



University of Puerto Rico
Mayagüez Campus
College of Engineering
Department of Mechanical Engineering
Bachelor of Science in Mechanical Engineering



Course Syllabus

1. General Information: Alpha-numeric codification: INME 4107 Course Title: Materials Science and Engineering Number of credits: 4 Contact Period: Three hours of lecture and two hours of laboratory per week.
2. Course Description: English: A study of the relationships of the mechanical properties of materials to their micro and macro structure, with emphasis on the application of materials in the fields on engineering. Spanish: Un estudio de las relaciones entre las propiedades mecánicas de los materiales y su micro y macro estructuras con énfasis en las aplicaciones de estas en el campo de ingeniería.
3. Pre/Co-requisites and other requirements: Prerequisites: QUIM 3132 and QUIM 3134 and FISI 3171
4. Course Objectives: Upon successful completion, students will be able to: <ul style="list-style-type: none">• Identify and select materials by applying principles of engineering, science, and mathematics that explain a particular mechanical behavior (1);• Design viable processing strategies that achieve the necessary chemical and physical microstructures in the chosen material.• Make clear and effective technical presentations, both in terms of form as well as content, of his/her work and write clear technical reports describing his/her work (3);• Describe how material science fits into the larger framework of professional engineering (4).• Use project management tools such as Gantt charts, Pareto charts, critical path analysis, and action items for planning, prioritizing, and scheduling tasks in a design project work effectively. Work on project teams in both member and leader roles, with team members who may have different backgrounds and technical skill levels (5);• Develop and conduct appropriate experimentation in the area of material testing and interpret data, and use engineering judgment to draw conclusions (6);• Identify adequate processing routes and select suitable materials for particular applications.
5. Instructional Strategies: <input checked="" type="checkbox"/> conference <input type="checkbox"/> discussion <input type="checkbox"/> computation <input checked="" 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 checked="" type="checkbox"/> other, please specify: Monograph

6. Minimum or Required Resources Available:

None.

7. Course time frame and thematic outline

General Topics	Contact Hours
Structure of Engineering Materials.	3
Imperfections in Solid Bodies.	3
Materialographic Characterization Laboratory.	4
Hardness Measurements Laboratory.	2
Impact Testing Laboratory	1
The Phenomenon of Diffusion in Metals.	3
Phase Diagrams.	5
Phase Transformations in Metal and Alloys.	5
Thermal Processing of Metals and their Alloys.	5
Thermal Processing Laboratory.	6
Mechanical Behavior of Engineering Materials.	6
Tensile Testing Laboratory.	2
Fundamentals of Fracture.	5
Strengthening Mechanisms.	5
Introduction to Environmental Degradation.	2
Partial Exam.	3
Total hours: (equivalent to contact period)	60

8. Grading System Quantifiable (letters) Not Quantifiable**9. Evaluation Strategies**

	Quantity	Percent *
<input checked="" type="checkbox"/> Exams	1-3	15-25
<input type="checkbox"/> Final Exam **		
<input checked="" type="checkbox"/> Short Quizzes	0-10	0-50
<input checked="" type="checkbox"/> Oral Reports	0-10	0-25
<input type="checkbox"/> Monographies		
<input type="checkbox"/> Portfolio		
<input checked="" type="checkbox"/> Projects	0-1	0-25
<input type="checkbox"/> Journals		
<input checked="" type="checkbox"/> Other, specify:		
Written Reports	3-10	0-50
Attendance	1	0-25
TOTAL:		100%

*All evaluation strategies will add to 100%

** In design courses a capstone project may replace the final exam.

10. Bibliography:**Textbook:**Callister, W. D., & Rethwisch, D. G. (2018). *Materials science and engineering: An introduction*. Hoboken, NJ: Wiley.**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