ES2C1-15 Introduction to Biomedical and Clinical Engineering

24/25

Department
School of Engineering
Level
Undergraduate Level 2
Module leader
Mathias Foo
Credit value
15
Module duration
10 weeks
Assessment
100% coursework
Study location
University of Warwick main campus, Coventry

Description

Introductory description

ES2C1-15 Introduction to Biomedical and Clinical Engineering

Module web page

Module aims

Provide an introduction to the multi-disciplinary applications of Engineering in medicine and healthcare and to clinical engineering as a profession. This module will give an overview of different areas of Biomedical Engineering and highlight how previously taught topics can be used.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Principles of Biomedical Engineering and Medical Devices

- Introduction to relevant anatomy and physiology
- Introduction to Biomedical Instrumentation:

Biomedical Engineering Research (example topics only)

- Biomechanics
- Use and applications of Biomedical Signals
- Biofeedback and regulation
- Biomedical Systems Modelling
- Medical Imaging Technology

Biomedical Engineering and Clinical Engineering profession

- Biomedical Engineering as a profession: various roles of the biomedical engineer, career paths, the role of ethics in BME.
- Principles of medical devices and system safety and regulation Instrumentation: physiological effects of electricity; macro- and microshock hazards; electrical safety principles and standards; safe equipment design.
- Medical software as medical device: implications

Learning outcomes

By the end of the module, students should be able to:

- Critically assess the appropriateness of innovative health care technologies
- Identify and describe the large array of biomedical engineering fields.
- Explain the basic tenets of fundamental technologies in biomedical engineering
- Understand Biomedical Engineering as a profession and ethical considerations.
- Apply fundamental engineering techniques to analyse and solve Biomedical problems

Indicative reading list

- Stefan Silbernagl, Agamemnon Despopoulos, "Color atlas of physiology", 7th edition, Theieme, New York, May 2015, ISBN: 9783135450070
- Frize, Monique. "Health Care Engineering, Part I: Clinical Engineering and Technology Management." Synthesis Lectures on Biomedical Engineering 8.2 (2013): 1-97.
- Street, Laurence J. Introduction to biomedical engineering technology. CRC Press, 2011
- Enderle, John Denis, and Joseph D. Bronzino. Introduction to biomedical engineering. Academic press, 2012.
- Miniati, Roberto, Ernesto Iadanza, and Fabrizio Dori. Clinical Engineering: From Devices to Systems. Academic Press, 2015. Tony Easty, "Human Factors for Health Technology Safety: Evaluating and improving the use of health technology in the real world" (June 2014), IFMBE press
- E. Iadanza, Clinical Engineering Handbook, 2nd Edition, Elsevier Academic Press, 2019, Hardcover ISBN: 9780128134672, eBook ISBN: 9780128134689
- Selected articles and papers from scientific journals and official bulletins, including:
  o Annals of Biomedical Engineering, ISSN: 1573-9686

- o Annual review of biomedical engineering, ISSN: 1523-9829
- o The Health Technology Assessment Journal, ISSN: 2046-4924 (Online)
- o WHO bulletin
- o European official Journal Euro Lex

Subject specific skills

TBC

Transferable skills

TBC

Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (13%)
Seminars	(0%)
Online learning (independent)	10 sessions of 1 hour (7%)
Private study	120 hours (80%)
Total	150 hours

Private study description

120 hours guided independent learning

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A1

	Weighting	Study time	Eligible for self-certification
Individual coursework	40%		Yes (extension)
Literature review and video presentation on advancement of biomedical devices and technologies (approx 1500 words + 5min video presentation)			
Biomedical Engineering Projects (Group)	60%		No
Mini biomedical modelling projects to be assessed via group report (max 16 pages) + peer assessment			

Feedback on assessment

- Support through advice and feedback hours.
- Written feedback on marked coursework.

Availability

Courses

This module is Core for:

- Year 2 of UESA-H161 BEng Biomedical Systems Engineering
- Year 2 of UESA-H163 MEng Biomedical Systems Engineering

This module is Optional for:

- Year 2 of UESA-H315 BEng Mechanical Engineering
- Year 2 of UESA-H316 MEng Mechanical Engineering
- Year 2 of UCSA-G406 Undergraduate Computer Systems Engineering
- Year 2 of UCSA-G408 Undergraduate Computer Systems Engineering
- Year 2 of UESA-H605 Undergraduate Electrical and Electronic Engineering

This module is Option list A for:

- Year 2 of UESA-H63W BEng Electronic Engineering
- Year 2 of UESA-H113 BEng Engineering
- Year 2 of UESA-HH35 BEng Systems Engineering
- Year 2 of UESA-H112 BSc Engineering
- Year 2 of UESA-HN11 BSc Engineering and Business Studies
- Year 2 of UESA-H63X MEng Electronic Engineering
- Year 2 of UESA-H114 MEng Engineering
- Year 2 of UESA-H316 MEng Mechanical Engineering
- UESA-HH31 MEng Systems Engineering
    - Year 2 of HH31 Systems Engineering

    - Year 2 of HH35 Systems Engineering
- Year 2 of UESA-H605 Undergraduate Electrical and Electronic Engineering
- Year 2 of UESA-H606 Undergraduate Electrical and Electronic Engineering MEng