University of East Anglia

LTC14D075

Title:	***New Course Proposal - Engineering***
Author:	Prof Lawrence Coates, Head of Engineering
Date:	13th November 2014
Circulation:	Learning and Teaching – 3 December 2014
Agenda:	LTC14A002
Version:	Draft
Status:	Open

Issue

To provide a response to LTC members queries on the course proposal for Engineering

Recommendation

Recipient are requested to approve the course proposal for Engineering

Resource Implications

See response in point 2) under the title “Discussion”.

Risk Implications

If this course is not approved, Engineering as an entity will become less sustainable as an entity due to economies of scale not being achieved.

Equality and Diversity

Engineering as a subject struggles to recruit female applications from students (12% nationally), however, systems are being actively put in place to address this imbalance. Please see the full course proposal for more details.

Timing of decisions

A decision will need to be made at this LTC meeting for the prospectus publication deadline. If not, we will miss the prospectus publication for the launch date agreed to by ET and Council (2016 entry).

Further Information

Prof Lawrence Coates, Head of Engineering, Lawrence.Coates@uea.ac.uk, x2632

Background

The University committed support for the launch of Engineering in 2011 when the first MSc in Science was launched. Since then the course offering has expanded into an UG variant of the same subject area.

The final format and structure of the new course proposed comes following significant consultation with industry and industry representatives, in relation to the launch of this variant of Engineering as a subject. Specifically Elizabeth Truss and Michael Fallon as Energy Minister have been consulted over our commitment to Engineering and expansion of it.

Discussion

Following consideration at LTC meeting on the 22nd October 2014, a number of queries arose which I seek to address, and reassure colleagues, to inform the viability of this course proposal.

Specifically:

1) expressed some concern that given it was a new area of study students might not have access to the breadth and depth of academic resources they would expect, in addition to those provided in class or by tutors;

A meeting took place between the Head of Library Services (HoLS), Senior Faculty Manager and myself on the 28th October whereby it was agreed that a list of electronic journals required to cover all years of study would be produced and agreed with the service. This has now occurred and agreement has been reached.

The meeting and subsequent clarification from HoLS (see full proposal section BC7.4) has put the library provision on a clear and sound footing and includes a plan for continual review to maintain a satisfactory provision as Engineering grows.

Engineering lecturers and students will continue to work with their librarian to ensure that the full range of resources is properly utilised.

2) questioned, on the basis of information provided in the new course proposal document, whether the courses were financially viable.

This new course/s is a part of a portfolio of a number of areas feeding into this one subject area along with other activities designed to make Engineering sustainable (see Appendix I). The Dean of Science is fully behind the development of Engineering as a complete product from a financial perspective and assures the committee that we are committed to Engineering given the strong political drive behind this from regional industry.

3) existing students should be consulted about the proposals and evidence of this consultation be added to the Course Proposal.

A meeting with SSLC representatives took place on the 10th November 2014 where an overview of the new course proposals was presented, and comments minuted as below.

"At a special meeting of the ENG SSLC on Monday 10th November 2014 the proposed degrees were discussed. There was general support for the new developments. There was a general consensus that the plan for a common first year for all degrees in the portfolio was a key strength that should influence the marketing. The many links with industry should be exploited and grown as a plus point for all degrees rather than trying to distinguish the new engineering degrees from the established energy engineering degrees."

A full set of minutes from this special one agenda item meeting has been placed on the Engineering Communications section of Blackboard for all ENG students to see.

Attachments

Appendix I

Engineering (ENG)
2014-15 Financial Summary

November 2014

(excludes Income Redistribution and Apportionments)

V1415.05

	CURRENT YEAR 2014-15			FORECAST			
	APPROVED ORIGINAL BUDGET	CURRENT FORECAST	(OVER) / UNDER SPEND	2015-16	2016-17	2017-18	2018-19
Income - Teaching							
Funding Body Grants (Teaching)	33,407	33,407	0	33,407	33,407	33,407	33,407
Course fees (UG/PGT) (excl. NHS contracts)	679,596	393,796	(285,800)	860,868	1,056,318	1,207,056	1,273,110
Teaching contracts (incl. NHS)	0	0	0	0	0	0	0
Other teaching income	600	600	0	600	600	0	0
Teaching project overheads and income	0	0	0	0	0	0	0
Sub-total teaching income (excl. project gross-ups)	713,603	427,803	(285,800)	894,875	1,090,325	1,240,463	1,306,517
Income - Research							
Funding Body Grants (Research)	0	0	0	0	0	0	0
Course fees (PGR)	0	0	0	0	0	0	0
Research project overheads and income	19,098	19,098	0	24,297	45,309	58,055	59,407
Sub-total research income (excl. project gross-ups & ODG adj)	19,098	19,098	0	24,297	45,309	58,055	59,407
Income - Other							
Funding Body Grants (Other) incl. Capital Grant Release	0	0	0	0	0	0	0
Other income (excl. overheads)	0	500	500	500	500	500	500
Other project overheads (OSR, Consultancy/Conferences)	0	0	0	0	0	0	0
Transfer (to) / from endowment and notional funds	0	0	0	0	0	0	0
Sub-total other income (excl. project gross-ups, incl endowments)	0	500	500	500	500	500	500
Less share of income from joint ventures	0	0	0	0	0	0	0
Income excluding gross-ups and redistributions	**732,701**	**447,401**	**(285,300)**	**919,672**	**1,136,134**	**1,299,018**	**1,366,424**
Expenditure							
Payroll costs (excl. project gross-up)	(240,128)	(225,416)	14,712	(287,663)	(397,677)	(460,890)	(480,295)
Other operating expenditure* (excl. project gross-up)	(124,612)	(125,112)	(500)	(127,283)	(141,667)	(146,902)	(150,313)
Internal Recharge income	0	0	0	0	0	0	0
Depreciation (excl. project gross-up - trading areas only)	0	0	0	0	0	0	0
Loan interest	0	0	0	0	0	0	0
Taxation	0	0	0	0	0	0	0
Expenditure excluding gross-ups and redistributions	**(364,740)**	**(350,528)**	**14,212**	**(414,946)**	**(539,344)**	**(607,793)**	**(630,608)**
Joint ventures operating surplus/(deficit)	0	0	0	0	0	0	0
Departmental Managed Surplus / (deficit)	**367,961**	**96,873**	**(271,088)**	**504,726**	**596,790**	**691,225**	**735,816**

**Other operating expenditure comprises the net figure of other operating and intercompany expenditure*

University of East Anglia

LEARNING & TEACHING SERVICE

FULL COURSE PROPOSAL FORM

(taught programmes only)

for NEW COURSES and COURSE AMENDMENTS with RESOURCE IMPLICATIONS

Please refer to the course proposal Procedure and Guidance **CP-2013** to complete this or any other course proposal form: to ensure the correct form is being used; for information on early considerations and timescales; for general guidance on the course approval process; and for notes on completing the form.

Course Title(s)	**new course?** *note 1*		**If no, please give existing course code**
1. BEng (Hons) Energy Engineering with Environmental Management	~~**Y**~~	**N**	U1H221302
2. BEng (Hons) Energy Engineering with Environmental Management with a Year in Industry	~~**Y**~~	**N**	U1H22A402
3. MEng Energy Engineering with Environmental Management	~~**Y**~~	**N**	U1H220402
4. BEng Energy Engineering	**Y**	~~**N**~~	
5. MEng Energy Engineering	**Y**	~~**N**~~	
6. BEng Engineering	**Y**	~~**N**~~	
7. BEng Engineering with a Year in Industry	**Y**	~~**N**~~	
8. MEng Engineering	**Y**	~~**N**~~	
School(s) of study & Faculty			
School of Mathematics, Faculty of Science			
Proposer & proposer's school			
Prof Lawrence Coates, School of Mathematics			
Proposed start date (of new course or of changes) *note 2*			

September 2016						
This proposal requires: *note 3*	**Prior approval by Council**	~~**Y**~~	**N**	**Prior approval by LTC**	**Y**	~~**N**~~

This form is in 5 parts:

Part 1 Summary and Rationale
Part 2 Business Case
Part 3 Academic Case including Programme Specification
Part 4 Key Information Set (KIS) data
Part 5 Approvals and Notification

The initiator is responsible for completing <u>parts 1-4</u>

<u>Structure of the Document</u>

A number of linked course changes are proposed and although some are minor the interpretation of the guidance has been to include all of them in the one document for clarity. This has been confirmed by the LTS Coordinator. The minor amendments and phasing out of existing degrees cannot proceed without approval of the new degree proposals.

	Existing	Proposed	Comment	Accrediting body
1	BEng (Hons) Energy Engineering with Environmental Management	BEng (Hons) Energy Engineering with Environmental Management	No change	Energy Institute
2	BEng (Hons) Energy Engineering with Environmental Management with a Year in Industry		Degree to be phased out and replaced with (7).	Energy Institute
3	MEng Energy Engineering with Environmental Management		Degree to be phased out and reintroduced by (5) involving a minor change to title with no change to content.	Energy Institute
4		BEng Energy Engineering	New variant achieved by relaxing the compulsory options	Energy Institute
5	*MEng Energy Engineering with Environmental Management*	MEng Energy Engineering	Change of degree title, no change to content.	Energy Institute
6		BEng Engineering	New degree requiring additional compulsory modules	IET and/or IMechE
7		BEng Engineering with a Year in Industry	Same as above but with YINI	IET and/or IMechE and/or Energy Institute
8		MEng Engineering	Same as BEng plus a 4th year requiring additional modules	IET and/or IMechE

The proposed portfolio of degrees is:

- BEng Energy Engineering with Environmental Management
- BEng/MEng Energy Engineering
- BEng/MEng Engineering
- BEng Engineering with a Year in Industry

UEA LEARNING & TEACHING SERVICE

FULL COURSE PROPOSAL

Part 1 SUMMARY AND RATIONALE

Course One				
S1	**a**	**SCHOOL(S) OF STUDY**	Mathematics	
note S1c	**b**	**FACULTY or FACULTIES**	Science	
	c	**JOINT COURSE?** (i.e. owned/taught by more than one School)	~~**YES**~~	
			NO	
	d	**NAME OF COURSE DIRECTOR** (Home School)	Prof Lawrence Coates	
	e	**NAME OF DEPUTY COURSE DIRECTOR** (partner School, for Joint Courses only)	N/A	
S2 *note S2a*	**a**	**COURSE TITLE**	BEng Energy Engineering with Environmental Management	
note S2b	**b**	**COURSE CODE**	U1H221302	
note S2c & S2d	**c**	**AWARD**	**BEng (Hons)**	
	d	**EXIT AWARD(S) AND TITLE(S)**	Certificate of Higher Education [CertHE] Diploma of Higher Education [DiplHE]	
	e	**FULL/PART-TIME (please specify)**	Full-time	
	f	**LOCATION (UEA Norwich, UEA London, Distance Learning)**	**UEA Norwich**	
	g	**AVAILABLE FROM:**	Continuing. [1st entrants were in 2013]	
S3 *note S3a* *note S3b*	**a**	**PROFESSIONAL AWARD (if any)**	N/A	
	b	**ACCREDITING/VALIDATING BODY (if relevant)**	The Energy Institute (EI) gives partial exemption for requirements for CEng (Chartered Engineer) status.	
		Website (URL)	www.energyinst.org	
		Date when accreditation/ validation may take place	The EI will visit to consider current degrees during 2015 and will award conditional accredited status. This is usually conditional on seeing the work of successful graduates at a later date and then accredited status is back-dated to the year of first admission.	
S4 *note S4*	**LEVEL**	Sub-degree (e.g. Cert. Dip.)		
		Undergraduate	✓	
		Integrated Masters		
		Masters		

		Other postgraduate (please specify)				
S5 *note S5a*	**a**	**DURATION** (years or months)	3 years			
note S5b	**b**	**MODE OF ATTENDANCE** (full-time, part-time, distance, other)	Full-time			
S6 *note S6*	**PLACEMENT(S)/WORK-BASED LEARNING REQUIRED**		~~YES~~		NO	✓
			If YES, does this conform with the UEA's code of practice on placements?			
S7 *note S7*	**RELEVANT SUBJECT BENCHMARK STATEMENT(S)**		QAA Benchmarking Statement for Engineering (Combines BEng and MEng) UK Standard for Professional Engineering Competence (UK-SPEC): The Accreditation of Higher Education Programmes (2010)			
S8 *note S8*	**ENTRY REQUIREMENTS**		Current requirements will be retained and are : BEng - ABB To include A-level Mathematics and a science from a suggested list. GCSE science if not offered at A level.			
S9	**JACS Subject Level Code(s)** To be completed by the Planning Office following approval of the Business Case					
S10	**UCAS ADMISSION CODE / COURSE CODE** To be completed by the Planning Office following approval of the Business Case		H221 exists			
S11 *note S11*	**FURTHER INFORMATION** available via…		www.uea.ac.uk/engineering			
S12	**COURSE HIGHLIGHTS** (for publication in University Prospectus / Website / other publicity) **NB** Please include employability prospects/career possibilities					
note S12	See current Programme Specification					

Course Two				
S1	**a**	**SCHOOL(S) OF STUDY**	Mathematics	
note S1c	**b**	**FACULTY or FACULTIES**	Science	
	c	**JOINT COURSE?** (ie owned/taught by more than one School)	**~~YES~~**	
			NO	
	d	**NAME OF COURSE DIRECTOR** (Home School)	Prof Lawrence Coates	
	e	**NAME OF DEPUTY COURSE DIRECTOR** (partner School, for Joint Courses only)	N/A	
S2 *note S2a*	**a**	**COURSE TITLE**	BEng (Hons) Energy Engineering with Environmental Management with a Year in Industry	

note S2b	**b**	**COURSE CODE**	U1H22A402	
note S2c & S2d	**c**	**AWARD**	**BEng (Hons)**	
	d	**EXIT AWARD(S) AND TITLE(S)**	Certificate of Higher Education [CertHE] Diploma of Higher Education [DiplHE]	
	e	**FULL/PART-TIME (please specify)**	Full-time	
	f	**LOCATION (UEA Norwich, UEA London, Distance Learning)**	**UEA Norwich**	
	g	**AVAILABLE FROM:**	Last entry September 2015.	
S3 *note S3a* *note S3b*	**a**	**PROFESSIONAL AWARD (if any)**	N/A	
	b	**ACCREDITING/VALIDATING BODY (if relevant)**	The Energy Institute (EI) gives partial exemption for requirements for CEng (Chartered Engineer) status.	
		Website (URL)	www.energyinst.org	
		Date when accreditation/ validation may take place	The EI will visit to consider current degrees during 2015 and will award conditional accredited status. This is usually conditional on seeing the work of successful graduates at a later date and then accredited status is back-dated to the year of first admission.	
S4 *note S4*	**LEVEL**	Sub-degree (e.g. Cert. Dip.)		
		Undergraduate	✓	
		Integrated Masters		
		Masters		
		Other postgraduate (please specify)		
S5 *note S5a*	**a**	**DURATION** (years or months)	4 years including YINI	
note S5b	**b**	**MODE OF ATTENDANCE** (full-time, part-time, distance, other)	Full-time	
S6 *note S6*	**PLACEMENT(S)/WORK-BASED LEARNING REQUIRED**		YES ✓ ~~NO~~	
			If YES, does this conform with the UEA's code of practice on placements?	Yes
S7 *note S7*	**RELEVANT SUBJECT BENCHMARK STATEMENT(S)**		QAA Benchmarking Statement for Engineering (Combines BEng and MEng) UK Standard for Professional Engineering Competence (UK-SPEC): The Accreditation of Higher Education Programmes (2010)	
S8 *note S8*	**ENTRY REQUIREMENTS**		Current requirements will be retained and are : BEng with YINI - AAB To include A-level Mathematics and a science from a suggested list. GCSE science if not offered at A level.	

S9	**JACS Subject Level Code(s)** To be completed by the Planning Office following approval of the Business Case	
S10	**UCAS ADMISSION CODE / COURSE CODE** To be completed by the Planning Office following approval of the Business Case	H22A Exists
S11 *note S11*	**FURTHER INFORMATION** available via…	www.uea.ac.uk/engineering
S12	**COURSE HIGHLIGHTS** (for publication in University Prospectus / Website / other publicity) **NB** Please include employability prospects/career possibilities	
note S12	See current Programme Specification	

Course Three				
S1	**a**	**SCHOOL(S) OF STUDY**	Mathematics	
note S1c	**b**	**FACULTY or FACULTIES**	Science	
	c	**JOINT COURSE?** (ie owned/taught by more than one School)	~~**YES**~~	
			NO	
	d	**NAME OF COURSE DIRECTOR** (Home School)	Prof Lawrence Coates	
	e	**NAME OF DEPUTY COURSE DIRECTOR** (partner School, for Joint Courses only)	N/A	
S2 *note S2a*	**a**	**COURSE TITLE**	MEng Energy Engineering with Environmental Management	
note S2b	**b**	**COURSE CODE**	U1H220402	
note S2c & S2d	**c**	**AWARD**	**MEng**	
	d	**EXIT AWARD(S) AND TITLE(S)**	Certificate of Higher Education [CertHE] Diploma of Higher Education [DiplHE] BEng Energy Engineering with Environmental Management	
	e	**FULL/PART-TIME (please specify)**	Full-time	
	f	**LOCATION (UEA Norwich, UEA London, Distance Learning)**	**UEA Norwich**	
	g	**AVAILABLE FROM:**	Last entry September 2015	
S3 *note S3a* *note S3b*	**a**	**PROFESSIONAL AWARD (if any)**	N/A	
	b	**ACCREDITING/VALIDATING BODY (if relevant)**	The Energy Institute (EI) gives exemption for academic requirements for CEng (Chartered Engineer) status.	
		Website (URL)	www.energyinst.org	
		Date when accreditation/ validation may take place	The EI will visit to consider current degrees during 2015 and will award conditional accredited status. This is usually conditional	

			on seeing the work of successful graduates at a later date and then accredited status is back-dated to the year of first admission.			
S4 *note S4*	**LEVEL**	Sub-degree (e.g. Cert. Dip.)				
		Undergraduate				
		Integrated Masters	✓			
		Masters				
		Other postgraduate (please specify)				
S5 *note S5a*	**a**	**DURATION** (years or months)	4 years			
note S5b	**b**	**MODE OF ATTENDANCE** (full-time, part-time, distance, other)	Full-time			
S6 *note S6*	**PLACEMENT(S)/WORK-BASED LEARNING REQUIRED**		~~YES~~		NO	✓
			If YES, does this conform with the UEA's code of practice on placements?			
S7 *note S7*	**RELEVANT SUBJECT BENCHMARK STATEMENT(S)**		QAA Benchmarking Statement for Engineering (Combines BEng and MEng) UK Standard for Professional Engineering Competence (UK-SPEC): The Accreditation of Higher Education Programmes (2010)			
S8 *note S8*	**ENTRY REQUIREMENTS**		Current requirements will be retained and are : MEng - AAA To include A-level Mathematics and a science from a suggested list. GCSE science if not offered at A level.			
S9	**JACS Subject Level Code(s)** To be completed by the Planning Office following approval of the Business Case					
S10	**UCAS ADMISSION CODE / COURSE CODE** To be completed by the Planning Office following approval of the Business Case		H220 exists			
S11 *note S11*	**FURTHER INFORMATION** available via…		www.uea.ac.uk/engineering			
S12	**COURSE HIGHLIGHTS** (for publication in University Prospectus / Website / other publicity) **NB** Please include employability prospects/career possibilities					
note S12	See current Programme Specification					

Course Four				
S1	**a**	**SCHOOL(S) OF STUDY**	Mathematics	
note S1c	**b**	**FACULTY or FACULTIES**	Science	
	c	**JOINT COURSE?** (ie owned/taught by more than one School)	~~**YES**~~	
			NO	
	d	**NAME OF COURSE DIRECTOR** (Home School)	Prof Lawrence Coates	
	e	**NAME OF DEPUTY COURSE DIRECTOR** (partner School, for Joint Courses only)	N/A	
S2 *note S2a*	**a**	**COURSE TITLE**	BEng Energy Engineering	
note S2b	**b**	**COURSE CODE**	TBA	
note S2c & S2d	**c**	**AWARD**	**BEng (Hons)**	
	d	**EXIT AWARD(S) AND TITLE(S)**	Certificate of Higher Education [CertHE] Diploma of Higher Education [DiplHE]	
	e	**FULL/PART-TIME (please specify)**	Full-time	
	f	**LOCATION (UEA Norwich, UEA London, Distance Learning)**	**UEA Norwich**	
	g	**AVAILABLE FROM:**	September 2016	

S3 *note S3a* *note S3b*	**a**	**PROFESSIONAL AWARD (if any)**	N/A
	b	**ACCREDITING/VALIDATING BODY (if relevant)**	The Energy Institute (EI) gives partial exemption for requirements for CEng (Chartered Engineer) status.
		Website (URL)	www.energyinst.org
		Date when accreditation/ validation may take place	The EI will visit to consider current degrees during 2015. A subsequent visit may be required to consider the new proposed degrees during the second academic year of their introduction, i.e. 2018 Accreditation is usually conditional on seeing the work of successful graduates at a later date and then accredited status is back-dated to the year of first admission.

S4 *note S4*	**LEVEL**	Sub-degree (e.g. Cert. Dip.)	
		Undergraduate	✓
		Integrated Masters	
		Masters	
		Other postgraduate (please specify)	

S5 *note S5a*	**a**	**DURATION** (years or months)	3 years			
note S5b	**b**	**MODE OF ATTENDANCE** (full-time, part-time, distance, other)	Full-time			
S6 *note S6*	**PLACEMENT(S)/WORK-BASED LEARNING REQUIRED**		YES		NO	
			If YES, does this conform with the UEA's code of practice on placements?			
S7 *note S7*	**RELEVANT SUBJECT BENCHMARK STATEMENT(S)**		QAA Benchmarking Statement for Engineering (Combines BEng and MEng) UK Standard for Professional Engineering Competence (UK-SPEC): The Accreditation of Higher Education Programmes (2010)			
S8 *note S8*	**ENTRY REQUIREMENTS**		Same as existing requirements which are : BEng - ABB To include A-level Mathematics and a science from a suggested list. GCSE science if not offered at A level.			
S9	**JACS Subject Level Code(s)** To be completed by the Planning Office following approval of the Business Case					
S10	**UCAS ADMISSION CODE / COURSE CODE** To be completed by the Planning Office following approval of the Business Case					
S11 *note S11*	**FURTHER INFORMATION** available via…		www.uea.ac.uk/engineering			
S12	**COURSE HIGHLIGHTS** (for publication in University Prospectus / Website / other publicity) **NB** Please include employability prospects/career possibilities					
note S12	These BEng (Hons) and MEng programmes combine new investment in engineering with existing and substantial expertise across the Faculty of Science in the fields of applied mathematics, energy resource and environmental management. The programme has been developed in partnership with industry and employers, through close collaboration with the East of England Energy Group (EEEGR), and aims to address the national and regional shortage of high-calibre qualified graduates in the field of Energy Engineering. The Faculty of Science houses an impressive range of engineering expertise, particularly in the Schools of Mathematics, Environmental Sciences, Biological Sciences, Computing Sciences and Chemistry. We are internationally renowned for our research and teaching in many relevant fields, including Applied Mathematics, Computer Systems Engineering, Geophysical Sciences and Physical Oceanography and Physical Chemistry, to name but a few. This existing expertise, combined with significant new investment by the Faculty of Science, will ensure that these BEng (Hons) and MEng programmes equip students with training in the fundamentals of engineering, along with its application to the energy industry. All students will be required to undertake a substantial individual engineering project as part of the final stages of each programme, and it is anticipated that many students will have the opportunity to link this project to an employer in the energy sector. Accreditation is being sought from the Energy Institute to allow BEng graduates partial exemption towards CEng status. MEng graduates will be granted full exemption from the academic requirements for CEng status. A requirement of this is that they complete a major team-based project and this is included in fourth year.					

This programme offers excellent career prospects to graduates. Employers have identified a shortage of engineers, particularly in the energy sector, so high calibre graduates from this programme will be in demand.

Programme Aims

General

- provide a high-quality and challenging degree programme which addresses the importance of professionalism and the responsibility of an engineer to work within established ethical frameworks and engineering codes of conduct
- enable students to appreciate the importance of sustainable development on a finite planet and how to utilise this knowledge in completing modern engineering designs.
- enable students to enhance their intellectual skills through lectures, seminars, laboratory classes, visits to employers/industry, field trips and discussion with industrial practitioners
- enhance skills in critical analysis and project management to provide a range of techniques for decision making that can be employed in a range of different situations
- develop transferable, employability skills in self-expression, numeracy, computer literacy, team working, project management and independent research
- develop specific English language skills in both written and oral expression, including well-honed report-writing skills.
- acquire skills in forming scientific hypotheses and in testing these through research of relevant literature and through practical experimentation
- develop skills in communication of information to peers and non-specialists alike using a range of different forms of media.
- develop skills in and understanding of the process of design, from feasibility through concepts and scheme to final detailed design, followed by whole life issues and decommissioning.

Specific to Energy-related degrees

- provide a high-quality and challenging degree programme which addresses a range of current issues in energy engineering, covering a range of different areas including renewables (wind, wave, tidal, hydro, solar etc) and non-renewables (oil, gas, coal, nuclear)
- develop a range of subject-specific engineering skills related to the provision of a reliable and appropriate energy supply and effective measures for controlling demand
- expose students to the realities of the energy engineering industry and how it fits into the wider context of engineering and industry in general by utilising practising engineers. enable students to enhance their intellectual skills through lectures, seminars, laboratory classes, visits to employers/industry, field trips and discussion with industrial practitioners

	• develop an understanding of how the process of design requires the input of energy engineers at all levels and differs from other specialist engineering disciplines

Course Five				
S1	**a**	**SCHOOL(S) OF STUDY**	Mathematics	
note S1c	**b**	**FACULTY or FACULTIES**	Science	
	c	**JOINT COURSE?** (ie owned/taught by more than one School)	~~**YES**~~	
			NO	
	d	**NAME OF COURSE DIRECTOR** (Home School)	Prof Lawrence Coates	
	e	**NAME OF DEPUTY COURSE DIRECTOR** (partner School, for Joint Courses only)	N/A	
S2 *note S2a*	**a**	**COURSE TITLE**	MEng Energy Engineering	
note S2b	**b**	**COURSE CODE**	TBA	
note S2c & S2d	**c**	**AWARD**	**MEng**	
	d	**EXIT AWARD(S) AND TITLE(S)**	Certificate of Higher Education [CertHE] Diploma of Higher Education [DiplHE] BEng Energy Engineering	
	e	**FULL/PART-TIME (please specify)**	Full-time	
	f	**LOCATION (UEA Norwich, UEA London, Distance Learning)**	**UEA Norwich**	
	g	**AVAILABLE FROM:**	September 2016	
S3 *note S3a* *note S3b*	**a**	**PROFESSIONAL AWARD (if any)**	N/A	
	b	**ACCREDITING/VALIDATING BODY (if relevant)**	The Energy Institute (EI) gives exemption for academic requirements for CEng (Chartered Engineer) status.	
		Website (URL)	www.energyinst.org	
		Date when accreditation/ validation may take place	The EI will visit to consider current degrees during 2015. A subsequent visit may be required to consider the new proposed degrees during the second academic year of their introduction,i.e. 2018 Accreditation is usually conditional on seeing the work of successful graduates at a	

			later date and then accredited status is back-dated to the year of first admission.			
S4 *note S4*	**LEVEL**	Sub-degree (e.g. Cert. Dip.)				
		Undergraduate				
		Integrated Masters	✓			
		Masters				
		Other postgraduate (please specify)				
S5 *note S5a*	**a**	**DURATION** (years or months)	4 years			
note S5b	**b**	**MODE OF ATTENDANCE** (full-time, part-time, distance, other)	Full-time			
S6 *note S6*	**PLACEMENT(S)/WORK-BASED LEARNING REQUIRED**		~~YES~~		NO	✓
			If YES, does this conform with the UEA's code of practice on placements?			
S7 *note S7*	**RELEVANT SUBJECT BENCHMARK STATEMENT(S)**		QAA Benchmarking Statement for Engineering (Combines BEng and MEng) UK Standard for Professional Engineering Competence (UK-SPEC): The Accreditation of Higher Education Programmes (2010)			
S8 *note S8*	**ENTRY REQUIREMENTS**		Same as existing requirements which are : MEng - AAA To include A-level Mathematics and a science from a suggested list. GCSE science if not offered at A level.			
S9	**JACS Subject Level Code(s)** To be completed by the Planning Office following approval of the Business Case					
S10	**UCAS ADMISSION CODE / COURSE CODE** To be completed by the Planning Office following approval of the Business Case					
S11 *note S11*	**FURTHER INFORMATION** available via…		www.uea.ac.uk/engineering			
S12	**COURSE HIGHLIGHTS** (for publication in University Prospectus / Website / other publicity) **NB** Please include employability prospects/career possibilities					
note S12	These BEng (Hons) and MEng programmes combine new investment in engineering with existing and substantial expertise across the Faculty of Science in the fields of applied mathematics, energy resource and environmental management. The programme has been developed in partnership with industry and employers, through close collaboration with the East of England Energy Group (EEEGR), and aims to address the national and regional shortage of high-calibre qualified graduates in the field of Energy Engineering. The Faculty of Science houses an impressive range of engineering expertise, particularly in the Schools of Mathematics, Environmental Sciences, Biological Sciences, Computing Sciences and Chemistry. We are internationally renowned for our research and teaching in many relevant fields, including Applied Mathematics, Computer Systems Engineering, Geophysical Sciences and Physical Oceanography and Physical Chemistry, to name but a few. This existing expertise, combined with					

significant new investment by the Faculty of Science, will ensure that these BEng (Hons) and MEng programmes equip students with training in the fundamentals of engineering, along with its application to the energy industry.

All students will be required to undertake a substantial individual engineering project as part of the final stages of each programme, and it is anticipated that many students will have the opportunity to link this project to an employer in the energy sector. Accreditation is being sought from the Energy Institute to allow BEng graduates partial exemption towards CEng status. MEng graduates will be granted full exemption from the academic requirements for CEng status. A requirement of this is that they complete a major team-based project and this is included in fourth year.

This programme offers excellent career prospects to graduates. Employers have identified a shortage of engineers, particularly in the energy sector, so high calibre graduates from this programme will be in demand.

Programme Aims

General

- provide a high-quality and challenging degree programme which addresses the importance of professionalism and the responsibility of an engineer to work within established ethical frameworks and engineering codes of conduct
- enable students to appreciate the importance of sustainable development on a finite planet and how to utilise this knowledge in completing modern engineering designs.
- enable students to enhance their intellectual skills through lectures, seminars, laboratory classes, visits to employers/industry, field trips and discussion with industrial practitioners
- enhance skills in critical analysis and project management to provide a range of techniques for decision making that can be employed in a range of different situations
- develop transferable, employability skills in self-expression, numeracy, computer literacy, team working, project management and independent research
- develop specific English language skills in both written and oral expression, including well-honed report-writing skills.
- acquire skills in forming scientific hypotheses and in testing these through research of relevant literature and through practical experimentation
- develop skills in communication of information to peers and non-specialists alike using a range of different forms of media.
- develop skills in and understanding of the process of design, from feasibility through concepts and scheme to final detailed design, followed by whole life issues and decommissioning.

Specific to Energy-related degrees

- provide a high-quality and challenging degree programme which addresses a range of current issues in energy engineering, covering a range of different areas including renewables (wind, wave, tidal, hydro, solar etc) and non-renewables (oil, gas, coal, nuclear)

	• develop a range of subject-specific engineering skills related to the provision of a reliable and appropriate energy supply and effective measures for controlling demand • expose students to the realities of the energy engineering industry and how it fits into the wider context of engineering and industry in general by utilising practising engineers. enable students to enhance their intellectual skills through lectures, seminars, laboratory classes, visits to employers/industry, field trips and discussion with industrial practitioners • develop an understanding of how the process of design requires the input of energy engineers at all levels and differs from other specialist engineering disciplines

Course Six				
S1	**a**	**SCHOOL(S) OF STUDY**	Mathematics	
note S1c	**b**	**FACULTY or FACULTIES**	Science	
	c	**JOINT COURSE?** (ie owned/taught by more than one School)	~~**YES**~~	
			NO	
	d	**NAME OF COURSE DIRECTOR** (Home School)	Prof Lawrence Coates	
	e	**NAME OF DEPUTY COURSE DIRECTOR** (partner School, for Joint Courses only)	N/A	
S2 *note S2a*	**a**	**COURSE TITLE**	BEng Engineering	
note S2b	**b**	**COURSE CODE**	TBA	
note S2c & S2d	**c**	**AWARD**	**BEng (Hons)**	
	d	**EXIT AWARD(S) AND TITLE(S)**	Certificate of Higher Education [CertHE] Diploma of Higher Education [DiplHE]	
	e	**FULL/PART-TIME (please specify)**	Full-time	
	f	**LOCATION (UEA Norwich, UEA London, Distance Learning)**	**UEA Norwich**	
	g	**AVAILABLE FROM:**	September 2016	
S3 *note S3a* *note S3b*	**a**	**PROFESSIONAL AWARD (if any)**	N/A	
	b	**ACCREDITING/VALIDATING BODY (if relevant)**	Professional institutions do not normally accredit general engineering degrees, but instead accredit pathways that they can separately identify that satisfy their requirements. Discussions with IMechE have indicated the procedure (See Appendix 2)	

			The Energy Institute (EI) gives partial exemption for requirements for CEng (Chartered Engineer) status. The Institution of Mechanical Engineers gives partial exemption for requirements for CEng (Chartered Engineer) status. The Institution of Engineering and Technology gives partial exemption for requirements for CEng (Chartered Engineer) status. The Joint Board of Moderators gives partial exemption for requirements for CEng (Chartered Engineer) status.
		Website (URL)	www.energyinst.org www.imeche.org www.theiet.org www.jbm.org.uk
		Date when accreditation/ validation may take place	The EI will visit to consider current degrees during 2015. A subsequent visit may be required to consider the new proposed degrees during the second academic year of their introduction, ie 2018 The relevant institutions of IET, IMechE, JBM will visit once the degree is running and will award conditional accredited status. This is usually conditional on seeing the work of successful graduates at a later date and then accredited status is back-dated to the year of first admission.
S4 *note S4*	**LEVEL**	Sub-degree (e.g. Cert. Dip.)	
		Undergraduate	✓
		Integrated Masters	
		Masters	
		Other postgraduate (please specify)	
S5 *note S5a*	**a**	**DURATION** (years or months)	3 years
note S5b	**b**	**MODE OF ATTENDANCE** (full-time, part-time, distance, other)	Full-time
S6 *note S6*	**PLACEMENT(S)/WORK-BASED LEARNING REQUIRED**		~~YES~~ / NO: ✓
			If YES, does this conform with the UEA's code of practice on placements?
S7 *note S7*	**RELEVANT SUBJECT BENCHMARK STATEMENT(S)**		QAA Benchmarking Statement for Engineering (Combines BEng and MEng) UK Standard for Professional Engineering Competence (UK-SPEC): The Accreditation of Higher Education Programmes (2010)

S8 *note S8*	**ENTRY REQUIREMENTS**	Same as existing requirements which are : BEng - ABB To include A-level Mathematics and a science from a suggested list. GCSE science if not offered at A level.
S9	**JACS Subject Level Code(s)** To be completed by the Planning Office following approval of the Business Case	
S10	**UCAS ADMISSION CODE / COURSE CODE** To be completed by the Planning Office following approval of the Business Case	
S11 *note S11*	**FURTHER INFORMATION** available via…	www.uea.ac.uk/engineering
S12	**COURSE HIGHLIGHTS** (for publication in University Prospectus / Website / other publicity) **NB** Please include employability prospects/career possibilities	

note S12

These BEng (Hons) and MEng programmes combine new investment in engineering with existing and substantial expertise across the Faculty of Science. The programme has been developed in partnership with industry and employers, through close collaboration with the Hethel Innovation, and aims to address the national and regional shortage of high-calibre qualified engineering graduates.

The Faculty of Science houses an impressive range of engineering expertise, particularly in the Schools of Mathematics, Environmental Sciences, Biological Sciences, Computing Sciences and Chemistry. We are internationally renowned for our research and teaching in many relevant fields, including Applied Mathematics, Computer Systems Engineering, Geophysical Sciences and Physical Oceanography and Physical Chemistry, to name but a few. This existing expertise, combined with significant new investment by the Faculty of Science, will ensure that these BEng (Hons) and MEng programmes equip students with training in the fundamentals of engineering, along with its application to specific engineering disciplines including mechanical, civil, electronic and electrical engineering.

All students will be required to undertake a substantial individual engineering project as part of the final stages of each programme, and it is anticipated that many students will have the opportunity to link this project to an employer in the energy sector. Accreditation is being sought for specific discipline pathways from the relevant professional institutions to allow BEng graduates partial exemption towards CEng status. MEng graduates will be granted full exemption from the academic requirements for CEng status. A requirement of this is that they complete a major team-based project and this is included in fourth year.

This programme offers excellent career prospects to graduates. Employers have identified a shortage of engineers, so high calibre graduates from this programme will be in demand.

Programme Aims

General

- provide a high-quality and challenging degree programme which addresses the importance of professionalism and the responsibility of an engineer to work within established ethical frameworks and engineering codes of conduct

- enable students to appreciate the importance of sustainable development on a finite planet and how to utilise this knowledge in completing modern engineering designs.

- enable students to enhance their intellectual skills through lectures, seminars, laboratory classes, visits to employers/industry, field trips and discussion with industrial practitioners
- enhance skills in critical analysis and project management to provide a range of techniques for decision making that can be employed in a range of different situations
- develop transferable, employability skills in self-expression, numeracy, computer literacy, team working, project management and independent research
- develop specific English language skills in both written and oral expression, including well-honed report-writing skills.
- acquire skills in forming scientific hypotheses and in testing these through research of relevant literature and through practical experimentation
- develop skills in communication of information to peers and non-specialists alike using a range of different forms of media.
- develop skills in and understanding of the process of design, from feasibility through concepts and scheme to final detailed design, followed by whole life issues and decommissioning.

<u>Specific to General Engineering Degrees and Pathways</u>

- provide a high-quality and challenging degree programme which addresses a range of current issues in engineering, integrating the appreciation of mechanical, electronic & electrical, civil and energy engineering disciplines covering a range of different areas that cut across these disciplines including health & safety risk management, fundamental physical principles, control systems, commercial pressures, quality processes and systems and computational techniques.
- develop a range of subject-specific engineering skills related to engineering in the chosen discipline
- expose students to the modern reality of multi-disciplinary engineering working practices and utilise field trips and discussion with industrial practitioners to help them to see how in depth study of their own discipline (mechanical, electrical etc.) can feed in to the holistic approach to the production of engineering artefacts
- develop an understanding of how the process of design in their chosen discipline differs between specialist engineering disciplines

Course Seven				
S1	**a**	**SCHOOL(S) OF STUDY**	Mathematics	
note S1c	**b**	**FACULTY or FACULTIES**	Science	
	c	**JOINT COURSE?** (ie owned/taught by	~~**YES**~~	

		more than one School)	**NO**	
	d	**NAME OF COURSE DIRECTOR** (Home School)	Prof Lawrence Coates	
	e	**NAME OF DEPUTY COURSE DIRECTOR** (partner School, for Joint Courses only)	N/A	
S2 *note S2a*	**a**	**COURSE TITLE**	BEng Engineering with a Year in Industry	
note S2b	**b**	**COURSE CODE**	TBA	
note S2c & S2d	**c**	**AWARD**	**BEng (Hons)**	
	d	**EXIT AWARD(S) AND TITLE(S)**	Certificate of Higher Education [CertHE] Diploma of Higher Education [DiplHE]	
	e	**FULL/PART-TIME (please specify)**	Full-time	
	f	**LOCATION (UEA Norwich, UEA London, Distance Learning)**	**UEA Norwich**	
	g	**AVAILABLE FROM:**	September 2016	
S3 *note S3a* *note S3b*	**a**	**PROFESSIONAL AWARD (if any)**	N/A	
	b	**ACCREDITING/VALIDATING BODY (if relevant)**	Professional institutions do not normally accredit general engineering degrees, but instead accredit pathways that they can separately identify that satisfy their requirements. Discussions with IMechE have indicated the procedure (See Appendix 2) The Energy Institute (EI) gives partial exemption for requirements for CEng (Chartered Engineer) status. The Institution of Mechanical Engineers gives partial exemption for requirements for CEng (Chartered Engineer) status. The Institution of Engineering and Technology gives partial exemption for requirements for CEng (Chartered Engineer) status. The Joint Board of Moderators gives partial exemption for requirements for CEng (Chartered Engineer) status.
		Website (URL)	www.energyinst.org www.imeche.org www.theiet.org www.jbm.org.uk
		Date when accreditation/ validation may take place	The EI will visit to consider current degrees during 2015. A subsequent visit may be required to consider the new proposed degrees during the second academic year of

				their introduction, ie 2018 The relevant institutions of IET, IMechE, JBM will visit once the degree is running and will award conditional accredited status. This is usually conditional on seeing the work of successful graduates at a later date and then accredited status is back-dated to the year of first admission.		
S4 *note S4*	**LEVEL**		Sub-degree (e.g. Cert. Dip.)			
			Undergraduate	✓		
			Integrated Masters			
			Masters			
			Other postgraduate (please specify)			
S5 *note S5a*	**a**	**DURATION** (years or months)		4 years including YINI		
note S5b	**b**	**MODE OF ATTENDANCE** (full-time, part-time, distance, other)		Full-time		
S6 *note S6*	**PLACEMENT(S)/WORK-BASED LEARNING REQUIRED**			YES		NO
				If YES, does this conform with the UEA's code of practice on placements?		
S7 *note S7*	**RELEVANT SUBJECT BENCHMARK STATEMENT(S)**			QAA Benchmarking Statement for Engineering (Combines BEng and MEng) UK Standard for Professional Engineering Competence (UK-SPEC): The Accreditation of Higher Education Programmes (2010)		
S8 *note S8*	**ENTRY REQUIREMENTS**			Same as existing requirements which are : BEng with YINI - AAB To include A-level Mathematics and a science from a suggested list. GCSE science if not offered at A level.		
S9	**JACS Subject Level Code(s)** To be completed by the Planning Office following approval of the Business Case					
S10	**UCAS ADMISSION CODE / COURSE CODE** To be completed by the Planning Office following approval of the Business Case					
S11 *note S11*	**FURTHER INFORMATION** available via…			www.uea.ac.uk/engineering		
S12	**COURSE HIGHLIGHTS** (for publication in University Prospectus / Website / other publicity) **NB** Please include employability prospects/career possibilities					
note S12	These BEng (Hons) and MEng programmes combine new investment in engineering with existing and substantial expertise across the Faculty of Science. The programme has been developed in partnership with industry and employers, through close collaboration with the Hethel Innovation, and aims to address the national and regional shortage of high-calibre qualified engineering graduates. The Faculty of Science houses an impressive range of engineering expertise, particularly in the Schools of Mathematics, Environmental Sciences, Biological					

Sciences, Computing Sciences and Chemistry. We are internationally renowned for our research and teaching in many relevant fields, including Applied Mathematics, Computer Systems Engineering, Geophysical Sciences and Physical Oceanography and Physical Chemistry, to name but a few. This existing expertise, combined with significant new investment by the Faculty of Science, will ensure that these BEng (Hons) and MEng programmes equip students with training in the fundamentals of engineering, along with its application to specific engineering disciplines including mechanical, civil, electronic and electrical engineering.

All students will be required to undertake a substantial individual engineering project as part of the final stages of each programme, and it is anticipated that many students will have the opportunity to link this project to an employer in the energy sector. Accreditation is being sought for specific discipline pathways from the relevant professional institutions to allow BEng graduates partial exemption towards CEng status. MEng graduates will be granted full exemption from the academic requirements for CEng status. A requirement of this is that they complete a major team-based project and this is included in fourth year.

This programme offers excellent career prospects to graduates. Employers have identified a shortage of engineers, so high calibre graduates from this programme will be in demand.

Programme Aims

General

- provide a high-quality and challenging degree programme which addresses the importance of professionalism and the responsibility of an engineer to work within established ethical frameworks and engineering codes of conduct
- enable students to appreciate the importance of sustainable development on a finite planet and how to utilise this knowledge in completing modern engineering designs.
- enable students to enhance their intellectual skills through lectures, seminars, laboratory classes, visits to employers/industry, field trips and discussion with industrial practitioners
- enhance skills in critical analysis and project management to provide a range of techniques for decision making that can be employed in a range of different situations
- develop transferable, employability skills in self-expression, numeracy, computer literacy, team working, project management and independent research
- develop specific English language skills in both written and oral expression, including well-honed report-writing skills.
- acquire skills in forming scientific hypotheses and in testing these through research of relevant literature and through practical experimentation
- develop skills in communication of information to peers and non-specialists alike using a range of different forms of media.
- develop skills in and understanding of the process of design, from feasibility through concepts and scheme to final detailed design, followed by whole life issues and decommissioning.

	Specific to General Engineering Degrees and Pathways • provide a high-quality and challenging degree programme which addresses a range of current issues in engineering, integrating the appreciation of mechanical, electronic & electrical, civil and energy engineering disciplines covering a range of different areas that cut across these disciplines including health & safety risk management, fundamental physical principles, control systems, commercial pressures, quality processes and systems and computational techniques. • develop a range of subject-specific engineering skills related to engineering in the chosen discipline • expose students to the modern reality of multi-disciplinary engineering working practices and utilise field trips and discussion with industrial practitioners to help them to see how in depth study of their own discipline (mechanical, electrical etc.) can feed in to the holistic approach to the production of engineering artefacts • develop an understanding of how the process of design in their chosen discipline differs between specialist engineering disciplines • provide students with the opportunity to experience the reality of engineering in the workplace and to apply the theoretical principles learned on the course in an industrial setting.

Course Eight				
S1	**a**	**SCHOOL(S) OF STUDY**	Mathematics	
note S1c	**b**	**FACULTY or FACULTIES**	Science	
	c	**JOINT COURSE?** (ie owned/taught by more than one School)	~~**YES**~~	
			NO	
	d	**NAME OF COURSE DIRECTOR** (Home School)	Prof Lawrence Coates	
	e	**NAME OF DEPUTY COURSE DIRECTOR** (partner School, for Joint Courses only)	N/A	
S2 *note S2a*	**a**	**COURSE TITLE**	MEng Engineering	
note S2b	**b**	**COURSE CODE**	TBA	
note S2c & S2d	**c**	**AWARD**	**MEng**	
	d	**EXIT AWARD(S) AND TITLE(S)**	Certificate of Higher Education [CertHE] Diploma of Higher Education [DiplHE] BEng Engineering	
	e	**FULL/PART-TIME (please specify)**	Full-time	

	f	**LOCATION (UEA Norwich, UEA London, Distance Learning)**		**UEA Norwich**
	g	**AVAILABLE FROM:**		September 2016
S3 *note S3a* *note S3b*	**a**	**PROFESSIONAL AWARD (if any)**		N/A
	b	**ACCREDITING/VALIDATING BODY (if relevant)**		Professional institutions do not normally accredit general engineering degrees, but instead accredit pathways that they can separately identify that satisfy their requirements. Discussions with IMechE have indicated the procedure (See Appendix 2) The Energy Institute (EI) gives partial exemption for requirements for CEng (Chartered Engineer) status. The Institution of Mechanical Engineers gives partial exemption for requirements for CEng (Chartered Engineer) status. The Institution of Engineering and Technology gives partial exemption for requirements for CEng (Chartered Engineer) status. The Joint Board of Moderators gives partial exemption for requirements for CEng (Chartered Engineer) status.
		Website (URL)		www.energyinst.org www.imeche.org www.theiet.org www.jbm.org.uk
		Date when accreditation/ validation may take place		The EI will visit to consider current degrees during 2015. A subsequent visit may be required to consider the new proposed degrees during the second academic year of their introduction, ie 2018 The relevant institutions of IET, IMechE, JBM will visit once the degree is running and will award conditional accredited status. This is usually conditional on seeing the work of successful graduates at a later date and then accredited status is back-dated to the year of first admission.
S4 *note S4*	**LEVEL**	Sub-degree (e.g. Cert. Dip.)		
		Undergraduate		
		Integrated Masters		✓
		Masters		
		Other postgraduate (please specify)		
S5 *note S5a*	**a**	**DURATION** (years or months)		4 years

note S5b	**b**	**MODE OF ATTENDANCE** (full-time, part-time, distance, other)	Full-time			
S6 *note S6*	**PLACEMENT(S)/WORK-BASED LEARNING REQUIRED**		~~YES~~		NO	✓
			If YES, does this conform with the UEA's code of practice on placements?			
S7 *note S7*	**RELEVANT SUBJECT BENCHMARK STATEMENT(S)**		QAA Benchmarking Statement for Engineering (Combines BEng and MEng) UK Standard for Professional Engineering Competence (UK-SPEC): The Accreditation of Higher Education Programmes (2010)			
S8 *note S8*	**ENTRY REQUIREMENTS**		Same as existing requirements which are : MEng - AAA To include A-level Mathematics and a science from a suggested list. GCSE science if not offered at A level.			
S9	**JACS Subject Level Code(s)** To be completed by the Planning Office following approval of the Business Case					
S10	**UCAS ADMISSION CODE / COURSE CODE** To be completed by the Planning Office following approval of the Business Case					
S11 *note S11*	**FURTHER INFORMATION** available via…		www.uea.ac.uk/engineering			
S12	**COURSE HIGHLIGHTS** (for publication in University Prospectus / Website / other publicity) **NB** Please include employability prospects/career possibilities					
note S12	These BEng (Hons) and MEng programmes combine new investment in engineering with existing and substantial expertise across the Faculty of Science. The programme has been developed in partnership with industry and employers, through close collaboration with the Hethel Innovation, and aims to address the national and regional shortage of high-calibre qualified engineering graduates. The Faculty of Science houses an impressive range of engineering expertise, particularly in the Schools of Mathematics, Environmental Sciences, Biological Sciences, Computing Sciences and Chemistry. We are internationally renowned for our research and teaching in many relevant fields, including Applied Mathematics, Computer Systems Engineering, Geophysical Sciences and Physical Oceanography and Physical Chemistry, to name but a few. This existing expertise, combined with significant new investment by the Faculty of Science, will ensure that these BEng (Hons) and MEng programmes equip students with training in the fundamentals of engineering, along with its application to specific engineering disciplines including mechanical, civil, electronic and electrical engineering. All students will be required to undertake a substantial individual engineering project as part of the final stages of each programme, and it is anticipated that many students will have the opportunity to link this project to an employer in the energy sector. Accreditation is being sought for specific discipline pathways from the relevant professional institutions to allow BEng graduates partial exemption towards CEng status. MEng graduates will be granted full exemption from the academic requirements for CEng status. A requirement of this is that they complete a major team-based project and this is included in fourth year. This programme offers excellent career prospects to graduates. Employers have identified a shortage of engineers, so high calibre graduates from this programme will					

be in demand.

Programme Aims

General

- provide a high-quality and challenging degree programme which addresses the importance of professionalism and the responsibility of an engineer to work within established ethical frameworks and engineering codes of conduct
- enable students to appreciate the importance of sustainable development on a finite planet and how to utilise this knowledge in completing modern engineering designs.
- enable students to enhance their intellectual skills through lectures, seminars, laboratory classes, visits to employers/industry, field trips and discussion with industrial practitioners
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- develop specific English language skills in both written and oral expression, including well-honed report-writing skills.
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- develop skills in communication of information to peers and non-specialists alike using a range of different forms of media.
- develop skills in and understanding of the process of design, from feasibility through concepts and scheme to final detailed design, followed by whole life issues and decommissioning.

Specific to General Engineering Degrees and Pathways

- provide a high-quality and challenging degree programme which addresses a range of current issues in engineering, integrating the appreciation of mechanical, electronic & electrical, civil and energy engineering disciplines covering a range of different areas that cut across these disciplines including health & safety risk management, fundamental physical principles, control systems, commercial pressures, quality processes and systems and computational techniques.
- develop a range of subject-specific engineering skills related to engineering in the chosen discipline
- expose students to the modern reality of multi-disciplinary engineering working practices and utilise field trips and discussion with industrial practitioners to help them to see how in depth study of their own discipline (mechanical, electrical etc.) can feed in to the holistic approach to the production of engineering artefacts
- develop an understanding of how the process of design in their chosen

	discipline differs between specialist engineering disciplines

*****Please copy and paste the above table for additional (related) courses*****

S13	RATIONALE FOR PROPOSAL
note S13	Please explain why you are proposing this/these new course(s) or these course amendments, and why this proposal is being offered at this time. See guidance notes for further indication of what to include in this section.
	The original proposal to deliver energy engineering programmes was made on a sound basis. It emerged from discussions across the Science Faculty led by an Engineering Working Party, initially chaired by Professor Liss and subsequently chaired by Dr Ben Milner. The Working Party was established in March 2009 and presented its findings, after extensive consultation within the Faculty and more widely in UEA, to the Science Faculty Executive in February 2010 and to the University's Executive Team in March 2010. Both bodies encouraged development of the plans. There was consultation with industry, employers and professional bodies during the initial discussions and further discussions took place following the decisions at Science Executive and ET. An external consultant was engaged to assist with further work and on the basis of the consultant's recommendations and further discussion with industry/employers, a proposal was made in autumn 2011 leading to admitting the first group of students in 2013. There are a large number of energy/engineering employers in the eastern region, many of whom are finding it difficult to recruit/retain staff. Staff working in the industries in the region have to travel elsewhere for postgraduate provision in the subject. UEA's experience of introducing new programmes, such as Pharmacy, to fulfil a regional need is well established. The MSc Energy Engineering with Environmental Management, launched in September 2011, was the first stage in bringing to UEA a new area of teaching and research – the provision of undergraduate degrees in energy engineering was the second stage. The plan to ultimately introduce a broader range of engineering programmes was mentioned at that stage. For the existing focused undergraduate programmes market research in 2010 indicated an estimate of 6 entrants in total against a 5-year average target of 25 each year. At the time it was felt that a cautious approach should be adopted until the market was clearer. Although applications have steadily risen over the years (2013 – 38, 2014 – 73), continuing with the current provision alone will not lead to meeting targets because the number of applications and subsequent CF/UFs is still relatively low (CF/UFs 2013 - 11, 2014 - 10). Nevertheless the recent market research suggests that the entrant numbers (2013-13, 2014 -~14) are actually quite good for such specialist degrees. See Section BC2.4. The development of Engineering at UEA has been supported by an Engineering Implementation Group chaired by the Dean of Science. This Group determined that a separate set of strategy meetings was necessary to take things forward. These degree proposals arise from two internal strategy meetings chaired by the Dean of Science on 14th May 2014 and 4th June 2014 and discussion at the Engineering Industrial Advisory Board meeting on 23rd June 2014. The findings were reported back at the UEA Engineering Steering Group meeting on 2nd July 2014 at a point before the market research became available. The primary aim of this package of proposals is to broaden our provision with minimal

resource impact in a way that should attract more significant numbers of applications and which matches the requirement of engineering employers.

Feedback from teachers has suggested that energy engineering may be seen by sixth-formers as very specialist. Nevertheless continuing energy-focused courses is clearly the right thing to do since the global and national challenges in this area will only grow and our application numbers are growing. They also fit well with UEA's ethos.

The combination of energy engineering with environmental management was a sensible first step, riding on the back of our track record in ENV, and definitely appeals to some applicants who see it as combining engineering with an environmental science degree. However, it can be perceived as too niche for students who want to focus on engineering. Also many energy supply-side employers see the combination as potentially a softening of the engineering, whereas those from the Energy Management side see the combination as excellent. So although change is necessary retaining the current degree title in some way would be a good idea. We are also aware that the Energy Institute professional accrediting panel is yet to visit to assess the current degree programme. When students are trawling the UCAS lists the titles are seen as very important at their first stage of decision making.

Industry is unanimous in selecting mechanical engineering as a discipline they most like to recruit from and the numbers of applicants nationally is higher than other engineering disciplines and has almost doubled over 2008-2013. To deliver a dedicated research-led mechanical engineering degree would require significant investment in research and technical staff, laboratory and workshop space. The Formula Student competition is also a key attractor for applicants and where it is successful it is due to technician support and enthusiasm. An established alternative is an integrated engineering programme with specialisms in the final stages. This requires less dedicated mechanical-related investment and exploits the multiple commonalities across engineering disciplines. Nevertheless a longer term aim to deliver mechanical engineering should drive the current proposals and there is potential for company support for such an aim.

In the medium to long term it is acknowledged by industry, school careers advisers and ARM staff who attend careers fairs that mechanical engineering will be a good degree to offer. But getting to the point where we can rival the established big civics will require a significant investment in equipment and space. This proposal provides a foundation that maintains viability of each constituent module but allows the flexibility to develop new pathways. Every attempt will be made to gain accreditation for each pathway as early as possible.

The current UG course has been established with a significant amount of core material that is of a general engineering nature. This was done with future growth in mind. Many engineering Schools across the sector have moved to common first year teaching for efficiency reasons but market it as multi-disciplinarity. This applies to both specialist degrees like civil and mechanical engineering as well as those that admit to an integrated or general engineering programme.

Some engineering courses are under pressure to increase commonality in second year but entrenched discipline-based attitudes can make this difficult. At UEA we have no such barriers to this. By adopting a sensible approach to utilising existing options, we can ensure that there are real differences between the degrees which will appeal to prospective students. Some of the current first year students have indicated an interest in business modules and language modules so a structure that allows this will be popular.

The proposal is to provide an integrated degree programme that develops multi-disciplinarity via an Engineering degree which has 80-100 credits of each of first and second year in common with the current Energy degrees and which offers flexibility from third year onwards for specialisation.

A trawl of professional institution accreditation information and informal discussions with colleagues at Durham University (where they have well-established general engineering degrees) and the Accreditation Officer at IMechE, indicates that the Engineering Council co-ordinates accreditation visits to general engineering courses and assists with liaison with the several accrediting bodies:

a. JBM for Civil Engineering

b. IET for Electrical Engineering, but they have a broad range of degrees that they will accredit.
c. IOMMM for Materials Science
d. IMechE for Mechanical Engineering
e. IChemE for Chemical Engineering
f. EI for Energy Engineering

By October 2014 there will be 4 ENG staff. Given the strengths of the current ENG staff, and the ability to focus recruitment of the remaining new staff on plugging specific gaps in expertise, it should be possible to deliver the proposed new portfolio by extending the recruitment until the third year of the new programmes, i.e. to have all staff in post ready for start of 2018-19.

The proposals described here are based on the minimum of new taught material to allow each set of degrees to be different, utilising where possible existing option modules from across the Faculty. As new expertise is recruited opportunities will be taken to provide research-led teaching in relevant specific areas, e.g. Finite Element Analysis, Carbon Materials, Control systems etc. This will have a positive impact on applications because applicants like to know that they will have options available.

The proposed portfolio of degrees:

a. BEng Energy Engineering with Environmental Management
b. BEng/MEng Energy Engineering
c. BEng/MEng Engineering
d. BEng Engineering with a Year in Industry

is a measured response to these considerations. Bullet (a) is the existing most popular degree. Bullet (b) is a degree pair that does not restrict option choice to environmental options but is otherwise identical to (a). Bullet (c) is a degree pair that has a general engineering entry but with 100 credits of common material with (a) and (b). Bullet (d) replaces the current energy-focused year in industry degree with a more flexible route but with the specific requirement that the year in industry has to be in the specific specialism chosen by the student to ensure accreditation.

The Engineering Council has stipulated that to aspire to Chartered Engineer status a student must have completed the equivalent of a MEng. Since there are strict progression requirements from second year, students admitted to or transferred to MEng programmes must have the possibility of graduating with a corresponding BEng and this dictates the necessity of having BEng/MEng pairs wherever integrated Masters degrees exist.

In the proposed portfolio the first two bullets of degrees will be accredited by the Energy Institute. The second two bullets will be considered for accreditation by the relevant professional institutions listed above.

A key feature of the proposals, which is driven by the institutional requirement to minimise the number of degree titles, is that students will be admitted to an integrated engineering degree but will graduate with specialisms identified in their final degree title. It will be essential that the marketing of this generic entry point will enable potential students to clearly see that they will be able to exit the Engineering programme with a specialism in Mechanical or Electronic & Electrical material. The recent report of 'The Tracker Project' highlights explicit year 12 and 13 student interest in areas such as Civil, Mechanical and Electrical Engineering.

For the first set of pathways the following is proposed:

a. BEng/MEng Engineering
b. BEng/MEng Engineering (Mechanical)
c. BEng/MEng Engineering (Electronic and Electrical)

The Engineering BEng may end up being non-accredited and act as a reserve programme for students who do not meet the progression requirements, there is an outside chance that IET may accredit it and this will be pursued.

	Once the improved application numbers are clear then consideration could be given to BEng/MEng Engineering (Civil) but at this stage the additional requirements to satisfy the JBM requirements for accreditation would require too much additional resource. Nevertheless a shaded indication of a possible programme is indicated in Appendix 4.

FULL COURSE PROPOSAL

Part 2 BUSINESS CASE

note BC

BC1	ACADEMIC AND RECRUITMENT STRATEGY	Consult with HOS, Faculty Dean, PLN, ARM (including Admissions)
BC1.1	**How does the proposal fit with the University's Corporate Plan?**	
note BC1.1	The University is committed to enhancing its role in the Eastern region. The region is renowned for its energy industries and the current degrees go some way to providing an academic provision for this sector. But there is currently no more broadly relevant academic provision addressing the many engineering industries in the region. The proposed undergraduate courses will therefore significantly enhance UEA's role with this wider industrial base and contribute to the growth of this important provision. The degree programme will support UEA's Corporate Plan by refreshing existing provision to enhance employability and improve recruitment targets attracting high quality students. The Faculty is committed to expanding its delivery of STEM (Science, Technology, Engineering and Mathematics) subjects and this development fits in with that plan by expanding existing expertise. The recent proposal for a new integrated STEM teaching laboratory fits with this vision. The plan also fits with HEFCE's shift of funds towards STEM subjects from other teaching areas. The course is a good fit with research within the School of Mathematics and School of Environmental Sciences, as well as a number of currently taught modules that exist under NAM. The School of Computing Sciences is developing a strength in Computer Systems Engineering which involves embedded electronic engineering and many synergies exist and will be exploited.	
BC1.2	**Proposed Recruitment Strategy**	
note BC1.2	The aim is to continue to recruit both regionally, nationally and in EU countries as part of the UCAS process. The courses will be advertised through the web and appropriate prospectus. Local employers who have been very supportive so far may also support some of their better apprentices in improving their knowledge, which will make the BEng with a Year in Industry degree attractive. A dedicated Engineering website supports the current provision. Plans to revamp the website are in hand. UEA's MSc programme in Energy Engineering with Environmental Management will continue to raise awareness of the developments in engineering at UEA. Anecdotal evidence from colleagues in ARM and the International Office indicates that the addition of mechanical engineering to the portfolio matches the interest that they see at careers events in the UK and around the world and complements UEA's vision for our student population to be embrace the concept of global citizenship. Staff have offered to record these sorts of enquiries to confirm the anecdotal evidence. The School will continue to work with ARM to make the region aware of the growing presence of engineering at UEA, by outreach activities and visits to schools or inviting school parties on campus. The School has expertise in running Taster	

Courses of various types (e.g. Headstart) and has delivered an Energy Engineering Summer School in 2012, 2013 and 2014. For 2015 this will be grown to span two nights and renamed as an Engineering Summer School. As soon as possible consideration will be given to working with Headstart who have a track record of recruiting high calibre applicants from around the UK.

In March 2010 detailed market research was conducted and identified the following key issues (in italics). Each of these was addressed at the time of the 2011 submission but warrant further comments at this time:

1. ***This is an increasingly crowded market place – Whilst the number of applications and accepts to this course type has grown over the last five years this has been matched by a growth in courses on offer. The University will need to design a course and marketing strategy which is distinct and appealing to the market.***

   This assessment has proved correct and even though current recruitment has doubled the projections it is nowhere near the 25 target.

   It is this aspect that has led to the current proposal to broaden provision with minimum impact on resource.

   More recent market research (July 2014 by Lucy Finnie at BIU) has indicated the areas of engineering that will provide sustainable growth and these are being targeted.

2. ***Applicants who are highly qualified make up a very small part of the market- The bulk of the market for this course is non-traditional students and those with relatively low A level scores. The Faculty will need to plan for how best to target the top end of the market if it is to meet the University's desire for stronger qualified applicants whilst also attracting enough applications and accepts to run the course.***

   The backing of industry continues to support the developments. For the Energy programmes we will continue to work with EEEGR. For the General Engineering programmes it makes sense to work closely with Hethel Innovation and they have shown considerable support for the proposals.

   The SELECT sponsorship scheme was launched in 2013-14 and 5 of the 6 first year students who applied secured placements.

   Every opportunity will be taken to personalise communications with applicants. Past experience suggests that the high-calibre students value the personal contact with academics. There is considerable experience of this in the School.

   The first sentence in the comment (2) has not been reflected in the two intakes so far. This is almost certainly because the statement was based on the whole sector and not on the minority higher level part of it within which UEA operates. Nevertheless it was realised after the event that there were indeed some excellent BTEC applicants during 2013-14. There is scope for boosting the non-A level applications. For 2014-15 onwards the protocol will be changed so that all non-A level Home applicants will be scrutinised by the Admissions Tutor for ENG, as is done for the PGT applications. Interviews will be conducted as appropriate.

3. ***There is a lack of existing local demand – Currently very few applications and accepts to these courses come from the University's local area. To be successful the proposed course would either need to be attractive enough to encourage students from further afield or the Faculty will need to work to 'sell' both the concept of studying engineering and benefits of studying this at the University to the local market. Working with local schools and employers will be important to this. Highlighting the employability of graduates of the course will also be key.***

   All the above points were accepted although the first point is rather because UEA wasn't delivering any energy engineering courses at the time.

   ARM has since provided many opportunities for raising awareness locally and indeed the majority of attendees at the three summer schools have been local. Every single opportunity provided by ARM to meet with visitors of all types has been taken by

ENG staff.

Simon Allen (ENG 0.2 fte project manager) has developed a way of representing ENG at the various careers fairs around the region.

Part of the SCI strategy is to invite teachers to campus for focused conferences as they have a significant influence on applicant choices.

We have maintained 100% employment for our two graduating classes of MSc students and taken many opportunities to publicise this.

Accreditation of new programmes is always a challenge because the Engineering Council does not allow provisional accreditation any more. As soon as our current degrees are accredited the national market will open up. One of the few pieces of consistent advice given to applicants is to avoid non-accredited degrees.

Current Admissions Days generally receive good feedback but now that we have 4 ENG colleagues there is scope for further improvement.

BC1.3	**Partnership and commercial sensitivity**		
note BC1.3	**Has this proposal, in outline, been approved by the Partnerships Office?**	**YES**	YES
		NO	

Please paste their comments below

(Response Sally Walker Partnerships Office).
The only comment I have is that UEA and Essex jointly award a number of engineering programmes through the UCS arrangement. This is not in any way a problem, but is just worth considering in terms of what is delivered within the region. UCS is currently applying for its own taught degree-awarding powers and it is likely that programmes will cease to be validated by the two universities within the next few years.

More details can be found on the UCS website, but the courses are set out below:

FdSc Electronic Engineering
These degrees provide a broad common engineering experience for those who are, or seek to be employed in, electrical, electronic and mechanical engineering fields at higher technician and professional or managerial levels.
FdSc Civil Engineering
This programme aims to provide a general understanding of the function and operation construction industry together with opportunities for modules covering the more specialist areas of each student's chosen area of study.
BSc (Hons) Civil Engineering (Progression Route)
This programme aims to provide a general understanding of the function and operation construction industry together with opportunities for modules covering the more specialist areas of each student's chosen area of study.
Electrical Engineering
UCS offers a HNC and Foundation degree in Electrical Engineering at UCS Bury St Edmunds.
Mechanical Engineering
UCS offers a HNC and Foundation degree in Mechanical Engineering at UCS Bury St Edmunds.
FdSc Communication Technologies: Network Engineering
This is a part-time work-based course in which theory and practice associated with network and communications technologies are explored. The main focus of the syllabus is the physical and software set up of local and wider network architectures.
Operations Engineering
UCS Lowestoft offers degrees in Operations Engineering at a range of levels, including HNC, Foundation degree and Bachelor of Engineering (Hons) (Progression Route).
BEng (Hons) Engineering (Progression Route)
This programme offers progression to an Honours degree for students who have successfully graduated with a Foundation degree (or equivalent such as a HND) in Electrical, Electronic or Mechanical Engineering.

BC2 *note BC2*	**MARKET RESEARCH**	Consult with Market Research team
BC2.1	**What other and type of institution offers identical and/or similar courses in the UK?**	

The BIU team ordered data from UCAS based on all UK undergraduate engineering courses containing a range of additional keywords that matched the aspirations for possible specialisms including 'energy,' 'mechanical', 'civil', 'electrical', 'control systems' and a range of 'general engineering' degrees. These were then filtered by the Faculty with support from the BIU staff to only include courses which appeared to be relevant competitors to the proposed and current courses and further categorised under the three categories:

- General Engineering (including integrated engineering)
- Engineering (specialisms), e.g. Engineering (Mechanical)
- Specialist Engineering, e.g. Mechanical Engineering

The number of courses selected by the Faculty as comparable to the proposed UEA courses, and the number of institutions offering these, hardly changed in the three years 2011 to 2013. However during the same period there was a significant increase in applications in the major subject areas without a commensurate increase in admissions.

What is also clear from the market research is the very low application numbers for certain specialist degrees. This suggests that the original plan of identifying UEA niche markets is probably not viable in the long term. For example there is a lot of scope for employment in the sector dealing with control systems, but nearly all the degrees with this specialism have very low applicant numbers. The Engineering (Electronic and Electrical) pathway can include a study of control systems and provide graduates with the skills to secure jobs in this sector. A typical applicant may enjoy a range of electronic topics including an interest in control but at the time of application they will prefer to keep their options open.

Further confirmation of the weak recruiting power of very specialist degrees was provided by the BIU 'Tracker Project' data based on 1500 responses from year 12 and 13 students. Table BC2.1 summarises the response to the various engineering degree titles, showing popularity of Engineering as a subject and lack of popularity of many specialist degree titles.

Table BC2.1 Lack of popularity of specialist degrees – The Tracker Project.

Aeronautical Engineering	**16**
Aeronautical engineering with pilot course	1
Aerospace Engineering	**15**
Biomedical Engineering	1
Chemical Engineering	**19**
Chemical engineering (nuclear or energy)	1
Chemical engineering with French	1
Chemical engineering with year abroad	1
Civil and Environmental engineering	1
Civil Engineering	7
Design Engineering	3
Electrical Engineering	2
Electronic and Electrical Engineering	4
Electronic Engineering	9
Electronics	3
Engineering	**26**
Environmental and sustainable engineering	1
Integrated Mechanical & Electrical Engineering	1

Mechanical Engineering	18
Nuclear engineering	2
Petrochemical engineering	1
Petroleum engineering	2
Structural engineering	1

The degrees mentioned in the response from the Partnerships Office were acknowledged but the much higher tariff score required of UEA applicants means that they will not be direct competitors.

UCAS data reported a total increase of 38,126 in total applications into the Engineering subject group between 2008 and 2013, an increase of 35.3%. The number of accepted applicants over the same period rose by 13.4%, indicating an excess of demand for places over supply.

Year	Applications	Accepted
2008	108,144	23,519
2009	123,027	25,452
2010	134,601	26,070
2011	140,897	26,022
2012	137,027	25,293
2013	146,270	27,155

Engineering as a subject which has historically struggled to attract women into it, based upon 2013 UCAS data 12% of accepted students were female. The UEA is already fully committed to improving this statistic (against national trends); as an example we have recently appointed a new female Lecturer in Energy Engineering. The role holder will make an active contribution in encouraging female applicant to come to the UEA, to study Engineering,

BC2.2 **Are there any likely international competitors?** (Please give brief details)

At this stage we have undertaken no specific international market research but are aware that Engineering programmes are offered throughout the EU and internationally. There is no reason that our programme could not be attractively marketed to these areas. Indicative feedback from a dip in Science without Borders students for the 2014-15 entry was that UK institutions that were able to offer Engineering programmes received larger numbers of applicants. This is possibly indicative of a Brazilian market in this field.

There are indeed positive benefits in engaging with the international institutions and the international engineering educational organisation SEFI should be cultivated. In addition a growing movement for change in engineering education CDIO (http://www.cdio.org/) has over 100 international members including from England Aston, Lancaster, Bristol, Leeds, Leicester and Liverpool. Opportunities will be taken to engage with this organisation.

BC2.3 *note BC2.3* **What is the annual number of applicants currently applying nationally for similar courses, and what are the entry requirements for these competitor courses?**

See Table BC2.4a below for application numbers.

Entry requirements for the competitors vary significantly. Tables BC2.3a and BC2.3b show a selection from the competitor institutions and do not include lower institutions.

A selection was made based on the ratio of acceptances above 340 tariff points to the total acceptances, as a measure of the quality of the intake. It was interesting that based on this measure of quality and using a cut-off at 80% the subjects that emerged as consistently recruiting high quality applicants were restricted to

- Civil Engineering (19 Institutions)
- Engineering (Exeter, Heriot-Watt, Lancaster, Warwick, Oxford, Cambridge)
- Engineering (Mechanical) (Lancaster)
- Engineering Design with Study in Industry (Bristol)
- General Engineering (Durham)
- Integrated Mechanical and Electrical Engineering (Bath)
- Mechanical and Energy Engineering (Heriot-Watt)
- Mechanical Engineering (25 Institutions)

The vast majority of these were for MEng courses reinforcing the importance of offering MEng degrees in both specialist Energy and General Engineering as well as BEng. It was noted that when recruiting for Mechanical Engineering we will have to require Physics A level, whereas for our current courses we are more flexible about the science offered. It is important to note that although the market research included Control Systems it had not explicitly requested electronic or electrical degrees. There is plenty of evidence that the straightforward degree titles would attract the best students.

Table BC2.3a Entry Requirements for MEng in Engineering or General Engineering

Mechanical Eng and Engineering (Mechanical)	Offer for MEng
I50 Imperial College London	A*A*A - A*AAA
B16 University of Bath	A*AA
B78 University of Bristol	A*AA
L79 Loughborough University	A*AA
S27 University of Southampton	A*AA
S85 University of Surrey	A*AA
D86 Durham University	A*AA
O33 Oxford University	A*AA
B32 The University of Birmingham	AAA
C15 Cardiff University	AAA
G28 University of Glasgow	AAA
L14 Lancaster University	AAA
L41 The University of Liverpool	AAA
M20 The University of Manchester	AAA
N21 Newcastle University	AAA
N84 The University of Nottingham	AAA
S18 The University of Sheffield	AAA
W20 The University of Warwick	AAA
S78 The University of Strathclyde	AAA - A*AA
E56 The University of Edinburgh	AAA-ABB
E84 University of Exeter	AAA-ABB
U80 University College London	AAAe - AABe
Q75 Queen's University Belfast	AAB

BC2.4

What is the evidence for current and future demands for the course from
- **potential students?**
- **employers (public services, private sector, the professions etc)**

Potential Students

Market research was done in 2010 and showed that applications and accepts grew year on year with both having tripled between 2005 and 2009. Based on the experience of the selected competitor courses, energy engineering appeared to be a viable market for the University to operate in and indeed appeared to have the advantage of a growing number of

interested potential students and supporting employers.

Application numbers to UEA have doubled over the two years of undergraduate energy courses. Registrations for Open Days have shown sustained growth (2012 - 10, 2013 - 26, 2014 - ~29). Conversion is low at present and redoubled efforts will be needed to raise it. Recent purchases of capital equipment will help but the need to broaden provision is reinforced by the numbers involved.

Based on public domain data for 2008-2013, across the broad sector of Engineering application numbers are increasing at over 6500 per year. The major disciplines are Mechanical Engineering (3600 pa), Electronic and Electrical (460 pa), Chemical, Process and Energy Engineering (1520 pa)

Table BC2.4a Summary of 2013 Applications Data

Discipline	Applications 2013	Annual rate over 2008 - 2013	Percentage increase 2008-2013
Chemical, Process and Energy	16980	1520 pa	98%
Mechanical Engineering	46860	3600 pa	68%
General Engineering	14315	800 pa	48%
Electronic and Electrical Eng	23640	460 pa	12%
Civil Engineering	21965	-450 pa	-7%

The sector that includes Energy courses has shown the most rapid increase in percentage terms. The combination of Chemical Engineering with Energy Engineering makes it necessary to dig into the data as this combination masks the challenge of attracting high calibre applicants to energy courses.

In fact despite the struggle that UEA has had to admit a viable cohort to an energy-focused degree it appears that we had the highest number of applicants and accepts above 340 tariff points at 6 in 2013. Our obvious competitors for energy engineering at Leeds admitting 5, 1, 1, in 2011, 2012, 2013 respectively. With total energy related admissions being 16, 10, 4 over the same period. The majority of courses only admitted 1 high calibre applicant. Such institutions manage to maintain the courses by having a portfolio of engineering degrees with much commonality. The big difference that we can offer is the significant amount of energy industry involvement in our degrees and a lot of developments on our door step. In a related way Aberdeen might be expecting to be offering energy-related courses whereas in fact they focus on engineering courses with specialisms such as mechanical, electrical, civil etc, with by far and away their most successful course being the straightforward BEng Mechanical Engineering (averaging 30 high calibre applicants) followed by BEng Engineering (Mechanical). They also offer courses in Mechanical with Control, Mechanical with Oil and Gas Studies and Mechanical and Electrical which they are able to do because of their size.

The detailed scrutiny of the data suggests that applicants are risk averse and prefer to apply to well-known or less specialised degree titles thus keeping their options open. In many ways industry is similarly risk averse when looking to recruit.

Total numbers applying to competitor universities in the subjects of Energy, Environment and Sustainability have fallen as 692 (2011), 563 (2012), 397 (2013), with some of the drop being explained by weaker universities taking a two-fold increase. This confirms the need for UEA to move forwards at this time after a good start.

Employers

The current degree title: Energy Engineering with Environmental Management has been acknowledged by those employers in the energy management sector as a very good combination of subjects. By contrast the big players in the energy supply sector have worried about the addition of environmental management because they know that this will mean students study less engineering. However the 100% success in employment of our MSc students suggests that it is actually the transferable skills that industry values. Our students are encouraged to develop their spreadsheet skills and in several cases it is this that has secured them a job.

Some employers (e.g. East Anglia Offshore Wind) have indicated that students with the current degree title could probably be project managers but they couldn't see them being put

in a design office.

Accordingly the provision of energy degrees both with and without environmental management is an obvious step, and both are accreditable by the Energy Institute.

In 2012, in anticipation of recruiting new engineering lecturers, our Industrial Advisory Board and some other industry contacts were asked which disciplines they would prefer to recruit. Table BC2.4b shows the responses which make it clear that mechanical engineers are in demand. Recently Scira (Sheringham Shoal Wind Farm) failed to recruit a single mechanical engineer.

Table BC2.4b. Industry ranking of preferred graduate employees in 2012.

Name/Company	Role	Chemical	Civil	Mechanical	Electrical	Energy	Materials
Mark Aspinall – 4Nrg	MD			1			
Simon Coward - Hethel	Director	2		1			
Paul Rijks – ex Shell manager	MD		1=	1=			
Dave Rowson – Aquaterra Energy	Tech Dir.			1			
John Moore - Windcrop	Director		2=	1	2=		
Celia Anderson - EEEGR	Director			1	2		
Jason Martin – Scottish Power	Director		1=	1=	1=		

There are multiple instances of industry predicting a skills shortage and bemoaning the quality and number of good engineering graduates. Two examples follow.

Institution of Mechanical Engineers Policy Statement:
"The looming shortage of skilled engineers is seen as a major obstacle to restoring the UK's economic vibrancy…. Though broad agreement exists about the critical importance of increasing the supply and retention of engineers, no real consensus has been reached on how to achieve this." Closing the Skills Gap http://www.imeche.org/docs/default-source/position-statements-education/imeche-skills-gap-ps.pdf?sfvrsn=0

Institution of Engineering and Technology :
"Better returns are required from science, engineering, technology and mathematics (STEM) qualifications, with a clear link established and understood between STEM education, training and qualifications and economic growth. 39% of respondents to the IET Skills Survey reported that recent engineering, IT and technical recruits did not meet reasonable expectations for levels of skill. The biggest skills gap amongst new recruits was lack of practical experience: for example, 31% of organisations said that graduates did not have sufficient practical experience."

BC2.5	**Can current and projected demand be met from existing provision?**	
	Nationally:	No – sector skills councils continue to predict shortages.
	Regionally:	No – there are no high calibre competitors in the region.
BC2.6	**Where is/what are the competitive advantage(s) for UEA?**	

The Courses will help develop existing relationships with engineering and energy companies and build new relationships within this sector. The Sector is fast moving and does generate a significant amount of editorial coverage - UEA should continue to leverage PR benefit by demonstrating its research connections within this field and its ability to provide the next generation of leaders within the sector, PR has involved commitment from the academic team to contribute to stories as they develop.

	The Energy degrees remain linked to EEEGR and its 400 member companies. The industry exposure that this provides for our students is unique. The proposed Engineering degrees will be linked into Hethel Innovation (HI). HI has established NAAME (New Anglia Advanced Manufacturing & Engineering) with multiple links into regional and national manufacturing companies. With only an energy provision it has been difficult for UEA to engage in that very important sector. Simon Coward of HI has already committed its support for the proposals. This in turn provides links into the LEP. Innovative ways of teaching utilising these industry links will be explored. The sector also provides significant opportunity to demonstrate a strong employability story, whilst there will be a delay before our first undergraduate students graduate, we have already helped all of our MSc graduates to secure employment. This message frequently appears in our publicity. There are also a number of UEA graduates, including some from ENV, who are employed within the sector and we could use to demonstrate an enhanced employability story. Businesses who advised UEA on the development of the course include employers who have appointed UEA graduates or taken postgraduate dissertation placement students. The recently constructed UTC Norwich with which UEA has considerable involvement, and which has an energy engineering focus, provides a local future stream of applicants. Dr Ben Milner (CMP) is a director of the UTC. The local energy jobs market is leading to an increase in mature applications across the region. This has led City College Norwich to launch, for 2013, a new Access to Engineering course. UEA ENG staff have developed a relationship with the course delivery team which they acknowledge will allow us to recruit high academic calibre students the rest going on to their HND-style degrees.

BC3 *note BC3*	**MARKET DEMAND AND RECRUITMENT**	Consult with Careers and Employability team
BC3.1	**What graduate career opportunities may be available?**	
	In 2011 within the region a significant skills gap at this level was identified (e.g. EEEGR/Skills for Energy Feasibility Report for an Energy Skills Centre – Nautilus 2010: Power – Offshore Wind Supply Chain Study for the East of England – Douglas Westwood 2005; Norfolk Skills Economy Project Energy Skills Needs in Norfolk & Suffolk April 2011) It is, therefore envisaged there would be opportunities for graduates with an understanding of the current issues in energy engineering, covering a range of different areas including renewables (wind, wave, tidal, hydro, solar etc) and non-renewables (oil, gas, coal, nuclear). This demand for higher level skills within the energy sector will exist beyond the East of England, presenting graduates with opportunities globally. The employment of all of our MSc students so far has confirmed this assumption. The impending work associated with the massive offshore developments in wind energy together with the developments at Sizewell, both new build and decommissioning will build on this. This confirms continued employability of our energy-focused students. The introduction of an integrated engineering degree with pathways in mechanical and electronic/electrical will undoubtedly please a range of companies. We have held discussions with Hethel Innovation and they have agreed to support us as an interface to the local engineering industry. Their organisation NAAME (New Anglia Advanced Manufacturing & Engineering) will act as a useful vehicle for raising industry awareness and collaboration.	

	Delivering degrees with a broad coverage rather than niche titles will allow us to work with multiple engineering sectors. The links with KLM and the aircraft industry, and also Lotus, Caterham, ST Racing and the automotive industry will both be possible under a mechanical engineering umbrella. The North Sea Marine Cluster can also be linked in to the new degrees. In the same way the wide-ranging employability for those who work on Control Systems such as Proeon based at Hethel is more easily dealt with under the umbrella of electronic/electrical engineering. Engineering graduates have a range of useful transferable skills that that they are frequently targeted by other industries and blue chip employers as well.
BC3.2	**Who (externally) has been consulted about the proposals (e.g. Professional Associations, employers' groups, PSRBs)?**
	As part of the original proposals to deliver the current energy-focused degrees a number of industrialists were consulted. Their support at the time is still relevant. In addition UEA ENG has established an Industrial Advisory Board which meets once a term to offer advice on direction of travel. Mark Boyd – Chairman of Aquaterra Energy –Chair Paul Rijks – ex-Shell. Energy Engineering Visiting Professor John Moore - Director, Rural Energy Developments John Morse - Director, Gardline Dan Poulson - Engineering Director ,Tamar Energy Gregory Luxford - Finance Director, Adapt Martin Dronfield - Business Dev Director, James Fisher Grp Over several meetings discussion has included how mechanical engineering can be delivered at UEA. At the most recent meeting in June 2014 a discussion document was tabled outlining the ideas behind these proposed new degrees and received support and further advice. The terms of reference of the Board have also been agreed as relating to Engineering rather than just Energy Engineering. In addition the following people have also been consulted. Simon Coward (Chief Executive, Hethel Innovation) Peter Kerrison (Innovation Engineer, Hethel Innovation) Celia Anderson (Executive Director, Skills for Energy -East of England) An updated version of the proposals was recently circulated eliciting the following responses : From: Gregory Luxford (Adapt). Sent: Monday, August 18, 2014 2:34 PM "1) I like the concept of the general engineering course with specialism later. As a student I was sponsored by the MoD and in our pre-university year this is exactly what we did (in that instance we later selected mechanical, aeronautical, or electrical/electronic engineering) and I found it very valuable to have a cross-disciplinary foundation. 2) I notice that electrical is offered as a later specialism. Do you think that electronic/electrical might be more appealing (the latter could also tie in control engineering)? I'd give it careful consideration as it may lose otherwise interested students (when I was a student I particularly sought a course that covered light current and not just heavy current) 3) Similarly would it be helpful to have the degree title as Engineering (Energy)

rather than (renewable energy) as presumably it would cover more general aspects such as distribution networks, and the emerging area of demand-side management?"

From: Peter Kerrison [pkerrison@hethelinnovation.com], Sent: 29 August 2014 09:50
Cc: Simon Coward

"We have looked through your information and in terms of endorsing or sponsoring Hethel would be behind you 110%. We think that it is a great approach. Especially splitting off the environmental management course from the straight energy engineering course gives some clarity on the focus of each one regarding the various sectors of the energy industry."

The issues surrounding accreditation of the general engineering degrees prompted further detailed discussions with:
Sophie WIlliams, Executive Assistant, Accreditation and Professional Accreditation, Institution of Mechanical Engineers. This helped clarify what IMechE look for in accrediting such courses. Appendix 2 is a summary note.

Catherine Elliott, Education and Skills Senior Executive of the Engineering Council, was approached for clarification of how they would deal with degrees with a single UCAS code but multiple pathways. She said the key question is what it says on the graduate's degree certificate. They don't concern themselves with UCAS codes but instead they store on their database the graduating degree title. So this means as long as separate parchments can be set up for each different degree pathway then this is not an issue.

The current External Examiner Dr Bushra Al-Duri was consulted and asked for a view on the shift towards mechanical and electrical engineering. She responded positively although a little off message:

"1 - BEng Energy Engineering with Environmental Management
2 - BEng/MEng Energy Engineering
3 - BEng/MEng Engineering
4 - BEng Engineering with a Year in Industry

Based on the programmes shown above, I think number 1 is a very good idea where the students should learn all sources of energy; fossil & renewable, from land, subsea, sun and wind including the processes of obtaining them and the environmental advantages (or disadvantages) to each process. Of course this will require several fundamental engineering modules to facilitate understanding the specifics of energy. Number 2 is slightly similar to 1 in the sense that all energy studies aim at keeping the environment clean, but the emphasis for programme 2 is more the 'energy harvest' than 'pollution treatment'.

Programme 3 is quite 'generic' as I don't see the word energy in the title, however it can be incorporated within the course anyway; and Number 4 has more emphasis on the 'practical' aspects.

In a nutshell what I am trying to say is: It is a brilliant idea and I think that we all need to go to the drawing board and address the issue of energy right from the source to the user. We need an unbiased view on how each form of energy is obtained, processed, utilised; covering technical aspect, economic aspects and environmental aspect. This should cover improving and updating the existing non-renewable sources while working on renewable alternatives.

Also topics investigate converting energy from one form to the other are essential, incorporating the aspect above."

A long-standing link with National University Ireland in Galway has led to the

	proposer being the External Examiner for their Energy Systems Engineering degrees. They operate a similar system to the proposed portfolio by using departments of Mechanical, Civil and Electrical engineering to support a raft of modules that form the Energy Systems pathway. The course director for this pathway is Dr Rory Monaghan who comments : "At Galway we use a similar structure for our degrees of many common modules in the early stages of our degrees. This does indeed seem to have provided us with a much more simplified year 1 & 2. The only drawback that I can see is the near-total commonality in the first 1.5 years means all lectures are enormous (~250 students!). I worry that we are losing engagement of some of our borderline students. To compound this, we do not have the resources for Teaching Assistants. It has meant getting creative with online assessments in those years, but I believe nothing takes the place of face-to-face time. Even when the classes start to get smaller in the 2nd semester of 2nd year, they are still 50+ per class. The situation is more normal in years 3 and 4. So I would encourage you as your numbers grow to retain elements that allow this face to face contact. A secondary point of note is to avoid as much as possible different years of students in the same class. For example, our 4th year Mech and Energy Sys (mech) students take a Linear Control Systems class with 3rd year Electrical Eng students. It might seem trivial but it is a timetabling nightmare dipping between years, especially when our 3rd years have a truncated semester 2, in order to go on Work Placement. I completely agree with your assessment of the popularity of specialist degree titles. We have seen direct entry into our specialist degree course fall sharply, with a concurrent rise in our general "Undenominated" Engineering. I dislike the term Undenominated; it categorises the students for what they are not, rather than what they are. I would prefer General Engineering or simply Engineering as you are planning to do. More than 2/3 of our 1st years are Undenominated. We have shut down some of our highly specialised degree programmes as we were getting single digit numbers of applicants with massive admin overhead. We see the same trends as you, students want their options open until the last possible moment. Even after they commit to a degree we still have to reassure them that Mechanical Engineers don't all end up in manufacturing! There is talk of going to general entry only but we may stop short of that so we can accommodate that small number of students who are (or at least think they are!) driven to do a specific degree programme."

BC4 *note BC4*	**STUDENT NUMBERS AND TUITION FEES**		Consult with HOS, PLN, Faculty Dean, FFM
BC4.1	**Student Numbers**		
a	**Proposed student target intake**	number	
note BC4.1a	**Full Time (Home/EU)**	2014/15 18 FTE 2015/16 20 FTE 2016/17 24 FTE + 5 FTE = 31 FTE 2017/18 24 FTE + 10 FTE = 34 FTE 2018/19 24 FTE + 15 FTE = 39 FTE	
	Full Time (International)	2014/15 8 FTE 2015/16 8 FTE 2016/17 8 FTE 2017/18 8 FTE	
	Part Time (Heads)		
	Distance Learning (Heads)		
	Minimum viable intake (full times equivalents)	12 FTE across all programmes	

	Maximum viable intake (full times equivalents)	70 FTE across all programmes			
b	**Are the student numbers:**				
note BC4.1b	**a) available via redistribution within the School?** *Consult the Head of School*	**YES**		**NO**	NO
	b) available via redistribution with the Faculty? *Consult the Dean of Faculty*	**YES**		**NO**	NO
	c) additional numbers required? *Consult the Planning Office (PLN)*	**YES**	YES	**NO**	
	Please give a summary of how your answers to a), b) and c) above will be achieved.				
	The above figures are based on a reworking of the targets for the current degrees and a much more realistic estimate of likely success than it was possible to make in 2011 when the undergraduate degrees were first proposed. It is clear from the market analysis that although recruitment has been more difficult than anticipated the multiple approaches at raising awareness have led to UEA attracting more applicants than might be expected for the current provision. Nevertheless many applicants do not pursue their application even to the point of visiting UEA. It is felt (at present with little evidence, although a decliners survey has been promised by ARM) that a significant number of regional applicants would like to do engineering at UEA but were put off by the focus on energy. The target figures have been established by the Senior Faculty Manager Laura McGonagle and indicate the contribution to the support for the HEFCE bid for the new Integrated Laboratory Building. The lowest offer has been held at ABB to control numbers if necessary and to maintain Tariff score.				
BC4.2	**Tuition Fees**				
	Please select the relevant fee schedule:				
	a) Standard Home/EU/International	YES			
	b) Full-cost *Please consult with FFM*				
	c) Other *Please provide brief details*				

BC5	**IMPACT**		
BC5.1 *note BC5.1*	**EQUALITY AND DIVERSITY**	Consult with Equality & Diversity Manager and Widening Participation team	
a	**Does the course and/or School cover a subject area(s) which traditionally attract(s) a very specific or narrow student profile?**	**YES**	YES
		~~NO~~	
b	**If yes, what steps will be taken to attract non-traditional students to the course/School?** (Aspects to consider include: age, disability, ethnicity (home and international), gender, sexual orientation, religion and belief, and socio-economic group.)		

	The Faculty is submitting ATHENA SWAN applications for all Schools by September 2015. Mathematics courses in the UK attract roughly equal numbers of male and female students. However engineering courses in the UK traditionally attract male: female students in the proportion 88%:12%. The current BEng/MEng has done slightly better than this which may in part be due to the inclusion of Environmental Management. The Faculty of Science is proposing to apply for group membership of the Women's Engineering Society and will be exploring other relevant networks to learn from best practice at other institutions about marketing and recruiting from as wide a pool as possible. Outreach activities through both the Science Outreach Officer and the STEM-NET Co-ordinator (and other relevant officers in ARM) will continue to try to broaden the appeal of engineering beyond the 'traditional' audience and help promote the subject to schools and colleges in the region. It is interesting that the Energy Engineering Summer Schools have had the following Male: Female proportions: 2012 (12:9), 2013 (10:1), 2014 (8:4) averaging 68%:32% Whereas the two student undergraduate intakes have achieved: 2013 (11:2), 2014 (13:2) averaging 86%:14%. In 2013-14 the first year students were introduced to the Engineers without Borders organisation and engaged in their challenge competition. The students have been encouraged to start a EWB branch at UEA. It is known across the sector that this organisation which promotes engineers working on third world / development issues attracts a disproportionate number of female students on its committees. Competitor institutions have used this to their advantage in recruitment. Whilst there are numerous organisations aimed at recruiting more women into engineering (e.g. WISE = Women Into Science and Engineering) many years' experience suggests that women engineers dislike being singled out in this way. So targeting women is very difficult and probably counter-productive. In all other respects the engineering profession provides opportunities for a diverse range of students. A career can be developed in an office environment or on site. There is generally no bar. It has become clear from the MSc course that particular care and sensitivity is required in helping international students to understand the UK educational culture. The Dean of Students has been helpful in this regard.
c	**Will students undertake placements/ come into direct contact with vulnerable groups as part of their study? If so, will a CRB be required?**
	Not applicable.

BC 5.2 *note BC5.2*	**CURRENT STUDENTS AND/OR APPLICANTS**		
a	**Have School SSLCs been consulted regarding this proposal? If YES, what has been their input/response?**	**YES**	YES
		NO	
	At a special meeting of the ENG SSLC on Monday 10th November 2014 the proposed degrees were discussed. There was general support for the new developments. There was a general consensus that the plan for a common first year for all degrees in the portfolio was a key strength that should influence the marketing. The many links with industry should be exploited and grown as a plus point for all degrees rather than trying to distinguish the new engineering degrees from the established energy engineering degrees.		
b	**Will any current students or applicants be affected by this proposal?**	~~**YES**~~	
		NO (go to 5.3)	**NO**
c	**Evidence of consultation of current students and written consent obtained** Please briefly describe what consultation has taken place and what responses there have been. Is there full support from all members of the relevant student cohort(s)?		
	N/A		
d	**Informing applicants** What arrangements have been made (for informing applicants who may be affected by any change(s)? Written notification, including advice about any alternative options that may be given, must be sent to applicants holding unconditional/ conditional firm or conditional insurance offers.		
	N/A		
BC5.3 *note BC5.3*	**ACADEMIC STAFF**	Consult with HOS, Dean of Faculty	
	What is the impact / what are the resource implications of the proposal on academic staff?		
a	**Please give an indicative number of <u>additional</u> teaching hours required within the school to deliver the new course/changes to the course in any one year**		
b	**Is a new discipline or specialism being introduced that requires a new appointment?**	**YES**	YES
		NO	
c	**Are new appointments required to meet any additional hours?**	**YES**	YES
		NO	
d	**If yes to either b or c above, how many of what type (e.g. Teaching and Scholarship, Teaching and Research) and at what level?**		
	All new ENG staff will be ATR to fit in with Faculty plans for growing an engineering research strength. Many of the changes to first and second year do not require new teaching however existing ENG staff are over committed with first and second year and some need to be released in order to deliver later years' modules and to continue to grow liaison with industry. Recognising the financial challenges a careful consideration of the requirements shows that new staff are required as follows:		

Recruitment Year for following year's teaching	Comment	FTEs
2014-15 (already in plan)	To lead on module Nuclear and Solar, specialist MSc modules, e.g. Oil and Gas Engineering, and parts of first year to free up existing ENG expertise for later years teaching.	1
2015-16	To lead on design teaching and support major team projects and deliver parts of first year to free up existing ENG expertise for later years teaching.	1
2016-17	No additional teaching in 2017-18	0
2017-18	To lead on stress analysis and/or control systems	1
2018-19	To lead on Mechanical Engineering specialisms in new 4th year	1

The new proposals introduce the bare minimum of new modules initially, dictated by what will be required for accreditation. This recognises the time it takes inexperienced new lecturers to develop new teaching materials. Nevertheless it will be necessary to identify a specific mechanical engineer and an electrical (not electronic) engineer as part of the recruitment. [There is significant electronic and communications expertise in Computing Sciences that could be tapped if their teaching loads reflect the work required and if there is enough resource available.]

Appendix 5 shows how the modules phase in and the requirements in staff FTEs to support the growth. This suggests that ENG recruitment must continue but not in every year. The table is designed to show that with this minimal recruitment additional teaching support will be needed by other staff in the Faculty typically for project supervision and some first year teaching. In implementing the current degrees (see table A6.1 in Appendix 6) it is clear that MTH and CMP staff are making a significant contribution to supporting the teaching load.

e **What is the source of funding for new academic staff?**

Additional fee income generate over and above the current financial plan will be utilised to ensure a Faculty average SSR of 13.5:1 is maintained.

f **Are there any implications outside the sponsoring School/s e.g. service teaching, by other Schools of Studies?**

The survey of SCI expertise identified those who had an engineering background and could contribute to the teaching. All those identified with appropriate expertise are now involved.

For the new Engineering degrees the intention therefore is to recruit the specific expertise needed to deliver the new modules within the programmes, effectively we need to recruit a mechanical engineer and an electrical engineer within the new staff planned. In the event that suitably qualified staff cannot be recruited then further support from SCI may be necessary or else the restriction to ATR relaxed. However the bulk of the new engineering material is not needed until 2017/18 so there is time to recruit suitable staff. The likelihood of student numbers justifying new appointments should be clear from the recruitment cycle starting in June 2015 and up to when the main high-calibre applicants apply before December 2015.

Some teaching can be bought in from expertise in local industry on AT budgets. The following visiting lecturers provide cameo/case study support on a regular basis, others are recruited on an ad-hoc basis.

Lecturer	Company	Topic
Peter Haynes (Hon Lecturer)	Peter Haynes Associates	Risk Management (10+hrs)
Andrew New (VL)	Apogee	Finite Element Analysis (6hrs)
David Smail (VL)	Red7Marine	Offshore installation and maintenance (3hrs)

In order to provide a distinct theme in Electronic and Electrical engineering the modules *CMP 6023A Embedded Systems* has been identified as suitable to carry through the theme into third year. In fourth year the module *Applications Programming* has been made available for our MSc students for some while. This has been possible because of the conversion nature of the Computing Sciences MSc.

g **Are any other teaching adjustments required? For example, will new modules be introduced, other modules withdrawn or combined?**

The Faculty of Science has supported the growth of Engineering at UEA since the first MSc students were admitted in 2011. This has included financial support which included two major capital purchases of equipment (wind tunnel and steam turbine apparatus) in 2013-14.

The original proposals for undergraduate provision, which are still phasing in, included a plan to recruit one new member of staff each year until the fourth year of the undergraduate programme was being delivered.

An ATS Senior Lecturer in Engineering was appointed in October 2011 (the proposer). He has assisted with planning the teaching of most of the new material but to deliver a credible research-led programme of energy engineering required a phased appointment of new academic staff, in addition to the existing MSc provision. A further ATR Lecturer was admitted in September 2013 one year later than anticipated. Recruiting high-calibre ATR staff has proved difficult but it has been essential to stay firm on the required standard. Nevertheless this has put considerable pressure on the existing 2 staff. Fortunately 2 further staff were recruited in May 2014 and from September 2014 there will be 4 ENG staff which is enough to deliver the 1st, 2nd and PGT years needed in 2014/15.

Appendix 5 is a modified version of the plan from 2011 that has been extended to show the way that the new modules phase in for students admitted in October 2013 and 2016 with estimates of the new academic appointments necessary as an absolute minimum. Effectively this just extends the existing plan until the full portfolio is established.

In setting up the current degree programmes the possibility of growth was always considered such that there is a core of material that crosses all engineering disciplines. So a limited number of additional modules are required.

First Year:
The existing module with an energy focus called Energy Engineering Revolution will be compressed and subsumed into a ‘year-long’ module with the working title *Engineering Studies*. This module will follow the same case-study driven model of its predecessor but will introduce the essence of Mechanical, Civil, Electrical and Energy Engineering. Thus first year will have 100 credits of common material and

20 credits of defined options.
The module *ENG-4002Y Engineering Principles and Laws* currently contains Materials, Structures, Fluids, Thermodynamics and Heat Transfer. The opportunity will be taken to move the Structures element into *Engineering Studies* within the Civil Engineering part.

This will give a compulsory set of modules split 50:50 credits across the two semesters. Many of the available option modules are 20 credits in either semester. Those students on the BEng Energy Engineering with Environmental Management will continue to take module *ENV-4007/8B Physical and Chemical Processes of the Earth I or II*. The module *CMP-4008Y Programming 1* is year long and works well as an option. It appears that there are Language modules that are 20 credits in both semesters but could be spread over first and second year.

Second Year:
The module *Energy Engineering Principles* will be renamed as *Engineering Principles and Design* for 2017/18 if not before. A certain amount of rationalisation of content will be needed that is not much more than normal developments.

A new module with the working title *Dynamics and Vibration* will be developed primarily to develop it explicitly for IMechE accreditation. The embryonic material will be grown within the current *Energy Engineering Principles* module and then moved and expanded.

From the point of view of accreditation of the electronics and electrical pathway the existing module *CMP-5027B Analogue and Digital Electronics* will suffice.

Third Year:
Two new taught modules will be needed for 2018/19: *Stress Analysis and Design* and *Control Systems*. These are both for IMechE and the latter will also help to satisfy IET.

The individual project module will be a key module for satisfying accreditation. This 40-credit module will allows students to go into considerable depth in their pathway subject. Clearly it is possible to do this with a generic overall module title such as Individual Engineering Project. But it may be necessary to create two more specific module titles so that it is clear to the Engineering Council which pathway was taken. So the package of project modules would be

- ENG-6003Y Individual Energy Project
- ENG-60??Y Individual Engineering Project
- ENG-60??Y Individual Mechanical Engineering Project
- ENG-60??Y Individual Electronic and Electrical Project

For the time being the generic one has been included.

Fourth Year:
Much use can be made of existing modules in various MSc programmes. Nevertheless Mechanical Engineers will definitely need to know about CAD/CAM and CNC. The CMP 3D printing can help with this. At present this material is in the module with a working title *Advanced Computational Methods*, a title chosen to allow inclusion of Finite Element Analysis and also Optimisation for which ENG already has the expertise.

For IMechE accreditation and for a credible link to manufacturing and business awareness it is necessary to teach aspects of production lines, quality systems, Kanban, Just in Time, Lean Manufacture etc. This has been put in a module with the deliberately flexible title *Mechanical and Manufacturing Processes*. It is anticipated that Hethel Innovation will assist with this.

Summary

Modules to be withdrawn and their materials repackaged:

Code	Title	Last year delivered
ENG-4001A	Energy Engineering Revolution	2015/16
ENG-5001Y	Energy Engineering Principles	2016/17

Modules to be introduced:

Code	Title (Working Titles at present)	First year delivered
ENG-40??Y	*Engineering Studies*	2016/17
ENG-50??Y	*Engineering Principles and Design*	2017/18
ENG-50??Y	*Dynamics and Vibration*	2017/18
ENG-60??Y	*Individual Engineering Project*	2018/19
ENG-60??Y	*Stress Analysis and Design*	2018/19
ENG-60??Y	*Control Systems*	2018/19
ENG-70??Y	*Team Engineering Project*	2019/20
ENG-70??Y	*Advanced Computational Methods*	2019/20
ENG-70??Y	*Mechanical and Manufacturing Processes*	2019/20

Note that the new module ENG-70?? A Oil and Gas Engineering will be required in 2015/16 as part of the MSc programme due to the withdrawal of the M-Level ENV-MA35 Fossil Fuels and so will be submitted separately during autumn 2014.

BC5.4 *note BC5.4*	**COURSE RATIONALISATION**	Consult with HOS, Dean of relevant Faculties, PLN	
a	**DO ANY SIMILAR COURSES ALREADY EXIST AT UEA?**	~~**YES**~~	
		NO	NO

If YES, please specify Course name, UCAS Code(s) / Course codes

b	**IS/ARE ANY COURSE(S) TO BE CLOSED TO NEW APPLICANTS AS PART OF THIS PROPOSAL?**	**YES**	YES
		~~**NO**~~	

If YES, please specify Course name, UCAS Code(s) / Course codes and date from which course(s) is to be withdrawn?

The following degrees should be closed to entrants after 2015/16. However there is always the possibility of a student deferring or intercalating. They will need to have the option to return to complete their degree, these degrees will need to be retained on the books until all those students admitted up to 2015/16 inclusive have graduated.

UCAS Code	Course Code	Course Name	Date of withdrawal
H220	U1H220402	MEng Energy Engineering with Environmental Management	End of 2015/16
H22A	U1H22A402	BEng Energy Engineering with Environmental Management with a Year in Industry	End of 2015/16

c	**Please give an indicative number of teaching hours <u>released</u> within the school in any one year by the closure of the courses listed above**	N/A

BC6	**PHYSICAL RESOURCES**	
BC6.1 *note BC6.1*	**What new or additional facilities and /or equipment are required for the delivery of this course?**	
a	**Classroom and study facilities**	The staff are grateful to the Faculty for the provision of the Engineering Laboratory and continued use of shared ENV lab space and the Lewin Lab. The BIO/MTH PC Lab is also used by ENG students where dedicated software is installed. Not essential but a large flexible room with movable tables as a Design Centre (capacity 100) would be useful for a number of Schools as, apart from Congregation Hall, there are no other venues on campus. Otherwise nothing unusual for teaching is required. For laboratory provision ENG is particularly excited to be included within the plans for the HEFCE bid for the Integrated STEM Laboratory building. This will allow heavy-duty equipment (e.g. beam bending test, heavy duty induction motors, engine test rigs) to be installed at basement level as well as lightweight equipment in the higher floor in a later phase. The higher floor could in fact be used for the above-mentioned design centre.
b	**Computer equipment**	No special computing analysis hardware. Because of the use of CAD/CAM a requirement for a large plotter printer to A0 size will be required. Currently Solidworks is installed in the BIO/MTH PC Lab so that is the obvious venue. An HP Designjet is ~£1.5k A programme of introduction of specialist software will be needed to ensure that the process of design→drawing→CNC is completed. If necessary this can be done by saving drawing files and using equipment elsewhere, possibly at the UTC or Nexus.
c	**Other equipment**	Laboratory equipment has been purchased since 2012, some of it funded by industry (~£17k) and all of it can support the new programmes. Purchases were made in anticipation of growth towards a broader engineering provision. This programme of purchasing laboratory equipment will continue within the financial constraints of the student numbers. The most important requirement for students on an IMechE-accredited programme is that they must complete workshop practice using Lathes, CNC Machines, Welding kit etc. To have this on campus would probably be a waste of resource. Instead deals will be sought with Lowestoft College and/or the UTC Norwich to run workshop weeks. The IMechE have made it clear that a strict record of what each individual student has experienced must be kept. Other universities have achieved this to the satisfaction of IMechE who take a pragmatic approach about the costs involved of purchasing dedicated and under-utilised equipment.
d	**Consumables**	For some pieces of mechanical engineering equipment small pieces of steel have to be replaced. For example in the tension test equipment (that we already have) the small samples are tested to failure. This is not a major cost and can

		be covered within the normal maintenance budget.
BC6.2	**What additional books/journals/electronic resources other than those already available will be required year by year until steady state is reached?**	
	Since the 2011 Business Plan for ENG UG programmes the ENG staff have worked closely with the Library Staff to gradually develop additional resources, rather than leap in to unnecessary purchases. Rather than AutoCAD software we took advantage of the Norfolk County Council deal for Solidworks at a recurrent cost of £50 for 30 licences. Solidworks is actually favoured by mechanical engineers over autocad. The software AutoDesk, which is now freely available, as a design tool will be required for use by students, and will require installation by IT staff. CES Edupak has already been purchased for use by existing students, which will also be made available to any additional students requiring use of it. The Director of ISD has confirmed that it will not be a problem to install AutoCad. Students now have access to Knovel and Digimap. Scopus and IEEXplore have provided sufficient research resource so far. The possibility of subscribing to specific journals will be kept under review. The preferred solution at present is to utilise interlibrary loans until it becomes clear that there are multiple requests for certain journals. Also specific book purchases have been made from ENG budgets in support of MSc dissertation students which will lodged within the library. The remaining costly facility is British Standards online. This remains under review until the students enter third year and begin to do specific design work. The many design resources available through a modest recurrent fee less than £1k to the Steel Construction Institute are being investigated with the help of a link with Mott MacDonald. Many free resources are at http://www.steelbiz.org/	
BC6.3	**Are there any other special arrangements on which this course proposal will depend? (E.g. placements, year abroad).**	**YES** YES **NO**
	If Yes, please give details of likely costs/whether appropriate agreements are in place/have to be drawn up?	
	Agreements may be drawn up in respect of students on the BEng/MEng courses visiting a range of employers in the region to see the application of taught material in the modules in industrial settings. However to date all companies have been prepared to welcome students on site visits at zero cost. They usually do this as part of their CSR. Costs are associated with transport. The impact of interfacing to industry on administrative staff in the local Support Office has been small. However the appointment of Simon Allen as an administrative support for ENG Staff has been invaluable. The degree BEng Engineering with a Year in Industry benefits from the established Faculty of Science administrative procedures in support of YINI degrees. This support will be extended to support ENG YII placements.	
BC6.4	**Are there any start-up costs (e.g. any initial publicity**	**YES** YES

	and promotion?)	**NO**	
	If yes, please give details:		
	It will be necessary to raise awareness on two fronts: a) Local and national schools will need a publicity leaflet/poster explaining that engineering at UEA is offering a general engineering programme. Under UCAS rules this is allowed for new degrees. b) International students have been continually told that UEA does not offer engineering. It will be necessary to send countering leaflets to all British Council offices and all UEA agents abroad. c) Updated brochures will be needed. In parallel with this publicity an enhanced Engineering web presence will be established to which the leaflets can refer.		

BC7 *note BC7*	**IMPACT / RESOURCE IMPLICATIONS FOR OTHER UNIVERSITY SERVICES**
COMPLETION OF THIS SECTION TO BE COORDINATED BY LEARNING AND TEACHING SERVICE (LTS) COORDINATOR	
Please circulate Parts 1 & 2 to the following for their comments (if any). Comments to be returned within 10 working days.	
note BC7	**What is the impact of the proposal on support staff and resources in the office for which you are responsible?**
Date of circulation:	09.09.2014
BC7.1	Dean of Students (DOS)
	Any additional students potentially place demands on the range of services provided by the Dean of Students' Office, in particular from the Learning Enhancement Team. Although the new courses are located within the School of Mathematics and A level Maths will be an entry requirement, engineering students across the sector have tended to require substantial levels of service teaching in Maths. EU and international students may require support from English as a second language specialists.
BC7.2	Deputy Dean of Students (accommodation)
	Unless they live within 12 miles of the University, first year undergraduates will continue to be guaranteed University accommodation.
BC7.3	Director of Information Services (ISD)
	No comments received.
BC7.4	Director of Library Services (LIB)
	Original response began with : "I'm sorry not to be able to sign this course proposal off from a Library perspective as there are unresolved issues in Section BC6.2 which could adversely affect students."

Updated response:
We have been in further discussion with the School about the resource implications of this course proposal and our statement is now updated for the December 2014 LTC meeting.

We reiterate that the areas of Mechanical and Electrical Engineering are relatively new for UEA and it is important for quality assurance purposes that students get access to an adequate range of resources relevant to their studies, even though there are relatively small numbers of students in the first instance.

When planning for appropriate resources, the course approval process requires us to consider anticipated library resources for the duration of each course, not just what might be needed in the first couple of years.

The School advises it has now carried out further consultations with existing Engineering students and with the lecturers on the proposed courses. We understand this confirms that students and staff are making good use of existing resources available via UEA Library.

The Library can now support this proposal as follows:

1. Purchases of books and ebooks will continue to be met from Library budgets.
2. Having reviewed appropriate journal titles with the School, the Library offers to purchase the following additional titles having considered the School's specific needs and carried out some benchmarking with provision at other universities.

a. International Journal of Structural Stabilities and Dynamics £571 per annum
b. Journal of Engineering for Gas Turbines and Power – Transactions of the ASME £470 per annum
c. Journal of Heat Transfer – Transactions of the ASME £470 per annum

3. Other possible commitments, such as occasional access to articles in journals which are part of the ‘Proceedings of the Institution of Mechanical Engineers’ series, and the otherwise prohibitively expensive (£4.5k per annum) 'Engineering Optimization' journal, may more cost-effectively be met through interlending. To meet potential undergraduate needs for interlending, the Library proposes to allocate an additional £500 per annum to the Maths interlending target to support occasional undergraduate needs (with appropriate sign off in place) and to pay for copyright clearance for some specific articles for digitised course packs as required. We will review this after the first year and open discussions again about sources of funding, such as School supplementation, if this approach is not sufficient to meet student needs.

Access to additional modules of the Knovel databases may also be necessary as the course progresses, probably for the 2018/19 academic year when the new Mech Eng students are in third year. Given the Library’s new commitments above, there is no guarantee that library funds will be available for this and we may need to call on School supplementation for this.

As Engineering does not have its own separate section in the Library, we also strongly recommend that all lecturers and students meet early on with their Faculty Librarian to ensure all parties are aware of the resources already available, but possibly difficult to locate. This should also include orientation to the Knovel and IEEE databases.

BC7.5	Careers Manager (CCEN)
	No comments received.
BC7.6	Head of Learning & Teaching Service (LTS)
	1. I note that these are additional student numbers, however LTS would expect to be able to absorb the support for these without additional resource, depending on student numbers across the University, which we review every year to ensure our support is most appropriately aligned. I note that the placement support will remain locally provided, in line with the year-in-industry support for other programmes. 2. These will be governed by the new BIM regulations, and the exit awards will be the standard, unnamed, Cert and DipHEs, not named as is written in S2 (d). 3. Some thought will need to be given, with advice from Planning Office, LTS and ARM, regarding the mechanism to permit *'A key feature of the proposals, which is driven by the institutional requirement to minimise the number of degree titles, is that students will be admitted to an integrated engineering degree but will graduate with specialisms identified in their final degree title'*. Are we convinced that it is necessary to reflect specialisms in the degree title, when a full transcript/HEAR of all modules taken will be available to the graduates and perspective employers? If it is, what is to be gained by **not** offering these as entry routes through unique UCAS codes (A note that the proposer raises '*Advice would be welcomed on the wisdom of declaring to UCAS the two specialist pathways (4 extra UCAS codes*)'.
BC7.7	Head of Admissions (ARM)
	Broadening the Engineering offer at UEA is expected to aid growth in application demand by appealing to applicants who may currently overlook UEA in pursuit of an engineering degree elsewhere. Without mechanical engineering and/or the reputation of well-established engineering providers it is unlikely that in the short/medium term that UEA can expect any significant increase in demand and student numbers. However, these courses will be marketable to a local/regional audience and the positioning of these courses will improve considerably with accreditation.
BC7.8	Director of Planning Office (PLN)
	The additional numbers are in line with expectations in terms of the new STEM building but the intake in 2014/15 fell significantly short of the target (it is anticipated that 11 will register and still be at UEA by the census date). Therefore, the current targets should be considered vulnerable and the growth will require a significant amount of effort if it is to be delivered at the appropriate quality. The market research comments have been taken into account above (notably the lack of awareness of the term Energy Engineering and a move towards offering a broader titled course fits better with the results of that MR. Finalised targets will need to be built into the planning process taking place this autumn when targets will be discussed with PLN/SCI/ARM to ensure that only the most realistic numbers are included in future plans.

BC7.9	Any other service or department
note BC7.9	

BC8	**ADDITIONAL COMMENTS**
COMPLETION OF THIS SECTION TO BE COORDINATED BY LEARNING AND TEACHING SERVICE (LTS) COORDINATOR	
Please circulate Parts 1 & 2 to the following for their comments (if any). Comments to be returned within 10 working days.	
note BC8	**Is there anything further to add to the proposal from the perspective of your service and expertise?**
Date of circulation:	09.09.2014
BC8.1	Market Research Manager (on Section BC2)
	The comments in the Market Research section of this course review reflect accurately the quantitative and qualitative data available on the undergraduate engineering market.
BC8.2	Careers Manager (on Section BC3)
	No comments received.
BC8.3	Equality & Diversity Manager (on Section BC5.1)
	No comments received.
BC8.4	Director of Planning Office (PLN) (on full Business Case)
	I have some concerns about how achievable the proposed targets are based on current performance to date. However, this move to a wider offer should assist with recruitment and is in line with Market Research findings.
BC8.5	Faculty Finance Manager (on full Business Case)
note BC8.5	This course forms part of a package of new degrees that the Faculty of Science is looking to launch for 2016/17, and has our full support. With reference to section BC4.1. It should be noted that this is the total student number cohort which we expect Engineering as a subject to achieve including those already in planning assumptions. The only additional students numbers would be 2016/17 +5, 2017/18 +10 and 2018/19 +15.

BC9	**PROPOSER'S RESPONSE TO COMMENTS IN BC7 & BC8 ABOVE**

note BC9	**BC7.1** It may be worth noting that we now have an UEA Engineering student society. They would like to get involved in peer assisted learning as already undertaken within the School of Mathematics. The proposer has experience of providing a drop in centre utilising senior students to offer guidance within an agreed code of conduct. These measures would be seen as working as part of a coordinated package with DoS. **BC7.4** All comments received from Dir of Library Services noted and agreed to. **BC7.6** 1. Placement support is currently locally provided. Distinct Year in industry support has up to now benefited from a Faculty of Science integrated approach and will continue to benefit from local support. Engineering staff continue to develop links with local engineering industry in support of MSc placements, and this support will be extended to YII students. 2. The exit awards for Cert and DipHE should follow the BIM naming convention as indicated. The exit award for a MEng student who at the end of final year only achieves the learning outcomes appropriate to a BEng should still receive a named BEng award. 3. The proposal to use a single pair of UCAS codes (BEng/MEng Engineering) at entry but distinct specialisms on the degree certificates has involved advice from LTS in the sense that it was technically feasible to exit the programme with the degree parchment detailing the specialism. If operational constraints mean that separate UCAS codes become essential we will comply with that. We have referred this issue to ARM and LTS to resolve this in time for the prospectus deadlines. Other institutions do have one generic UCAS code supporting separate Engineering exit routes. The accreditation of these degrees is crucial for their success (as acknowledged by the response from ARM). Although in some limited cases it has been possible for the Engineering Council to accredit general engineering degrees through its Engineering Accreditation Board (EAB) the reality is that the Engineering Council acts as a co-ordinator of a range of professional engineering institutions and each in turn needs to be able to identify a distinct pathway through the general engineering provision that has sufficient focused material for them to accredit it. This is why we need distinct pathways or routes through the degree. For example, the Institution of Mechanical Engineers accredits general engineering degrees that have sufficient core mechanical engineering in them and are uniquely identifiable. Their accreditation officer indicated that however worthy a fully integrated Engineering degree might be and however good its graduates might be they don't accredit them. They do however routinely accredit pathways through such degrees and do so at universities such as Durham, Cardiff, Warwick, Lancaster and others. So a degree such as Engineering (Mechanical) is certainly accreditable. The Engineering Council's accreditation officer indicated that if we did have a single UCAS code but three exit pathways this was no problem at all for their registration process. They register the degree title on the certificate and pay no heed to UCAS codes. The combination of the above accreditation issues suggests that it is essential to be able to differentiate students on different pathways at graduation. The pathways proposed include new modules that provide at least 40 credits in second year, 80

credits in third year and between 40 and 80 credits of core mechanical engineering that distinguish the pathway for IMechE. They do this efficiently by ensuring that all compulsory modules are accessible as options to other students.

BC7.7
The comment is entirely in line with the proposer's interpretation of the market.

BC7.8
See the response to BC8.4

BC8.4
The MR data that was analysed by the proposer and BIU went some way to explaining why it has been so difficult to attract high-calibre applicants and entrants for the specialist degree of Energy Engineering. This was compounded by the actual degree titles all including Environmental Management, the inclusion of which was made originally on very sensible grounds of track record.
It also showed that the actual numbers achieved were far higher than might have been expected when compared with energy engineering degrees elsewhere at competitor universities.

The data are quite stark in indicating the growth of traditional degree titles over the last five years and in several cases decline of very specialist titles.

All the signs are that applicants prefer to keep their options open when applying and it is a reasonable extension to assume that having some specialist options attracts students. This is why the proposal retains a number of specialisms and introduces some explicit module titles that should also appeal to applicants.

The clarification about target numbers in the response from the Faculty Finance Manager in BC8.5 should also be noted. Rather than failing to meet the quite ambitious (in hindsight) targets for energy engineering and compounding the problem with a new set of degrees with similarly ambitious targets the proposal is to merge the targets with relatively little increase over those for Energy Engineering. The much stronger market for the proposed engineering degrees suggests that achieving the targets is possible. In achieving this it is important that students can defer their pathway choices until at least the end of first year, which is why the compulsory elements of first year are common to all programmes and the specific environmental option is in semester 2.

UEA LEARNING & TEACHING SERVICE

FULL COURSE PROPOSAL

Part 3 ACADEMIC CASE (including Programme Specification)

AC1	COURSE MANAGEMENT INFORMATION				
AC1.1	REGULATORY FRAMEWORK (please tick all that apply)				
	Undergraduate Regulations (including Integrated Masters)				✓
	Postgraduate Taught Regulations				
	Graduate Diplomas				
	PGCE				
AC1.2a	Is the course as a whole assessed on a pass/fail basis?	YES		NO	✓
AC1.2b	Are any modules assessed on a pass/fail basis?	YES	✓	NO	
AC1.2c	If so, how many modules and what is the credit volume for each module?				
	Within the degree including a Year in Industry the year in industry attracts 120 credits as a single module on a pass/fail basis. Students who fail are transferred to a programme that does not require a year in industry.				

AC2 *note AC2.1*	YEAR WEIGHTINGS AND PROGRESSION REQUIREMENTS (For undergraduate or integrated masters courses only) Please select only from the permitted options - see UG/PGT regulations				
Stage *Note AC2.2*	Level	Year of course	Weightings	Progression requirement	Exit Award *Note AC2.3*
Stage 0	Level 3	N/A			
Stage 1	Level 4	1	0% BEng, 0% MEng	40%	Cert HE
Stage 2	Level 5	2	40% BEng, 20% MEng	40% or 60%	Dip HE
Year Abroad / in Industry		3	Pass / Fail 0% weight	40%	Dip HE
Stage 3	Level 6	3	60% BEng, 30% MEng	40% or 60%	Dip HE
Stage M	Level 7	4	50% MEng	50%	BEng

AC3	BOARD OF EXAMINERS				
AC3.1	Is there an existing Board of Examiners?	YES	✓	NO	
AC3.2a	If YES, which existing board will be responsible for the course?	Engineering			
AC3.2b	If NO, please enter details for new board of examiners				
	Are any new external examiner(s) required?	YES	✓	NO	

AC3.3b	If yes, how many?	It may be possible to appoint an External Examiner for 2016/17 who has the capability to scrutinise both the energy programmes and the engineering programmes. This is to be preferred since so many of the modules are common. A maximum of two External Examiners could be needed.

PS	**PROGRAMME SPECIFICATION**
note PS	This part of the form will serve a dual purpose. Please read the guidance note carefully before completing

The following separate Programme Specifications are provided.

BEng/MEng Energy Engineering

BEng/MEng Engineering

BEng Engineering with a Year in Industry

The 'Learning Outcomes' have been assembled by reducing the 29 Learning Outcomes of the Engineering Council UK-Spec for accreditation version 3 to around 15 Learning Outcomes that encapsulate the important aspects. Although not truly expressed as learning outcomes it is these statements that we are obliged to match our programmes to.

University of East Anglia
LEARNING & TEACHING SERVICE

PROGRAMME SPECIFICATION FOR AN AWARD OF THE UNIVERSITY OF EAST ANGLIA

Course name	Route code *note S2b*	Year
BEng/MEng Energy Engineering	TBA	2016/17

NOTE: Whilst the University will make every effort to offer the modules listed, changes may sometimes have to be made for reasons outside the University's control (e.g. illness of a member of staff) or because of low enrolment or sabbatical leave. Where this is the case, the University will endeavour to inform students.

PS1 COURSE PROFILE

note PS1

YEAR 1 profile				Level	This column will be deleted prior to publication
				4	
Module Code (TBA if not known)	**Compulsory? - or name of Option range**	**Credits**	**Module Title**	**Teaching period, eg Sem 1, Year-long**	**New / amended / existing**
TBA	**Compulsory**	**20**	***Engineering Studies [ENG-4ESY]***	**Year long**	**New**
ENG-4002Y	Compulsory	20	Engineering Principles and Laws	Year long	Existing
ENG-4003Y	Compulsory	20	Engineering Practice	Year long	Existing
ENG-4004Y	Compulsory	20	Engineering Maths and Mechanics	Year long	Existing
ENV-4002Y	Compulsory	20	Maths for Scientists A	Year long	Existing
ENV-4007B	Option Range A	20	Physical and Chemical Processes of the Earth I	Sem 2	Existing
ENV-4008B	Option Range A	20	Physical and Chemical Processes of the Earth I	Sem 2	Existing
NBS-4002Y	Option Range A	20	Introduction to Business	Year long	Existing
CMP-4008Y	Option Range A	20	Programming 1	Year long	Existing
	Option Range A	20	Other Directed Options to be confirmed subject to timetable		Existing

PS1 COURSE PROFILE - *continued*

note PS1

YEAR 2 profile				Level	This column will be deleted prior to publication
				5	
Module Code (TBA if not known)	**Compulsory? - or name of Option range**	**Credits**	**Module Title**	**Teaching period, eg Sem 1, Year-long**	**New / amended / existing**
TBA	**Compulsory**	**20**	***Engineering Principles and Design [ENG-5EPD]***	**Year long**	**New**
ENG-5002Y	Compulsory	20	Renewable Energy	Year long	Existing
CMP-5027B	Compulsory	20	Analogue and Digital Electronics	Sem 2	Existing
ENV-5006A	Compulsory	20	Maths for Scientists B	Sem 1	Existing
ENV-5007B	Compulsory	20	Maths for Scientists C	Sem 2	Existing
TBA	**Option Range A**	**20**	***Dynamics and Vibration [ENG-5DAV]***	**Sem 1**	**New**
ENV-5003A	Option Range A	20	Climate Change: Science and Policy	Sem 1	Existing
ENV-5008A	Option Range A	20	Meteorology I	Sem 1	Existing
ENV-5016A	Option Range A	20	Ocean Circulation	Sem 1	Existing
ENV-5019A	Option Range A	20	Chemical Oceanography	Sem 1	Existing
CMP-5020B	Option Range A	20	Programming for Non-Specialists (CMP)	Sem 2	Existing
NBS-4001Y	Option Range A	20	Introduction to Financial and Management Accounting	Year long	Existing

NBS-4005Y	Option Range A	20	Introduction to Organisational Behaviour	Year long	Existing
NBS-5013Y	Option Range A	20	Strategic Marketing	Year long	Existing
	Option Range A	20	*Other Directed Options*		Existing

PS1 COURSE PROFILE - *continued*

note PS1

YEAR 3 profile				Level	This column will be deleted prior to publication
				6	
Module Code (TBA if not known)	**Compulsory? - or name of Option range**	**Credits**	**Module Title**	**Teaching period, eg Sem 1, Year-long**	**New / amended / existing**
ENV-6009A	Compulsory	20	Fossil Fuels	Sem 1	Existing
ENG-6002Y	Compulsory	20	Nuclear and Solar Energy	Year long	Existing
ENG-6001B	Compulsory	20	Electrical Generation and Distribution	Sem 2	Existing
ENG-6003Y	Compulsory	40	Individual Energy Project	Year long	Existing
TBA	Option Range A	**20**	***Stress Analysis and Design [ENG-6SADY]***	**Year long**	**New**
TBA	Option Range A	**20**	***Control Systems [ENG-6CSA]***	**Sem 1**	**New**
CMP-6023A	Option Range A	20	Embedded Systems	Sem 1	Existing
ENV-6004A	Option Range A	20	Modelling Environmental Processes	Sem 1	Existing
ENV-6007B	Option Range A	20	Global Environmental Change	Sem 2	Existing
ENV-6008A	Option Range A	20	The Carbon Cycle and Climate Change	Sem 1	Existing
ENV-6013A	Option Range A	20	Climate Change: Physical Science Basis	Sem 1	Existing
ENV-6020B	Option Range A	20	Atmospheric Composition: Measurement and Modelling	Sem 2	Existing

MTHD6018B	Option Range A	20	Dynamical Meteorology	Sem 2	Existing
MTHD6019A	Option Range A	20	Continuum Mechanics and Elasticity	Sem 1	Existing
MTHD6020A	Option Range A	20	Fluid Dynamics	Sem 1	Existing
NBS-5001B	Option Range A	20	Accounting for Non-Specialists	Sem 2	Existing
NBS-5002Y	Option Range A	20	Financial Accounting	Year long	Existing
NBS-5004Y	Option Range A	20	Business and Company Law	Year long	Existing
NBS-5008Y	Option Range A	20	Business Finance	Year long	Existing
NBS-5010Y	Option Range A	20	Operations Strategy and Management	Year long	Existing
NBS-5011Y	Option Range A	20	Human Resource Management	Year long	Existing

PS1 COURSE PROFILE - *continued*

note PS1

YEAR 4 profile – MENG ONLY				Level	This column will be deleted prior to publication
				7	
Module Code (TBA if not known)	**Compulsory? - or name of Option range**	**Credits**	**Module Title**	**Teaching period, eg Sem 1, Year-long**	**New / amended / existing**
ENG-7003B	Compulsory	20	Wind Energy Engineering	Sem 2	Existing
ENG-7004B	Compulsory	20	Wave, Tidal and Hydro Energy Engineering	Sem 2	Existing
ENG-7010Y	Compulsory	40	Team Energy Project	YEAR LONG	Existing
CHE-7801Y	Compulsory	20	Energy Futures	YEAR LONG	Existing
TBA	**Option Range A**	**20**	***Oil and Gas Production [ENG-7OGPA]***	**Sem 1**	**New**
TBA	**Option Range A**	**20**	***Advanced Computational Methods [ENG-7ACMA]***	**Sem 1**	**New**
TBA	**Option Range A**	**20**	***Mechanical and Manufacturing Processes [ENG-7MMPY]***	YEAR LONG	**New**
ENV-7020A	Option Range A	20	Theory of Environmental Assessment	Sem 1	Existing
MTHD7019A	Option Range A	20	Continuum Mechanics and Elasticity with Advanced Topics	Sem 1	Existing
MTHD7020A	Option Range A	20	Fluid Dynamics with Advanced Topics	Sem 1	Existing
CMPSMA23	Option Range A	20	*Applications Programming*	Sem 1	Existing
	Option Range A	20	*Other Directed Options*		Existing

PS2 MAPPING LEARNING OUTCOMES

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 1 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Knowledge and understanding of the **scientific** and **mathematical** principles necessary to support application of key engineering principles.		ENG-4002Y	ENG-4002Y ENV-4002Y	ENG-4002Y ENV-4002Y ENG-4004Y	*ENG-4ESY*			ENV-4002Y ENG-4004Y	ENG-4004Y
Ability to monitor, interpret and apply the results of **analysis** and modelling to understand the performance of systems and components					*ENG-4ESY* ENG-4003Y				*ENG-4ESY*
Ability to use the results of **engineering analysis** to solve engineering problems and to recommend appropriate action.			ENG-4002Y	ENG-4002Y	ENG-4003Y	ENG-4003Y ENG-4004Y			
Working with information that may be incomplete, define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards and apply problem-solving skills, technical knowledge and understanding to create or adapt **design solutions**					*ENG-4ESY* ENG-4003Y	*ENG-4ESY* ENG-4003Y			
Communicate their work to technical and non-technical audiences.						*ENG-4ESY*			*ENG-4ESY*
Understanding of the need for a high level of **professional and ethical conduct** in engineering and a knowledge of professional codes of conduct								ENG-4003Y	
Knowledge and understanding of the **commercial**, economic and social context of engineering processes								ENG-4003Y	
Knowledge of **management techniques** that may be used to achieve engineering objectives									
Awareness of relevant **legal requirements** governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues								ENG-4003Y	

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 1 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Awareness of **risk issues, including health & safety**, environmental and commercial risk.				ENV-4007B				ENG-4003Y	
Understanding of and ability to use relevant materials, equipment, tools, processes, or products			ENG-4002Y	ENG-4002Y					
Knowledge and understanding of workshop and laboratory practice		ENG-4002Y							
Awareness of quality issues and their application to continuous improvement									
Exercise personal responsibility and demonstrate awareness of team roles and the ability to work as a member of an engineering team.					ENG-4003Y				ENG-4003Y
Plan and carry out a personal programme of work								ENG-4002Y ENG-4003Y	
Other: please give details									

PS2 MAPPING LEARNING OUTCOMES - *continued*

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 2 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Knowledge and understanding of the **scientific** and **mathematical** principles necessary to support application of key engineering principles.		ENG-5EPD		ENV-5006A ENV-5007B				ENV-5006A ENV-5007B *ENG-5DAV*	
Ability to monitor, interpret and apply the results of **analysis** and modelling to understand the performance of systems and components		CMP-5027B						CMP-5027B	
Ability to use the results of **engineering analysis** to solve engineering problems and to recommend appropriate action.					ENG-5EPD			*ENG-5DAV*	
Working with information that may be incomplete, define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards and apply problem-solving skills, technical knowledge and understanding to create or adapt **design solutions**					ENG-5EPD				
Communicate their work to technical and non-technical audiences.									
Understanding of the need for a high level of **professional and ethical conduct** in engineering and a knowledge of professional codes of conduct									
Knowledge and understanding of the **commercial**, economic and social context of engineering processes								ENG-5002Y	
Knowledge of **management techniques** that may be used to achieve engineering objectives								ENG-5002Y	
Awareness of relevant **legal requirements** governing engineering activities, including personnel, health & safety, contracts, intellectual								ENG-5002Y	

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 2 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
property rights, product safety and liability issues									
Awareness of **risk issues, including health & safety**, environmental and commercial risk.								*ENG-5DAV*	
Understanding of and ability to use relevant materials, equipment, tools, processes, or products									
Knowledge and understanding of workshop and laboratory practice		CMP-5027B							
Awareness of quality issues and their application to continuous improvement									
Exercise personal responsibility and demonstrate awareness of team roles and the ability to work as a member of an engineering team.									
Plan and carry out a personal programme of work									
Other: please give details The actual format of assessment will be finalised during the first phase of this module during 2014-15									

PS2 MAPPING LEARNING OUTCOMES - *continued*

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 3 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Knowledge and understanding of the **scientific** and **mathematical** principles necessary to support application of key engineering principles.			ENG-6001B					*ENG-6SADY*	
Ability to monitor, interpret and apply the results of **analysis** and modelling to understand the performance of systems and components								*ENG-6SADY*	
Ability to use the results of **engineering analysis** to solve engineering problems and to recommend appropriate action.	ENV-6009A		ENG-6001B					*ENG-6SADY*	
Working with information that may be incomplete, define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards and apply problem-solving skills, technical knowledge and understanding to create or adapt **design solutions**					ENG-6IEPY ENG-6003Y				
Communicate their work to technical and non-technical audiences.					ENG-6IEPY ENG-6003Y				
Understanding of the need for a high level of **professional and ethical conduct** in engineering and a knowledge of professional codes of conduct									
Knowledge and understanding of the **commercial**, economic and social context of engineering processes									
Knowledge of **management techniques** that may be used to achieve engineering objectives					ENG-6IEPY ENG-				

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 3 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
					6003Y				
Awareness of relevant **legal requirements** governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues									
Awareness of **risk issues, including health & safety**, environmental and commercial risk.	ENG-6002Y				**ENG-6IEPY ENG-6003Y**				
Understanding of and ability to use relevant materials, equipment, tools, processes, or products									
Knowledge and understanding of workshop and laboratory practice									
Awareness of quality issues and their application to continuous improvement									
Exercise personal responsibility and demonstrate awareness of team roles and the ability to work as a member of an engineering team.									
Plan and carry out a personal programme of work					**ENG-6IEPY ENG-6003Y**				
Other: please give details									

PS2 MAPPING LEARNING OUTCOMES - *continued*

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 4 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Knowledge and understanding of the **scientific** and **mathematical** principles necessary to support application of key engineering principles.								ENG-7003B ENG-7004B	
Ability to monitor, interpret and apply the results of **analysis** and modelling to understand the performance of systems and components					ENG-7010Y ***ENG-7TEPY***			ENG-7003B ENG-7004B	
Ability to use the results of **engineering analysis** to solve engineering problems and to recommend appropriate action.	CHE-7801Y	*ENG-7MMPY*			ENG-7010Y ***ENG-7TEPY***			ENG-7003B ENG-7004B	
Working with information that may be incomplete, define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards and apply problem-solving skills, technical knowledge and understanding to create or adapt **design solutions**					ENG-7010Y ***ENG-7TEPY***				
Communicate their work to technical and non-technical audiences.					ENG-7003B ***ENG-7TEPY***	ENG-7003B			
Understanding of the need for a high level of **professional and ethical conduct** in engineering and a knowledge of professional codes of conduct									

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 4 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Knowledge and understanding of the **commercial**, economic and social context of engineering processes					ENG-7010Y ***ENG-7TEPY***			***ENG-7MMPY***	
Knowledge of **management techniques** that may be used to achieve engineering objectives					ENG-7010Y ***ENG-7TEPY***			*ENG-7MMPY*	
Awareness of relevant **legal requirements** governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues					ENG-7010Y ***ENG-7TEPY***				
Awareness of **risk issues, including health & safety**, environmental and commercial risk.					***ENG-7TEPY***			*ENG-7MMPY*	
Understanding of and ability to use relevant materials, equipment, tools, processes, or products					***ENG-7TEPY***			*ENG-7MMPY*	
Knowledge and understanding of workshop and laboratory practice								*ENG-7MMPY*	
Awareness of quality issues and their application to continuous improvement								*ENG-7MMPY*	
Exercise personal responsibility and demonstrate awareness of team roles and the ability to work as a member of an engineering team.					ENG-7010Y ***ENG-7TEPY***				
Plan and carry out a personal programme of work									

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 4 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Other: please give details The actual format of the assessment will be determined when the module is first delivered.									

PROGRAMME SPECIFICATION FOR AN AWARD OF THE UNIVERSITY OF EAST ANGLIA

Course name	Route code *note S2b*	Year
BEng/MEng Engineering	TBA	2016/17

NOTE: Whilst the University will make every effort to offer the modules listed, changes may sometimes have to be made for reasons outside the University's control (e.g. illness of a member of staff) or because of low enrolment or sabbatical leave. Where this is the case, the University will endeavour to inform students.

PS1 COURSE PROFILE

note PS1

YEAR 1 profile				Level	This column will be deleted prior to publication
				4	
Module Code (TBA if not known)	**Compulsory? - or name of Option range**	**Credits**	**Module Title**	**Teaching period, eg Sem 1, Year-long**	**New / amended / existing**
TBA	**Compulsory**	**20**	***Engineering Studies [ENG-4ESY]***	**Year long**	**New**
ENG-4002Y	Compulsory	20	Engineering Principles and Laws	Year long	Existing
ENG-4003Y	Compulsory	20	Engineering Practice	Year long	Existing
ENG-4004Y	Compulsory	20	Engineering Maths and Mechanics	Year long	Existing
ENV-4002Y	Compulsory	20	Maths for Scientists A	Year long	Existing
ENV-4007B	Option Range A	20	Physical and Chemical Processes of the Earth I	Sem 2	Existing
ENV-4008B	Option Range A	20	Physical and Chemical Processes of the Earth I	Sem 2	Existing
NBS-4002Y	Option Range A	20	Introduction to Business	Year long	Existing
CMP-4008Y	Option Range A	20	Programming 1	Year long	Existing
	Option Range A	20	Other Directed Options to be confirmed subject to timetable		Existing

PS1 COURSE PROFILE - *continued*

note PS1

YEAR 2 profile				Level	This column will be deleted prior to publication
				5	
Module Code (TBA if not known)	**Compulsory? - or name of Option range**	**Credits**	**Module Title**	**Teaching period, eg Sem 1, Year-long**	**New / amended / existing**
TBA	**Compulsory**	**20**	***Engineering Principles and Design [ENG-5EPD]***	**Year long**	**New**
ENG-5002Y	Option Range A	20	Renewable Energy	Year long	Existing
CMP-5027B	Compulsory	20	Analogue and Digital Electronics	Sem 2	Existing
ENV-5006A	Compulsory	20	Maths for Scientists B	Sem 1	Existing
ENV-5007B	Compulsory	20	Maths for Scientists C	Sem 2	Existing
TBA	**Compulsory**	**20**	***Dynamics and Vibration [ENG-5DAV]***	**Sem 1**	**New**
CMP-5020B	Option Range A	20	Programming for Non-Specialists (CMP)	Sem 2	Existing
CMP-5013A	Option Range A	20	Architectures and Operating Systems	Sem 1	Existing
NBS-4001Y	Option Range A	20	Introduction to Financial and Management Accounting	Year long	Existing
NBS-4005Y	Option Range A	20	Introduction to Organisational Behaviour	Year long	Existing
NBS-5013Y	Option Range A	20	Strategic Marketing	Year long	Existing
	Option Range A	20	*Other Directed Options*		Existing

PS1 COURSE PROFILE - *continued*

note PS1

YEAR 3 profile				Level	This column will be deleted prior to publication
				6	
Module Code (TBA if not known)	**Compulsory? - or name of Option range**	**Credits**	**Module Title**	**Teaching period, eg Sem 1, Year-long**	**New / amended / existing**
ENV-6009A	Option Range A	20	Fossil Fuels	Sem 1	Existing
ENG-6002Y	Option Range A	20	Nuclear and Solar Energy	Year long	Existing
ENG-6001B	Compulsory	20	Electrical Generation and Distribution	Sem 2	Existing
TBA	Compulsory	**40**	**Individual Engineering Project [ENG-6IEPY]**	**Year long**	**New**
TBA	Compulsory (Mech) Option Range A (Elec) Option Range A (Eng)	**20**	***Stress Analysis and Design [ENG-6SADY]***	**Year long**	**New**
TBA	Compulsory	**20**	***Control Systems [ENG-6CSA]***	**Sem 1**	**New**
CMP-6023A	Opt Range A (Mech) Compulsory (Elec) Opt Range A (Eng)	20	Embedded Systems	Sem 1	Existing
ENV-6004A	Option Range A	20	Modelling Environmental Processes	Sem 1	Existing
ENV-6007B	Option Range A	20	Global Environmental Change	Sem 2	Existing
ENV-6008A	Option Range A	20	The Carbon Cycle and Climate Change	Sem 1	Existing
ENV-6013A	Option Range A	20	Climate Change: Physical Science Basis	Sem 1	Existing
ENV-6020B	Option Range A	20	Atmospheric Composition: Measurement and Modelling	Sem 2	Existing

MTHD6018B	Option Range A	20	Dynamical Meteorology	Sem 2	Existing
MTHD6019A	Option Range A	20	Continuum Mechanics and Elasticity	Sem 1	Existing
MTHD6020A	Option Range A	20	Fluid Dynamics	Sem 1	Existing
NBS-5001B	Option Range A	20	Accounting for Non-Specialists	Sem 2	Existing
NBS-5002Y	Option Range A	20	Financial Accounting	Year long	Existing
NBS-5004Y	Option Range A	20	Business and Company Law	Year long	Existing
NBS-5008Y	Option Range A	20	Business Finance	Year long	Existing
NBS-5010Y	Option Range A	20	Operations Strategy and Management	Year long	Existing
NBS-5011Y	Option Range A	20	Human Resource Management	Year long	Existing

PS1 COURSE PROFILE - *continued*

note PS1

YEAR 4 profile MENG ONLY				Level	This column will be deleted prior to publication
				7	
Module Code (TBA if not known)	**Compulsory? - or name of Option range**	**Credits**	**Module Title**	**Teaching period, eg Sem 1, Year-long**	**New / amended / existing**
ENG-7003B	Option Range A	20	Wind Energy Engineering	Sem 2	Existing
ENG-7004B	Compulsory	20	Wave, Tidal and Hydro Energy Engineering	Sem 2	Existing
TBA	**Compulsory**	**40**	***Team Engineering Project [ENG-7TEPY]***	**YEAR LONG**	**New**
CHE-7801Y	Option Range A	20	Energy Futures	YEAR LONG	Existing
TBA	Option Range A	**20**	***Oil and Gas Production [ENG-7OGPA]***	**Sem 1**	**New**
TBA	**Compulsory**	**20**	***Advanced Computational Methods [ENG-7ACMA]***	**Sem 1**	**New**
TBA	Option Range A (Elec) Compulsory (Mech) Option Range A (Eng)	**20**	***Mechanical and Manufacturing Processes [ENG-7MMPY]***	YEAR LONG	**New**
ENV-7020A	Option Range A	20	Theory of Environmental Assessment	Sem 1	Existing
ENV-7021B	Option Range A (Eng only)	20	Environmental Assessment Effectiveness	Sem 2	Existing
MTHD7019A	Option Range A	20	Continuum Mechanics and Elasticity with Advanced Topics	Sem 1	Existing
MTHD7020A	Option Range A	20	Fluid Dynamics with Advanced Topics	Sem 1	Existing
CMPSMA23	Compulsory (Elec) Opt Range A (Mech) Opt Range A (Eng)	20	*Applications Programming*	Sem 1	Existing

	Option Range A	20	*Other Directed Options*		Existing

PS2 MAPPING LEARNING OUTCOMES

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 1 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Knowledge and understanding of the **scientific** and **mathematical** principles necessary to support application of key engineering principles.		ENG-4002Y	ENG-4002Y ENV-4002Y	ENG-4002Y ENV-4002Y ENG-4004Y	*ENG-4ESY*			ENV-4002Y ENG-4004Y	ENG-4004Y
Ability to monitor, interpret and apply the results of **analysis** and modelling to understand the performance of systems and components					*ENG-4ESY* ENG-4003Y				*ENG-4ESY*
Ability to use the results of **engineering analysis** to solve engineering problems and to recommend appropriate action.			ENG-4002Y	ENG-4002Y	ENG-4003Y	ENG-4003Y ENG-4004Y			
Working with information that may be incomplete, define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards and apply problem-solving skills, technical knowledge and understanding to create or adapt **design solutions**					*ENG-4ESY* ENG-4003Y	*ENG-4ESY* ENG-4003Y			
Communicate their work to technical and non-technical audiences.						*ENG-4ESY*			*ENG-4ESY*
Understanding of the need for a high level of **professional and ethical conduct** in engineering and a knowledge of professional codes of conduct								ENG-4003Y	
Knowledge and understanding of the **commercial**, economic and social context of engineering processes								ENG-4003Y	
Knowledge of **management techniques** that may be used to achieve engineering objectives									
Awareness of relevant **legal requirements** governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues								ENG-4003Y	

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 1 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Awareness of **risk issues, including health & safety**, environmental and commercial risk.				ENV-4007B				ENG-4003Y	
Understanding of and ability to use relevant materials, equipment, tools, processes, or products			ENG-4002Y	ENG-4002Y					
Knowledge and understanding of workshop and laboratory practice		ENG-4002Y							
Awareness of quality issues and their application to continuous improvement									
Exercise personal responsibility and demonstrate awareness of team roles and the ability to work as a member of an engineering team.					ENG-4003Y				ENG-4003Y
Plan and carry out a personal programme of work								ENG-4002Y ENG-4003Y	
Other: please give details									

PS2 MAPPING LEARNING OUTCOMES - *continued*

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 2 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Knowledge and understanding of the **scientific** and **mathematical** principles necessary to support application of key engineering principles.		ENG-5EPD		ENV-5006A ENV-5007B				ENV-5006A ENV-5007B *ENG-5DAV*	
Ability to monitor, interpret and apply the results of **analysis** and modelling to understand the performance of systems and components		CMP-5027B						CMP-5027B	
Ability to use the results of **engineering analysis** to solve engineering problems and to recommend appropriate action.					ENG-5EPD			*ENG-5DAV*	
Working with information that may be incomplete, define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards and apply problem-solving skills, technical knowledge and understanding to create or adapt **design solutions**					ENG-5EPD				
Communicate their work to technical and non-technical audiences.									
Understanding of the need for a high level of **professional and ethical conduct** in engineering and a knowledge of professional codes of conduct									
Knowledge and understanding of the **commercial**, economic and social context of engineering processes								ENG-5002Y	
Knowledge of **management techniques** that may be used to achieve engineering objectives								ENG-5002Y	
Awareness of relevant **legal requirements** governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues								ENG-5002Y	

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 2 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Awareness of **risk issues, including health & safety**, environmental and commercial risk.								*ENG-5DAV*	
Understanding of and ability to use relevant materials, equipment, tools, processes, or products									
Knowledge and understanding of workshop and laboratory practice		CMP-5027B							
Awareness of quality issues and their application to continuous improvement									
Exercise personal responsibility and demonstrate awareness of team roles and the ability to work as a member of an engineering team.									
Plan and carry out a personal programme of work									
Other: please give details The actual format of assessment will be finalised during the first phase of this module during 2014-15									

PS2 MAPPING LEARNING OUTCOMES - *continued*

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 3 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Knowledge and understanding of the **scientific** and **mathematical** principles necessary to support application of key engineering principles.			ENG-6001B					*ENG-6SADY*	
Ability to monitor, interpret and apply the results of **analysis** and modelling to understand the performance of systems and components								*ENG-6SADY*	
Ability to use the results of **engineering analysis** to solve engineering problems and to recommend appropriate action.	ENV-6009A		ENG-6001B					*ENG-6SADY*	
Working with information that may be incomplete, define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards and apply problem-solving skills, technical knowledge and understanding to create or adapt **design solutions**					ENG-6IEPY ENG-6003Y				
Communicate their work to technical and non-technical audiences.					ENG-6IEPY ENG-6003Y				
Understanding of the need for a high level of **professional and ethical conduct** in engineering and a knowledge of professional codes of conduct									
Knowledge and understanding of the **commercial**, economic and social context of engineering processes									
Knowledge of **management techniques** that may be used to achieve engineering objectives					ENG-6IEPY ENG-6003Y				

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 3 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Awareness of relevant **legal requirements** governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues									
Awareness of **risk issues, including health & safety**, environmental and commercial risk.	ENG-6002Y				**ENG-6IEPY ENG-6003Y**				
Understanding of and ability to use relevant materials, equipment, tools, processes, or products									
Knowledge and understanding of workshop and laboratory practice									
Awareness of quality issues and their application to continuous improvement									
Exercise personal responsibility and demonstrate awareness of team roles and the ability to work as a member of an engineering team.									
Plan and carry out a personal programme of work					**ENG-6IEPY ENG-6003Y**				
Other: please give details									

PS2 MAPPING LEARNING OUTCOMES - *continued*

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 4 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Knowledge and understanding of the **scientific** and **mathematical** principles necessary to support application of key engineering principles.								ENG-7003B ENG-7004B	
Ability to monitor, interpret and apply the results of **analysis** and modelling to understand the performance of systems and components					ENG-7010Y ***ENG-7TEPY***			ENG-7003B ENG-7004B	
Ability to use the results of **engineering analysis** to solve engineering problems and to recommend appropriate action.	CHE-7801Y	*ENG-7MMPY*			ENG-7010Y ***ENG-7TEPY***			ENG-7003B ENG-7004B	
Working with information that may be incomplete, define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards and apply problem-solving skills, technical knowledge and understanding to create or adapt **design solutions**					ENG-7010Y ***ENG-7TEPY***				
Communicate their work to technical and non-technical audiences.					ENG-7003B ***ENG-7TEPY***	ENG-7003B			
Understanding of the need for a high level of **professional and ethical conduct** in engineering and a knowledge of professional codes of conduct									
Knowledge and understanding of the **commercial**, economic and social context of engineering processes					ENG-7010Y			***ENG-7MMPY***	

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 4 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
					ENG-7TEPY				
Knowledge of **management techniques** that may be used to achieve engineering objectives					ENG-7010Y ***ENG-7TEPY***			*ENG-7MMPY*	
Awareness of relevant **legal requirements** governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues					ENG-7010Y ***ENG-7TEPY***				
Awareness of **risk issues, including health & safety**, environmental and commercial risk.					***ENG-7TEPY***			*ENG-7MMPY*	
Understanding of and ability to use relevant materials, equipment, tools, processes, or products					***ENG-7TEPY***			*ENG-7MMPY*	
Knowledge and understanding of workshop and laboratory practice								*ENG-7MMPY*	
Awareness of quality issues and their application to continuous improvement								*ENG-7MMPY*	
Exercise personal responsibility and demonstrate awareness of team roles and the ability to work as a member of an engineering team.					ENG-7010Y ***ENG-7TEPY***				
Plan and carry out a personal programme of work									
Other: please give details The actual format of the assessment will be determined when the module is first delivered.									

PROGRAMME SPECIFICATION FOR AN AWARD OF THE UNIVERSITY OF EAST ANGLIA

Course name	Route code *note S2b*	Year
BEng Engineering with a Year in Industry	TBA	2016/17

NOTE: Whilst the University will make every effort to offer the modules listed, changes may sometimes have to be made for reasons outside the University's control (e.g. illness of a member of staff) or because of low enrolment or sabbatical leave. Where this is the case, the University will endeavour to inform students.

PS1 COURSE PROFILE

note PS1

YEAR 1 profile				Level	This column will be deleted prior to publication
				4	
Module Code (TBA if not known)	**Compulsory? - or name of Option range**	**Credits**	**Module Title**	**Teaching period, eg Sem 1, Year-long**	**New / amended / existing**
TBA	**Compulsory**	**20**	***Engineering Studies [ENG-4ESY]***	**Year long**	**New**
ENG-4002Y	Compulsory	20	Engineering Principles and Laws	Year long	Existing
ENG-4003Y	Compulsory	20	Engineering Practice	Year long	Existing
ENG-4004Y	Compulsory	20	Engineering Maths and Mechanics	Year long	Existing
ENV-4002Y	Compulsory	20	Maths for Scientists A	Year long	Existing
ENV-4007B	Option Range A	20	Physical and Chemical Processes of the Earth I	Sem 2	Existing
ENV-4008B	Option Range A	20	Physical and Chemical Processes of the Earth I	Sem 2	Existing
NBS-4002Y	Option Range A	20	Introduction to Business	Year long	Existing
CMP-4008Y	Option Range A	20	Programming 1	Year long	Existing
	Option Range A	20	Other Directed Options to be confirmed subject to timetable		Existing

PS1 COURSE PROFILE - *continued*

note PS1

YEAR 2 profile				Level	This column will be deleted prior to publication
				5	
Module Code (TBA if not known)	**Compulsory? - or name of Option range**	**Credits**	**Module Title**	**Teaching period, eg Sem 1, Year-long**	**New / amended / existing**
TBA	**Compulsory**	**20**	***Engineering Principles and Design [ENG-5EPD]***	**Year long**	**New**
ENG-5002Y	Option Range A	20	Renewable Energy	Year long	Existing
CMP-5027B	Compulsory	20	Analogue and Digital Electronics	Sem 2	Existing
ENV-5006A	Compulsory	20	Maths for Scientists B	Sem 1	Existing
ENV-5007B	Compulsory	20	Maths for Scientists C	Sem 2	Existing
TBA	**Compulsory**	**20**	***Dynamics and Vibration [ENG-5DAV]***	**Sem 1**	**New**
CMP-5020B	Option Range A	20	Programming for Non-Specialists (CMP)	Sem 2	Existing
CMP-5013A	Option Range A	20	Architectures and Operating Systems	Sem 1	Existing
NBS-4001Y	Option Range A	20	Introduction to Financial and Management Accounting	Year long	Existing
NBS-4005Y	Option Range A	20	Introduction to Organisational Behaviour	Year long	Existing
NBS-5013Y	Option Range A	20	Strategic Marketing	Year long	Existing
	Option Range A	20	*Other Directed Options*		Existing

PS1 COURSE PROFILE - *continued*

note PS1

YEAR 3 profile				Level	This column will be deleted prior to publication
				6	
Module Code (TBA if not known)	**Compulsory? - or name of Option range**	**Credits**	**Module Title**	**Teaching period, eg Sem 1, Year-long**	**New / amended / existing**
ENG-6005Y	Compulsory	120	Year in Industry	Year Long	Existing

PS1 COURSE PROFILE - *continued*

note PS1

YEAR 4 profile [Level 6]				Level	This column will be deleted prior to publication
				6	
Module Code (TBA if not known)	**Compulsory? - or name of Option range**	**Credits**	**Module Title**	**Teaching period, eg Sem 1, Year-long**	**New / amended / existing**
ENV-6009A	Option Range A	20	Fossil Fuels	Sem 1	Existing
ENG-6002Y	Option Range A	20	Nuclear and Solar Energy	Year long	Existing
ENG-6001B	Compulsory	20	Electrical Generation and Distribution	Sem 2	Existing
TBA	Compulsory	**40**	**Individual Engineering Project [ENG-6IEPY]**	**Year long**	**New**
TBA	Compulsory (Mech) Option Range A (Elec) Option Range A (Eng)	**20**	***Stress Analysis and Design [ENG-6SADY]***	**Year long**	**New**
TBA	Compulsory	**20**	***Control Systems [ENG-6CSA]***	**Sem 1**	**New**
CMP-6023A	Opt Range A (Mech) Compulsory (Elec) Option Range A (Eng)	20	Embedded Systems	Sem 1	Existing
ENV-6004A	Option Range A	20	Modelling Environmental Processes	Sem 1	Existing
ENV-6007B	Option Range A	20	Global Environmental Change	Sem 2	Existing
ENV-6008A	Option Range A	20	The Carbon Cycle and Climate Change	Sem 1	Existing
ENV-6013A	Option Range A	20	Climate Change: Physical Science Basis	Sem 1	Existing
ENV-6020B	Option Range A	20	Atmospheric Composition: Measurement and Modelling	Sem 2	Existing

MTHD6018B	Option Range A	20	Dynamical Meteorology	Sem 2	Existing
MTHD6019A	Option Range A	20	Continuum Mechanics and Elasticity	Sem 1	Existing
MTHD6020A	Option Range A	20	Fluid Dynamics	Sem 1	Existing
NBS-5001B	Option Range A	20	Accounting for Non-Specialists	Sem 2	Existing
NBS-5002Y	Option Range A	20	Financial Accounting	Year long	Existing
NBS-5004Y	Option Range A	20	Business and Company Law	Year long	Existing
NBS-5008Y	Option Range A	20	Business Finance	Year long	Existing
NBS-5010Y	Option Range A	20	Operations Strategy and Management	Year long	Existing
NBS-5011Y	Option Range A	20	Human Resource Management	Year long	Existing

PS2 MAPPING LEARNING OUTCOMES

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 1 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Knowledge and understanding of the **scientific** and **mathematical** principles necessary to support application of key engineering principles.		ENG-4002Y	ENG-4002Y ENV-4002Y	ENG-4002Y ENV-4002Y ENG-4004Y	*ENG-4ESY*			ENV-4002Y ENG-4004Y	ENG-4004Y
Ability to monitor, interpret and apply the results of **analysis** and modelling to understand the performance of systems and components					*ENG-4ESY* ENG-4003Y				*ENG-4ESY*
Ability to use the results of **engineering analysis** to solve engineering problems and to recommend appropriate action.			ENG-4002Y	ENG-4002Y	ENG-4003Y	ENG-4003Y ENG-4004Y			
Working with information that may be incomplete, define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards and apply problem-solving skills, technical knowledge and understanding to create or adapt **design solutions**					*ENG-4ESY* ENG-4003Y	*ENG-4ESY* ENG-4003Y			
Communicate their work to technical and non-technical audiences.						*ENG-4ESY*			*ENG-4ESY*
Understanding of the need for a high level of **professional and ethical conduct** in engineering and a knowledge of professional codes of conduct								ENG-4003Y	
Knowledge and understanding of the **commercial**, economic and social context of engineering processes								ENG-4003Y	
Knowledge of **management techniques** that may be used to achieve engineering objectives									
Awareness of relevant **legal requirements** governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues								ENG-4003Y	

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 1 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Awareness of **risk issues, including health & safety**, environmental and commercial risk.				ENV-4007B				ENG-4003Y	
Understanding of and ability to use relevant materials, equipment, tools, processes, or products			ENG-4002Y	ENG-4002Y					
Knowledge and understanding of workshop and laboratory practice		ENG-4002Y							
Awareness of quality issues and their application to continuous improvement									
Exercise personal responsibility and demonstrate awareness of team roles and the ability to work as a member of an engineering team.					ENG-4003Y				ENG-4003Y
Plan and carry out a personal programme of work								ENG-4002Y ENG-4003Y	
Other: please give details									

PS2 MAPPING LEARNING OUTCOMES - *continued*

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 2 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Knowledge and understanding of the **scientific** and **mathematical** principles necessary to support application of key engineering principles.		ENG-5EPD		ENV-5006A ENV-5007B				ENV-5006A ENV-5007B *ENG-5DAV*	
Ability to monitor, interpret and apply the results of **analysis** and modelling to understand the performance of systems and components		CMP-5027B						CMP-5027B	
Ability to use the results of **engineering analysis** to solve engineering problems and to recommend appropriate action.					ENG-5EPD			*ENG-5DAV*	
Working with information that may be incomplete, define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards and apply problem-solving skills, technical knowledge and understanding to create or adapt **design solutions**					ENG-5EPD				
Communicate their work to technical and non-technical audiences.									
Understanding of the need for a high level of **professional and ethical conduct** in engineering and a knowledge of professional codes of conduct									
Knowledge and understanding of the **commercial**, economic and social context of engineering processes								ENG-5002Y	
Knowledge of **management techniques** that may be used to achieve engineering objectives								ENG-5002Y	
Awareness of relevant **legal requirements** governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues								ENG-5002Y	

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 2 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Awareness of **risk issues, including health & safety**, environmental and commercial risk.								*ENG-5DAV*	
Understanding of and ability to use relevant materials, equipment, tools, processes, or products									
Knowledge and understanding of workshop and laboratory practice		CMP-5027B							
Awareness of quality issues and their application to continuous improvement									
Exercise personal responsibility and demonstrate awareness of team roles and the ability to work as a member of an engineering team.									
Plan and carry out a personal programme of work									
Other: please give details The actual format of assessment will be finalised during the first phase of this module during 2014-15									

PS2 MAPPING LEARNING OUTCOMES - *continued*

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 3 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Knowledge and understanding of the **scientific** and **mathematical** principles necessary to support application of key engineering principles.									
Ability to monitor, interpret and apply the results of **analysis** and modelling to understand the performance of systems and components									
Ability to use the results of **engineering analysis** to solve engineering problems and to recommend appropriate action.									
Working with information that may be incomplete, define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards and apply problem-solving skills, technical knowledge and understanding to create or adapt **design solutions**					ENG-6005Y				
Communicate their work to technical and non-technical audiences.					ENG-6005Y				
Understanding of the need for a high level of **professional and ethical conduct** in engineering and a knowledge of professional codes of conduct					ENG-6005Y				
Knowledge and understanding of the **commercial**, economic and social context of engineering processes					ENG-6005Y				
Knowledge of **management techniques** that may be used to achieve engineering objectives					ENG-6005Y				
Awareness of relevant **legal requirements** governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues					ENG-6005Y				

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 3 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Awareness of **risk issues, including health & safety**, environmental and commercial risk.					ENG-6005Y				
Understanding of and ability to use relevant materials, equipment, tools, processes, or products									
Knowledge and understanding of workshop and laboratory practice									
Awareness of quality issues and their application to continuous improvement									
Exercise personal responsibility and demonstrate awareness of team roles and the ability to work as a member of an engineering team.					ENG-6005Y				
Plan and carry out a personal programme of work					ENG-6005Y				
Other: please give details									

PS2 MAPPING LEARNING OUTCOMES - *continued*

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 4 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Knowledge and understanding of the **scientific** and **mathematical** principles necessary to support application of key engineering principles.			ENG-6001B					*ENG-6SADY*	
Ability to monitor, interpret and apply the results of **analysis** and modelling to understand the performance of systems and components								*ENG-6SADY*	
Ability to use the results of **engineering analysis** to solve engineering problems and to recommend appropriate action.	ENV-6009A		ENG-6001B					*ENG-6SADY*	
Working with information that may be incomplete, define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards and apply problem-solving skills, technical knowledge and understanding to create or adapt **design solutions**					ENG-6IEPY ENG-6003Y				
Communicate their work to technical and non-technical audiences.					ENG-6IEPY ENG-6003Y				
Understanding of the need for a high level of **professional and ethical conduct** in engineering and a knowledge of professional codes of conduct									
Knowledge and understanding of the **commercial**, economic and social context of engineering processes									
Knowledge of **management techniques** that may be used to achieve engineering objectives					ENG-6IEPY ENG-6003Y				

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type **YEAR 4 learning outcomes**	**Assessment type**								
	Essay	Lab report	Course test	Exam	Project/ Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
Awareness of relevant **legal requirements** governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues									
Awareness of **risk issues, including health & safety**, environmental and commercial risk.	ENG-6002Y				**ENG-6IEPY ENG-6003Y**				
Understanding of and ability to use relevant materials, equipment, tools, processes, or products									
Knowledge and understanding of workshop and laboratory practice									
Awareness of quality issues and their application to continuous improvement									
Exercise personal responsibility and demonstrate awareness of team roles and the ability to work as a member of an engineering team.									
Plan and carry out a personal programme of work					**ENG-6IEPY ENG-6003Y**				
Other: please give details									

PS3 PROGRAMME COHERENCE AND FEEDBACK CYCLES

note PS3

PS3.1 learning progression

How will progression in terms of skills, knowledge and understanding be reflected in the programme between modules in any one year and across the years as students progress through their course of study?

note PS3.1

Engineering degrees by their very nature are progressive. Fundamental physical and mathematical material is taught in year 1 that underpins all subsequent work. Year 2 gradually introduces engineering applications of the fundamental principles so that in year 3 a student is equipped to complete the design, drawings and specifications for a specific artefact. At each stage ancillary information is introduced together with development of transferable skills and in Year 4 (MEng only) this is consolidated in a major team design project that encompasses not just the engineering but also aspects of quality systems, health and safety, risk, environmental impacts, costs and procurement which have been gradually introduced in earlier years. Much of this work is completed in teams in order to help students develop team working skills that they will take into industry.

It is possible to identify longitudinal themes of study through the programme that explicitly identify this progression. One way of expressing this is to use The 6 Engineering Council UK-Spec themes. Table PS3.1 shows how the compulsory modules map onto these themes both across years and longitudinally.

Table PS3.1 Cross Year and Longitudinal Themes in Compulsory Modules

Theme	Relevant Modules	Level
Science and mathematics Engineering is underpinned by science and mathematics, and other associated disciplines, as defined by the relevant professional engineering institution(s).	Engineering Maths and Mechanics Maths for Scientists A Maths for Scientists B Maths for Scientists C	4 4 5 5
Engineering analysis Engineering analysis involves the application of engineering concepts and tools to the solution of engineering problems.	Engineering Principles and Laws Engineering Maths and Mechanics ***Dynamics and Vibration*** ***Control Systems*** ***Advanced Computational Methods***	4 4 5 6 6
Design Design at this level is the creation and development of an economically viable product, process or system to meet a defined need. It involves technical and intellectual challenges and can be used to integrate all engineering understanding, knowledge and skills to the solution of real problems.	Engineering Practice ***Engineering Principles and Design*** ***Dynamics and Vibration*** ***Stress Analysis and Design*** ***Mechanical and Manufacturing Processes***	4 5 5 6 7
Economic, legal, social, ethical and environmental context Engineering activity can have impacts on the environment, on commerce, on society and on individuals. Graduates therefore need the skills to manage their activities and to be aware of the various legal and ethical constraints under which they are expected to operate.	Engineering Practice ***Engineering Studies*** ***Engineering Principles and Design*** Renewable Energy Nuclear and Solar Energy	4 4 5 6 6
Engineering practice	Engineering Practice	4

This is the practical application of engineering skills, combining theory and experience, and use of other relevant knowledge and skills.	Renewable Energy Analogue and Digital Electronics ***Dynamics and Vibration*** Fossil Fuels Nuclear and Solar Energy ***Control Systems*** Embedded Systems Wind Energy Engineering Wave, Tidal and Hydro Energy Engineering ***Mechanical and Manufacturing Processes***	5 5 5 6 6 6 6 7 7 7
Additional general skills Graduates must have developed transferable skills, additional to those set out in the other learning outcomes that will be of value in a wide range of situations.	Individual Engineering Project ***Team Engineering Project***	6 7

PS3.2 feedback cycle

Please explain how assessments and feedback / feed forward support the coherence of the programme. Comment on number and types of assessment, both formative and summative; the types and format of feedback students will receive; and their sequencing. How will assessments and feedback impact on subsequent modules?

note PS3.2

The feedback strategy in engineering is multi-faceted related to both formative and summative assessment. Different approaches are adopted depending on the challenge of the task and the amount of time that each requires. For short summative assessments there is time to provide a formative opportunity from which the student can feed forward. For more significant pieces of work the additional effort required to submit a formative version would overload the students so the focus is on feedback on the summative assignments. Given the progressive nature of the degrees and the themes described above there are still opportunities to feed forward this feedback to subsequent years.

Formative assignments are introduced gradually and as the student develops maturity and confidence there is a shift away from reliance on summative assessment.

Some examples of how this appears in the programme are:
In year 1 students complete a formative laboratory report mid-way through the year and receive extensive feedback of a general and specific nature. They are then able to put this into action when submitting a summative report at the end of semester 2. Considerable improvement is shown by those students who take advantage of this learning opportunity.

Mock examination assessment is used in year 1 to introduce students to the nature of university examinations.

To provide rapid feedback staff release general feedback comments on the institutional virtual learning environment (Blackboard) as soon as they are available and often a few days before the specific feedback and marks are available to students.

Feedback can take the form of oral discussion and explanation in-class, individual feedback from a student's Adviser, grid-based proformas that provide students with a

profile of their individual performance so that they can see where they have done well and where improvement is required in certain aspects. In some modules where oral presentations are being assessed the student audience are invited to provide anonymous feedback on their peers. This is of value on both sides of the transaction.

In years 3 and 4 where significant project work takes place the early assignments are formative. Inception reports, interim reports and interim presentations are formative elements of the individual projects to allow students to do themselves justice in the significant end of semester assignments. For design projects that involve several stages of the design process that must be completed (e.g. feasibility, concept, scheme, preliminary and detailed design) the early components are formative.

As these new degree programmes phase in further opportunities will be taken to help students to take advantage of formative assessment.

PS4	EXAMINATIONS	note PS4

	Written	Practical (e.g. OSCES and OSPES)
How many modules will include an exam element?	12	
How many hours of exams are there in Stage 0? (if applicable)	N/A	N/A
How many hours of exams are there in Stage 1?	9 + options	
How many hours of exams are there in Stage 2?	9 + options	
How many hours of exams are there in Stage 3?	7 + options	
How many hours of exams are there in Stage 4? (if applicable)	2 + options	
How many hours of exams are there in Stage 5? (if applicable)		
How many hours does the programme (as a whole) include?	27 + options	

PS5	EQUALITY & WIDENING PARTICIPATION	note PS5
PS5.1	How do the admissions criteria specifically for this course ensure equality of opportunity for all applicants?	
	UEA Admissions Policy will apply to this course.	
PS5.2	What steps have been taken to ensure an inclusive curriculum?	
	Accessibility issues in respect to industrial visits will be considered and special arrangements made where necessary and available.	
PS5.3	In what ways do learning and teaching and assessment methods ensure inclusivity, reasonable adjustment and equality of opportunity?	
	The course uses a diverse range of assessment methods and offers access to learning materials in a number of different forms, with electronic support in the form of Blackboard. Students will also have an allocated Adviser and access to the Dean of Students office for support with respect to potential individual arrangements including allowance for disabilities. International students are pro-actively encouraged to explore the many support services available in the Dean of Students Office, recognising the challenge of the different educational culture for such students.	

PS6	EMPLOYABILITY	note PS6
	How is employability embedded into the delivery of the course?	

Employability is explained to students during Induction with help from the Careers and Employability staff. Emphasis is placed on the importance of networking and developing contacts using the opportunities provided. Students are also encouraged early on to engage in the extra-curricular activities that will make them stand out from other engineering applicants at job interview. It is made clear that leaving career planning to third year will be too late. The concept of professionalism is introduced in year 1.

The SELECT Sponsorship scheme which provides first year students with the possibility of a placement after their first year acts as a vehicle for motivating each student to prepare a professional CV by their first Christmas vacation and complete an open-ended application form. Careers staff are invaluable in supporting this.

Opportunities are being taken to embed employability within summative coursework. For example in the module Engineering Practice students are invited to reflect on their learning by preparing notes in advance of a job interview in anticipation of questions on some key topics. This initiates the important skill of reflecting on learning.

Developing links with industry requires dedicated staff to visit industry and discuss collaboration on multiple occasions before allowing students to benefit. The following are just a selection of ways that this is done.

- Whenever an approach is received from a company an opportunity is taken to visit them to discuss ways of collaborating.
- A flyer is maintained that indicates a list of ways that industry can support UEA so that it can be sent whenever an enquiry arises and used as the basis of initial discussions.
- Attending industry and trade conferences and spending time chatting to the staff on the stands to become known.
- Encouraging, and in some cases paying for, students to attend conferences, meetings, breakfast meetings etc.to gain confidence in networking and to make their own contacts.
- Paying for UEA tables at trade gala dinners and allowing students to attend. Certain gala dinners are not suitable for students but in all cases it is these social events that the CEOs attend. Networking takes place in the evenings.

At present Engineering has contacts with over 35 companies at a variety of levels and intensities with a core of around 20 companies that can be relied upon to respond to requests such as the SELECT sponsorship scheme providing student placements. In addition to the significant support from the East of England Energy Group (EEEGR) and Skills for Energy, further links are being developed through Hethel Innovation and the New Anglia Advanced Manufacturing & Engineering (NAAME).

AC4	MODULE OUTLINES FOR EXISTING COMPULSORY MODULES				
note AC4	Number of existing COMPULSORY modules	4+4+4+3			
	Module outlines attached? (as Appendix 1 to this form)	YES	YES	NO	

AC5	MINOR CHANGES TO EXISTING MODULES	
note AC5	Please list all existing modules, compulsory and optional, to which you are proposing minor changes	
Module Code	**Module Title**	**Minor changes proposed**
N/A		

AC6	NEW MODULES	
note AC6	How many new modules are being proposed?	9
Please complete a table AC6.x for each proposed new module		

AC6.1	NEW MODULE 1			
Module Title	Engineering Studies			
Level			4	
Credit Value			20	
Teaching period, eg Semester 1, Year-long			Year Long	
Likely Module Organiser	To be recruited (interim Prof Lawrence Coates)			
Module Type (eg EX/CW/WW/PR etc)				
Does the Module include an Exam? Yes/No	NO	How long will the exam be? (ie 1, 2 3 hours)		N/A
Module Marking Scheme (Please tick as appropriate)	Pass/Fail?		Percentage marking?	YES
Proposed Module Code	ENG-4005Y			

Module Delivery (eg distance-learning campus based, work placement)	Campus-based
Brief Description	This module introduces the engineering disciplines of Mechanical Engineering, Electronic and Electrical Engineering, Civil Engineering and Energy Engineering using a mix of case studies, visiting speakers, laboratory and field work, student-centred learning. Assessment will include oral presentations, research studies, and reports on site visits, laboratory exercises.
Aims / learning outcomes	To lay the foundations of subsequent degree pathways and provide information to assist students in their choice. To develop an awareness of the importance of energy supply and demand management to all engineering disciplines. To contrast the disciplines of civil and mechanical engineering. To provide hands-on experience of simple electronic circuits. To expose students to the multidisciplinary nature of modern engineering.
Key Reading (2-5 key texts or resources for targeted Library expenditure/purchase)	TBC

AC6.1	**NEW MODULE 2**			
Module Title	Engineering Principles and Design			
Level			5	
Credit Value			20	
Teaching period, eg Semester 1, Year-long			Year Long	
Likely Module Organiser	To be recruited (interim Prof Lawrence Coates)			
Module Type (eg EX/CW/WW/PR etc)			WW	
Does the Module include an Exam? Yes/No	YES	How long will the exam be? (ie 1, 2 3 hours)		3 hours
Module Marking Scheme (Please tick as appropriate)	Pass/Fail?		Percentage marking?	YES
Proposed Module Code	ENG-5003Y			
Module Delivery (eg distance-learning campus based, work placement)	Campus based			

Brief Description	This module builds on the material introduced in the first year modules Engineering Principles and Laws and Engineering Practice. Thermodynamics and Heat Transfer will be taken further and related to real life applications. Linear momentum is developed and applied to wind turbines. Students will complete small elements of detailed design utilising industry standard codes of practice. Further study of risk assessment and management will be completed.
Aims / learning outcomes	To consolidate the understanding of thermodynamics and heat transfer. To utilise fluid mechanics in the understanding of wind turbines and other applications To develop confidence in the use of industry standard software and design codes of practice To appreciate the care that must go into detailed design of all elements of engineering artefacts.
Key Reading (2-5 key texts or resources for targeted Library expenditure/purchase)	TBC

AC6.1	**NEW MODULE 3**			
Module Title	Dynamics and Vibration			
Level			5	
Credit Value			20	
Teaching period, eg Semester 1, Year-long			Semester 1	
Likely Module Organiser	To be recruited (interim Prof Lawrence Coates)			
Module Type (eg EX/CW/WW/PR etc)			WW	
Does the Module include an Exam? Yes/No	Yes	How long will the exam be? (ie 1, 2 3 hours)		2 hours
Module Marking Scheme (Please tick as appropriate)	Pass/Fail?		Percentage marking?	YES
Proposed Module Code	ENG-5004A			
Module Delivery (eg distance-learning campus based, work placement)	Campus-based			

Brief Description	The introductory material from first year Engineering Mechanics is developed. An appreciation of why dynamics and vibration are important for engineering designers leads to consideration of Single-degree-of-freedom (SDOF) systems, Equation of motion, free vibration analysis, Natural frequency, undamped and damped systems and loading. Fourier series expansion and modal analysis are applied to vibration concepts: eigenfrequency, resonance, beats, critical, undercritical and overcritical damping, and transfer function. Applications to beams and cantilevers.
Aims / learning outcomes	To develop confidence in applying equations of motion to vibrating and oscillating systems. To understand the nature of vibration and its consequences.
Key Reading (2-5 key texts or resources for targeted Library expenditure/purchase)	TBC

AC6.1	**NEW MODULE 4**			
Module Title	Individual Engineering Project			
Level			6	
Credit Value			40	
Teaching period, eg Semester 1, Year-long			Year Long	
Likely Module Organiser	To be recruited (interim Prof Lawrence Coates)			
Module Type (eg EX/CW/WW/PR etc)			PR	
Does the Module include an Exam? Yes/No	NO	How long will the exam be? (ie 1, 2 3 hours)		
Module Marking Scheme (Please tick as appropriate)	Pass/Fail?		Percentage marking?	YES
Proposed Module Code	ENG-6004Y			
Module Delivery (eg distance-learning campus based, work placement)	Campus based			
Brief Description	Students will choose from a published list a study of a topic related to their chosen engineering discipline pathway and complete an in-depth individual project. Projects may be research-based, experimental, computational or other. Where possible projects will be			

	linked to an industrial partner. Project management and risk assessment will be embedded in the taught elements. Students will complete an inception report, an interim report and final dissertation report defended at a viva.
Aims / learning outcomes	To demonstrate the ability to manage and complete a self-motivated in-depth study of an engineering topic utilising skills learned in first and second year. To study a topic with an emphasis on a specific engineering discipline chosen from mechanical, electronic, electrical or energy engineering.
Key Reading (2-5 key texts or resources for targeted Library expenditure/purchase)	TBC

AC6.1	**NEW MODULE 5**			
Module Title	Stress Analysis and Design			
Level			6	
Credit Value			20	
Teaching period, eg Semester 1, Year-long			Year Long	
Likely Module Organiser	To be recruited (interim Prof Lawrence Coates)			
Module Type (eg EX/CW/WW/PR etc)			WW	
Does the Module include an Exam? Yes/No	YES	How long will the exam be? (ie 1, 2 3 hours)		3 hours
Module Marking Scheme (Please tick as appropriate)	Pass/Fail?		Percentage marking?	YES
Proposed Module Code	ENG-6006Y			
Module Delivery (eg distance-learning campus based, work placement)	Campus based			
Brief Description	Beginning with a revision of first and second year concepts of elasticity this module will consolidate an understanding of torsion, shear and bending in open and closed sections with applications in aerospace, wind engineering, bridge design and others. Analytical techniques such as Mohr's circle will be covered. Students will be exposed to stress analysis design codes. Connections such as bolted and welded will be analysed.			

Aims / learning outcomes	To be able to apply analytical techniques to determine the stresses in a given artefact under load and to design an artefact to withstand a given load without stress-related failure.
Key Reading (2-5 key texts or resources for targeted Library expenditure/purchase)	TBC

*****Please copy and paste the above table for additional new modules*****

AC6.1	**NEW MODULE 6**			
Module Title	Control Systems			
Level			6	
Credit Value			20	
Teaching period, eg Semester 1, Year-long			Year Long	
Likely Module Organiser	To be recruited (interim Prof Lawrence Coates)			
Module Type (eg EX/CW/WW/PR etc)			WW	
Does the Module include an Exam? Yes/No	YES	How long will the exam be? (ie 1, 2 3 hours)		2 hours
Module Marking Scheme (Please tick as appropriate)	Pass/Fail?		Percentage marking?	Yes
Proposed Module Code	ENG-6007B			
Module Delivery (eg distance-learning campus based, work placement)	Campus based			
Brief Description	Control systems are everywhere; automatic control of wind turbines, building management controls. Aerospace controls. Understanding control systems is important for engineers. The module begins with a review of the underlying theory of control utilising Laplace transforms and other techniques. Open and closed loop systems, feedback and stability will be considered. Software tools will be used. Industrial applications will be introduced using case studies.			
Aims / learning outcomes	To be able to articulate the important aspects of control systems and give examples of their application in engineering. Develop confidence in the application of mathematical techniques to the analysis of control systems.			

Key Reading (2-5 key texts or resources for targeted Library expenditure/purchase)	TBC

AC6.1	**NEW MODULE 7**				
Module Title	Team Engineering Project				
Level				7	
Credit Value				40	
Teaching period, eg Semester 1, Year-long				Year Long	
Likely Module Organiser	To be recruited (interim Prof Lawrence Coates)				
Module Type (eg EX/CW/WW/PR etc)				PR	
Does the Module include an Exam? Yes/No	NO	How long will the exam be? (ie 1, 2 3 hours)			
Module Marking Scheme (Please tick as appropriate)	Pass/Fail?			Percentage marking?	Yes
Proposed Module Code	ENG-7011Y				
Module Delivery (eg distance-learning campus based, work placement)	Campus based				
Brief Description	An essential element of an accredited MEng programme is a major team-based design project. Students will work in mixed discipline teams adopting a role appropriate to their chosen degree specialism and work through the initial stages of design to the point of agreeing a working scheme. Each student will then identify an element of the team's design that they will work on individually to full detailed design producing a formal report, design calculations, drawings and where appropriate a model. From feasibility through concept choice several submissions will be formative. Typical projects will be based on a recent development in industry. Often a company will be the client.				
Aims / learning outcomes	To work in a mixed discipline team and develop further team working skills. To appreciate the stages of design that contribute to the decision about a chosen solution. To produce a detailed design worked up as an individual student. To deliver the team's designs in both oral and written form for the client.				

Key Reading (2-5 key texts or resources for targeted Library expenditure/purchase)	TBC

AC6.1	**NEW MODULE 8**			
Module Title	Advanced Computational Methods			
Level			7	
Credit Value			20	
Teaching period, eg Semester 1, Year-long			Semester 1	
Likely Module Organiser	To be recruited (interim Prof Lawrence Coates)			
Module Type (eg EX/CW/WW/PR etc)			CW	
Does the Module include an Exam? Yes/No	NO	How long will the exam be? (ie 1, 2 3 hours)		
Module Marking Scheme (Please tick as appropriate)	Pass/Fail?		Percentage marking?	YES
Proposed Module Code	ENG-7005A			
Module Delivery (eg distance-learning campus based, work placement)	Campus based			
Brief Description	A number of computational techniques are used in engineering design and practice: Computer-Aided Drafting, Computer-Aided Design, Finite Element Analysis, Computer Numerical Control of manufacturing equipment, 3D printing. In a hands-on approach students will develop a broad awareness and detailed competence in some techniques building on material introduced during earlier years of the degree.			
Aims / learning outcomes	To appreciate the range of computational techniques used in modern engineering. To develop competence in utilising two or more of the computational techniques appropriate to the chosen engineering discipline.			
Key Reading (2-5 key texts or resources for targeted Library expenditure/purchase)	TBC			

AC6.1	NEW MODULE 9			
Module Title	Mechanical and Manufacturing Processes			
Level			7	
Credit Value			20	
Teaching period, eg Semester 1, Year-long			Year Long	
Likely Module Organiser	To be recruited (interim Prof Lawrence Coates)			
Module Type (eg EX/CW/WW/PR etc)				
Does the Module include an Exam? Yes/No	YES	How long will the exam be? (ie 1, 2 3 hours)		2
Module Marking Scheme (Please tick as appropriate)	Pass/Fail?		Percentage marking?	YES
Proposed Module Code	ENG-7006Y			
Module Delivery (eg distance-learning campus based, work placement)	Campus based			
Brief Description	Mechanical engineering is often distinguished from other disciplines by the many production line processes that it utilises. Students will develop manufacturing and business awareness through studying aspects of production lines, quality systems, Kanban, Just in Time, Lean Manufacture etc. Students will contrast the approaches in different sectors (e.g. aerospace, automotive mass production, automotive specialist production etc.)			
Aims / learning outcomes	To understand how to utilise modern mechanical and manufacturing process controls and quality systems to improve productivity and quality of engineering artefacts.			
Key Reading (2-5 key texts or resources for targeted Library expenditure/purchase)	TBC			

AC 7 *note AC7*	DEFINED CHOICE
How do you envisage 'Defined Choice' working for the course in question? Please specify, for each year of the course, defined choice within the 3 categories of: • Programme-specific choice • Enrichment and Employment modules (EEC)	

- Language choice

The over-arching important feature of the balance of compulsory and optional modules is that professional accrediting bodies will expect to see all of the Engineering Council UK-Spec learning outcomes available to students within compulsory modules. As such defined choice is not aimed at ensuring certain learning outcomes are achieved but instead is valued for its broadening educational aspects (EEC). So students will be given opportunities to explore subjects that might not involve any engineering.

Experience so far shows that the success and provision of Defined Choice modules is very much dependent on up to date timetable information. So a certain amount of flexibility is required until timetables of the many Schools involved have stabilised.

Appendix 4 shows the ways that defined choice is planned. More information on possible language choices is needed.

The programme BEng Energy Engineering with Environmental Management has to have a more restricted choice than the other programmes to ensure that students complete sufficient environmental-related modules by the end of second year to justify the degree title.

It is intended that students on the BEng/MEng Energy Engineering and the BEng/MEng Engineering programmes will have the opportunity to study a language theme in several years of their programme.

In response to student requests the Business theme utilised by the Mathematics students has been made available. Although students are not compelled to pursue it throughout their degree pre-requisites must be dealt with.

For the BEng/MEng Engineering programmes there are a number of Computing Sciences themes that are of benefit to those on the Electronic and Electrical Engineering pathway. There will be further discussion with CMP staff to ensure that the best subset is made available.

AC8 *note AC8*	**JOINT COURSES**		
	Is the proposed course is a joint course?	**YES**	
		NO	NO
	If YES, how will the student experience be managed?		

AC9	**COMMENTS/FEEDBACK FROM EXTERNAL PROFESSIONALS/ BODIES**
note AC9	**Please provide a summary of external professional feedback received. Append full reports as Appendix 2**

	A2a: Accreditation Staff in the Institution of Mechanical Engineers have confirmed the procedures for accrediting integrated engineering degrees and highlighted some of the important issues. A2b: Accreditation Staff in the Engineering Council have confirmed that the process of registration of separate pathways through a set of degree programmes is driven solely by what appears on the degree certificate.
note AC9	**Please provide a summary of Professional, Statutory or Regulatory Body (PSRB) approval, if appropriate. Append any relevant documents as Appendix 3**
	N/A

AC10	**COMMENTS ON ACADEMIC CASE AND PROGRAMME SPECIFICATION**
COMPLETION OF THIS SECTION TO BE COORDINATED BY LEARNING AND TEACHING SERVICE (LTS) COORDINATOR	
note AC10	**Please circulate Parts 1, 3 & 4 to the following for their additional comments (if any). Comments to be returned to proposer within 10 working days.** **NB these comments should focus on the *ACADEMIC CONTENT* of the proposal**
Date of circulation:	09.09.2014 [Recirculated in time for 03.12.2014]
AC10.1	Careers Manager (CCEN)
No comments received.	
AC10.2	Learning & Teaching Service (LTS) Manager (UG or PGT, as appropriate)
I have the following comments: i) The proposed pathways in Mech and Elec Eng are likely to need their own route codes due to the way SITS is currently set up. SITS cannot accommodate pathways. ii) The matrix in Appendix 4 shows that students on the BEng/MEng Energy Engineering and the BEng/MEng Engineering can study identical modules throughout their course but come out with different degree titles. Presumably the subjects of the Individual Project at Stage 6 and the Team Project in Stage 7 will be what differentiates the degrees. iii) It is not clear how the opportunity to take languages will be offered unless the directed options will allow for a Beginners or Intermediate Language 1 at Level 4and the follow up Beginners/Intermediate Language 2 at Level 5.	

iv) Under BIM, any directed options at Level 7 must be Level 7 modules.
v) Assessment of modules involved a significant number of examinations. The New Academic Model states that from 2015/16 there should be a move to fewer examinations as part of course level assessment strategies.

Michele Pavey

Learning and Teaching Manager
23 September 2014

Comment:
Following SCI's established 'Year in Industry' model, therefore, should comply with University's code of Practice on Placements and Work-based Learning.

Becky Fitt
Learning and Teaching Manager - Placements

AC10.2	Equality & Diversity Manager (PPE)

No comments received.

AC11	PROPOSER'S RESPONSE TO COMMENTS IN AC9 & AC10 ABOVE
note AC11	**AC10.2** i) We are grateful for this explanation. We are still working with ARM to establish how the various codes map on to UCAS codes. At this stage it seems prudent to proceed with a single pair of UCAS codes for BEng/MEng Engineering until those who understand the constraints of SITS and UCAS can advise us of the best course of action, from an operational point of view, that secures different exit degree titles at graduation. As part of the concerted marketing strategy we will also take advice from ARM. It will be possible to differentiate the degrees on our own webpages. ii) The current proposal, as has been stated, has been put together with almost the minimum of differentiation between programmes. This is not because this is seen to be a virtue but instead because of the challenge of recruiting high calibre research-active lecturers. It was felt very unwise to attempt to establish very distinct programmes with many new modules that we might struggle to deliver. There is a possibility that as we continue to recruit lecturers this might bring in research-led expertise that would support new modules that would be relevant to our likely graduate employers. So growth in this way is possible. The pathways support the accreditation for the courses. In Appendix 4 each programme has a distinct pattern of compulsory modules but as many of them as possible are available as options for other students to maintain their viability. However it is correct to indicate that the two major projects provide 40 credits of differentiation in the final years. This is why the energy projects have been retained. The fourth year Team Engineering Project is deliberately multi-disciplinary and each student will represent their chosen discipline within their team. This is less explicit but will be a feature that is emphasised to the accreditors. iii) The proposer found it very difficult to find the relevant information about

	option language study. The facility is mentioned because some of the current students have expressed an interest in it and it is certainly worth considering because some applicants specifically seek it. This will be something where the proposer will have to discuss the details before finalising the directed option lists. Timetabling will be a key issue to consider as well. iv) This is noted. This is the case within these proposals. v) To comply with NAM this will have to be addressed. In looking at the KIS data the percentages of assessment based on credits, at 38%:50%:18% BEng and 38%:50%:18%:4% MEng, don't seem unusually high. They are what is usual from an accreditation perspective since second year contains the very important technical knowledge that individual engineers need to be able to demonstrate. We have reviewed the proposal from the point of view of examinations in second year. Maths for scientists B & C contribute significantly to the exam load, and this is necessary. The exam weights for Engineering Principles and Design, and Dynamics and Vibration have been reduced so that the percentages attached to exams are now 43% in second year. However, if the concern was from the perspective of total examination hours then the proposer holds strong views on this for certain types of examination. Engineering technical and design examinations can involve detailed and important calculations that demonstrate engineering competence and satisfy professional accreditors. Everybody can make mistakes or incorrect assumptions in such calculations and this is why professional engineers have a strict checking regime. In an examination scenario a simple mistake that leads to an answer which is obviously incorrect can throw a student if they are under pressure. They will feel that they must check back to find where they have made an error. This is good but takes time and can jeopardize their ability to answer further questions. So, whenever sensible, such examinations are scheduled for 3hrs but material that requires about 2.5hrs work is included. Otherwise the exercise can become a lottery and perfectly good students can be unfairly penalised whereas others can fluke it. Where possible and sensible 2hr papers have been indicated, but for design modules 3hrs have been used. As the modules are delivered and as part of the normal programme and module review processes the balance of examinations will be reviewed.

FULL COURSE PROPOSAL

Part 4 KEY INFORMATION SET (KIS) DATA

For BEng Energy Engineering and BEng Engineering

KIS	KEY INFORMATION SET data (undergraduate courses only)					Note KIS
KIS1	Quantitative KIS data					Note KIS1
		Year 1	Year 2	Year 3	Year 4	Year 5
1.1	Percentage of assessment by written exams	38%	43%	18%		
1.2	Percentage of assessment by practical exams					
1.3	Percentage of assessment by coursework	62%	57%	82%		
1.4	Percentage of time in scheduled learning and teaching activities	54%	38%	28%		
1.5	Percentage of time in guided independent study	46%	62%	79%		
1.6	Percentage of time on placements					
KIS2	Professional Accreditation					Note KIS2
2.1	Name of accrediting body (if applicable)					
	Accreditation will be sought from the following: Energy Institute for BEng Energy Engineering with Environmental Management and BEng/MEng Energy Engineering Institution of Mechanical Engineers and / or Institution of Engineering and Technology For designated pathways for BEng/MEng Engineering and BEng Engineering with a Year in Industry					
2.2	Please give details, including any memberships, exemptions etc that the award confers. Please also give accrediting body website URL.					
	www.energyinst.org www.imeche.org www.theiet.org					
2.3	Is the accreditation dependent on specific module choices? If so, please include URL of web pages where these details are outlined.					
	Yes. But not available yet.					

For MEng Energy Engineering and MEng Engineering

KIS	KEY INFORMATION SET data (undergraduate courses only)					Note KIS
KIS1	**Quantitative KIS data**					*Note KIS1*
		Year 1	Year 2	Year 3	Year 4	Year 5
1.1	Percentage of assessment by written exams	38%	43%	18%	4%	
1.2	Percentage of assessment by practical exams					
1.3	Percentage of assessment by coursework	62%	57%	82%	96%	
1.4	Percentage of time in scheduled learning and teaching activities	54%	38%	28%	24%	
1.5	Percentage of time in guided independent study	46%	62%	79%	76%	
1.6	Percentage of time on placements					
KIS2	**Professional Accreditation**					*Note KIS2*
2.1	Name of accrediting body (if applicable)					
	Accreditation will be sought from the following: Energy Institute for BEng Energy Engineering with Environmental Management and BEng/MEng Energy Engineering Institution of Mechanical Engineers and / or Institution of Engineering and Technology For designated pathways for BEng/MEng Engineering and BEng Engineering with a Year in Industry					
2.2	Please give details, including any memberships, exemptions etc that the award confers. Please also give accrediting body website URL.					
	www.energyinst.org www.imeche.org www.theiet.org					
2.3	Is the accreditation dependent on specific module choices? If so, please include URL of web pages where these details are outlined.					
	Yes. But not available yet.					

For BEng Engineering with a Year in Industry

KIS	KEY INFORMATION SET data (undergraduate courses only)					Note KIS
KIS1	Quantitative KIS data					Note KIS1
		Year 1	Year 2	Year 3	Year 4	Year 5
1.1	Percentage of assessment by written exams	38%	43%	0%	18%	4%
1.2	Percentage of assessment by practical exams					
1.3	Percentage of assessment by coursework	62%	57%	100%	82%	96%
1.4	Percentage of time in scheduled learning and teaching activities	54%	38%		28%	24%
1.5	Percentage of time in guided independent study	46%	62%	100%	79%	76%
1.6	Percentage of time on placements			100%		
KIS2	Professional Accreditation					Note KIS2
2.1	Name of accrediting body (if applicable)					
	Accreditation will be sought from the following: Energy Institute for BEng Energy Engineering with Environmental Management and BEng/MEng Energy Engineering Institution of Mechanical Engineers and / or Institution of Engineering and Technology For designated pathways for BEng/MEng Engineering and BEng Engineering with a Year in Industry					
2.2	Please give details, including any memberships, exemptions etc that the award confers. Please also give accrediting body website URL.					
	www.energyinst.org www.imeche.org www.theiet.org					
2.3	Is the accreditation dependent on specific module choices? If so, please include URL of web pages where these details are outlined.					
	Yes. But not available yet.					

FULL COURSE PROPOSAL

Part 5 APPROVALS AND NOTIFICATION

APPROVALS

Note AP

THIS SECTION WILL BE COORDINATED BY THE SECRETARY TO YOUR FACULTY TEACHING AND LEARNING QUALITY COMMITTEE (FLTQC)				
AP1	**APPROVAL OF THE BUSINESS CASE**			
	APPROVAL/SIGNATURES	**Name**	**Signature/ evidence of approval**	**Date**
AP1.1	School Director of Learning, Teaching and Quality			
AP1.2	Head of School (on behalf of School Board)			
AP1.3	Dean of Faculty (on behalf of Faculty Executive)			
AP1.4	LTC (if relevant)			
AP1.5	Council (if relevant)			
AP1.6	Reasons for approval being withheld (and by whom)			

AP2	**APPROVAL OF THE ACADEMIC CASE**			
AP2.1	**Head of School**	**Name**	**Signature**	**Date**
	Approved:			
	Approved with amendments:			
	Rejected:			
	Comments (if any):			

AP2.2	**Faculty Associate Dean (for Faculty LTQC)**	**Name**	**Signature**	**Date**
	Approved:			
	Approved with amendments:			
	Rejected:			
	Comments (if any):			
AP2.3	**PVC Academic (for LTC)**	**Name**	**Signature**	**Date**
	Approved:			
	Approved with amendments:			
	Rejected:			
	Comments (if any):			
Where applicable:				
AP2.4	**Secretary to Council**	**Name**	**Signature**	**Date**
	Approved:			
	Approved with amendments:			
	Rejected:			
	Comments (if any):			

FULL COURSE PROPOSAL

Note N1	**NOTIFICATION OF APPROVAL**			
This section should be completed by Faculty FLTQC Secretary once a course proposal has been approved. Its purpose is to ensure that relevant Offices are informed of the approval of course proposals (new courses and course amendments), in accordance with the procedures for course approval.				
FACULTY			**SCHOOL**	
NEW COURSE?	**Y**	**N**	**If NO, please enter existing course code**	
DEGREE AWARD (e.g. BSc/MA)				
TITLE OF PROGRAMME				
START DATE			**LENGTH OF COURSE**	

Course Approved by**:**	Name of Committee Chair	Date of approval
Faculty Learning and Teaching Quality Committee (FLTQC)		
Learning and Teaching Committee (LTC)		

RELEVANT OFFICE INFORMED? *insert date			
Planning Office	**Admissions and Marketing**	**Learning and Teaching Service**	**Union of UEA Students**
*	*	*	*
sis.records@uea.ac.uk	arm.operations@uea.ac.uk	Email the LTS coordinator responsible for the course	union.academic@uea.ac.uk

Note N1	**IMPLEMENTATION ACTIONS**
COURSE NAME	**NEW ROUTE CODE**

ACTION	**DATE**
COURSE INFORMATION LIVE IN ADMISSIONS	
PROGRAMME SPECIFICATION UPLOADED ONTO WEBSITE	
COURSE PROFILE UPLOADED ONTO SITS	
COURSE CLOSURES COMMENCED (where appropriate)	

Appendix 1. Module Outlines

ENG-4002Y, ENGINEERING PRINCIPLES AND LAWS

Academic Session	2014/5
Period	YEAR
Occ.	A
Slot	C1, C2, C3, D7, D8, A3
Credit Value	20
School	Mathematics
Actual (Target)	11 (30)
Module Organiser	Professor Lawrence Coates
Assessment	Examination with Coursework or Project

Module Description

To take this module you will need the equivalent of Maths A level grade B. This 20-credit module consolidates several distinct topics – all of which will be essential during the later stages of the course. During the first semester, students investigate how to harness the properties of modern materials within an engineering context through lab work whilst developing an appreciation of structural behaviour through examination of solid and lattice structures. Semester 2 focuses on thermodynamics, integrating the study of heat transfer, fluid flow and hydraulics into coursework and a final exam worth 70% of the module. The formative assessment is a laboratory report to prepare students for the summative report.

Module Assessment Pattern

Seq	Type	Share	Assessment Title
001	WA	15	Lab Report
002	CT	15	Autumn Test
003	EXSTD	70	Examination
FM1	FRM	0	Formative Assessment

ENG-4003Y, ENGINEERING PRACTICE

Academic Session	2014/5
Period	YEAR
Occ.	A
Slot	
Credit Value	20
School	Mathematics
Actual (Target)	11 (25)
Module Organiser	Professor Lawrence Coates
Assessment	Coursework

Module Description

RESERVED FOR ENGINEERING STUDENTS. Engineering Practice prepares students for the inherent financial and ethical considerations of working in the engineering industry as well as kick-starting the creative design theme of the course. Semester 1 begins by recreating the team-based nature of modern energy companies through an induction activity aimed at helping students with the transition to university study. The group then studies the historical developments which govern design principles in today's low-carbon world, including business sustainability and the ethical responsibility of resource depletion. These concepts then feed directly into students' design work as they learn to produce professional technical drawings and sketches alongside 3D models using CAD software. Students are assessed on their progress through coursework and learning is supplemented by industrial site visits in both semesters. Semester 2 provides opportunities for students to apply the skills they have learned to a real

conceptual design (currently based on the EWB Challenge) and culminates in a number of activities related to how business works.

Module Assessment Pattern

Seq	Type	Share	Assessment Title
001	PS	5	Induction Exercise
002	WA	30	Portfolio
003	PS	35	Conceptual team-based design
004	WA	30	Business Exercises

ENG-4004Y, ENGINEERING MATHEMATICS AND MECHANICS

Academic Session	2014/5
Period	YEAR
Occ.	A
Slot	
Credit Value	20
School	Mathematics
Actual (Target)	11 (25)
Module Organiser	Dr Matthew Alexander
Assessment	Examination with Coursework or Project

Module Description

RESERVED FOR ENGINEERING STUDENTS. This module utilises the mathematical concepts from the Maths for Scientists module in an engineering context, before complementing the material with practical mechanics to solve real-world problems. Over the first semester students are introduced to the vocational necessity of estimation in the absence of accurate data through a team-based competition, as well as the practical geometry and numerical methods which can be used when analytical techniques fail. This is supplemented by practical exercises in graphical presentation and data analysis which will contribute to the coursework element of the module. Teaching then concentrates on mechanics in the second semester, encompassing Newton's laws of motion, particle dynamics and conservation laws before a final exam.

Module Rules

WHILE TAKING THIS MODULE YOU MUST TAKE MTHA4005Y OR TAKE MTHB4006Y OR TAKE ENV-4002Y

Module Assessment Pattern

Seq	Type	Share	Assessment Title
001	WA	20	Report - Numerical Methods
002	PS	30	Estimation Competition
003	WA	20	Mechanics
004	EXSTD	30	Examination
FM1	FRM	0	Excel Skills

ENV-4002Y, MATHEMATICS FOR SCIENTISTS A

Academic Session	2014/5
Period	YEAR
Occ.	A
Slot	DD
Credit Value	20

School	Environmental Sciences
Actual (Target)	39 (120)
Module Organiser	Dr Manoj Joshi
Assessment	Examination with Coursework or Project

Module Description

THIS MODULE CAN NOT BE TAKEN WITH ENV-4003Y. This module in designed for students with A2 or AS level mathematics. It covers differentiation, integration, vectors, partial differentiation, ordinary differential equations, further integrals, power series expansions, complex numbers, and statistical methods. In addition to the theoretical background, there is an emphasis on applied examples. Previous knowledge of calculus is assumed. This module is the first in a series of three maths modules for students across the Faculty of Science that provide a solid undergraduate mathematical training. The modules that follow at Level 2 are Mathematics for Scientists B and C. This module is assessed by formative assessments and coursework / examination.

Module Rules

IN TAKING THIS MODULE YOU CANNOT TAKE ENV-4003Y

Module Assessment Pattern

Seq	Type	Share	Assessment Title
001	CT	40	Online Statistics Course Test
002	EXSTD	60	Examination
FM1	FRM	0	Formative Assessment

ENV-5006A, MATHEMATICS FOR SCIENTISTS B

Academic Session	2014/5
Period	SEM1
Occ.	A
Slot	BB
Credit Value	20
School	Environmental Sciences
Actual (Target)	69 (70)
Module Organiser	Dr Nigel Scott
Assessment	Examination

Module Description

This module is the third in a series of four mathematical units for students across the Faculty of Science. It covers vector calculus (used in the study of vector fields in subjects such as fluid dynamics and electromagnetism), time series and spectral analysis (a highly adaptable and useful mathematical technique in many science fields, including data analysis), and fluid dynamics (which has applications to the circulation of the atmosphere, ocean, interior of the Earth, chemical engineering, and biology). There is a continuing emphasis on applied examples, and the use of numerical computing software (Matlab). This module replaces ENV-2A61.

Module Rules

BEFORE TAKING THIS MODULE YOU MUST TAKE ENV-4002Y

Module Assessment Pattern

Seq	Type	Share	Assessment Title
001	EXSTD	100	Examination

ENV-5007B, MATHEMATICS FOR SCIENTISTS C

Academic Session	2014/5
Period	SEM2
Occ.	B
Slot	BB
Credit Value	20
School	Environmental Sciences
Actual (Target)	54 (60)
Module Organiser	Dr Emilian Parau
Assessment	Examination with Coursework or Project

Module Description

This module is the third in a series of three mathematical units for students across the Faculty of Science. It covers matrix algebra and numerical methods (with applications to many multi-variable problems in science), second order partial differential equations (which govern the behaviour of diffusive, advective and wave-like systems), and solid mechanics (applications in geophysics, glaciology, and material science). There is a continuing emphasis on applied examples, and the use of numerical computing software (Matlab) is extended with a dedicated programming component. This module replaces ENV-2A62.

Module Rules

BEFORE TAKING THIS MODULE YOU MUST TAKE ENV-5006A

Module Assessment Pattern

Seq	Type	Share	Assessment Title
001	PT	20	Matlab Programming Exercise
002	EXSTD	80	Examination
FM1	FRM	0	Matrix Algebra
FM2	FRM	0	Solid Mechanics

ENG-5002Y, RENEWABLE ENERGY

Academic Session	2014/5
Period	YEAR
Occ.	A
Slot	E1, E2, E3
Credit Value	20
School	Mathematics
Actual (Target)	14 (40)
Module Organiser	Dr Matthew Alexander
Assessment	Coursework

Module Description

With the number of skilled energy engineers decreasing but concerns over climate change rising, there is more demand than ever for graduates with a detailed knowledge of renewable energy resources. This module expands your understanding of wind, tidal and hydroelectric energy whilst acquainting you with alternative techniques including heat pumps, deep geothermal sources and anaerobic digestion. Students will consider how these various technologies can realistically contribute to the energy mix, as well as the developing possibilities of converting waste to energy. An important aspect of the module is the study of the various targets and legislative instruments that are used to control and encourage developments.

Module Assessment Pattern

Seq	Type	Share	Assessment Title

Module Assessment Pattern

Seq	Type	Share	Assessment Title
001	WA	40	Exercise 1
002	WA	60	Exercise 2

CMP-5027B, ANALOGUE AND DIGITAL ELECTRONICS

Academic Session	2014/5
Period	SEM2
Occ.	B
Slot	A1*A2,B1*B2*B3*E4/B5*B6*B7*B8
Credit Value	20
School	Computing Sciences
Actual (Target)	24 (50)
Module Organiser	Dr Mark Fisher
Assessment	Coursework

Module Description

This module provides a practical introduction to electronics. Topics include a review of basic components, and fundamental laws; Introduction to semiconductors; operational amplifiers, amplitude modulation; combinational logic; sequential logic; and state machines. Much of the time is spent on practical work. Students learn how to build prototypes, make measurements and produce PCBs.Pre-requisites: CMP-4002B Computing Principles and CMP5013A Architectures and Operating Systems

Module Assessment Pattern

Seq	Type	Share	Assessment Title
001	PR	50	Mini Project 1 Bench Demo
002	WA	50	Mini Project 2 Bench Demo
FM1	FRM	0	Formative Assessment

ENG-6001B, ELECTRICITY GENERATION AND DISTRIBUTION

Academic Session	2014/5
Period	SEM2
Occ.	B
Slot	
Credit Value	20
School	Mathematics
Actual (Target)	0 (999)
Module Organiser	Dr Ben Milner
Assessment	Coursework

Module Description

In the final semester of third year this module will build on your established understanding of electricity by studying the technical aspects of the electrical industry. Analysing transformer designs will help consolidate your knowledge of generation before developing an advanced understanding of the constraints of cabling for offshore wind turbines. You will evaluate the efficiency of the national grid by comparing the practical design aspects to the costs involved. A detailed consideration of the current shortfall in meeting demand for electricity will lead to

the study of novel methods of distribution, including pumped-storage schemes and super-capacitors.

Module Assessment Pattern

Seq	Type	Share	Assessment Title
001	WA	40	Coursework
002	WA	40	Coursework
003	CT	20	Course Test

ENG-6002Y, NUCLEAR AND SOLAR ENERGY

Academic Session	2014/5
Period	YEAR
Occ.	A
Slot	
Credit Value	20
School	Mathematics
Actual (Target)	0 (999)
Module Organiser	Professor Lawrence Coates
Assessment	Coursework

Module Description

As we turn to new energy supplies to replace our polluting traditional resources, it is essential to fully consider the responsibilities of introducing new technologies into the mainstream energy mix. This module addresses the technical aspects of nuclear power and solar energy, whilst letting students apply their knowledge from the Engineering Practice module to make ethical decisions incorporating health and safety risk assessments. Successful design of nuclear installations requires a detailed quantitative risk analysis within a regulatory framework that imposes high tolerances. In contrast, the rapid installation of solar panels at a domestic scale requires education to ensure smaller companies remain in line with legislation. Although these new energies are considered cleaner it is essential to consider the developing environmental impact and planning law, as well as changing the societal perception of nuclear and solar energies.

Module Assessment Pattern

Seq	Type	Share	Assessment Title

ENG-6003Y, INDIVIDUAL ENERGY PROJECT

Academic Session	2014/5
Period	YEAR
Occ.	A
Slot	
Credit Value	40
School	Mathematics
Actual (Target)	0 (999)
Module Organiser	Professor Lawrence Coates
Assessment	Project

Module Description

This module allows students to display their full talents and understanding of energy engineering through an extended piece of individual work. This significant piece of work is worth 40 credits of the overall degree and

runs over both semesters of the third year. The student has freedom to specialise in any aspect of the course, but the project will comprise research, design, implementation and practical elements. The subject of the project is negotiated between the student and a supervisor at the start of the module. The supervisor will then continue to support the student in project management, team-working, report-writing and the applied design process throughout the assignment. Projects are often based on a topic suggested by our industrial partners. Examples of possible projects include • Designing and testing a small wave energy capture device • Investigating the impact of a tidal barrage in a particular location • Computer modelling of novel small-scale wind turbines • Critical analysis of the prospects for carbon capture and storage • Evaluating techniques for large-scale electricity storage • Predicting the long-term impact of electric cars on the National Grid • Effectively communicating the potential impact of waste to energy plants. • Designing a district scale CHP plant

Module Assessment Pattern

Seq	Type	Share	Assessment Title

ENV-6009A, FOSSIL FUELS

Academic Session	2014/5
Period	SEM1
Occ.	A
Slot	AGJ
Credit Value	20
School	Environmental Sciences
Actual (Target)	0 (999)
Module Organiser	Professor Jan Alexander
Assessment	Examination

Module Description

Geological, economic and political aspects of fossil fuels (oil, natural gas and coal) are introduced. These are used to discuss environmental concerns arising from the use of fossil fuels, and the potentially profound implications of future fuel scarcity. This module is suitable for students taking degrees in the School of Environmental Sciences. Some knowledge of Earth Science will be expected. Before taking this module you must take or be taking at least 20 credits of Earth Science or Geophysics modules at honours level. This module replaces ENV-3A35. In taking this module you cannot take ENV-7008A.

Module Assessment Pattern

Seq	Type	Share	Assessment Title
001	EXSTD	100	Examination

ENG-7003B, WIND ENERGY ENGINEERING

Academic Session	2014/5
Period	SEM2
Occ.	B
Slot	
Credit Value	20
School	Mathematics
Actual (Target)	0 (20)
Module Organiser	Professor Lawrence Coates
Assessment	Coursework

Module Description

Wind energy is the main provider of renewable energy and the source that is receiving the majority of investment in both the UK and overseas, making its study vital to energy engineering. This module begins by examining the kinetic energy of air and the design of wind turbines to extract this energy. Relationships between wind speed, blade area, turbine height and resulting output power are studied. Different turbine designs are examined and comparisons made of their effectiveness. Issues regarding placement of wind turbines are discussed as well as the choice of onshore or offshore locations. Practical considerations are discussed and include data collection of wind speeds for possible wind farm sites and implications of optimal spacing of turbines.

Module Assessment Pattern

Seq	Type	Share	Assessment Title
001	WA	20	Exercise 1
002	WA	30	Exercise 2
003	WA	50	Exercise 3

ENG-7004B, WAVE, TIDAL AND HYDRO ENERGY ENGINEERING

Academic Session	2014/5
Period	SEM2
Occ.	B
Slot	
Credit Value	20
School	Mathematics
Actual (Target)	0 (20)
Module Organiser	Professor Lawrence Coates
Assessment	Coursework

Module Description

This module studies renewable energy sources that use the energy stored in water to produce electrical energy. An examination is made into the potential energy and kinetic energy stored in water, either implicitly through waves/tide or explicitly in hydro. Devices for energy extraction from waves are examined with the effect of wave height, period and speed considered. Tidal energy extraction devices are also studied with design decisions regarding the tide-pool considered. Finally the design and operation of hydroelectric turbines is studied. Practicalities are discussed such as the characteristics of regions that are suitable for each of the energy generation modes and how measurements can be made as to a site's likely energy output.

Module Assessment Pattern

Seq	Type	Share	Assessment Title
001	WA	30	Exercise 1
002	WA	30	Exercise 2
003	WA	40	Exercise 3

ENG-7010Y, TEAM ENERGY PROJECT

Academic Session	2014/5
Period	YEAR
Occ.	A
Slot	
Credit Value	40
School	Mathematics

Actual (Target)	0 (999)
Module Organiser	Unavailable
Assessment	Dissertation

Module Description

This year-long 40-credit module aims to recreate the industrial process of working in multi-disciplinary teams, competing for the support of a larger client. Real life industrial partners offer a new project to our students each year, with previous examples including designing a CHP facility to integrate anaerobic digestion as a fuel process and improving the industrial efficiency of a sugar manufacturer. Over the first semester each team expands the brief through the conceptual stage through to a design scheme, after being introduced to procurement and engineering design. In the second semester each team member focuses on a small element of the process to complete an individual design element before the team delivers a final report and presentation.

Module Assessment Pattern

Seq	Type	Share	Assessment Title
001	DI	100	Dissertation

CHE-7801Y, ENERGY FUTURES

Academic Session	2014/5
Period	YEAR
Occ.	A
Slot	DL
Credit Value	20
School	Chemistry
Actual (Target)	0 (15)
Module Organiser	Professor Christopher Pickett
Assessment	Coursework

Module Description

This module is designed to provide students with an understanding of the developing landscape and challenges in the broad area of energy generation and transduction. It has a particular emphasis on the science that underpins emerging technologies related to the hydrogen economy, photovoltaics and biological or solar fuels. Necessarily it encompasses cross-discipline aspects of chemistry, physics materials and biological science with the students gaining knowledge of how these disciplines interplay in the design and construction of new devices for energy harvesting and utilisation.

Module Assessment Pattern

Seq	Type	Share	Assessment Title
001	WA	40	Review Essay 1
002	WA	60	Review Essay 2

Appendix 2. Professional Bodies

2a Notes of Meeting with Sophie Williams of IMechE Accreditation

Sophie Williams is an Executive Assistant to both the Academic Standards Committee and the Professional Development Committee. She has a wealth of experience and Prof Coates had a useful meeting at IMEchE, London, on 17th July.

The UEA plans for a General Engineering degree suite were explained and guidance was sought on what the main concerns might be.

Sophie advised that as we plan for accreditation we must use the brand new AHEP version 3 that has been developed by the Engineering Council rather than the current one. These are accessible at http://www.engc.org.uk/about-us/register-news/61#nav6241 [The UK-Spec learning outcomes adopted in this proposal have done so]

She indicated that there are two ways that accreditation of General Engineering degrees can be managed:

1) The Engineering Council organises the panel visit and co-ordinates the various institutions (in this case EI, IET and IMEchE
2) One of the set of institutions takes the lead and organises the visit with UEA staff dealing directly with them and with the others.

Method 1 may require the process to be planned longer in advance to avoid miscommunications that may occur when using the Engineering Council as intermediary under time pressure.
Method 2 works best for the accreditors but does require UEA staff to deal directly with each professional institution.

To accredit a General or Integrated Engineering programme they will always be looking for the specific pathway that contains enough mechanical engineering. They won't accredit a completely general engineering degree even though Sophie could see the educational value of this multidisciplinary approach.

When discussing degree titles and the plan to identify pathways at graduation but not on UCAS, she advised that they can cope with this but expressed concern that the Engineering Council Registration of the degree title might cause difficulties. She advised contacting them and gave the names shown in the contact list below.

When accrediting BEng (Hons) degrees they are actually accrediting them for IEng status (Incorporated Engineer). However for international recognition purposes most institutions prefer to express this accreditation as "partial satisfaction of the requirements for CEng" because international institutions see the CEng and will recognise the degrees. They rarely recognise IEng degrees. This was useful to know.

Some issues that routinely crop up or are routinely scrutinised:

a) Laboratory provision.
b) When they scrutinise exam papers they dislike seeing papers that are too easy or where questions seem to crop up repeatedly each year with very little change. [*Staff will need to be alerted to this*]
c) They scrutinise the obligatory group project for MEng students and seek to see how individual students are assessed, and how peer assessment is used. [*ENG staff have experience of dealing with this in an effective way*]
d) Workshop practice. Across the sector workshop practice is being eroded by mechanical engineering degree providers. This is seen as a bad thing but inevitable because of costs. Viable solutions involve collaboration with local colleges or companies to expose students to workshop practice, lathe turning, CAD and CNC machines, welding etc. Their panel had recently accredited another university and this led her to emphasising that although such links are perfectly acceptable the link has to be explicit and formal, and demonstrate that every student engages in these essential activities. [*ENG is in a good position to set this up, probably with Lowestoft College but also to some extent with KLM or Hethel. But we will have to recognise that this will cost us and will have to fit round the college's timetable commitments. This suggests a block week approach during vacations. We may also be able to exploit our links with the UTC and others.*]
e) Teaching professional ethics is now a hot topic. [*We have experience of this and it is already embedded in first year*]

A few key individuals were mentioned:

i) For a preliminary meeting to discuss academic issues they have an Academic Consultant – Bernard Challen, who can advise. He has worked for Perkins Engines and Ricardo (so might know John Moore).

ii) Lara Mallett, Business Development Manager for the East Midlands Region, is the regional contact for UEA.

iii) Catherine Elliott, Education and Skills Senior Executive, and Hermione Cross, Accreditation Executive, are the main accreditation contacts in the Engineering Council. They can help with degree registration issues. http://www.engc.org.uk/
T: +44 (0)20 3206 0500 main switchboard

2b. Engineering Council Accreditation Registration

Telephone conversation with Catherine Elliott, Education and Skills Senior Executive, Friday 5th September.

Catherine Elliott was posed the question about having a single UCAS code and single entry point but different exit points corresponding to the multiple pathways through the BEng/MEng Engineering degrees. She indicated that the key question is what it says on the graduate's degree certificate. They don't concern themselves with UCAS codes but they store on their database the graduating degree title. So this means as long as the IT systems can be set up with separate SITS code or other device to produce different degree certificates then this is not an issue.

Appendix 3 – N/A

Appendix 4 – Matrix of modules and programmes

Table A4.1. Structure of proposed degree programmes. Civil Engineering and Environmental Engineering have been shown for future information only.
M = Mandatory, O = Option List

	Module Code	Semester	BEng (Hons) Energy Engineering with Environmental Management	BEng/MEng Energy Engineering	BEng/MEng Engineering	BEng (Hons) Engineering with a Year in Industry	BEng/MEng Engineering (Mechanical)	BEng/MEng Engineering (Electronic and Electrical)	BEng/MEng Engineering (Civil)	BEng/MEng Environmental Engineering
YEAR ONE										
Engineering Principles and Laws	ENG-4002Y	Y	M	M	M	M	M	M	M	M
Engineering Practice	ENG-4003Y	Y	M	M	M	M	M	M	M	M
Engineering Maths and Mechanics	ENG-4004Y	Y	M	M	M	M	M	M	M	M
Maths for Scientists A	ENV-4002Y	Y	M	M	M	M	M	M	M	M
Physical and Chemical Processes of the Earth I or II	ENV-4007B ENV-4008B	2	M	O	O	O	O	O	O	M
Engineering Studies	ENG-40??Y	2	M	M	M	M	M	M	M	M
Introduction to Business	NBS-4002Y	Y		O	O	O	O	O	O	
Programming 1	CMP-4008Y	Y		O	O	O	O	O	O	
Other Directed Options	Various			O	O	O	O	O	O	

	Module Code	Semester	BEng (Hons) Energy Engineering with Environmental Management	BEng/MEng Energy Engineering	BEng/MEng Engineering	BEng (Hons) Engineering with a Year in Industry	BEng/MEng Engineering (Mechanical)	BEng/MEng Engineering (Electronic and Electrical)	BEng/MEng Engineering (Civil)	BEng/MEng Environmental Engineering
YEAR TWO										
Engineering Principles and Design	ENG-50??Y	Y	M	M	M	M	M	M	M	M
Renewable Energy	ENG-5002Y	Y	M	M	O	O	O	O	O	M
Analogue and Digital Electronics	CMP-5027B	2	M	M	M	M	M	M	M	M
Maths for Scientists B	ENV-5006A	1	M	M	M	M	M	M	M	M
Maths for Scientists C	ENV-5007B	2	O	M	M	M	M	M	M	
Dynamics and Vibration	ENG-50??A	1	O	O	M	M	M	M	M	
Architectures and Operating Systems	CMP-5013A	1			O	O	O	O	O	
Programming for Non-Specialists (CMP)	CMP-5020B	2	O	O	O	O	O	O	O	
Climate Change: Science and Policy	ENV-5003A	1	O	O						O
Meteorology I	ENV-5008A	1	O	O						O
Ocean Circulation	ENV-5016A	1	O	O						O
Chemical Oceanography	ENV-5019A	1	O	O						O
Environmental Politics and Policy Making	ENV-5002B	2	O							O
Shelf Sea Dynamics and Coastal Processes	ENV-5017B	2	O							O
Low Carbon Energy	ENV-5022B	2	O							O
Introduction to Financial and Management Accounting	NBS-4001Y	Y		O	O	O	O	O	O	
Introduction to Organisational Behaviour	NBS-4005Y	Y		O	O	O	O	O	O	
Strategic Marketing	NBS-5013Y	Y		O	O	O	O	O	O	
Other Directed Options				O	O	O	O	O	O	

	Module Code	Semester	BEng (Hons) Energy Engineering with Environmental Management	BEng/MEng Energy Engineering	BEng/MEng Engineering	BEng (Hons) Engineering with a Year in Industry	BEng/MEng Engineering (Mechanical)	BEng/MEng Engineering (Electronic and Electrical)	BEng/MEng Engineering (Civil)	BEng/MEng Environmental Engineering
YEAR THREE										
Fossil Fuels	ENV-6009A	1	M	M	O	O	O	O	O	M
Nuclear and Solar Energy	ENG-6002Y	Y	M	M	O	O	O	O	O	M
Electrical Generation and Distribution	ENG-6001B	2	M	M	M	M	M	M	M	M
Individual Energy Project (40)	ENG-6003Y	Y	M	M						
Individual Engineering Project (40)	ENG-60??Y	Y			M	M	M	M	M	
Stress Analysis and Design	ENG-60??Y	Y	O	O	M	M	M	O	M	
Control Systems	ENG-60??B	2	O	O	M	M	M	M	O	
Embedded Systems	CMP-6023A	1		O	O	O	O	M	O	
Modelling Environmental Processes	ENV-6004A	1	O	O	O	O	O	O	O	O
Global Environmental Change	ENV-6007B	2	O	O	O	O	O	O	O	O
The Carbon Cycle and Climate Change	ENV-6008A	1	O	O	O	O	O	O	O	O
Climate Change: Physical Science Basis	ENV-6013A	1	O	O	O	O	O	O	O	O
Atmospheric Composition: Measurement and Modelling	ENV-6020B	2	O	O	O	O	O	O	O	O
Dynamical Meteorology	MTHD6018B	2	O	O	O	O	O	O	O	O
Continuum Mechanics and Elasticity	MTHD6019A	1	O	O	O	O	O	O	O	
Fluid Dynamics	MTHD6020A	1	O	O	O	O	O	O	O	
Accounting for Non-Specialists	NBS-5001B	2	O	O	O	O	O	O	O	
Financial Accounting	NBS-5002Y	Y	O	O	O	O	O	O	O	
Business and Company Law	NBS-5004Y	Y	O	O	O	O	O	O	O	
Business Finance	NBS-5008Y	Y	O	O	O	O	O	O	O	
Operations Strategy and Management	NBS-5010Y	Y	O	O	O	O	O	O	O	
Human Resource Management	NBS-5011Y	Y	O	O	O	O	O	O	O	
Individual Environmental Project (40)	ENG-60??Y	Y								M
Geotechnical Engineering									M	

	Module Code	Semester	BEng (Hons) Energy Engineering with Environmental Management	BEng/MEng Energy Engineering	BEng/MEng Engineering	BEng (Hons) Engineering with a Year in Industry	BEng/MEng Engineering (Mechanical)	BEng/MEng Engineering (Electronic and Electrical)	BEng/MEng Engineering (Civil)	BEng/MEng Environmental Engineering
YEAR FOUR (MEng Only)										
Wind Energy Engineering	ENG-7003B	2		M	O		O	O	O	O
Wave, Tidal and Hydro Energy Engineering	ENG-7004B	2		M	M		M	M	M	M
Team Energy Project (40)	ENG-7010Y	Y		M						
Team Engineering Project (40)	ENG-7???Y	Y			M		M	M	M	M
Energy Futures	CHE-7801Y	Y		M	O		O	O	O	O
Oil and Gas Engineering (2015-16)	ENG-???A	1		O	O		O	O	O	O
Advanced Computational Methods	ENG-70??A	1		O	M		M	M	O	
Mechanical and Manufacturing Processes	ENG-70??Y	Y		O	O		M	O		
Theory of Environmental Assessment	ENV-7020A	1		O	O		O	O	O	M
Environmental Assessment Effectiveness	ENV-7021B	2		O	O		O	O	O	M
Continuum Mechanics and Elasticity with Advanced Topics	MTHD7019A	1		O	O		O	O	O	
Fluid Dynamics with Advanced Topics	MTHD7020A	1		O	O		O	O	O	O
Applications Programming	CMPSMA23	1		O	O			M	O	O
Structural Engineering and Design	ENG-7???								M	
Civil Engineering Materials	ENG-7???								M	
Highway and Transport Engineering	ENG-7???								O	

M = Compulsory (Mandatory), O = Option List (subject to timetable)

Appendix 5 - Updated Phasing of New Modules. Existing Option Modules not shown.
Assumes that direct entrants to second year are not allowed in advance.

Core Module Titles	Module Credits	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
ENG-4001A Energy Engineering Revolution	20	E	E				
ENG-4002Y Engineering Principles and Laws	20	E	E	E	E	E	E
ENG-4003Y Engineering Practice	20	E	E	E	E	E	E
ENV-4002Y Maths for Scientists A	20	E	E	E	E	E	E
ENG-4004Y Engineering Maths and Mechanics	20	E	E	E	E	E	E
ENG-40??Y *Engineering Studies*	20			✓	✓	✓	✓
CMP-5027B Analogue and Digital Electronics	20	E	E	E	E	E	E
ENG-5001Y Energy Engineering Principles	20	✓	✓	✓			
ENG-5002Y Renewable Energy	20	✓	✓	✓	✓	✓	✓
ENV-5006A Mathematics for Scientists B	20	E	E	E	E	E	E
ENV-5007B Mathematics for Scientists C	20	E	E	E	E	E	E
ENG-50?? Dynamics and Vibration	***20***				✓	✓	✓
ENG-50?? Engineering Principles and Design	***20***				✓	✓	✓
ENV-6009A Fossil Fuels	20	E	E	E	E	E	E
ENG-6001B Electrical Generation and Distribution	20	E	E	E	E	E	E
ENG-6002Y Nuclear and Solar Energy	20		✓	✓	✓	✓	✓
ENG-6003Y Individual Energy Project	40		✓	✓	✓	✓	✓
ENG-60??Y Individual Engineering Project	**40**					✓	✓
ENG-60??Y Stress Analysis and Design	**20**					✓	✓
ENG-60??X Control Systems	**20**					✓	✓
CMP-6023A Embedded Systems	20	E	E	E	E	E	E
ENG-MA04 Wind energy engineering	20	E	E	E	E	E	E
ENG-MA06 Wave, tidal and hydro energy engineering	20	E	E	E	E	E	E
CHE-7801Y Energy Futures	20	E	E	E	E	E	E
ENG-70??A Oil and Gas Production	20		✓	✓	✓	✓	✓
ENG-70?? Advanced Computational Methods	20						✓
ENG-70?? Mechanical and Manufacturing Processes	20						✓
CMPSMA23 Applications Programming	20						✓
ENG-7010Y Team Energy Project	40			✓	✓	✓	✓
ENG-7???Y Team Engineering Project	40						✓
New Appointments to be in Post ->		*2FTE*	1FTE	0	1FTE	1FTE	0
Residual additional staff teaching load from existing SCI staff ->		0 credits	0 credits	40 credits	0 credits	20 credits	0 credits

E = Already Exists. * indicates the intention to pilot these two new modules earlier than required if possible.

The projected Staff FTEs are for academic only. Technician support will need to grow and will peak when the individual projects begin in 2015/16. The basis is that part of the load will be spread around a number of individuals in SCI and 1 staff FTE = two 20-credit modules per annum (i.e. 30% FTE) plus research and admin load. The residual credits in third and fourth year are largely project supervision and assessment. The use of PGRs in support of assessment has not been factored in.

Appendix 6 - SCI and NBS Schools involvement for 2014-15 – shown as credits NOT students

Compulsory Module Titles	Module Credits	Semester	Year Required	MTH	ENG	ENV	CHE	CMP	BIO	NBS		Missing credits
ENG-4001A Energy Engineering Revolution	20	1	Running		2			16	2			0
ENG-4002Y Engineering Principles and Laws	20	Y	Running		9			11				0
ENG-4003Y Engineering Practice	20	Y	Running		20					5		0
ENV-4002Y Maths for Scientists A	20	Y	Running	*18*		*2*						0
ENG-4004Y Eng Mathematics *and Mechanics*	20	1 and 2	Running	*10*	10							0
ENV 4007B/8B Physical & Chemical Processes in the Earth's System I & II	*20*	*2*	Running			*20*						*0*
CMP-5027B Analogue and Digital Electronics	20	1	2014-15					*20*				
ENG-5001Y Energy Engineering Principles	20	1 and 2	2014-15		20							0
ENG-5002Y Renewable Energy	20	1 and 2	2014-15		18					2		0
ENV-5006A Mathematics for Scientists B	20	1	2014-15									20
ENV-5007B Mathematics for Scientists C	20	2	2014-15									20
ENV-6009A Fossil Fuels	20	1	2015-16			*20*						0
ENG-6001B Electricity Generation and Distribution	20	2	Running					20				0
ENG-600?A Industrial Project 1	20	1	2015-16	??	??	??	??	??	??			20
ENG-6002Y Nuclear and Solar Energy	20	Y	2015-16		??	??	??	??	??			20
ENG-6003Y Individual Energy Project	40	Y	2015-16	??	??	??	??	??	??			40
ENG-7003B Wind energy engineering	20	2	Running	5	13					~2		0
ENG-7004B Wave, tidal and hydro energy engineering	20	2	Running	5	15							0
ENG- 700?A Industrial Project 2	20	1	2016-17	??	??	??	??	??	??			20
CHE-7801Y Energy Futures	20	Y	2013-14				19		1			0
ENG-7010Y Team Energy Project	40	Y	2016-17	??	??	??	??	??	??			40
ENG-MA01 Energy Eng Fundamentals	20	1	Running	10	9							0
ENG-MP1X Energy Engineering Dissertation	40	2	Running	8	24			8				0
ENG- MB01/02/1Y Topics in Energy Engineering	20	1 and/or 2	Running		~18					~2		20
Total Credits for yrs 1 & 2 and M yr in 14-15			**2014-15**	**20**	**114**	**0**	**19**	**55**	**3**	**11**		
Credit to staff ratio			2014-15	*~7.*	*28.5*	*0.*	*~4.*	*~9.*	*1.5*			
Credits including existing options			2014-15	*48*	*114*	*42*	*19*	*75*	*3*	*11*		

NB. ENV, CHE and MTH have made available option modules to ENG students. Such modules are italicised and not included in totals, which does not recognise assessment load. Some modules are offered under different codes at levels 3 and M. A single credit load has been used for such modules.