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|  | **ÇANKAYA UNIVERSITY**  **Engineering** **Course Definition Form** |

This form should be used for either an elective or a compulsory course being proposed and curricula development processes for an undergraduate curriculum at Çankaya University, Faculty of Engineering. Please fill in the form completely and submit the printed copy containing the approval of the Department Chair to the Dean's Office, and mail its electronic copy. Upon the receipt of *both copies*, the printed copy will be forwarded to the Faculty Academic Board for approval. Incomplete forms will be returned to the Department. The approved form is finally sent to the President’s office for approval by the Senate.

**Part I. Basic Course Information**

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| **Department Name** | Mechanical Engineering | | | | **Dept. Numeric Code** | | 15 |
| **Course Code** | **ME 413** | **Number of Weekly Lecture Hours** | **1** | **Number of Weekly Lab/Tutorial Hours** | **4** | **Number of Credit Hours** | **3** |
| **Course Web Site** | http://me413.cankaya.edu.tr | | | | **ECTS Credit** | | 5.00 |

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| **Course Name**  *This information will appear in the printed catalogs and on the web online catalog.* | |
| English Name | Mechanical Engineering Laboratory I |
| Turkish Name | Makine Mühendisliği Laboratuvarı I |

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| **Course Description**  *Provide a brief overview of what is covered during the semester. This information will appear in the printed catalogs and on the web online catalog.*  *Maximum 60 words.* |
| This course covers following subjects: methods of mechanical measurements (strain gages, load cells, displacement sensors, inertial measurement units, etc.) and related actuators (DC motors, servo motors, step motors, etc.). Experiments, which involve mechanical measurements, will be carried out by each student on prototype systems devised by the student himself/herself. |

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| **Prerequisites**  (if any)  *Give course codes and check all that are applicable.* | 1st  **ME 312** | 2nd  **ME 202** | | | 3rd | | 4th |
|  |  | |  | |  | |  |
|  | Consent of the Instructor | | | Senior Standing | Give others, if any. | | |
| **Co-requisites**  (if any) | 1st | 2nd | | | 3rd | 4th | |
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| **Course Type**  *Check all that are applicable* | Must course for dept.  Must course for other dept.(s)  Elective course for dept.  Elective course for other dept.(s) | | | | | | |

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| **Course Classification**  *Give the appropriate percentages for each category.* | | | | | |
| Category | Engineering Sciences | Engineering Design |  |  |  |
| Percentage | 40.00 | 60.00 |  |  |  |

**Part II. Detailed Course Information**

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| **Course Objectives**  *Explain the aims of the course. Maximum 100 words.* |
| - To teach operation of laboratory equipment and perform data analysis by promoting students operate laboratory facilities themselves - To teach design and planning of experiments - To promote coordination and communication in a teamwork through planning of laboratory work in a group of students - To introduce students to the application of experimental methods in the practice of Mechanical Engineering - To develop in students the ability to formulate a research problem, design experiments and analysis tools and to complete a research project in a team setting |

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| **Learning Outcomes**  *Explain the learning outcomes of the course. Maximum 10 items.* |
| 1. Ability to investigate mechanical systems experimentally 2. Ability in designing, devising, and carrying out experiments on mechanical systems 3. Ability to report experimental results both orally and written, both individually and in teams  4. Ability to interpret results of experiments on mechanical systems and compare them with analytical and numerical solutions |

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| **Textbook**(s)  *List the textbook(s), if any, and other related main course materials.* | | | | |
| Author(s) | Title | Publisher | Publication Year | ISBN |
| Figliola and Beasley, Theory and Design for Mechanical Measurements, 5th ed., John Wiley & Sons, Inc., 2011, 978-0-470-64618-2 | | | | |

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| **Reference Book**s  *List the reference books as supplementary materials, if any.* | | | | |
| Author(s) | Title | Publisher | Publication Year | ISBN |
| David G. Alciatore, Introduction to mechatronics and measurement systems, McGraw Hill, 2012, 9780071086042 | | | | |

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| **Teaching Policy**  *Explain how you will organize the course (lectures, laboratories, tutorials, studio work, seminars, etc.)* |
| During the lecture hours, introductory information about mechanical sensors and actuators will be presented. |

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| **Laboratory/Studio Work**  *Give the number of laboratory/studio hours required per week, if any, to do supervised laboratory/studio work, and list the names of the laboratories/studios in which these sessions will be conducted.* |
| During laboratory hours students will be assigned to conduct two experiments related to mechanics such as experimental stress analysis, mechanical vibration analysis etc. Students are expected to design and devise a proper set-up to conduct each experiment. Gathered experimental data should be analyzed and results should be presented in the form of a comprehensive technical report by the students after each laboratory. Although the set-up will be designed and devised by groups of students, students are expected to submit individual reports. Students are expected to use software for acquisition and analysis of experimental data (LabView, MATLAB, Maple, Mathematica, etc.). Additionally, students are expected to prepare experiment reports using office programs. |

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| **Computer Usage**  *Briefly describe the computer usage and the hardware/software requirements in the course.* |
| Students are expected to use software for acquisition and analysis of experimental data (LabView, MATLAB, Maple, Mathematica, etc.). Additionally, students are expected to prepare experiment reports using office programs. |

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| **Course Outline**  *List the topics covered within each week.* | |
| Week | Topic(s) |
| 1. Introduction 2. Electromagnetic principles, solenoids, relays 3. DC motors, servo motors 4. Step motors 5. Hydraulic and pneumatic actuators 6. Position and speed measurement 7. Position and speed measurement 8. Stress and Strain Measurement 9. Stress and Strain Measurement 10. Stress and Strain Measurement 11. Vibration and acceleration measurement 12. Vibration and acceleration measurement 13. Microelectromechanical sensors 14. Microelectromechanical sensors | |

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| **Grading Policy**  *List the assessment tools and their percentages that may give an idea about their relative importance to the end-of-semester grade.* | | | | | | | | |
| Assessment Tool | Quantity | Percentage | Assessment Tool | Quantity | Percentage | Assessment Tool | Quantity | Percentage |
| Attendance | 0 | 10 | Oral Presentation | 2 | 30 | Project Report | 2 | 40 |
| Final Exam | 1 | 20 |  |  |  |  |  |  |

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| **ECTS Workload**  *List all the activities considered under the ECTS.* | | | |
| Activity | Quantity | Duration  (hours) | Total Workload  (hours) |
| Attending Lectures (*weekly basis*) | 14 | 1.00 | 14.00 |
| Attending Labs/Recitations (*weekly basis*) | 14 | 4.00 | 56.00 |
| Preparation beforehand and finalizing of notes (*weekly basis*) |  |  |  |
| Collection and selection of relevant material (*once*) |  |  |  |
| Self study of relevant material (*weekly basis*) | 14 | 1.00 | 14.00 |
| Homework assignments |  |  |  |
| Preparation for Quizzes |  |  |  |
| Preparation for Midterm Exams (*including the duration of the exams*) |  |  |  |
| Preparation of Term Paper/Case Study Report (*including oral presentation*) |  |  |  |
| Preparation of Term Project/Field Study Report (*including oral presentation*) | 2 | 15.00 | 30.00 |
| Preparation for Final Exam (*including the duration of the exam*) | 1 | 8.00 | 8.00 |
| TOTAL WORKLOAD **/** 25 | | | 122.00/25 |
| **ECTS Credit** | | | **5** |

*Total Workloads are calculated automatically by formulas. To update all the formulas in the document first press CTRL+A and then press F9.*

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| **Program Qualifications vs. Learning Outcomes**  *Consider the below program qualifications determined in terms of learning outcomes of all the courses in the curriculum and capabilities. Look at the learning outcomes of this course given above. Relate these two using the Likert Scale by marking with X in one of the five choices at the right..* | | | | | | |
| **No** | **Program Qualifications** | **Contribution** | | | | |
| **0** | **1** | **2** | **3** | **4** |
| 1 | Adequate knowledge in mathematics, science and engineering subjects pertaining to engineering; ability to use theoretical and applied information in these areas to model and solve complex engineering problems. |  |  | **x** |  |  |
| 2 | Ability to identify and define complex engineering problems; ability to select and apply proper analysis tools and modeling techniques for formulating and solving such problems. |  |  | **x** |  |  |
| 3 | Ability to design a complex system, a process or product under realistic constraints and conditions in such a way as to meet the desired requirements; ability to apply modern design methods for this purpose. |  |  |  |  | x |
| 4 | Ability to devise, select and use modern techniques to analyze and solve complex problems for engineering practice; ability to use information technologies effectively. |  |  |  |  | x |
| 5 | Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems. |  |  |  |  | x |
| 6 | Ability to work efficiently in intra-disciplinary and multidisciplinary teams by collaborating effectively; ability to work individually. |  | **x** |  |  |  |
| 7 | Ability to communicate effectively in Turkish and in English both orally and in writing; knowledge of at least one foreign language; ability to write report, to read report, to prepare design and production reports, to give presentation, to give instruction and receive instruction, effectively. |  | **x** |  |  |  |
| 8 | Awareness of life-long learning; ability to access information, to follow developments in science and technology, and to keep continuous self-improvement. | **0** |  |  |  |  |
| 9 | Awareness of professional and ethical responsibility; knowledge in standarts used in engineering applications. |  | **x** |  |  |  |
| 10 | Knowledge in project management, risk management and change management; awareness of entrepreneurship and innovation; knowledge in sustainable development. | **0** |  |  |  |  |
| 11 | Knowledge in global and social effects of engineering practices on health, environment, safety and contemporary issues; awareness of the legal consequences of engineering solutions. | **0** |  |  |  |  |

Contribution Scale to a Qualification: **0**-None, **1**-Little, **2**-Medium, **3**-Considerable, **4**-Largest

**Part III New Course Proposal Information**

*State only if it is a new course*

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| Is the new course **replacing** a former course in the curriculum**?** | | | | Yes | No | Former Course’s Code | | | | Former Course’s Name | |
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| Is there any similar course which has content **overlap** with other courses offered by the university**?** | | | | Yes | No | Most Similar Course’s Code | | | | Most Similar Course’s Name | |
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| **Frequency** of Offerings  *Check all semesters that the course is planned to be offered.* | | | | Fall  Spring  Summer | | | | | | | |
| **First** Offering | Academic Year | | 2023 | | | | Semester | | Fall  Spring | | |
| Maximum **Class Size** Proposed | | 80 | Student **Quota** for Other Departments | | | |  | Approximate **Number of Students** Expected to Take the Course | | | 60 |
| **Justification for the proposal**  *Maximum 80 words* | | | | | | | | | | | |
| Designing and devising experimental setup is especially important for mechanical engineering. Therefore, senior students are offered this course, where they experience designing and devising experiments. As an extension to ME 311 – Experimentation and Measurement, the students experience to design, device, and conduct an experiment. | | | | | | | | | | | |

**Part IV Approval**

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| **Proposed by** | Faculty Member  *Give the Academic Title first.* | Signature | Date |
| Dr. Öğr. Üyesi Özgün Selvi |  | 05/05/2022 |
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| Departmental Board Meeting Date |  | Meeting Number |  | Decision Number |  |
| Department Chair | Prof. Dr. Haşmet TÜRKOĞLU | Signature |  | Date |  |

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| Faculty Academic Board Meeting Date |  | Meeting Number |  | Decision Number |  |
| Dean | Prof. Dr. Sıtkı Kemal İDER | Signature |  | Date |  |

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| Senate  Meeting Date |  | Meeting Number |  | Decision Number |  |

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