

COURSE SYLLABUS

1. General Information:

Alpha-numeric codification: INGE 4011
Course Title: Mechanics of Materials I
Number of credits: 3
Contact Period: 3 contact hours of Conference a week

2. Course Description:

English: Stresses and strains due to axial, torsional, and bending loads; shear and moment diagrams.

Spanish: Esfuerzos y deformaciones debido a cargas axiales, torsionales, y esfuerzos de flexión. Diagramas de fuerza cortante y momento flector.

3. Pre/Co-requisites and other requirements:

INGE 3031 and (MATE 3032 or MATE 3184)

4. Course Objectives:

Develop a thorough understanding of the relations between the external loads applied to deformable bodies and the stress-strains produced in the body, principally for bodies that behave linearly.

Upon completion of this course, the student shall be able to:

- Define the concepts of stress and strain due to elastic and plastic deformations.
- Identify the mechanical properties of materials.
- Apply Hooke's law and know its limitations.
- Calculate stress (normal and shear) in a structural component loaded in various ways.
- Analyze axially loaded members.
- Use stress concentration factors to find stresses in axially loaded members.
- Analyze deformations in structures due to thermal effects.
- Determine stresses and/or strains in torsional member.
- Write equations of shear and bending moment in terms of position and draw the corresponding diagrams for beams subjected to some combination of concentrated loads, distributed loads, and moments.
- Calculate normal and shearing stresses in beams.
- Design members using strength criteria.

The objectives of the course will be assessed using exams, quizzes and short assignments. Other assessment tools such as special reports and projects could be used at the professor's discretion.

5. Instructional Strategies:

- Conference Discussion Computation Laboratory
 Seminar with formal presentation Seminar without formal presentation
 Workshop Art workshop Practice Trip
 Thesis Special problems Tutoring Research
 Other, please specify:

6. Minimum or Required Resources Available:

Textbook. For online lectures a laptop with camera and access to High Speed Internet are needed.

7. Course time frame and thematic outline:

Outline of Topics	Hours
• Introduction	1.5
• Normal Stress and Strain	1.5
• Mechanical Properties of Materials	1.5
• Lin Linear Elasticity and Hooke's Law	1.5
• Shear Stress and Strain	1.5
• Allowable Stresses and Allowable Loads	1.5
• Axially Loaded Members	1.5
• Changes in Length of Axially Loaded Members	1.5
• Statically Indeterminate Structures	1.5
• Thermal Effects	1.5
• Stress on Inclined Planes Axial Loads	1.5
• Strain Energy	1.5
• Stress Concentrations	1.5
Assessment and Evaluation 1	
• Torsion of Circular Bars	1.5
• Nonuniform Torsion	1.5
• Stresses and Strain in Pure Shear	1.5
• Relationship between Moduli of Elasticity E and G	1.5
• Transmission of Power by Circular Shafts	1.5
• Statically Indeterminate Torsional Members	1.5
Assessment and Evaluation 2	
• Types of Beams, Loads and Reactions	1.5
• Shear Forces and Bending Moments	1.5
• Loads, Shear Forces, and Bending Moment Relationships	1.5
• Shear-Force and Bending-Moment Diagrams	1.5
Assessment and Evaluation 3	

Outline of Topics	Hours
Assessment and Evaluation 3	
• Pure and Non-uniform Bending	1.5
• Curvature of a Beam	1.5
• Normal Strains and Stresses in Beam	1.5
• Design of Beams for Bending Stresses	1.5
• Shear Stresses in Beam	1.5
• Shear Stresses in the Webs of Beams with Flange	1.5
• Beams with Axial Loads	1.5
Assessment and Evaluation 4	
Total Hours	45

8. Grading System:

Quantifiable (letters) Not Quantifiable

9. Evaluation Strategies:

THEORY	Quantity	Percent
<input checked="" type="checkbox"/> Exams	2 to 4	40 to 80
<input checked="" type="checkbox"/> Final Exam	1	20 to 40
<input checked="" type="checkbox"/> Quizzes	Variable	0 to 20
<input checked="" type="checkbox"/> Homework	Variable	0 to 20
<input checked="" type="checkbox"/> Oral Reports	Variable	0 to 10
<input checked="" type="checkbox"/> Written Reports	Variable	0 to 10
<input checked="" type="checkbox"/> Portfolio	Variable	0 to 10
<input checked="" type="checkbox"/> Projects	Variable	0 to 10
<input type="checkbox"/> Journals		
<input checked="" type="checkbox"/> Other, specify: Participation	Variable	0 to 10
TOTAL:		100%

10. Bibliography:

Textbook:

- Mechanics of Materials, James M. Gere and Barry J. Goodno, 8th ed., 2013, CENGAGE Learning.

Additional References:

- Mechanics of Materials, Mechanics of Materials, James M. Gere, 6th Edition, 2004, Brooks/Cole Thomson Learning.
- Mechanics of Materials, R.C. Hibbeler, 7th Edition, 2008, Pearson Prentice Hall.
- Mechanics of Materials, F.P. Beer, E.R. Johnston, and J.T. DeWolf, 4th Edition, 2006, McGraw-Hill, Inc.
- Mechanics of Materials, by R.R. Craig, 1st. Ed., 1996, John Wiley and Sons.
- Mechanics of Materials, W.F. Riley, L.D. Sturges, and D.H. Morris, 5th Edition, 1999, John Wiley and Sons, Inc.

11. Reasonable Accommodation (Law 51):

The University of Puerto Rico at Mayagüez (RUM) recognizes that each student has an inherited right to request reasonable accommodation according to Law 51: Law for Integral Educational Services for People with Disabilities. Every student has the right to receive reasonable accommodation if he/she presents the necessary evidence to be evaluated by the Office of Services to Students with Disabilities (OSEI-RUM), and the related information can be found at the following link: <https://www.uprm.edu/cms/index.php/page/85>. If your case is approved by OSEI-RUM, you will receive reasonable accommodation in your courses and evaluation, and you must contact each professor for course registered. For additional information contact OSEI-RUM at Sánchez Hidalgo 410 or via telephone 787-832-4040 extension 3107.

12. Academic Integrity:

The University of Puerto Rico promotes the highest standards of academic and scientific integrity. Article 6.2 of the UPR Students General Bylaws (Board of Trustees Certification 13, 2009-2010) states that academic dishonesty includes, but is not limited to: fraudulent actions; obtaining grades or academic degrees by false or fraudulent simulations; copying the whole or part of the academic work of another person; plagiarizing totally or partially the work of another person; copying all or part of another person answers to the questions of an oral or written exam by taking or getting someone else to take the exam on his/her behalf; as well as enabling and facilitating another person to perform the aforementioned behavior. Any of these behaviors will be subject to disciplinary action in accordance with the disciplinary procedure laid down in the UPR Students General Bylaws.—

13. Policy Against Discrimination Based on Sex, Sexual Orientation, and Gender Identity:

The University of Puerto Rico prohibits discrimination based on sex, sexual orientation, and gender identity in any of its forms, including that of sexual harassment. According to the Institutional Policy Against Sexual Harassment at the University of Puerto Rico, Certification Num. 130, 2014-2015 from the Board of Governors, any student subjected to acts constituting sexual harassment, may turn to the Office of the Student Ombudsperson, the Office of the Dean of Students, and/or the Coordinator of the Office of Compliance with Title IX for an orientation and/or formal complaint.

14. Sexual Harassment: Certification 130-2014-2015 states:

Sexual harassment in the workplace and in the study environment is an illegal and discriminatory act and is against the best interests of the University of Puerto Rico. All persons who understand they have been subject to acts of sexual harassment at the University of Puerto Rico may file a complaint and request that the institution investigate, where necessary, and assume the corresponding action by the university authorities. If the complainant is a student, he or she must refer his or her complaint to the Office of the Student Ombudsperson or that of the Dean of Students.

15. Certification 06-43 of the Academic Senate states, "The academic guidelines for offering online courses," defines:

Traditional face-to-face courses are those that have less than 25% of the course's regular contact hours via the Internet. Therefore, a three-credit course will be considered "face to face" if, of the 45 hours of regular contact, 11 or less are taught via the Internet. According to certification 16-43 of the Academic Senate, a course may include up to 25% of its total contact hours via the Internet. The objective of this is so that all professors have this alternative in the case of any unscheduled eventuality.

Revised by:



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Approved by:



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