

# *Course Syllabus*

## **MECH 3351 Design of Mechanical Systems**

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### **Course Information**

*MECH3351.002*  
*Design of Mechanical Systems*  
*Fall 2018*

*Tuesday & Thursday*  
*10:00am – 11:15am*  
*ECSW 1.355*

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### **Professor Contact Information**

*D. Todd Griffith, PhD*  
*Office Phone: 972-883-4930*  
*Email: tgriffith@utdallas.edu*  
*Office Location: ECSN 3.212*  
*Office Hours: Tuesday and Thursday 1-2pm*  
*Other Information: Please call or email for appointments if you cannot meet during office hours (although occasional walk-ins are welcomed).*

*Teaching Assistant: Marzieh Baan*  
*Email: Marzieh.Baan@utdallas.edu*  
*Office Hours and Location: Tuesday and Thursday 11:30am – 12:30pm. (ECSN 2.124)*

### **Course Pre-requisites, Co-requisites, and/or Other Restrictions**

*Prerequisite: MECH 2320 and ENGR 3300, Pre or co-requisite: MECH 3350.*

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### **Course Description**

Lecture course. Design and analysis tools for mechanical systems. Design criteria based on reliability and functionality are introduced. Basic principles of stress and deflection analysis, application to mechanical components and systems. Failure design theory based on static and dynamic loads, stochastic considerations, and design of mechanical components such as shafts, bearing and shaft-bearing systems, gear and gear systems and mechanical joints.

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### **Course Learning Outcomes**

1. Apply knowledge of the working principles of mechanical components and systems;
  2. Analyze and select basic mechanical components, such as shaft and shaft accessories, bearings, gears, fasteners, etc., for the design of a mechanical system;
  3. Formulate existing solutions to open-ended problems, and conceive possible future solutions;
  4. Interpret a design problem to model it as a solvable engineering problem;
  5. Understand and synthesize engineering analysis results;
  6. Operate in a team-oriented design project.
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### **Required Textbooks and Materials**

*Required Texts*  
*Shigley's Mechanical Engineering Design, 10th ed., McGraw-Hill by Budynas and Nisbett.*

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### Course Organization & Academic Calendar

The following schedule lists the approximate organization of the planned course lecture and exam schedule. Please note the required reading for each lecture. It is highly advised that the required reading be studied prior to the lecture. The lecture schedule is subject to change based on the needs of the course. Homework assignments will be made on a weekly basis, with the exception of quiz and exam weeks.

Week	Date	Topic	Required Reading (Shigley)	Additional Reading (Shigley)
1	8/21/18	Introduction to Design & Analysis	1.1-1.12	1.13-1.17
	8/23/18	Stress-strain Diagram; Material Property Determination	2.1-2.6	2.7-2.13
2	8/28/18	Material Selection	2.14-2.16; 2.20-2.21	2.17-2.19
	8/30/18	Load and Stress Analysis: Equilibrium and Free-body Diagrams; Shear Force and Bending Moments in Beams; Intro to Singularity Functions	3.1, 3.2, 3.3	
3	9/4/18	Load and Stress Analysis: Stress concepts; Bending and shear stresses in beams	3.4-3.5; 3.10-3.11	3.6; 3.7-3.9
	9/6/18	Load and Stress Analysis: Torsion; Pressurized cylinders	3.12; 3.14	3.15-3.19
4	9/11/18	Deflection and Stiffness: Spring Rates, Deflection due to Bending; Superposition	4.1 - 4.5	
	9/13/18	Deflection and Stiffness: Singularity Functions	3.3	4.6
5	9/18/18	Deflection and Stiffness: Deflection of beams; Beam Design & Analysis Examples	4.6	4.7-4.9
	9/20/18	Deflection and Stiffness: Deflection of beams; Beam Design & Analysis Examples	4.6	4.7-4.9
6	9/25/18	Deflection and Stiffness: Compression Members and Buckling	4.10 - 4.16	4.17
	9/27/18	Review of Loads & Stress and Deflection & Stiffness	Review Ch. 3 and Ch. 4 topics	

	10/2/18	Midterm Exam		
7	10/4/18	Failure due to Static Loading: Static strength, factors of safety, stress concentration	5.1-5.2; 1.11; 3.13	
8	10/9/18	Failure due to Static Loading: Mohr's Circle and Intro to failure theories	3.6; 5.3	
	10/11/18	Failure due to Static Loading: Ductile and Brittle Material Failure	5.4-5.10	5.11-5.13
9	10/16/18	Failure due to Variable Loading: Intro to Fatigue; Fatigue-life methods	6.1-6.6	
	10/18/18	Failure due to Variable Loading: Endurance Limit, S-N Curve and examples	6.7-6.8	
10	10/23/18	Failure due to Variable Loading: Additional Topics	6.9-6.12	
	10/25/18	Failure due to Variable Loading: Additional Topics	6.9-6.12	
11	10/30/18	Design of Shafts	7.1-7.4	3.12
	11/1/18	Design of Shafts	7.5-7.8	
12	11/6/18	Assignment of Team Design Project		
	11/8/18	Screws, Fasteners: Introduction, Bolt pre-load	8.1-8.7, 8.8-8.12	
13	11/13/18	Screws, Fasteners: Introduction, Bolt pre-load	8.1-8.7, 8.8-8.12	
	11/15/18	Springs: Introduction	10.1-10.6	10.7-10.15
14	11/20/18	Fall Break -- no lecture		
	11/22/18	Thanksgiving Holiday -- no lecture		
15	11/27/18	Gears: Intro and terminology	13.1-13.7	13.8
	11/29/18	Gears: Selection, gear trains, and analysis	13.9-13.14	13.15-13.17
16	12/4/18	Welds and joints	9.1-9.9	
	12/6/18	Bearings	Chapter 12	
17	12/10/18	Reading Day -- no lecture		
18	12/11 - 12/17/18	Finals Week		

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**Grading Policy**

Homework/Quizzes:	30%
Midterm Exam:	20%
Team Project:	20%
Final Exam:	30%

Grade appeals shall be submitted within *one week* of the return date for the assignment or exams and *must be submitted in writing*. The reason for requesting a regrade must be clearly stated. Requests submitted later than one week after the return date or not in writing will not be processed.

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**Course & Instructor Policies*****Make-up exams***

No make-up exams will be given with the only exception of a serious emergency. Advance notice in writing must be given in such a case.

***Late Work***

Late work will not be graded.

***Class Attendance***

Students are expected to attend each class. Missing class or arriving late for class on a frequent basis (more than 3 occurrences) will result in deduction of points.

***Cell phone/electronic device usage***

Cell phone and any other type of electronic devices for communication must be turned off during the class. Computer and tablet can ONLY be used for the purpose of taking notes.

***Email usage***

Please note that email communications with regard to the course must be handled through your UT Dallas email address according to the University policy.

***Academic Integrity***

Academic integrity is a serious matter. Students can discuss the assignments and projects. However, direct copy from one to another or from solution manual will lead to a zero grade for all those involved. Any violation of the academic conduct policy will be dealt with according to the University Policy.

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**Comet Creed**

*This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:*

“As a Comet, I pledge honesty, integrity, and service in all that I do.”

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## **UT Dallas Syllabus Policies and Procedures**

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus.

Please go to <https://coursebook.utdallas.edu/syllabus-policies/> for these policies.

*The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.*