i>Coursework %</i></th> </tr> </thead> <tbody> <tr> <td colspan="7"><b>One Semester</b></td> </tr> <tr> <td>10</td> <td>ILS005</td> <td>Interactive Learning Skills and Communication</td> <td>30</td> <td>65</td> <td>-</td> <td>100</td> </tr> <tr> <td>4</td> <td>PG1006</td> <td>Maths for Engineering and Sciences</td> <td>15</td> <td>60</td> <td>100</td> <td>-</td> </tr> <tr> <td>4</td> <td>PG1007</td> <td>Engineering Systems</td> <td>15</td> <td>60</td> <td>50</td> <td>50</td> </tr> <tr> <td colspan="7"><i>Or dependant on pathway</i></td> </tr> <tr> <td>4</td> <td>PG1008</td> <td>Introduction to Oil and Gas</td> <td>15</td> <td>60</td> <td>50</td> <td>50</td> </tr> <tr> <td colspan="7"><b>60 credit points</b></td> </tr> </tbody> </table>	<b>Pre-Masters in Engineering</b>							<b>Core Modules</b>							<i>Contact Hrs/Week</i>	<i>College Module Code</i>	<i>Module Name</i>	<i>Credit Points</i>	<i>Pass Mark %</i>	<i>Exam %</i>	<i>Coursework %</i>	<b>One Semester</b>							10	ILS005	Interactive Learning Skills and Communication	30	65	-	100	4	PG1006	Maths for Engineering and Sciences	15	60	100	-	4	PG1007	Engineering Systems	15	60	50	50	<i>Or dependant on pathway</i>							4	PG1008	Introduction to Oil and Gas	15	60	50	50	<b>60 credit points</b>						
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Management	The Pre-Masters in Engineering programme is delivered by ICRGU on the Garthdee Campus of Robert																																																																						

	<p>Gordon University. This scenario seeks to provide the necessary resources to ensure that all students enrolled with ICRGU are afforded an educational experience that not only provides assimilation into campus and student life but is aligned with the standards and protocols of the University experience.</p> <p>The programme operates under and according to the general compliance structures determined by the Academic Registry Navitas UP Europe. This Office has oversight of all Navitas programmes operating in the UK and Europe. Any changes to a programme must be submitted via the normal Navitas processes through the Academic Registry.</p> <p>The general operational management of the programme lies with ICRGU's academic services which assumes overall responsibility for the administrative and implementation functions.</p> <p>The ICRGU College Principal/Director or nominee, is responsible for the day-to-day management of the programme inclusive of attendance monitoring.</p> <p>ICRGU provides additional tutorial support to any student who may require it, to the amount of two (2) extra contact hours per week per enrolled student.</p> <p>The various academic module lecturers/tutors are responsible for the delivery and initial assessment of modules whilst appraisal of delivery and programme content is advised by the ICRGU College Principal/Director or nominee in consultation with the Academic Registry, academic services officers and/or Link Tutor.</p>
Monitoring and Review	<p>Formal review of the (ICRGU) Pre Masters in Engineering programme takes place as an annual review between ICRGU, the Navitas UP Europe Academic Registry and representation from the RGU School of Engineering. Strategic, logistical and operational issues are developed within the remit of the Academic Advisory Committee (AAC) held on a trimester basis and chaired by Robert Gordon University. Progression is determined via the ICRGU Board of Examiners. For details of this review and quality management of this and all ICRGU programmes, see, CPR QS9.</p> <p>Informal Review takes place on a regular basis via interface between students, academic services and the teaching staff using both student surveys and teaching observation.</p>
Entry Requirements	<p>Standard and approved requirements for academic international benchmark qualifications, see CPR QS3.</p> <p>English language entry is at CEFR level B2 in line with UKVI requirements for SCQF 10.</p>
Appendix 1	<p>Delivery schedule incorporating notional, contact and self-directed hours of study applied to each module and therein the programme.</p>
Appendix 2	<p>College MDs.</p>

## Appendix 1

### Development of Programme Learning Outcomes (LOs) in the Constituent Modules:

The tables below map where the intended LOs of the programme are assessed in the core/constituent modules. It provides an aid to (i) academic staff in understanding how individual modules contribute to the programme aims, (ii) a checklist for quality control purposes, and (iii) a means to help students monitor their own learning, personal and professional development as the programme progresses. Key: LOs which are assessed as part of a given module ✓✓; LOs which are not explicitly assessed as part of a given module ✓.

#### Pre-masters in Engineering (Oil and Gas)

SCQF 10		A.1	A.2	A.3	A.4	A.5	A.6	A.7	A.8	A.9	A.10	A.11
Core Modules	Module Code											
Interactive Learning Skills and Communication	ILS005	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓	✓	✓	✓	✓
Maths for Engineering and Sciences	PG1006	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Introduction to Oil and Gas	PG1008	✓	✓	✓	✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓

#### Knowledge and understanding:

A.1	Define and critically assess arguments and evidence from a range of academic sources
A.2	Recall and explain approaches to effective critical reading at postgraduate level
A.3	Apply a full range of research methodologies and research methods for postgraduate level study.
A.4	Demonstrate techniques and forms of effective and clear communication expressed in a variety of academic and professional settings in accordance with Level B2 'Independent User' as described by the Council of Europe, see benchmarking documentation of this document for reference.
A.5	Apply the ethics of research and the process of undertaking research
A.6	Understand fundamental geological concepts that will allow students to explain how hydrocarbon accumulations occur and how different reservoirs are formed
A.7	Provide an understanding of the physical and chemical nature of oil and gas and its use.
A.8	Display a basic understanding of the roles of and within governments and companies concerning the upstream petroleum industry
A.9	Have acquired the fundamental specialist vocabulary that will allow them to successfully communicate these concepts with industry participants
A.10	Gain a general understanding of well construction and production processes



A.11	Be capable of describing key systems and components of drilling and production facilities
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**SCQF 10**

Cognitive/Intellectual Skills:

ICRGU Core Modules	Module Code	B.1	B.2	B.3	B.4	B.5	B.6	B.7	B.8	B.9	B.10	B.11	B.12	B.13
Interactive Learning Skills and Communication	ILS005	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓	✓	✓	✓
Maths for Engineering and Sciences	PG1006	✓	✓	✓	✓	✓	✓	✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓
Introduction to Oil and Gas	PG1008	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

B.1	Ability to distinguish between a 'good' and a 'poor' argument and justify conclusions using appropriate terminology
B.2	Ability to define and explain bias
B.3	Ability to plan and construct an effective argument
B.4	Ability to understand and evaluate the credibility of various types of evidence, inclusive of qualitative and quantitative approaches
B.5	Ability to select, synthesise and critically assess information from a variety of written sources to reach informed conclusions
B.6	Make full use of library and e-learning search (catalogue and bibliographic) resources.
B.7	Ability to effectively retain and communicate knowledge and understanding of topics covered in the module in a comprehensive manner under timed conditions without re-course to learning aids.
B.8	Demonstrate a critical approach to knowledge commensurate with postgraduate level study.
B.9	Carry out basic operations on complex numbers and calculate their powers and roots.
B.10	Perform calculations using the vector differential operators grad, div and curl and apply these to problems in engineering.
B.11	Solve first and second order ordinary differential equations by algebraic methods and apply Laplace transform methods to problems involving simple linear systems.
B.12	Derive and apply solutions of partial differential equations by separation of variables and Fourier series.
B.13	Calculate and understand simple descriptive and summary statistics, and apply elementary probability theory to problems in engineering.

<b>SCQF 10</b>	<b>Intended Los</b>
	<b>Practical Skills</b>

Core Modules	Module Code	C.1	C.2	C.3	
Interactive Learning Skills and Communication	ILS005	✓✓	✓✓	✓✓	
Maths for Engineering and Sciences	PG1006	✓	✓	✓	
Introduction to Oil and Gas	PG1008	✓	✓	✓	

Practical skills:

C.1	Develop organisational skills for deadline submission.
C.2	Proficiently use techniques and technology in the collation, interpretation and presentation of data in oral and written formats.
C.3	Source, read, assimilate, evaluate, utilise and reference any literature relevant to the topic.

SCQF 10		Intended LOs			
		Cognitive/Intellectual Skills			
ICRGU Core Modules	Module Code	D.1	D.2	D.3	D.4
Interactive Learning Skills and Communication	ILS005	✓✓	✓✓	✓✓	✓✓
Maths for Engineering and Sciences	PG1006	✓	✓	✓	✓
Introduction to Oil and Gas	PG1008	✓	✓	✓	✓

Transferable skills:

D.1	Practice and illustrate the importance of self-study and reliance; this involves cultivating and developing a responsibility within each student to take cognizance for their own learning, initiative, effective time-management and self-discipline within the academic and professional environments.
D.2	Apply basic research and referencing techniques to all aspects of study, information collation, information presentation and formulation of academic opinion.
D.3	Select, read, digest, summarise and synthesise information material in a variety of forms, both qualitative and quantitative (text, numerical data and diagrammatic) and in an appropriate manner to identify and determine key facts/themes, relevancy and assessment of problems and identification and implementation of solutions.
D.4	Ability to arrange and communicate effectively, both orally and in writing, qualitative and quantitative information.

Development of Programme Learning Outcomes (LOs) in the Constituent Modules:

The tables below map where the intended LOs of the programme are assessed in the core/constituent modules. It provides an aid to (i) academic staff in understanding how individual modules contribute to the programme aims, (ii) a checklist for quality control purposes, and (iii) a means to help students monitor their own learning, personal and professional development as the programme progresses. Key: LOs which are assessed as part of a given module ✓✓; LOs which are not explicitly assessed as part of a given module ✓.

Pre-Masters in Engineering (Engineering Systems)							
SCQF 10							
Core Modules	Module Code	A.1	A.2	A.3	A.4	A.5	A.6
Interactive Learning Skills and Communication	ILS005	✓✓	✓✓	✓✓	✓✓	✓✓	✓
Maths for Engineering and Sciences	PG1006	✓	✓	✓	✓	✓	✓
Engineering Systems	PG1007	✓	✓	✓	✓	✓	✓✓

Knowledge and understanding:

A.1	Define and critically assess arguments and evidence from a range of academic sources
A.2	Recall and explain approaches to effective critical reading at postgraduate level
A.3	Apply a full range of research methodologies and research methods for postgraduate level study.
A.4	Demonstrate techniques and forms of effective and clear communication expressed in a variety of academic and professional settings in accordance with Level B2 'Independent User' as described by the Council of Europe, see benchmarking documentation of this document for reference.
A.5	Apply the ethics of research and the process of undertaking research
A.6	Describe basic electrical theory, methods of electrical power generation and equipment utilised in the production of electrical power generation.

SCQF 10		Intended LOs																	
		Cognitive/Intellectual Skills																	
ICRGU Core Modules	Module Code	B.1	B.2	B.3	B.4	B.5	B.6	B.7	B.8	B.9	B.10	B.11	B.12	B.13	B.14	B.15	B.16	B.17	B.18
Interactive Learning Skills and Communication	ILS005	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Maths for Engineering and Sciences	PG1006	✓	✓	✓	✓	✓	✓	✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓	✓	✓	✓
Engineering Systems	PG1007	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓✓	✓✓	✓✓	✓✓	✓✓

Cognitive/Intellectual Skills:

B.1	Ability to distinguish between a 'good' and a 'poor' argument and justify conclusions using appropriate terminology
B.2	Ability to define and explain bias
B.3	Ability to plan and construct an effective argument
B.4	Ability to understand and evaluate the credibility of various types of evidence, inclusive of qualitative and quantitative approaches
B.5	Ability to select, synthesise and critically assess information from a variety of written sources to reach informed conclusions
B.6	Make full use of library and e-learning search (catalogue and bibliographic) resources.
B.7	Ability to effectively retain and communicate knowledge and understanding of topics covered in the module in a comprehensive manner under timed conditions without re-course to learning aids.
B.8	Demonstrate a critical approach to knowledge commensurate with postgraduate level study.
B.9	Carry out basic operations on complex numbers and calculate their powers and roots.
B.10	Perform calculations using the vector differential operators grad, div and curl and apply these to problems in engineering.
B.11	Solve first and second order ordinary differential equations by algebraic methods and apply Laplace transform methods to problems involving simple linear systems.
B.12	Derive and apply solutions of partial differential equations by separation of variables and Fourier series.
B.13	Calculate and understand simple descriptive and summary statistics, and apply elementary probability theory to problems in engineering.
B.14	Analyse the performance of wide range of energy systems and apply basic optimisation tools
B.15	Evaluate the fundamentals of energy conversion
B.16	Evaluate techniques and procedures used in thermal processes and heat generation
B.17	Evaluate the energy efficiency of electric drives and inverter-motor interactions
B.18	Compare the performance of different energy storage technologies

SCQF 10	Intended Los
	Practical Skills

Core Modules	Module Code	C.1	C.2	C.3	
Interactive Learning Skills and Communication	ILS005	✓✓	✓✓	✓✓	
Maths for Engineering and Sciences	PG1006	✓	✓	✓	
Engineering Systems	PG1007	✓	✓	✓	

Practical skills:

C.1	Develop organisational skills for deadline submission.
C.2	Proficiently use techniques and technology in the collation, interpretation and presentation of data in oral and written formats.
C.3	Source, read, assimilate, evaluate, utilise and reference any literature relevant to the topic.

SCQF 10		Intended LOs			
		Cognitive/Intellectual Skills			
ICRGU Core Modules	Module Code	D.1	D.2	D.3	D.4
Interactive Learning Skills and Communication	ILS005	✓✓	✓✓	✓✓	✓✓
Maths for Engineering and Sciences	PG1006	✓	✓	✓	✓
Engineering Systems	PG1007	✓	✓	✓	✓

Transferable skills:

D.1	Practice and illustrate the importance of self-study and reliance; this involves cultivating and developing a responsibility within each student to take cognizance for their own learning, initiative, effective time-management and self-discipline within the academic and professional environments.
D.2	Apply basic research and referencing techniques to all aspects of study, information collation, information presentation and formulation of academic opinion.
D.3	Select, read, digest, summarise and synthesise information material in a variety of forms, both qualitative and quantitative (text, numerical data and diagrammatic) and in an appropriate manner to identify and determine key facts/themes, relevancy and assessment of problems and identification and implementation of solutions.
D.4	Ability to arrange and communicate effectively, both orally and in writing, qualitative and quantitative information.

## Appendix 2

### Teaching Rotations: Pathway course – Pre Masters in Engineering (Oil and Gas)

#### Semester 1

Pre Masters in Engineering (Oil and Gas)								
Week	ILS0005		PG1006		PG1008		Contact (Directed study) hours/week	Self-directed study hours/week
	Interactive Learning and Communication	Skills and	Maths for Engineering and Sciences		Introduction to Oil and Gas			
	Contact hours (Directed Study)	Self-dir Study	Contact hours (Directed Study)	Self-dir Study	Contact hours (Directed Study)	Self-dir Study		
1	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
2	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
3	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
4	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
5	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
6	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
7	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
8	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
9	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
10	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
<b>Total hours / module</b>	100 (40)	160	40 (40)	70	40 (40)	70	180 (120)	300
<b>Notional hours / module</b>	<b>300</b>		<b>150</b>		<b>150</b>		<b>600</b>	
<b>Credit Points</b>	<b>30</b>		<b>15</b>		<b>15</b>		<b>60</b>	

**Pre Masters in Engineering (Engineering Systems)**

Week	ILS0005		PG1006		PG1007		Contact (Directed study) hours/week	Self-directed hours/week study
	Interactive Learning Skills and Communication		Maths for Engineering and Sciences		Engineering Systems			
	Contact hours (Directed Study)	Self-dir Study	Contact hours (Directed Study)	Self-dir Study	Contact hours (Directed Study)	Self-dir Study		
1	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
2	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
3	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
4	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
5	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
6	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
7	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
8	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
9	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
10	10 (4)	16	4 (4)	7	4 (4)	7	18 (12)	30
<b>Total hours / module</b>	100 (40)	160	40 (40)	70	40 (40)	70	180 (120)	300
<b>Notional hours / module</b>	<b>300</b>		<b>150</b>		<b>150</b>		<b>600</b>	
<b>Credit Points</b>	<b>30</b>		<b>15</b>		<b>15</b>		<b>60</b>	