WASHINGTON STATE UNIVERSITY
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School of Engineering and Computer Science

MECH 314: Machine Design I

Catalog Data:	**314 Machine Design I** 3 Course Prerequisite: MECH 215; MECH 309; certified major in Mechanical Engineering. Design process, factor of safety, stress-deformation, combined stresses, curved members; deformation analysis, static and fatigue failure theories; design of mechanical elements, stress analysis and finite elements; shafts and coupling design. Typically offered Spring.
Class Schedule:	Three 50-minute lecture sessions per week, for one semester.
Laboratory Schedule:	None
Prerequisites by Course:	MECH 215, MECH 309
Prerequisites by Topic:	1. Basic math/algebra 2. Statics and mechanics of materials 3. Knowledge of force analysis and stress analysis
Textbook:	Eggert, Rudolph, J., *Engineering Design*, Second Edition, 2010, High Peak Press Shigley, J.E., Budynas, R.G., and Nisbett, J.K., *Mechanical Engineering Design*, 10th Edition, 2015, McGraw-Hill Publishing Company
Course Coordinator:	Dr. Hamid Rad
Course Objectives:	1. Introduce engineering design process. 2. Develop skills in application of engineering principles to open-ended projects. 3. Learn to effectively communicate engineering designs, both verbally and in writing. 4. Learn fundamentals of engineering economics. 5. Use energy method to analyze two- and three-dimensional components under combined loadings. 6. Introduce failure theories for mechanical design.
Topics Covered:	1. Design Process 2. Reverse Engineering 3. Project Management 4. DFM/Ergonomics, Teamwork-Ethics 5. Concepts of stress-strain and deflection due to axial, torsional, bending, and combined loading conditions 6. Introduce strain energy method 7. Design of curved beams 8. Failure Theories for static and dynamic loadings
Lab Experiments and Activities:	None

Course Outcomes:	Students will be able to:			
	Assessed for Student Outcomes	1-d. Apply mathematics, scientific and/or engineering principles such as failure theories for both static and fatigue design toward solving engineering design problems. 2-a. Define an engineering problem for mechanical system. 2-b. Apply the engineering design process (such as concept generation, modeling, evaluation, and iteration) to satisfy project requirements for mechanical systems. 2-c. Analyze an engineering system within realistic constraints, such as economic, environmental, social, cultural, global, public health, safety, welfare and other factors appropriate to the discipline. 4-b. Evaluate situations involving ethical considerations using ASME's code of ethics.		
	Other	1-a. Demonstrate knowledge of fundamental scientific and/or engineering principles. 1-b. Evaluate information to identify engineering problems. 1-c. Use appropriate models to formulate solutions. 2-d. Produce solutions that meet specified needs for engineering designs. 5-a. Establish common goals, tasks timeline, etc., as a team. 5-b. Share responsibilities and information on project schedule and tasks with other members as a team. 5-c. Collaborate with individuals with diverse backgrounds, skills and/or perspectives to meet objectives.		
Required or Elective Course:		Required		
Relationship of Course to Program:		Meets: Educational Objectives 1, 2, 3 Student Outcomes 1, 2, 4, 5		
Prepared by:		Dr. Hamid Rad	Date:	March 15, 2018 (4/23/18 mb)
Approved by USC:		4/18/18		