



**Jordan University of Science and Technology**  
**Faculty of Engineering**  
**Biomedical Engineering Department**

**BME 201 Introduction to Biomedical Engineering**

**Course Catalog**

3 Credit hours (3 h ). Engineering profession and its applications in biomedicine, introductory lectures on the definition of biomedical engineering, its history, ethics and regulations with a scientific overview of the different topics : biomechanics, bioinstrumentation, medical imaging and physiological modeling, biomedical sensors and biomedical signal processing and biomicro and nanotechnology, Simultaneously the students will be instructed on principles of technical writing and will be asked to apply their knowledge on a group project about which they will be required to write a report and give an oral presentation.

**Textbooks**

Enderle J.D., Blanchard S. M., & Bronzino J. D. ( 2005) *Introduction to Biomedical Engineering*. 2<sup>nd</sup> Ed. Elsevier Academic Press

**References**

**Books**

- 1) Peterson, D.R., and Bronzino, J.D. (2014). *The Biomedical Engineering Handbook*. 4<sup>th</sup> ed. CRC Press
- 2) Valero D. A. (2007) *Biomedical Ethics for Engineers Ethics and Decision Making in Biomedical and Biosystem Engineering*, 1<sup>st</sup> Ed. Elsevier
- 3) Abdiel Foo, Wilson S. J., Bradley A.P., Gwee W., & Tam D. K. (2013) *Ethics for Biomedical Engineers*. 1<sup>st</sup> Ed. Springer New York

**Journals**

- 1) Annals of Biomedical Engineering
- 2) Annual Review of Biomedical Engineering

**Internet links**

<http://ocw.mit.edu/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/>

**Instructor**

Instructor **Dr. Areen Al-Bashir**, E-mail: [abashir@just.edu.jo](mailto:abashir@just.edu.jo)

|                 |  |
|-----------------|--|
| Office Location | College of Engineering building, C5-L1                         |
| Office Phone    | 720-1000 ext: 22629  |
| Office Hours    | TO BE POSTED ONLINE!   |
| E-mail          | <a href="mailto:akbashir@just.edu.jo">akbashir@just.edu.jo</a> |

**Prerequisites**

|                                |                    |
|--------------------------------|--------------------|
| <b>Prerequisites by topic</b>  | English Language 2 |
| <b>Prerequisites by course</b> | ENG 112            |
| <b>Co-requisites by course</b> | -                  |
| <b>Prerequisite for</b>        | BME 466            |

**Evaluation**

| Assessment Tool                           | Expected Due Date                                      | Weight |
|---|--|--------|
| Quizzes                                   | During Sessions  | 10%    |
| 1 <sup>st</sup> and 2 <sup>nd</sup> Exams | According to Department Schedule                       | 20 %   |
| Group Projects & HW's                     | Due one week after being assigned                      | 30 %   |
| Final Project                             | Last week of Class                                     | 20%    |
| Final Exam                                | According to the University final examination schedule | 20 %   |

**Topics Covered**

| Week | BME Topics | Technical Communications | Chapters in Text |
|------|------------|--------------------------|------------------|
|------|------------|--------------------------|------------------|

|    |                                     |                          |                             |
|----|-------------------------------------|--------------------------|-----------------------------|
| 1  | Introduction to BME                 |                          | Chapter 1                   |
| 2  | BioMechanics                        | Writing a cover letter   | Chapter 4, 2.1-2.2          |
| 3  | Rhabilitation Engineering           | Journal Paper Content    | Chapter 5, 2.3-2.4          |
| 4  | BioMaterials                        | Writing a resume         | Chapter 6                   |
| 5  | Tissue Engineering                  | Report Writing 1         | Chapter 7                   |
| 6  | Bioinstrumentation                  | Report Writing 2         | Chapter 8                   |
| 7  | Biomedical Sensors                  | Oral Presentation        | Chapter 9                   |
| 8  | Ethical Issues for BME              |                          | Chapter 2.5- 2.8, 2.10-2.13 |
| 9  | Biosignal Processing                | Posters                  | Chapter 10                  |
| 10 | Physiological Modeling              | Referencing and citation | Chapter 12                  |
| 11 | Medical Imaging                     | Group Presentations      | Chapter 16                  |
| 12 | Bioand Nanotechnology               | Group Presentations      | Handout                     |
| 13 | Fronteirs in Biomedical Engineering |                          | Handout                     |
| 14 | Regulations and FDA Process         | Group Posters            | Chapter 2.9, 2.14           |

### Objectives and Outcomes<sup>1</sup>

| Objectives   | Outcomes   |
|--|--|
| 1. Get introduced to the field of biomedical engineering and the wide range of employment opportunities available. | 1.1 Introduction to biomedical engineering [1]<br>1.2 Explain the roles played by biomedical engineers [4]<br>1.3 Understand the role of the biomedical engineer in the modern health care system [4]  |
| 2. Introduction to the variety of fields and specialties in biomedical engineering                                 | 2.1 Understand the applications of different fields of biomedical engineering such as biomechanics, biomaterials, and bioimaging. [1]<br>2.2 Apply engineering physics, mathematics, and biology to the understanding of the different specialties of biomedical engineering [1]<br>2.3 Familiarity with future specialty classes and the variety of specialisits in the field of BME in the departments |
| 3. Understand Biomedical Engineering Ethics  | 3.1 Define ethics, morality, beneficence, nonmaleficence [4]<br>3.2 Understand ethics in biomedical experimentation [4]<br>3.3 Understand ethics in clinical and non-clinical research [4]<br>3.4 Explain regulations in medical device innovation [4]   |
| 4. Learn the basic tools for technical communication skills  | 4.1 Understand basic technical writing principles including wrting resumes, technical reports, cover letters, and other formats [3]<br>4.2 Understand basic technical presentation tools including oral presentations and posters [3]<br>4.3 Apply basic research principles such as journal article search and anlysis [7]<br>4.4 Define plagiarism and apply the rules of referencing and citation [4] |
| 5. Encourage life long learning, foster teamwork [d,g,h,I,]  | 5.1 Exposure to team work and group effort [5,7]<br>5.2 Conducting a group project that will include the application of acquired communication skills [5,3,4,7]  |

### Contribution of Course to Meeting the Professional Component

The course introduces the field of biomedical engineering and provides the basic principles of ethics in the field while teaching the students the implementation of communication skills.

#### Relationship to Program Outcomes (%)

|    |   |    |    |    |   |    |   |   |
|----|---|----|----|----|---|----|---|---|
| 1  | 2 | 3  | 4  | 5  | 6 | 7  | 8 | 9 |
| 20 | 5 | 15 | 35 | 10 | 5 | 10 |   |   |

#### Relationship to Biomedical Engineering Program Objectives

|      |      |      |       |
|------|------|------|-------|
| PEO1 | PEO2 | PEO3 | PEO 4 |
| √    | √    | √    | √     |

<sup>1</sup> Lower-case letters in brackets refer to the Program outcomes