Engineering Ethics and Accreditation

Neal Juster

Chair IMechE Academic Accreditation Committee

Vice-Principal (Strategy & Resources) University of Glasgow

Outline

1. Purpose of Accreditation
2. Accreditation Process
3. UK-SPEC
4. Looking for Ethics

Purpose of Accreditation

- To ensure that
  - the learning outcomes of a degree match the UK-SPEC (UK Standard for Professional Engineering Competence)
  - Students awarded the degree achieve the learning outcomes

Academic Accreditation

- The IMechE have a license from Engineering Council UK to accredit to UK-SPEC
- Subject coverage cognate to Mechanical Engineering
  - Including manufacturing, engineering management, sports engineering ….

Accreditation Procedure

- Universities usually visited on a 5 year rolling programme
- IMechE Visiting Team consists of
  - 2 academics
  - 1 industrialist
  - 1 support staff
- Engineering Accreditation Board (EAB) visits can accredit across multi discipline courses
  - Larger visit teams
    - Mixture of Professional Engineering Institutions
    - Mixture of academics and industrialists
    - Normally at least 2 per discipline

Accreditation Procedure

- Prior to visit
  - University submits outline documentation
    - Does documentation suggest course meets UK-SPEC learning outcomes?
    - Other external reviews (QAA, examiners) suggest course managed and delivered appropriately?
- Visit:
  - Review documentation and assessments
  - Meet with key staff and students
  - Visit: library, labs and other learning resources.

Accreditation Procedure

- Post Vist
  - Visit report sent to Academic Standards Committee
  - University may need to submit action plan to address concerns prior to accreditation being awarded
  - May accredit for less than 5 years with paper review before extension
  - Cannot accredit for more than 5 years

Accreditation History

- SARTOR
  - Driven by input standards
  - Often prescriptive of curriculum
- UK-SPEC (2004)
  - Move to output standards
  - Universities define content and delivery

UK-SPEC

- Brief document
- 4 General learning Outcomes (for BEng)
  - Knowledge and Understanding
  - Intellectual Abilities
  - Practical Skills
  - General Transferable Skills
- 26 Specific Learning Outcomes (for BEng)
  - Underpinning Science and Mathematics and associated Engineering Principles (US 1-3)
  - Engineering Analysis (E 1-4)
  - Design (D 1-6)
  - Economic, Social and Environmental Context (S 1-5)
  - Engineering Practice (P 1-8)

UK-SPEC - Ethics

- Knowledge and Understanding
  - …they must appreciate the social, environmental, ethical, economic and commercial considerations affecting the exercise of their engineering judgement
- S5 –
  - Understanding of the need for a high level of professional and ethical conduct in engineering

UK-SPEC

I MECH E

Link to Summary of Specific Learning Outcomes

INSTITUTION OF MECHANICAL ENGINEERS

THE SUMMARY OF UK-SPEC SPECIFIC LEARNING OUTCOMES

Programme Title BEng(H): Mechanical Engineering

YEAR	COURSES		Level	Assessment Method	US1	US2	US3	E1	E2	E3	E4	D1	D2	D3	D4	D5	D6	S1	S2	S3	S4	S5	P1	P2	P3	P4	P5	P6	P7	P8
YEAR 1	Introductory Mechanics	EN0100	4	15% Class test, 15% Lab, 70% Exam	✓	✓		✓									✓							✓						
	Energy and the Environment	EN0101	4	15% Class test, 15% Lab, 70% Exam	✓			✓	✓			✓												✓						
	Design and Computing Skills	EN0103	4	100% CW							✓	✓	✓				✓									✓				✓
	Materials and Manufacture	EN0146	4	15% Class test, 15% Lab, 70% Exam	✓									✓		✓				✓	✓									
	Communications Skills and Experimental Study	EN0151	4	100% CW	✓			✓							✓								✓	✓						
	Engineering Mathematics	MS0265	4	25% CW, 75% Exam		✓			✓																					
YEAR 2	Applied Mechanics	EN0200	5	15% CW, 15% Lab, 70% Exam	✓	✓			✓		✓																			
	Energy Conversion Systems	EN0201	5	15% CW, 15% Lab, 70% Exam	✓	✓		✓	✓														✓	✓						
	Computer Modelling and Design	EN0204	5	100% CW						✓	✓	✓					✓													✓
	Business of Manufacture	EN0205	5	20% Lab, 80% Exam							✓			✓				✓	✓						✓				✓	
	Further Engineering Mathematics	MS0264	5	100% exam		✓			✓	✓																				
	Professional Development	CM0501	5	100% CW														✓			✓	✓								
	Instrumentation, Electronics and Industrial Control	EN0557	5	100% exam	✓				✓														✓			✓				
YEAR 3	Placement Period Semester 1	EN0261	5	Pass/Fail					✓									✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	
	Placement Period Semester 2	EN0262	5	Pass/Fail					✓									✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	
YEAR 4	Advanced Mechanics	EN0300	6	20% CW, 80% Exam	✓	✓	✓		✓	✓	✓																			
	Energy Management and Efficiency	EN0301	6	20% CW, 80% Exam		✓			✓		✓									✓		✓								
	Materials Failure	EN0304	6	20% CW, 80% Exam	✓	✓		✓										✓								✓				
	Project	EN0360	6	100% CW			✓		✓	✓	✓	✓			✓											✓				
	Design for Manufacture	ME0032	6	100% exam										✓		✓		✓					✓				✓			
	Industrial Systems (Option)	CM0054	6	100% exam						✓		✓											✓							
	Digital Product Design (Option)	EN0359	6	40% CW, 60% Exam			✓		✓	✓					✓								✓							
				Total Year 1	4	2	0	3	2	0	1	2	1	1	1	1	2	0	0	1	1	0	1	3	0	1	0	0	0	1
				Total Year 2	3	3	0	1	4	2	3	1	0	1	0	0	1	2	1	0	1	1	2	1	1	1	0	0	1	1
				Total Year 3	0	0	0	0	2	0	0	0	0	0	0	0	0	2	2	0	2	2	2	2	2	0	2	2	2	0
				Total Year 4	2	3	3	1	4	4	3	2	0	1	2	1	0	2	0	1	0	1	3	0	0	2	1	0	0	0

UK-SPEC

I MECH E

Programme Title BEng(H): **Mechanical Engineering**

YEAR	COURSES		Level	Assessment Method	US1	US2	US3	E1	E2	E3	E
YEAR 1	Introductory Mechanics	EN0100	4	15X Class test, 15X Lab, 70X Exam	✓	✓		✓			
	Energy and the Environment	EN0101	4	15X Class test, 15X Lab, 70X Exam	✓			✓	✓		
	Design and Computing Skills	EN0103	4	100X CW							✓
	Materials and Manufacture	EN0146	4	15X Class test, 15X Lab, 70X Exam	✓						
	Communications Skills and Experimental Study	EN0151	4	100X CW	✓			✓			
	Engineering Mathematics	MS0265	4	25X CW, 75X Exam		✓			✓		

UK-SPEC

- Evidence of Learning outcomes:
  - Discussion with staff and students
  - Inspection of course descriptors
  - Inspection of course notes
  - Inspection of assessments

UK-SPEC

- Ethics
  - Would not expect a module called *Ethics*
  - Look for a thread and/or embedding
    - Word appears in module descriptors
    - Assignments or part of in design modules
    - Case studies in “Professional Development”, “Engineer in Society”, “Engineering Management” ….
    - Visiting practitioners giving seminars
    - Group and individual project work


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