



American University of Ras Al Khaimah

AURAK Syllabus

Course Title: Mechanics of Materials

Course Code: CIEN 212.01

Credit Hours: 3

Method of Instruction: This course is taught using the face-to-face method of instruction. This class is lecture-based, utilizing out-of-class activities, such as homework and projects, as well as in-class activities, such as group work and open discussions.

Prerequisite course(s) and/or co-requisite courses, if applicable: Pre-requisite CIEN 211

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Contact Information and Office Hours:

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Course Description:

Types of loads, axial stress and strain of determinate and indeterminate system, normal and bending moment diagrams, torsion of determinate and indeterminate system, bending of beams, combined stresses, shearing stress and strain, Mohr's circle of stress and strain, thin walled pressure vessels.

Additional Information about the Course:

This course is NOT an online course. This course provides the students with knowledge in the concepts of stress and strain, normal stress and strain, shear stress and strain, general state of stress, and design of simple connections. It introduces the students to stress analysis, materials behavior, constitutive relationship, Hooke's law, transformation equations, and Mohr's circle. It teaches the students axially loaded members, torsion, change of length, angle of twist and

transmission of power by shafts. The course also introduces the flexure formulas and provides a review of drawing of shear and bending moment diagrams.

Course Textbooks and Materials:

1. Textbook: Hibbeler, R.C. (2018). *Mechanics of Materials in SI units*, 10th Edition, Pearson, ISBN: 978-1292178202.

Other Resources:

- Notes and Handouts by instructor

Web Resources:

Course Learning Outcomes (CLOs)

Course Learning Outcomes At the end of this course, students should be able to:	
CLO 1	Calculate deformation, strain, and stress that develop in materials when subjected to various loading conditions (axial, torsion, bending, shear, and combined loading).
CLO 2	Design (and verify the design of) simple structural members.
CLO 3	Analyze simple indeterminate members by using equilibrium and compatibility equations.
CLO 4	Demonstrate skills in problem solving and analytical thinking.

Assessment Activities

The dates for exams, submission of assignments, and project are specified in the schedule. You will be graded in this class based on the number of points you earn for exams, written assignments, projects, or other activities, including your class participation. Keep track of your scores in Blackboard.

Assessment Activities and Grading Weight	Class Participation 10%	Homework Assignments 15%	Project 15%	Mid-term Exam 25%	Final Exam 35%
CLO 1	X	X	X	X	X
CLO 2	X	X	X	X	X
CLO 3	X	X	X	X	X
CLO 4	X	X	X	X	X

Program Learning Outcomes (PLOs) and Mapping Course to Program Learning Outcomes

Please see the APPENDIX for the Course to Program Learning Outcomes mapping.

Grading Scale:

The grading system and scale for AURAK, as established by the Board of Trustees, is as follows:

AURAK Grading System and Scale		
Grade	Percentage Scores	Grade Points
A	95-100	4
A-	90-94	3.7
B+	86-89	3.3
B	83-85	3
B-	80-82	2.7
C+	76-79	2.3
C	73-75	2
C-	70-72	1.7
D+	66-69	1.3
D	60-65	1
F	0-59	0

Weekly Course Information

Schedule of Course Topics, Required Reading, and Assignments and Assessments (Including scheduling of laboratory, studio, external visit, and other non-classroom meeting sessions, as appropriate)				
Week	Topic	Required Readings	Assignment, Assessment (with grade weighting) & Due Date	Mapping of CLO's to Assessments
1	Course Introduction	Handout	Homework #1 (3%) (Topics 1, 2) 20 Sep (Sunday)	CLO 1
2	1. Stress and Strain	Sec 1.1-1.6, Sec 2.1-2.2		CLO 1, 2
3	2. Mechanical Properties of Materials	Sec 3.1-3.6		CLO 1, 4
4	3. Axial Load	Sec 4.1-4.4	Homework #2 (3%) (Topics 3, 4) 4 Oct (Sunday)	CLO 1, 3
5	4. Torsion	Sec 5.1-5.5		CLO 1, 3
6	Midterm Exam (25%): Topics 1 to 4 6 Oct (Tuesday)			CLO 1, 2, 3, 4
7	5. Bending	Sec 6.1-6.4	Homework #3 (3%) (Topics 5, 6) 25 Oct (Sunday)	CLO 1
8	6. Transverse Shear	Sec 7.1-7.2		CLO 1
9	7. Combined Loadings	Sec 8.1-8.2	Homework #4 (3%) (Topics 7, 8) 8 Nov (Sunday)	CLO 1
10	8. Stress Transformation	Sec 9.1-9.4		CLO 1
11	9. Design of Beams and Shafts	Sec 11.1-11.2	Homework #5 (3%) (Topics 9, 10, 11) 29 Nov (Sunday)	CLO 2
12	10. Deflection of Beams and Shafts	Sec 12.1-12.2		CLO 2
13	11. Buckling of Columns	Sec 13.1-13.3		CLO 2
14	Course Review and Exercises	Handouts		CLO 1, 2, 3, 4
15	Course Project (15%): 1 Dec (Tuesday)			CLO 1, 2, 3, 4
16	Final Exam (35%) As per the University Final Exams Schedule			CLO 1, 2, 3, 4

Attendance Policy

University policy is that students are to attend all classes and to arrive on time. Students are required to:

- Attend all learning and teaching sessions associated with their program of study.
- Notify their course instructors in advance (in person, by phone or e-mail) that they will be absent from time-tabled class sessions.
- Obtain prior permission from their instructor or course manager, for planned absences of two or more consecutive class sessions during the semester.
- Provide a medical certificate or other corroborating evidence to explain their absence, if required by the University.

Unsatisfactory student attendance includes failure to regularly attend learning and teaching sessions without providing a satisfactory reason to instructors for absence and/or persistent late arrival at, or early departure from, learning and teaching sessions. Where a student fails to attend classes for **four or more weeks cumulatively**, or where a recurring pattern of non-attendance is observed over the course of the semester, the instructor has the option of deeming that the student has failed the course, in which case that student may receive an "F (Fail)" or "U (Unsatisfactory)" grade, as appropriate. At this point, and at the instructor's recommendation, the dean also has the authority to instruct the registrar to remove or withdraw the student from the course.

Disability Accommodations

Students with disabilities may find they require additional support, services, or considerations. AURAK will endeavor to support students with disabilities or special needs where resources are available. Accommodations will be provided, for students with verified needs, allowing equal access to educational facilities, programs, services, and activities at AURAK. Disability Accommodations are never applied retroactively – only students who have previously requested and have been approved for supporting accommodations can have them apply to a given academic semester/course. Students needing support must make the request from the Department of Counseling, Testing, and Disability Services located in Building H.

Other Relevant Policies

A. Academic Integrity

The Honor Code

The American University of Ras Al Khaimah strongly supports the concept of academic integrity and expects students and all other members of the AURAK community to be honest in all academic endeavors. The AURAK Honor Code can be found in the AURAK Student Handbook.

The role of the Honor Code and associated Academic Integrity Policy is to protect the academic integrity of the university, encourage consistent ethical behavior among students, and foster a climate of honorable academic achievement. The Honor Code is an integral part of university life and students are responsible, therefore, for understanding and abiding by the code's provisions. While a student's commitment to honesty and personal integrity is assumed and expected, this Code and associated policy and procedures provides clarity of expectations.

Expectations

Cheating, plagiarism, and all other forms of academic fraud are unacceptable; they are serious violations of university policy. AURAK expects all students to be familiar with university policies on academic integrity. The university will not accept a claim of ignorance – either of the policy itself or of what constitutes academic fraud – as a valid defense against such a charge.

Violations of Academic Integrity

Violations of academic integrity constitute academic fraud. Academic fraud consists of any actions that serves to undermine the integrity of the academic process or that gives the student an unfair advantage, including:

- Inspecting, duplicating or distributing test materials without authorization.
- Cheating, attempting to cheat, or assisting others to cheat – relevant here is the prohibition on being in possession of a mobile telephone or similar electronic device during a test or examination. In case such devices are found with a student, the student will be deemed to have attempted to cheat and will be subject to disciplinary action under the Student Academic Integrity Policy.
- Altering work after it has been submitted for a grade.
- Plagiarizing.
- Using or attempting to use anything that constitutes unauthorized assistance.
- Fabricating, falsifying, distorting, or inventing any information, documentation, or citation.

Plagiarism

One of the most common violations of academic integrity is plagiarism. Plagiarism can be intentional or unintentional. However, since each student is responsible for knowing what constitutes plagiarism, unintentional plagiarism is as unacceptable as intentional plagiarism and thus will bring the same penalties.

Plagiarism – submitting the work of others as one’s own - is a serious offense. In the academic world, plagiarism is theft. Information from sources – whether quoted, paraphrased, or summarized – must be given credit through specific citations. When a student paraphrases a work, it is still necessary to cite the original source. Merely rearranging a sentence or changing a few words is not sufficient. The citation style should be appropriate for the discipline and should clearly indicate the beginning and ending of the referenced material. All sources used in the preparation of an academic paper must also be listed with full bibliographic details at the end of the paper, as appropriate in the discipline.

Faculty and Student Expectations

- Every student, faculty member, and administrator is responsible for upholding the highest standards of academic integrity. Every member of the AURAK community shall honor the spirit of this policy by refusing to tolerate academic fraud.
- It is the responsibility of the instructor to provide students with additional guidelines for what constitutes “authorized” and “unauthorized” assistance.
- It is the responsibility of every student to see clarification if in doubt about what constitutes “authorized” and “unauthorized” assistance. In cases involving collaborative work, all students within the collaborative group may be held responsible for violating the code if any member of the group receives, accepts, or utilizes "unauthorized" assistance.
- Students are required to obtain permission prior to submitting work, any part of which was previously or will be submitted in another course. The instructor has the option of accepting, rejecting, or requiring modification of the content of previously or simultaneously submitted work.

A student who suspects that a violation of academic integrity has occurred should report the violation to the dean or to the Office of the Provost. In this report, the student should describe any action taken, such as talking with the person involved or with a faculty or staff member. Every effort will be made to preserve the anonymity of the student reporting the incident;

Possible penalties for academic fraud include: Formal warning, Reduction in grade for the assignment, Reduction in the grade for the course, A failing grade for the assignment, A failing grade (F) in the course, and/or Dismissal or Expulsion from the University.

Please refer to the relevant section in the *Student Handbook* and ensure a clear understanding of the provisions of the University Honor Code and the Student Academic Integrity Policy.

B. Concerns about grades or other course matters.

Students are responsible for their learning experiences. If you are concerned about a class matter, first discuss it with the instructor. If the matter is not resolved, the next step is to meet with the Chair of the department in which the course is taught. If you still have a concern, meet

with the Dean of the school in which the course is taught. The matter is likely to be resolved before it reaches that point, but if it is not, then visit the Associate Provost for Academic and Student Affairs. Students who decide to “jump to the top” will be referred “back” to the appropriate next step.

C. Assignments

University policy is that assignments are due on the date assigned. Instructors may refuse to accept late assignments or lower the grade that would be otherwise given.

D. Mobile Phones

All mobile phones, pagers and/or other communication devices should be turned off before entering the classroom. Students may NOT have mobile telephone or other electronic devices in their possession while completing examinations. Any violation will be deemed as having attempted to cheat.

E. Diversity and the Use of English

English is the common language of the AURAK campus for everyone. It is the only language to be used in the classroom. AURAK brings together students and faculty from diverse cultural and linguistic backgrounds, which is one of the strengths of the university. This diversity provides an opportunity to share our different experiences and enlarge our understanding of the world.

APPENDIX

Program Learning Outcomes At the completion of the program, students should be able to:	
PLO 1	Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
PLO 2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
PLO 3	Communicate effectively with a range of audiences
PLO 4	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
PLO 5	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
PLO 6	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
PLO 7	Acquire and apply new knowledge as needed, using appropriate learning strategies

Mapping Course to Program Learning Outcomes

The learning outcomes of this course contribute to meeting one or more of the program learning outcomes as shown below, with the contribution designated as “high”, “medium”, or “low”:							
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO7
CLO 1	High						
CLO 2	Medium						
CLO 3	Medium						
CLO 4	High						

Mapping ABET Standards to Program Learning Outcomes Addressed in the Course

<i>ABET Standards (1-7)</i>	<i>Program Learning Outcome Addressed in the Course</i>	<i>Program Learning Outcomes</i>
1	X	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2		An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3		An ability to communicate effectively with a range of audiences
4		An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5		An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6		An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7		An ability to acquire and apply new knowledge as needed, using appropriate learning strategies