



University of Puerto Rico
Mayagüez Campus
College of Engineering
Department of Mechanical Engineering
M.S./Ph.D. in Mechanical Engineering



Course Syllabus

1. General Information:
Alpha-numeric codification: INME 6048 Course Title: Continuum Mechanics Number of credits: 3 Contact Period: Three hours of lecture per week
2. Course Description:
English: Study of continuum mechanics covering algebra and calculus of tensors, analysis of stress and deformation at a point. Development of the basic equations of a continuum medium by applying the basic laws of conservation of mass, linear momentum, moment of momentum, and the first and second law of thermodynamics. Study of constitutive axioms and constitutive relations for solids and fluids, application to problems of solid mechanics and/or fluid mechanics.
Spanish: Estudio de la mecánica continua cubriendo temas de algebra y cálculo de tensores y análisis de esfuerzo y deformación en un punto. Desarrollo de las ecuaciones básicas de un medio continuo aplicando las leyes de conservación de masa, momento lineal y la primera y segunda ley de termodinámica. Estudio de axiomas y relaciones constitutivas para sólidos y fluidos, con aplicaciones a problemas de mecánica sólida y/o mecánica de fluidos.
3. Pre/Co-requisites and other requirements:
Pre-requisite: Authorization of the Director of the Department
4. Course Objectives:
<ul style="list-style-type: none">• Understanding and using Cartesian tensors;• Formulating and analyzing stress and deformation at a point;• Formulating and analyzing the kinematics of deformation and motion of continuum;• Formulating the fundamental equations of conservation of mass, linear momentum, moment of momentum, and the first and second law of thermodynamics;• Applying linear elasticity to a continuous medium.
5. Instructional Strategies:
<input checked="" type="checkbox"/> conference <input type="checkbox"/> discussion <input type="checkbox"/> computation <input type="checkbox"/> laboratory <input type="checkbox"/> seminar with formal presentation <input type="checkbox"/> seminar without formal presentation <input type="checkbox"/> workshop <input type="checkbox"/> art workshop <input type="checkbox"/> practice <input type="checkbox"/> trip <input type="checkbox"/> thesis <input type="checkbox"/> special problems <input type="checkbox"/> tutoring <input type="checkbox"/> research <input type="checkbox"/> other, please specify:
6. Minimum or Required Resources Available:
General Library

7. Course time frame and thematic outline

General Topics	Contact Hours
Introduction	1
Cartesian Tensors (Algebra, Fields, and Calculus)	6
Stress principles	8
Kinematics of Deformation & Motions	7
Fundamental Law and Equations	6
Linear Elasticity	8
Classical Fluids	6
Tests	3
Total hours: (equivalent to contact period)	45

8. Grading System

Quantifiable (S/NS) Not Quantifiable

9. Evaluation Strategies

	Quantity	Percent
<input checked="" type="checkbox"/> Exams	3	75
<input checked="" type="checkbox"/> Final Exam	1	25
<input type="checkbox"/> Short Quizzes		
<input type="checkbox"/> Oral Reports		
<input type="checkbox"/> Monographies		
<input type="checkbox"/> Portfolio		
<input type="checkbox"/> Projects		
<input type="checkbox"/> Journals		
<input type="checkbox"/> Other, specify:		
TOTAL:		100%

10. Bibliography:**Textbook:**

Reddy, J. N. 2010. *Principles of Continuum Mechanics: A Study of Conservation Principles with Applications*. Cambridge: Cambridge University Press. [Available at the Circulation Collection (QA808.2. R433 2010), UPRM General Library]

Other resources:

- Mase, Thomas G., and George E. Mase. 1999. *Continuum Mechanics for Engineers*. Florida: CRC Press. <http://dx.doi.org/10.1201/9781439832578>. [Available via MechanicalENGINEERINGnetBASE, UPRM General Library Databases] (**)
- Electronic resources available through the Library's website:
<http://www.uprm.edu/library/cre/listdbsp.php?l=1&st=0&topic=77>.

** These books are key classic references and remain as the top books for the subjects covered in the course and there are no up-to-date textbooks to substitute these books.

11. Law 51: The Comprehensive Educational Services Act for People with Disabilities:

States that after identifying with the instructor and the institution, the student with disabilities will receive reasonable accommodation in their courses and evaluations. For more information, contact the Department of Counseling and Psychological services at the Office of the Dean of Students (Office DE 21) or call 787-265-3864 or 787-832-4040 x 3772, 2040 and 3864.

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. Certification 06-43 of the Academic Senate

"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 06-43 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.

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.

Revised: February, 2019