

## **ME7B07 RESEARCH METHODS – [15 Credits]**

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**Semester:** 1 AND 2

### **Module Organisation**

The lecture element for this module runs for the first 10 weeks of semester 1 (2 hours per week). Other elements will be assessed during semester 2 and at the time of project submission.

### **Module Description**

This module will provide an introduction to students the key aspects of research in engineering, research methods & designs, data collection and analysis, ethical and legal perspectives.

The module aims to:

- Develop a critical outlook in students regarding published research
- Support students in the development of their research project
- Expose students to the organisation, conduct & implementation of research in universities & institutes
- Enable students to utilise the available research resources and develop a supportive research environment

### **Module Content & Syllabus**

- Research philosophies in engineering
- Research in academia
- Research scopes & problems
- Research process and design
- Characteristics of good research and choice of research topic
- Components of research proposal
- Literature review
- Research strategies
- Sampling analysis
- Data collection
- Research access
- Citation manager software training
- Report writing and presentation
- Production of a short video (3-5 minutes) that explains project background, bioengineering activities, purpose of the project research activity, focusing on the research and/or clinical outcomes.

### **Learning Outcomes**

On successful completion of this module, students should have developed the skills to:

1. Plan and manage a postgraduate research project
2. Critically appraise existing research tools, methods and publications
3. Identify scope of future research and design a research proposal

4. Summarise and communicate (in written and oral form), research within and outside their own field
5. Recognise issues of plagiarism, confidentiality, data protection and other ethical issues
6. Design engineering experiments and analyse and interpret quantitative information collected
7. Identify and apply appropriate statistical software tools for experimental problem solving
8. Communicate design and research concepts visually and orally, to multi-disciplinary teams.
9. Understand the relevance of individual research in society and the potential impact on individuals, groups and society
10. Communicate and explain research topics to diverse audiences, including non-specialists and lay audiences using multimedia tools.

### Module Notes

Provided on Blackboard

### Teaching Strategies

The module is taught using a combination of lectures, seminars delivered by academics and industrial experts.

### Assessment Modes

Assessment is through written coursework and presentations, linked to the individual research project being completed by each student

Element	%	Due Date
Project proposal	15	Wk 8 of Semester 1 or in agreement with project supervisor
Conference Participation	15	Semester 2 (January)
Oral Presentation	20	Semester 2 (June)
Video Presentation	20	Semester 2 (June)
Ethics	10	Thesis (August)
Business	10	Thesis (August)
Short Paper	10	Thesis (August)

### Recommended Texts

- Creswell, J. W. Research design: Qualitative, quantitative and mixed methods approach. 3rd Ed. Thousand Oaks, CA: Sage., 2009.
- Peter Bock. 2007. Getting it Right: R&D Methods for Science and Engineering. Academic Press.
- Miller & Freund's Probability and Statistics for Engineers 8th Economy Edition by Richard A. Johnson, Irwin Miller and John Freund (2010)
- Douglas C. Montgomery, George C. Runger. Applied Statistics and Probability for Engineers, 4th Edition, Wiley; ISBN: 978-0-471-74589-1, June 2006.