MODULE SPECIFICATION

Module Title:	**Engineering Science B**	**Level**:	5	**Credit Value**:	20

Module code:	ENG540	**Is this a new module?**	No	**Code of module being replaced**:	

Cost Centre:	GAME	**JACS3 code**:	F311

Trimester(s) in which to be offered:	1, 2 & 3	**With effect from:**	September 16

School:	Applied Science, Computing & Engineering	**Module Leader:**	Rob Bolam

Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
FdEng Industrial Engineering	☐	✓

Pre-requisites
None

Derogations
A derogation from regulations has been approved for this module which means that whilst the pass mark is 40%, each element of assessment requires a minimum mark of 30% for the module to be passed overall.

Office use only

Initial approval June 16

APSC approval of modification August 20 Version 2

Change from core to optional module

Have any derogations received SQC approval? Yes ✓ No ☐

Module Aims
The module aims to develop both the traditional broad ranging engineering science topics along with industry specific topics.

Intended Learning Outcomes

Key skills for employability

KS1	Written, oral and media communication skills
KS2	Leadership, team working and networking skills
KS3	Opportunity, creativity and problem solving skills
KS4	Information technology skills and digital literacy
KS5	Information management skills
KS6	Research skills
KS7	Intercultural and sustainability skills
KS8	Career management skills
KS9	Learning to learn (managing personal and professional development, self-management)
KS10	Numeracy

At the end of this module, students will be able to		Key Skills	
1	Apply scientific principles and mathematics to the solution of problems.	KS10	
2	Analyse engineering systems/equipment and formulate opinions relating to performance and efficiency	KS6	
3	Research and critically appraise information, for a given engineering science topic, in order to concisely provide a written summery of findings	KS1	

Assessment:

Assessment 1 - The report should involve research into a given topic relative to engineering science being applied in industry. The student should not just provide a summary of the information found, but also give their opinions and be able to justify them. Two topics from the syllabus outline should be chosen as the subject/s for the assignments, these will be relevant to the particular industry the student is from. e.g. students from the water industry would have their assignments on measuring characteristics and water purification, whereas students from the paper industry would have assignments on Steam and water pollutants.

Assessment 2 - The theoretical aspects of the delivery will be assessed by means of an in course test, this will be closed book and the students will be expected to recall formulae necessary for calculations.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	2 & 3	Report	40		1500
2	1	In-class test	60		2hrs

Learning and Teaching Strategies:

Lectures - presentation of theory, facts and concepts, relating to engineering science, in order to convey critical information. Interaction or active learning should be implemented to develop an understanding of principles and concepts and stimulate discussion.

Tutorials – Close interaction with students ensuring that the work presented during lectures has been understood, with specific help being given in order to overcome any learning problems, should they occur.

Demonstrations – Laboratory experiments performed in order to demonstrate engineering science principles being applied.

'Break out sessions' and guest lecturers will be used to cover specific elements for **sub-groups** within the cohort.

Specialist knowledge and expertise from industrial partners can and will be disseminated to other students where relevant. e.g. surface water run off treatment.

Syllabus outline:

- CHP (combined heat & power): sustainability, carbon footprint, energy recuperation, efficiency – reheat systems, cogeneration, Trigeneration (CCHP- combined cooling, heat and power)

- Boilers and steam: Safety devices and systems, Combustion and heat value of fuels, Boiler types, super heated steam, Energy transfer and losses;
- Linear and angular motion: two dimensional linear motion, path planning for articulated bodies, Angular impulse and momentum, Torsion of circular shafts;
- Complex loading: beams cylinders, pressure vessels, pipes and flanges;
- Electricity AC: RLC parallel circuits, Polar and rectangular calculation methods, Power Factor and correction; Attenuators and Filter networks: Resonance.
- Measuring characteristics: measurement uncertainty (accuracy), precision, repeatability, sensitivity, linearity, Errors - systematic, random, sources of error, quantification and effects, reduction measures. Noise: – type and source, effects on signals, noise reduction, shielding, grounding etc. Calibration: principles, control of test environment, traceability, recording, management system, applied calibration, verification procedures.
- Water pollutant constituents and sources: Petrochemical/chemical, organic, pesticides, hormones, dyes, detergents, alkali and acidic substances. Treatment of industrial wastewater: Biodegradable, Trickle filters, Activated sludge, Aerated lagoons, Flocculation, polyelectrolytes, separators.
- Water Purification: Contaminants and pathogens/bacteria, Screens and separators, Slow sand filters, Chlorination, Coagulation, Adsorption, Membranes, Ultra violet, Ionisation.

Bibliography:

Essential reading

Bird, J.O. (2003) *Science for Engineering*, 3rdEdn., Newnes

Other indicative reading

Bolton, W. (2006) *Engineering Science*, 5thEdn., Newnes

Batey, J. (2008) *Steam boilers and combustion*, BiblioBazaar

O'conner, J. (2009) *Water Treatment Plant,* Wiley-Blackwell