



**TED UNIVERSITY**  
**Department of Mechanical Engineering**  
**ME 345 – Mechanics of Materials**

Fall 2016 Syllabus

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### Course Information

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<b>Instructor</b>	Dr. Levend Parnas	<b>Instructor Info</b>	Email: levend.parnas@tedu.edu.tr Room: D309
<b>Semester</b>	Fall 2016	<b>Class Hours and Classrooms</b>	Tue 09:00 – 11:00 Rm. A226 Fri 13:00 – 14:00 Rm. A226 (Class locations may change)
<b>Course Credit/ ECTS credits</b>	(3-0-0) 3 / 5	<b>Office Hours</b>	Tue 15:00-17:00, Fri 15:00-17:00 or by appointment
<b>Pre-requisite/ Co-requisite</b>	ME 241	<b>Level of Course</b>	Junior
<b>Teaching Assistant</b>	Saeid H. Dashatan (e-Mail: saeid.dashatan@tedu.edu.tr, Room D206)		
<b>Textbook</b>	Mechanics of Materials by R. C. Hibbeler, 9th Edition, SI Version Pearson 2014. ISBN: 978-981-06-9436-4		
<b>Recommended Reading</b>	Mechanics of Materials by F. P. Beer, E. R Johnston, J. T DeWolf, D.F. Mazurek: 7th Edition (Global Edition), McGraw Hill 2015. ISBN: 978-9814595247.		
<b>Course Web Pages</b>	Please register to Moodle page <a href="http://moodle.tedu.edu.tr">http://moodle.tedu.edu.tr</a> and regularly follow this link to have access to course materials.		

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### Catalog Description

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Combined stress due to bending, torsion, shear and axial load. Mohr circle. Design of beams and shafts for strength. Statically indeterminate problems. Introduction to energy methods. Buckling of columns. Failure modes: plastic deformation, fracture, fatigue, creep.

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### Course Learning Outcomes

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Upon successful completion of this course, a student will be able to

1. use plane stress transformation to find principal stress states
2. understand the principle of virtual work
3. understand small-strain elastic-plastic deformation
4. understand failure modes for materials
5. develop an awareness of mechanics to provides base for further study and specialization within solid mechanics, including continuum mechanics; computational mechanics (e.g., finite-element methods)

**Bloom's Taxonomy Levels: (C) Comprehension, (a) Application, (A) Analyze, (E) Evaluate**

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## Course Assignments

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- A. **Midterm Exams (20% each):** There will be 2 midterm exams in class. Tentative dates: MT1 – November 02 (Week 6), Wednesday, MT2 – December 07, Wednesday (Week 11)
- B. **Final (35%):** There will be a cumulative final. Date of the final will be announced at the end of the semester
- C. **Homeworks, Project and Quizzes (10%):** There will be multiple homeworks and quizzes.
- D. **Laboratory work and Project (10%):** *There will be experiments and a related project*
- E. **Attendance (10%):** Students are required to attend 80% of lectures in order to be eligible for the final exam.

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## Course Assessments & Learning Outcomes Matrix

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Assessment Methods	Course Learning Outcomes
Midterm Exams	#1, #2, #3, #4, #5
Final Exam	#1, #2, #3, #4, #5
Weekly Homeworks	#1, #2, #3, #4, #5
Project and Lab	#1, #2, #3, #4, #5

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## Extended Description

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This course provides Mechanical Engineering students with an awareness of various responses exhibited by solid engineering materials when subjected to mechanical loadings; an introduction to the physical mechanisms associated with design-limiting behavior of engineering materials, especially stiffness, strength, toughness, and durability; an understanding of basic mechanical properties of engineering materials, testing procedures used to quantify these properties, and ways in which these properties characterize material response; quantitative skills to deal with materials-limiting problems in engineering design; and a basis for materials selection in mechanical design.

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## Teaching Methods & Learning Activities

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| <input checked="" type="checkbox"/> Telling/Explaining           | <input type="checkbox"/> Simulations & Games            |
| <input checked="" type="checkbox"/> Discussions/Debates          | <input checked="" type="checkbox"/> Video Presentations |
| <input checked="" type="checkbox"/> Questioning                  | <input type="checkbox"/> Oral Presentations/Reports     |
| <input checked="" type="checkbox"/> Reading                      | <input type="checkbox"/> Concept Mapping                |
| <input type="checkbox"/> Peer Teaching                           | <input checked="" type="checkbox"/> Brainstorming       |
| <input type="checkbox"/> Scaffolding/Coaching                    | <input type="checkbox"/> Drama/Role Playing             |
| <input checked="" type="checkbox"/> Demonstrating                | <input type="checkbox"/> Seminars                       |
| <input checked="" type="checkbox"/> Problem Solving              | <input type="checkbox"/> Field Trips                    |
| <input type="checkbox"/> Inquiry                                 | <input checked="" type="checkbox"/> Guest Speakers      |
| <input checked="" type="checkbox"/> Collaborating                | <input checked="" type="checkbox"/> Hands-on Activities |
| <input checked="" type="checkbox"/> Think-Pair-Share             | <input type="checkbox"/> Service Learning               |
| <input type="checkbox"/> Predict-Observe-Explain                 | <input checked="" type="checkbox"/> Web Searching       |
| <input type="checkbox"/> Microteaching                           | <input checked="" type="checkbox"/> Experiments         |
| <input checked="" type="checkbox"/> Case Study/Scenario Analysis | <input checked="" type="checkbox"/> Other(s): Homework  |

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## Student Workload

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<input checked="" type="checkbox"/> Lectures .....42 hrs	<input type="checkbox"/> Resource Review ..... hrs
<input checked="" type="checkbox"/> Course Readings .....30 hrs	<input type="checkbox"/> Research Review ..... hrs
<input type="checkbox"/> Workshop .....hrs	<input type="checkbox"/> Report on a Topic ..... hrs
<input type="checkbox"/> Online Discussion ..... hrs	<input type="checkbox"/> Case Study Analysis ..... hrs
<input type="checkbox"/> Debate .....hrs	<input type="checkbox"/> Oral Presentation ..... hrs
<input type="checkbox"/> Work Placement ..... hrs	<input type="checkbox"/> Poster Presentation .....hrs
<input type="checkbox"/> Field Trips/Visits ..... hrs	<input type="checkbox"/> Demonstration .....hrs
<input type="checkbox"/> Observation ..... hrs	<input type="checkbox"/> Web Designs .....hrs
<input checked="" type="checkbox"/> Lab Applications ..... 10 hrs	<input type="checkbox"/> Mock Designs .....hrs
<input type="checkbox"/> Hands-on Work ..... hrs	<input type="checkbox"/> Team Meetings.....hrs
<input checked="" type="checkbox"/> Exams/Quizzes .....6 hrs	<input checked="" type="checkbox"/> Other: Homework.....80 hrs

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## Assessment Methods

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<input checked="" type="checkbox"/> Test/Exam	<input type="checkbox"/> Self-evaluation
<input checked="" type="checkbox"/> Quiz	<input type="checkbox"/> Peer Evaluation
<input type="checkbox"/> Oral Questioning	<input type="checkbox"/> Portfolio
<input checked="" type="checkbox"/> Performance Project	<input type="checkbox"/> Presentation (Oral, Poster)
<input checked="" type="checkbox"/> Written <input type="checkbox"/> Oral	<input checked="" type="checkbox"/> Other(s): Homework and Project
<input type="checkbox"/> Observation	

## Tentative Course Outline

Week	TOPICS	READING	ACTIVITIES
1	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Review of ME241               <ul style="list-style-type: none"> <li>– Displacement and strain</li> <li>– Stress and equilibrium</li> <li>– Mechanical properties</li> </ul> </li> </ul>	Chaps 1-5	
2	<ul style="list-style-type: none"> <li>• Review of ME241               <ul style="list-style-type: none"> <li>– Torsion</li> <li>– Statically indeterminate structures</li> </ul> </li> </ul>	Chap 4, 5	<ul style="list-style-type: none"> <li>• Homework 1</li> <li>• Quiz 1</li> </ul>
3	<ul style="list-style-type: none"> <li>• Beam bending (review)</li> </ul>	Chap 6	<ul style="list-style-type: none"> <li>• Homework 2</li> <li>• Quiz 2</li> <li>• Lab 1 (Beam Bending)</li> </ul>
4	<ul style="list-style-type: none"> <li>• Transverse shear</li> <li>• Shear flow and shear center</li> </ul>	Chap 7	<ul style="list-style-type: none"> <li>• Homework 3</li> <li>• Quiz 3</li> </ul>
5	<ul style="list-style-type: none"> <li>• Thin-walled pressure vessel</li> <li>• Combined loading</li> </ul>	Chap 8	<ul style="list-style-type: none"> <li>• Homework 4</li> <li>• Quiz 4</li> </ul>
6	<ul style="list-style-type: none"> <li>• Plane stress problem</li> <li>• Stress transformation</li> <li>• Strain transformation</li> </ul>	Chap 9	• <b>MIDTERM 1</b>
7	<ul style="list-style-type: none"> <li>• Strain transformation</li> <li>• Strain rosettes</li> <li>• Failure theories</li> </ul>	Chap 10	<ul style="list-style-type: none"> <li>• Homework 5</li> <li>• Quiz 5</li> <li>• Lab 2 (Pressure Vessel)</li> </ul>
8	<ul style="list-style-type: none"> <li>• Design of beams and shafts</li> </ul>	Chap 11	<ul style="list-style-type: none"> <li>• Homework 6</li> <li>• Quiz 6</li> </ul>
9	<ul style="list-style-type: none"> <li>• Deflection of beams and shafts</li> <li>• Statically indeterminate beams</li> </ul>	Chap 12	<ul style="list-style-type: none"> <li>• Homework 7</li> <li>• Quiz 7</li> </ul>
10	<ul style="list-style-type: none"> <li>• Uniaxial elastic-plastic behavior</li> </ul>	Chaps 3, 4, 5	<ul style="list-style-type: none"> <li>• Homework 8</li> <li>• Quiz 8</li> </ul>
11	<ul style="list-style-type: none"> <li>• Stress concentrations</li> <li>• Inelastic bending</li> <li>• Residual stress</li> </ul>	Chap 6	<ul style="list-style-type: none"> <li>• Homework 9</li> <li>• <b>MIDTERM 2</b></li> </ul>
12	<ul style="list-style-type: none"> <li>• Fatigue</li> <li>• Creep</li> </ul>	Chap 3	<ul style="list-style-type: none"> <li>• Homework 10</li> <li>• Quiz 9</li> </ul>
13	<ul style="list-style-type: none"> <li>• Energy methods</li> <li>• Virtual work</li> <li>• Castigliano's theorem</li> </ul>	Chap 14	<ul style="list-style-type: none"> <li>• Homework 11</li> <li>• Quiz 10</li> </ul>
14	<ul style="list-style-type: none"> <li>• Buckling of columns</li> <li>• Principals for material selection</li> </ul>	Chap 13	<ul style="list-style-type: none"> <li>• Homework 12</li> <li>• Quiz 11</li> </ul>

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## Course Policies and Some Remarks

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### *Attendance*

You are expected to attend all classes. Classes start on time. Please be respectful of your classmates by being on time. Cell phones should be turned off and kept out of sight. Please do not use your computers during class time.

### *Calculator Policy*

You may use a graphing calculator or software that does symbolic calculations during exams.

### *Plagiarism*

All of the following are considered plagiarism:

- Turning in someone else's work as your own
- Copying words or ideas from someone else without giving credit
- Failing to put a quotation in quotation marks
- Giving incorrect information about the source of a quotation
- Changing words but copying the sentence structure of a source without giving credit
- Copying so many words or ideas from a source that it makes up the majority of your work, whether you give credit or not" ([www.plagiarism.org](http://www.plagiarism.org))

Plagiarism is a very serious offense and will be penalized accordingly by the university disciplinary committee. The best way to avoid accidentally plagiarizing is to work on your own before you ask for the help of other resources.

Collaboration on non-collected homework and in studying is strongly encouraged; however, the work you hand in must be solely your own. Sharing written work before it is turned in to be graded is academic dishonesty. For more information on TEDU policy on intellectual integrity see the link:

[http://www.tedu.edu.tr/Assets/Documents/News/Public/TEDU\\_Ogrenci\\_El\\_Kitabi\\_2012.pdf](http://www.tedu.edu.tr/Assets/Documents/News/Public/TEDU_Ogrenci_El_Kitabi_2012.pdf)

### *Cheating*

Cheating has a very broad description which can be summarized as "acting dishonestly". Some of the things that can be considered as cheating are the following: copying answers on exams, homework and lab works, using prohibited material on exams, lying to gain any type of advantage in class, providing false, modified or forged data in a report, plagiarizing, modifying graded material to be re-graded, causing harm to colleagues by distributing false information about an exam, homework or lab.

Cheating is a very serious offense and will be penalized accordingly by the university disciplinary committee. For more information on TEDU policy on intellectual integrity, please see the following link:

[http://www.tedu.edu.tr/Assets/Documents/News/Public/TEDU\\_Ogrenci\\_El\\_Kitabi\\_2012.pdf](http://www.tedu.edu.tr/Assets/Documents/News/Public/TEDU_Ogrenci_El_Kitabi_2012.pdf)

### *Disability Support*

If you have a disabling condition which may interfere with your ability to successfully complete this module, please contact Dr. Asli Bugay (email: [asli.bugay@tedu.edu.tr](mailto:asli.bugay@tedu.edu.tr)) or Dr. Tolga İnan (email: [tolga.inan@tedu.edu.tr](mailto:tolga.inan@tedu.edu.tr)). For more information please see Handbook for Registered Students.

### *Make Up Exams*

Make-up exams for midterm exams will NOT be offered generally. If you have a legitimate reason for missing an exam, then you must arrange to make up the exam BEFORE the scheduled time of the exam. The only exceptions are illness or emergency (e.g., death in family, a traffic accident, etc.). In case of an illness or emergency you need to submit a documentation that supports your claim.

Also please read the document given in the link [http://www.tedu.edu.tr/tr-TR/Content/Akademik/Akademik\\_Belgeler/Yonetmelikler\\_ve\\_Yonergeler.aspx](http://www.tedu.edu.tr/tr-TR/Content/Akademik/Akademik_Belgeler/Yonetmelikler_ve_Yonergeler.aspx)