MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 428/ME 429/ME 430 Senior Project Design/Senior Project Laboratory (3 Units/ 2 Units/1Units) Required for All Concentrations Except HVAC&R

Course Descriptions: (2013-15 Catalog)	ME 428: 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 definitions, concept generation, feasibility studies and decision making. Practice of professional skills including written and oral communication, teaming, project management, societal responsibility and ethics. 1 lecture, 2 laboratories. ME 429: Continuation of a project begun in ME 428. Activities focused on detail design, analysis and material procurement. 2 laboratories. ME 430: Completion of a project begun in ME 428 and continued in ME 429. Design verified through prototyping and testing. 1 laboratory.
Prerequisite Courses:	ME 329, ME 343, ME 347, ENGL 149.
Prerequisites by Topic:	Coverage of all topics presumes completion of basic engineering science courses in mechanics, mechanical component design, thermodynamics, fluid mechanics and heat transfer.
Textbook: (and/or other required material)	Senior Design Project Reference and Survival Guide, by Davol, Mello, Shollenberger, Schuster and Widmann, January 2014. FE Supplied-Reference Handbook, National Council of Examiners, 8th Edition, 2008 NSPE Code of Ethics
References:	Total Design: Integrated Methods for Successful Product Engineering, Stuart Pugh, Addison-Wesley, 1991. Shigley's Mechanical Engineering Design, Budynas and Nisbett, 8th Edition, McGraw Hill, 2006 Fundamentals of Machine Component Design, Juvinal and Marshek, 3rd Edition, John Wiley and Sons, 2000 The Mechanical Design Process, Ullman, 4th Edition, McGraw Hill, 2010 Engineering Design, Dieter and Schmidt, 4th Edition, McGraw Hill, 2009
Course Coordinator/Instructor:	James M. Widmann, Professor of ME

Course Learning Outcomes:

1. Apply a formal engineering design process to solve an open-ended, externally supplied engineering design problem.
2. Work effectively on an engineering team.
3. Develop, analyze and maintain an engineering project schedule using a Gantt chart and appropriate software.
4. Use Quality Function Deployment (QFD) to evaluate customer requirements
5. Formally define an engineering problem
6. Generate an engineering specification document.
7. Apply creative techniques to generate conceptual design solutions.
8. Apply structured decision schemes to select appropriate engineering concepts in a team environment.
9. Design subsystems within constraints of strength, size, materials, performance, cyclic loading, etc.
10. Evaluate potential design solutions through the use of engineering and physical science analysis techniques and tools.
11. Apply current industrial design practice and techniques such as DFX, FMEA and/or TQM to engineering design problems.
12. Construct and test prototype designs.
13. Develop and implement a design verification plan and report.
14. Communicate and present engineering design project results orally, graphically and in writing
15. Students will improve their ability to discuss and take a stand on open-ended topics involving engineering ethics and product liability
16. Discuss engineering professionalism and its responsibility to society
17. Understand the codes of ethics and their implications in engineering practice

Relationship of Course to MECHANICAL ENGINEERING Program Outcomes:												
a	*b*	*C*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*
H	**M**	**H**	**H**	**H**	**H**	**H**	**M**	**H**	**H**	**H**	**H**	**H**

Topics Covered:

Design Process and Methodology (1 lectures)
Teaming: Theory Skills and Practice (1 lecture)
Creativity and Idea Generation (1 lecture)
Idea Section/Structured Decision Making (1 lecture)
Design for Sustainability (1 lecture)
Design for Safety (1 lecture)
Design for Manufacturability (1 lecture)
Design with Quality in Mind (1 lecture)
Various current event subjects such as: Engineering Ethics and the Environment; Engineering Ethics and Product Liability; Engineering Ethics and Patents; Engineering Ethics and Politics; Case Studies involving Disasters.

Laboratory Activities:	The primarily laboratory activity is the design, construction and testing of an artifact that solves an externally supplied engineering problem. Formal laboratory activities applied to the projects include: Requirements and Specifications Quality Function Deployment (QFD) Teaming Exercises+ Discussion of Concurrent Engineering Review of Engineering Analysis, Economics and Graphic Communication Design Verification and Test Plans (DVP&R) Engineering Ethics Discussions and Student Presentations Formal Design Reviews including Student Presentations Weekly team meetings with laboratory advisor (approx ½ each week per team).	
Class/Lab Schedule:	ME428: One 50-minute lectures per week. Two 170-minute lab per week. ME429: Two 170-minute lab per week. ME430: Team meetings by arrangement with laboratory advisor	
Contribution of Course to Meeting the Professional Component:	(a) College-level mathematics and basic sciences:	0 credits
	(b) Engineering Topics:	6 credits
	Design:	Yes
	(c) General Education:	0 credits
	(d) Other:	0 credits
Prepared by: James Widmann	**Date:** 5/8/14	