

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 428, ME 429, ME 430 - Senior Design Project I, II, III (2 Units each)
Required for all concentrations except HVAC&R.

Course Descriptions: (2019-20 Catalog)	<p><u>ME 428</u>: First of three courses taken sequentially in component and system design using real-world problems. Small teams study and apply techniques of the engineering design process including problem definition, concept generation, feasibility studies and decision making. Practice of professional skills including written and oral communication, teaming, project management, societal responsibility and ethics. 2 labs.</p> <p><u>ME 429</u>: Continuation of a project begun in ME 428. Activities focused on detail design, analysis and material procurement. 2 labs.</p> <p><u>ME 430</u>: Completion of a project begun in ME 428 and continued in ME 429. Design verified through prototyping and testing. 2 labs.</p>
Prerequisite Courses:	ME 329. Concurrent: ME 318, ME 350.
Prerequisites by Topic:	Mechanical systems design. Mechanical vibrations. Heat transfer
Textbook: (and/or other required material)	<u>Senior Design Project Student Success Guide</u> (online) October 2019. <u>FE Reference Handbook</u> , 9.5, NCEES, 2018 <u>NSPE Code of Ethics</u>
References:	<u>Shigley's Mechanical Engineering Design</u> , 11 th ed., Budynas & Nisbett, McGraw-Hill, 2019. <u>Creative Design of Products and Systems</u> , 1 st ed., Niku, Wiley, 2008. <u>Total Design: Integrated Methods for Successful Product Engineering</u> , Pugh, Addison-Wesley, 1991. <u>The Mechanical Design Process</u> , 5 th ed., Ullman, McGraw-Hill, 2015. <u>Marks' Standard Handbook for Mechanical Engineers</u> , 12 th ed., Sadegh & Worek, McGraw-Hill, 2017. <u>Engineering Design</u> , 5 th ed., Dieter & Schmidt, McGraw-Hill, 2012. Manufacturers' catalogs
Course Coordinator:	Peter Schuster, Professor of ME
Course Learning Outcomes:	<ol style="list-style-type: none">1. Design a product to satisfy a customer's need.2. Work effectively on an engineering team.3. Plan and manage a long-term engineering project.4. Create a clear problem statement to define a design challenge.5. Formulate engineering specifications from customer needs.6. Generate creative concept solutions to an open-ended problem.7. Select alternatives using structured decision schemes.

8. Design subsystems to meet engineering specifications.
9. Evaluate designs using appropriate analysis techniques.
10. Apply current engineering techniques to solve a design problem.
11. Construct and test prototype designs.
12. Create detailed design reports, drawings, and presentations.
13. Debate open-ended topics involving ethics, professionalism, and product liability.
14. Relate the codes of ethics to practical engineering challenges.

Relationship of Course to Mechanical Engineering Student Outcomes:

- SO 1: Master (M)
- SO 2: Master (M)
- SO 3: Master (M)
- SO 4: Master (M)
- SO 5: Master (M)
- SO 6: Develop (D)
- SO 7: Master (M)

Topics Covered:

- Teamwork (theory, skills, team building, giving feedback)
- Project management (design process, planning, tracking, Gantt)
- Problem definition (empathy, research, specifications, QFD)
- Conceptualization (ideation, evaluation, concept models)
- Detailed design (analysis, FMEA, economics, CAD)
- DfX (design for manufacturing, safety, reliability, etc)
- Prototyping (planning, building)
- Testing (planning, data collection, analysis, DVP&R)
- Communication (meetings, drawings, reports, presentations)
- Ethics (codes, presentations, discussions)

Laboratory Activities:

These courses comprise the complete design, build, and testing of a product to solve a customer's needs. Weekly lab activities engage the students in applying the topics listed above to their own project.

Class/Lab Schedule:

Two 170-minute labs per week.

Contribution of Course to Meeting the Professional Component:

- (a) College-level math and basic sciences: 0 credits
- (b) Engineering Topics: 6 credits
 - Design: Yes
- (c) General Education: 0 credits
- (d) Other: 0 credits

Prepared by:
Peter Schuster

Date:
11/17/19
