**ABDULLAH GUL UNIVERSITY**
**GRADUATE SCHOOL OF ENGINEERING & SCIENCE**
**BIOENGINEERING DEPARTMENT**
**COURSE DESCRIPTION AND SYLLABUS**

| Course Name | CODE | SEMESTER | T+L Hour | CREDIT | ECST |
|---|---|---|---|---|---|
| Biomechanics | 522 | FALL- SPRING | 3 + 0 | 3 | 10 |

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| **Prerequisite Courses** | None |

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| **Course Type** | Elective |
| **Course Language** | English |
| **Course Coordinator** | Assoc. Prof. Dr. Sevil Dinçer İşoğlu |
| **Lecturers** | Assoc. Prof. Dr. Sevil Dinçer İşoğlu |
| **Course Assistants** | None |
| **Course Objectives** | Learning of the systems which provide living organisms with locomotion. Learning of how to apply bioengineered devices to movement and locomotion systems. |
| **Learning Outcomes** | Students,<br>• Able to describe how living things move<br>• Able to apply knowledge of applications of bioengineered devices in movement and locomotion systems containing damages and defects |
| **Course Content** | Introduction to biomechanics and musculoskeletal system, introduction to processes of biomechanics and transport in biological systems, dynamics of mechanical systems, dynamics of muscle and joint, responses of living tissues to prolonged loads, application methods of mechanical engineering to human musculoskeletal system, mechanical properties of tissues, analysis of orthopedic materials in terms of their mechanical properties, stress- strain and unit deformations in materials, analysis of break and fracture, fixation of break- fracture, friction of implants, cases of polishing and wearing, selected topics about dynamics of heart and the tempo of the heartbeat, circulatory systems, microcirculation and mechanistic of muscles, current developments in advanced mathematical biomechanics, introducing of urgent problems that can be solved with certain research fields of biomechanics. |

**WEEKLY SUBJECTS AND RELATED PRELIMINARY PAGES**

| Week | Subjects | Preliminary |
|---|---|---|
| 1 | Introduction to biomechanics and musculoskeletal system | Recommended books and scientific publications |
| 2 | Introduction to processes of biomechanics and transport in biological systems, | Recommended books and scientific publications |
| 3 | Dynamics of mechanical systems | Recommended books and scientific publications |
| 4 | Dynamics of muscle and joint | Recommended books and scientific publications |
| 5 | Responses of living tissues to prolonged loads | Recommended books and scientific publications |
| 6 | Application methods of mechanical engineering to human musculoskeletal system | Recommended books and scientific publications |
| 7 | Mechanical properties of tissues | Recommended books and scientific publications |
| 8 | Midterm | Recommended books and scientific publications |
| 9 | Orthopedic materials in terms of their mechanical properties, stress- strain and unit deformations in materials | Recommended books and scientific publications |
| 10 | Analysis of break and fracture, fixation of break- fracture, friction of implants, cases of polishing and wearing | Recommended books and scientific publications |
| 11 | selected topics about dynamics of heart and the tempo of the heartbeat, circulatory systems, microcirculation and mechanistic of muscles | Recommended books and scientific publications |
| 12 | Current developments in advanced mathematical biomechanics | Recommended books and scientific publications |
| 13 | Introducing of urgent problems that can be solved with certain | Recommended books and |

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|---|---|---|
| | research fields of biomechanics. | scientific publications |
| 14 | Presentations | Recommended books and scientific publications |
| 15 | Presentations | |
| 16 | Final | |

| **RESOURCES** | |
|---|---|
| **Course Notes** | Nihat Özkaya, Margareta Nordin, V.H. Frankel, R. Skalak, "Fundamentals of Biomechanics: Equilibrium, Motion, and Deformation", 1999, Springer; 2. baskı , ISBN-10: 0387982833. |
| **Other Resources** | Konu ile ilgili bilimsel makaleler ve ders notları<br>Y.C. Fung, "Biomechanics", Springer, 2. baskı, 1996), ISBN-10: 0387943846. |

| **MATERIAL SHARING** | |
|---|---|
| **Documents** | - |
| **Homework** | Homework, presentation at the end of the semester |
| **Exams** | Midterm, final |

| **RATING SYSTEM** | | |
|---|---|---|
| **SEMESTER WORKS** | **NUMBER** | **CONTRIBUTION** |
| Midterm | 1 | 35 |
| Presentation | 1 | 25 |
| **TOTAL** | | 60 |
| **Success Rate of Semester** | | 60 |
| **Success Rate of Final** | | 40 |
| **TOTAL** | | 100 |

| **Course Category** | |
|---|---|
| Basic Sciences and Mathematics | 50% |
| Engineering Sciences | 50% |
| Social Sciences | |

| **THE RELATIONSHIP BETWEEN THE LEARNING OUTCOMES AND PROGRAM COMPETENCE** | | | | | | | |
|---|---|---|---|---|---|---|---|
| No | Program Outcomes | Contribution Level | | | | | |
| | | 1 | 2 | 3 | 4 | 5 | |
| 1 | Understanding of Life Sciences, Mathematics and Engineering at the post-graduate level, and being able to implement of this knowledge into bioengineering problems | | | | x | | |
| 2 | Having the ability of developing a new scientific method or a technological product or process, and, designing experiments, implementing, collecting data and evaluating regarding these issues | | | | x | | |
| 3 | Choosing technical equipment used in the applications related to bioengineering, having sufficient knowledge in adopting and using new technological equipment | | | | x | | |
| 4 | Having the ability of reaching the information, using resources, contributing to the literature by transferring the process and results of scientific studies as written or verbally in the national and international environments | | | | x | | |
| 5 | Having the ability of working as an individual or a team, in the teams composed of discipline or different disciplines, gaining awareness of leadership and taking responsibility | | | | x | | |
| 6 | Having advanced level of foreign language knowledge to manage efficient verbal, written and visual communication in the major field | | | | | x | |
| 7 | Having the understanding of ethics in science and the responsibility in profession with the awareness of lifelong learning, being beneficial to society and sensitiveness to global issues | | | x | | | |
| 8 | Being aware of the social impacts of the solutions and applications of the challenges regarding Bioengineering | | | x | | | |

*From 1 to 5, it increasingly goes.

| **ECTS / WORK-LOAD TABLE** | | | |
|---|---|---|---|
| Activities | Activities | Duration (Hour) | Total (Work-Load) |
| Course Duration (Including exam week: 16x total course hour) | 16 | 3 | 48 |

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|---|---|---|---|
| Out of Class Exercise Time (Pre-study, reinforcement) | 16 | 7 | 112 |
| | | | |
| Searching on Internet, library study | 16 | 3 | 48 |
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| | | | |
| Presentation | 5 | 3 | 15 |
| Homework | 16 | 3 | 48 |
| Midterms | 1 | 15 | 15 |
| Final | 1 | 15 | 15 |
| **Total Work-Load** | | | 301 |
| **Total Work-Load / 30** | | | 301/30 |
| **Course ECTS Credit** | | | 10 |