

<b>Module Title:</b>	<b>Business, Research and Professional Development</b>	<b>Level:</b>	5	<b>Credit Value:</b>	20
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<b>Module code:</b>	ENG53B	<b>Is this a new module?</b>	Yes	<b>Code of module being replaced:</b>	ENG52F
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<b>Cost Centre:</b>	GAME	<b>JACS3 code:</b>	H100
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<b>Trimester(s) in which to be offered:</b>	1, 2	<b>With effect from:</b>	September 18
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<b>School:</b>	Faculty of Arts, Science and Technology	<b>Module Leader:</b>	Shafiu Monir
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Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0 hrs
<b>Module duration (total hours)</b>	<b>200 hrs</b>

<b>Programme(s) in which to be offered</b>	Core	Option
BEng (Hons) Aeronautical & Mechanical Engineering	✓	<input type="checkbox"/>
BEng (Hons) Mechanical Manufacturing	✓	<input type="checkbox"/>
BEng (Hons) Applied Product Design	✓	<input type="checkbox"/>
BEng (Hons) Automotive Engineering	✓	<input type="checkbox"/>
BEng (Hons) Drone Technology & Operations	✓	<input type="checkbox"/>
BEng (Hons) Renewable and Sustainable Engineering	✓	<input type="checkbox"/>
BEng (Hons) Electrical & Electronic Engineering	✓	<input type="checkbox"/>
BEng (Hons) Automation Engineering	✓	<input type="checkbox"/>
BEng (Hons) Optoelectronics & Holography	✓	<input type="checkbox"/>
BEng (Hons) Aerospace and Modern Optics	✓	<input type="checkbox"/>

<b>Pre-requisites</b>
None

Office use only

Initial approval February 17

APSC approval of modification September 18

Have any derogations received Academic Board approval?

Version 1

Yes ✓ No

**Module Aims**

To develop and enhance the student's awareness of himself/herself as an engineer within the wider context in which an engineer must work, with specific emphasis on (i) the development and operation of small, medium and large enterprises and (ii) research methods; hence, to be able to evaluate his/her own development needs as part of professional and personal development planning.

**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

At the end of this module, students will be able to		Key Skills	
1	Evaluate business practices within a company and the roles of engineers as team members contributing to the success and further development of that company; including activities such as planning and scheduling, evaluating outcomes, quality control and improvement in relation to engineering management.	KS1	KS2
		KS3	KS4
		KS7	KS8
2	Select and apply appropriate research methods to an engineering project, with an awareness of the limitations of any chosen method and to critically evaluate the activities undertaken;	KS1	KS4
		KS6	KS8
		KS9	KS10
3	Incorporate social, economic, ethical, environmental and sustainability considerations in development work relating to engineering within the fields of business and research.	KS2	KS3
		KS4	KS5
		KS6	KS10

**Derogations**

A derogation from regulations has been approved for this programme which means that whilst the pass mark is 40% overall, each element of assessment (where there is more than one assessment) requires a minimum mark of 30%.

**Assessment:**

Assessment One: is by means of a team-based mini-project (report and presentation) simulating the management team of small/medium company (typically 5 members) for the development of a product, project or service; roles relate (as examples) to marketing, finance, product R and D and production, record-keeping, team co-ordination and formal processes including reporting and presentation of outcomes. Individual assessment of own contribution and team performance will be an integral element of this. Overall grading is based on a combination of individual report/log and team performance. It covers outcomes 1 and 3.

Assessment Two: is by means of a portfolio representing a set of individual tasks exercising each aspect of research being studied. It covers outcomes 2 and 3.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1, 3	Group Project	50%	10 min Presentation	2,000
2	2, 3	Portfolio	50%		2,000

**Learning and Teaching Strategies:**

This module has two clear sections and each will be treated slightly differently but with the common theme of 'self-evaluation of personal development' running throughout. This will be formatively supported on an individual basis via maintenance of a PDP (Personal Development and Planning) log.

Business Management

This section will use key-note lectures (large groups) with small-group tutorials in the first part of the module followed by team-work activities. The team-work will be largely self-organised outside class times but will also be observed during programmed tutorial sessions. Access to specialist facilities, such as IT labs, will be arranged as required.

Research Methods

This section will use key-note lectures (large groups) followed by individual work on development exercises supported by tutorials consisting of one-to-one reviews of progress.

**Syllabus outline:**

**Development Considerations** (to be embedded into Business and Research studies detailed below)

**Company development:** Small, medium, large-scale enterprises; analysis of growth (case study). Case for rationalisation.

**Research development:** the role of 'research and development' in company growth; role of research in academic contribution to 'body of knowledge'.

**Personal development:** relevance of research and industrial context to personal studies, especially individual project, group design project and work placement (as applicable).

**Wider considerations:** social, economic, ethical, environmental and sustainability considerations in development decisions for business and research.

*\*Throughout this module the student will be encouraged and guided in maintaining a PDP (Personal Development Plan) log started in Level 4. This considered as good practice for the student's professional development following completion of his/her studies. However, it is a formative activity and is not formally assessed as part of this module.*

**Business Management**

**People in Organisations:** Relationship between own job role and that of others at work; legal framework (Health and Safety, etc); authority/delegation; leadership and motivation; setting/ achieving realistic goals/targets; human resource management; operation of personnel activities. Role of professional engineer.

Assess individual role within an enterprise: formal/informal structures and relationships within organisations; achieve work-related goals through a group/team, exercising communication and other skills and techniques appropriate to a supervisory role;

**Customer/Client Relationship:** identification of market; customer satisfaction; changes in customers, e.g. social, demographic and economic changes; new product development, patent protection; cost-effectiveness and pricing; communication skills. Define customer/client relationships: specify product, customer needs (organisational/ environmental constraints); effect of changes in customer/client attitudes, expectations and needs on the organisation and workers within it.

**Control/Management Activities:** Planning, organising/control techniques; management of projects and continuous operations; obtaining finance; budgetary control, cost effectiveness; cost-benefit analysis, budget proposals.

Management of others: employer/employee relations; human resource issues; Engineering management: professional status; formal/informal/contractual relationship between customer/client and the organisation; plan/cost/schedule work related activities, selecting and applying appropriate planning/control techniques; evaluate outcomes quality assurance, control and improvements.;

**Use of information technology:** for sourcing and production of realistic and relevant material.

**Research Methods**

**Individual organisation:** maintenance of research log/folder to record intentions, activities and results.

**The Planning of Research:** Defining the purpose and parameters of research. Reviewing evidence. Research models, strategies and design.

**Sources of Data/Problems of Comparability:** Published and unpublished data; primary and secondary sources; research bodies/pressure groups; web site sources; interviews; documentary methods; observation; case-study research.

**Research Methods and Specific Problems**

Surveys: design; principles, problems and methods of sampling; structured/unstructured interviewing; questionnaire design; analysis of survey data, problems of analysis.

Experimental methods: design of tests (including simulation tools); collecting and collating of data; calculations, errors and margins;

Other techniques: fieldwork, participant and non-participant observation; document research; interviews.

**Research Presentation and Appraisal:** presentation and analysis of statistics/numerical results; presentation and reporting of research findings. Critical appraisal of reports and statistics. Oral presentations.

**Research and Policy:** demands for research; consideration of options/policy; recommendations; ethical considerations when deciding policy.

**Bibliography:**

**Essential reading**

Mullins, L.J. (2010) *Management and Organisational Behaviour*, 9<sup>th</sup> Edn. Financial Times/Prentice-Hall.

Creswell, J.W. (2008) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 3<sup>rd</sup> Edn., Sage Publications, Inc.

**Other indicative reading**

Nicholas, J.M. and Steyn, H. (2011) *Project Management for Engineering, Business, and Technology*, 4<sup>th</sup> Edn., Butterworth-Heinemann.

Flick, U. (2007) *The SAGE Qualitative Research Kit*, Eight Volume Set Edn., Sage Publication Ltd.

Whitcomb, C. (2013) *Effective Interpersonal and Team Communications Skills for Engineers*, Wiley-Blackwell.

Fellows, R.F. and Liu, A.M.M. (2008) *Research Methods for Construction*, 3<sup>rd</sup> Edn., Wiley- Blackwell.

Davies, M.B. (2007) *Doing A successful Research Project: Using Qualitative and Quantitative Methods*, Palgrave McMillan.