MENG303 – Principles of Computer Aided Engineering

Eastern Mediterranean University
Faculty of Engineering

Department:
Mechanical Engineering

Program Name: Mechanical Engineering	**Program Code:** 23

Course Code:	**Course Title:**	**Credits:**	**Year/Semester:**
MENG303	Principles of Computer Aided Engineering	3 Cr (2 /3/ 0) 3	2019-2020 Fall

☒ Area Core
☐ Area Elective
☐ Service Course
☐ University Elective
☐ Compulsory (offered by other academic units)

Prerequisite(s): MENG104

Catalog Description:
Integration of computers into the design cycle. Interactive computer modeling and analysis. Geometrical modeling with wire frame, surface, and solid models. Finite element modeling and analysis. Curves and surfaces and CAD/CAM data exchange. The integration of CAD, CAE and CAM systems.

Instructor Name:	**Office no:**	**Office Tel:**
Assoc. Prof. Dr. Qasim Zeeshan	ME141	6301361

Course Web Page:
https://staff.emu.edu.tr/qasimzeeshan/en

Textbook(s): David G. ULLMAN, The Mechanical Design Process, 4th edition, Mc Graw Hill, 2010

Indicative Basic Reading List :
Anupam Saxena, Birendra Sahay, Computer Aided Engineering Design, Springer, Anamaya, 2003

Topics Covered and Class Schedule:
(2 hours of lectures per week, 3 hours Lab)

LECTURE SCHEDULE

Week 1-3	Mechanical Design Process
Week 4	Understanding Mechanical Design
Week 5	Designers and Design Teams
Week 6	Design Process and Product Discovery
Week 7	Planning for Design
Week 8	MIDTERM EXAMINATION
Week 9	Development of Engineering Specifications
Week 10	Concept Generation
Week 11	Concept Evaluation and Selection
Week 12	Product Generation
Week 13	Product Evaluation for Performance and the Effects of Variation
Week 14	Product Evaluation
Week 15	Optimization
Week 16	FINAL

LAB SCHEDULE

Week 1-3	Machine Part Drawings: (3 weeks) **Threads, pins, keys, springs, fits and tolerance.**
Week 4-5	Basic concepts of Graphics Programming: (2 week) **Coordinate systems, graphics libraries, Transformation Matrix.**
Week 6-7	SW Part Drawings: (2 weeks) **Introduction to Solid works, basic applications, 3D drawings.**
Week 8	MİDTERM EXAMİNATİON
Week 9	Introduction to MATLAB
Week 10-11-12	Integration of CAD, CAM, and CAE systems (3 weeks) **Design and manufacturing interface, Classification for coding.**
Week 13-14	SW Assembly drawing (2 weeks) & submission of Term Project **Each student either individually or as a group work will be given a design project.**
Week 15-16	SW FEA Modeling and Analysis (2 weeks) **Formulation of the FAE method, Automatic Mesh generation, analysis with COSMOS Program and Case study**

Lecture and Tutorial Learning Outcome	Student Outcomes	Performed Assessments and Percentage
1. recognize all mechanical design components 2. draw 3D solid models 3. draw mechanical assemblies 4. analyze mechanical components 5. learn how to write design objectives 6. learn how to communicate with other disciplines 7. write design criteria 8. establish design teams 9. learn basic actions of problem solving 10. manage product generation 11. learn project definition and planning 12. manage concept generation and concept evaluation	**1, 2, 3, 4, 5, 6**	**Quiz (1) 5%** **Midterm Exam Theroy (1) 10 %** **Quiz (2) 5%** **Final Examination (Theory) (1) 20 %** **Design Project (1) 30 %** (15 % Theory Report + 15 % CAD Models)

Lab. Experiment Title and Lab. Equipment Used	Lab Learning Outcome	Student Outcomes	Performed Assessments and Percentage
1. SolidWorks	• recognize all mechanical design components • draw 3D solid models • draw mechanical assemblies • analyze mechanical components	**7**	**Midterm Exam Lab (1) 10 %** **Final Examination (Lab) 20 %**

Student Outcomes

☒	1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
☒	2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
☒	3. an ability to communicate effectively with a range of audiences
☒	4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
☒	5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
☒	6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
☒	7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Contribution of Course to Criterion 5

Credit Hours for:

Mathematics & Basic Science : 0

Engineering Sciences and Design : 3

General Education : 0

Important Notes:

University rules and regulations are applied to this course. For details, please see http://mevzuat.emu.edu.tr

1. **"NG" Nil Grade/ Failing from Absenteeism:** Students who do not comply with the required level attendance and/or not fulfilling the requirements for the evaluation of the course are given the "NG" grade by the Instructor of the Course based on the criteria determined by the Faculty/School Academic Council. Students are informed about the criteria for receiving the "NG" grade by the related course instructor at the beginning of the semester. "NG" grade is included in the computation of GPA and CGPA.
2. Student attendance is monitored and assessed by the course instructor. A student who fails to meet the requirements of a course or who is absent more than the limit specified by the Faculty or School is considered to be unsuccessful in that course.
3. Students who do not attend any of the above assessment activities (such as mid-term exam, lab exam, homework, design project report etc.) will be given NG (Nil Grade).
4. Late Submissions of the Assignments, Lab Reports and Project will be graded as zero.

MAKE-UP Exam

1. There is no make up or resit for the Quiz and Lab Exam.
2. A student who fails to sit for an examination for a valid reason is given a make-up exam. Within three working days after the examination, students who wish to take a make-up must submit a **written statement** to the course instructor explaining the reason(s) for his/her request.
3. Eligibility to take a **Make-Up Exam**:
    a. Student must contact the Instructor immediately within "**three working days**" after the examination when (s)he has missed the mid-term exam or final exam and to discuss with the faculty about the date and time to take the make-up exam.
    b. Student must secure a "**Make-Up Exam Form**" from the department Office or from instructor website & fill-out the Form. For each Make-Up Exam, please use separate Form.
    c. Student must secure the approval from the instructor for taking the Make-Up Exam.
    d. Failure to take the Make-Up Exam at the agreed date and time will lead to a "NG" Grade for the Make-Up Exam, midterm or final.