

University of Puerto Rico - Mayagüez
College of Engineering
INGE 4001 Sections 040 & 080 – 1st Sem. 10-11

Instructor Information Data Sheet Form

1. General Information

Instructor: O. Marcelo Suárez
Office: Stéfani S-501
Phone: 832-4040 ext. 2350
Office Hours: Mondays and Wednesdays: 11:30 – noon; 1:30-2:30
Email: msuarez@ece.uprm.edu
Web page: <http://ece.uprm.edu/~msuarez/4001>

Graduate Student Assistant:
Glorimar Ramos
Office hours: Mondays & Wednesdays 5:00-7:00 pm
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2. Course INGE 4001 Description

Same as syllabus

3. Purpose

Same as syllabus

4. Course Goals

Same as syllabus

5. Additional Requirements

- All students are expected to:
- Come on time to all classes.
 - Have good attendance record. **12 absences (25% of scheduled classes) will be considered an F.**
 - Do all assignments (including reading assignments) and related homework.
 - Take ALL exams on the designated dates. Failure to take any of them will be considered as an **F** in the course. **NO make-up exams or quizzes will be given.**
 - Do well in all quizzes and tests to receive credit for the course.
 - Participate actively in class and teamwork assignments.

6. Instructional Strategy

This course will consist of lectures with participation and involvement of the students in the learning/teaching process. Students are, therefore, encouraged to browse the instructional material for the following class so as to bring up educated questions on the subject matter.

Team Work:

There will be few team assignments (indicated by the instructor). Each group will be conformed according to the instructor's directions. Every team member will be responsible for knowing all the details of a given assignment. Students are encouraged to make full use of the instructor's office hours when additional instruction material can be available. Every class will consist of PowerPoint presentations. These presentations not only will be available on the course Web page but also to any student that can bring a storage media during the instructor's office hours.

7. Evaluation and Grades

There will be quizzes, two partial exams and a final one. Grade points are given below:

Quizzes:	15 points
1 st Exam Wed. Oct. 20, 7:30pm (S-113):	25 points
2 nd Exam Fri. Nov. 19, 7:30pm (S-113):	25 points
Final Exam:	20 points
Team assignments	15 points

Exam and assignment grades will be returned at most 10 days after the date of the exam or the deadline for the assignment.

Teamwork assignments will be evaluated as a whole, i.e. with a single grade common to all team members. **Those members not participating in an assignment should not be reported by the team.** Then they will receive no credit (0 pt.) in that assignment.

The final exam is a comprehensive exam that covers the whole course.

The final letter grade for the course will be given according with the following scale:

Final Grade Range	Final Letter Grade
90-100	A
80-89	B
70-79	C
60-69	D
0-59	F

8. Deadline for Assignments

Individual deadlines for assignments will be scheduled according to the instructor's directions for each particular case.

9. Attendance and behavior

All students are expected attend all classes, to observe academic conduct, to behave as member of a higher education institution. Permanent class disruption and misconduct may result on a lower or even a failing grade.

10. Course Outline and Schedule

Exam dates for all groups will be posted with enough anticipation on the following Web page: ece.uprm.edu/~msuarez/4001/. **Quiz dates will be announced with short anticipation.**

IMPORTANT: Announcements and additional information will also be available at the same Web address. Make sure you visit it regularly! Handouts for the class presentations will be available in that Web address too. Make sure you bring them before each class.

Topics:

- a) *Introduction, Classification of Engineering Materials, Structure-Property-Performance Relationship.* A look at the general subject: its history, its presence and an outlook for what is to come and how everything relates to engineering.
- b) *Atomic Structure, Interatomic Bonds and their Effect on Properties.* A general overview of the constitution of matter and the effect of those on macroscopical properties of different materials.
- c) *Crystal Structure, X-Ray Diffraction.* The geometry of crystalline solids and basic analysis techniques to determine those geometrical features.
- d) *Imperfections in Crystals, Grain Structure, Microstructure.* How theory of crystals deviates from experimental findings, and the microscopical arrangement of atoms.
- e) *Atomic Diffusion, Fick's Laws, Industrial Applications.* Atoms in motion and activation energies; engineering materials based on these kinetics considerations.
- f) *Phase Diagrams, Phase Rule, Lever Rule and Microstructures of Alloys.* A look at thermodynamics as a frame for chemical reactions and phase transformations; prediction of microstructure based on phase diagrams.
- g) *Strengthening Mechanisms, Strain-Hardening, Solid Solution Strengthening, Dispersion Strengthening, and Precipitation Hardening.* Transformation of materials seeking for enhancement of mechanical properties.
- h) *Modification to Microstructure, Heat Treatments.* Effect of temperature on the modification of physical, chemical and mechanical properties of materials.
- i) *Ferrous and Non-Ferrous Alloys.* Metallurgical engineering foundations.
- j) *Polymers, ceramics and composites.*
- k) *Electrical Properties of Materials*
- l) *Corrosion*

11. Additional References

The following books are in the Library. This list must be complemented with other texts available in the circulation collection, preferably but not exclusively, under call numbers (*clasificación del recurso*) starting with TA 403 (US Library of Congress cataloguing):

Author	Title
D. R. Askeland	<i>The Science and Engineering of Materials</i>
J. F. Shackelford	<i>Introduction to Materials Science for Engineers</i>
C. O. Smith	<i>The Science of Engineering Materials</i>
L. H. Van Vlack	<i>Elements of Materials Science and Engineering</i>
W. F. Smith	<i>Principles of Materials Science and Engineering</i>
W. F. Smith	<i>Foundations of Materials Science and Engineering</i>
Flinn / Trojan	<i>Engineering Materials and Their Applications</i>
W. D. Callister	<i>Materials Science and Engineering – An Introduction</i>