

Course Syllabus

Materials Science - BME 3400 / MENG 3510 - M01 Spring 2018

General information

Course Reference Number	27460 (BME 3400) - 27461 (MENG 3510)
Course Credits	3
Prerequisites	BME-3200, CHEM-1120 with a grade of C- or higher
Class	16:00 - 17:15, MON & WED – Padre Rubio Hall 14
Add/Drop period	Last day to Drop w/o W or Add: January 21 st Last day to Drop w/ W: March 9 th

Instructor information

Name	Javier Oliva Quecedo, Ph.D. Civil Engineering
E-mail	olivaquecedoj@slu.edu
Phone	91 554 58 58
Office location	1 st Floor Padre Arrupe Hall
Office hours	18:45 – 19:45, WED (*)

(*) You can also contact me via e-mail to solve questions.

Javier lectures at SLU-Madrid since 2014, prior to that he taught at UPM (Universidad Politécnica de Madrid) for five years. Besides teaching he works as a project engineer in a private company specialized in the design of bridges and structures.

Textbook

Fundamentals of Materials Science and Engineering - An Integrated Approach (5th edition), William D. Callister, Jr. and David G. Rethwisch, Wiley.

This book is extremely appropriate for the course; therefore students are strongly encouraged to buy it. Affordable copies can be found on Amazon.

E-mail

Campus and course announcements will often be handled by e-mail. Students should check their "@slu.edu" e-mail regularly.

Course Description and Objectives

Materials Science is a multidisciplinary field requiring knowledge of biology, chemistry, thermodynamics, mechanics, transport, medicine, etc. In this course we will examine aspects of chemistry, materials science, mechanics, and biology. Our examination of the field will lead to a general understanding of where the physical properties of materials arise from, and how they can be altered.

Course Outline

1. Introduction
2. Atomic Structure and Interatomic Bonding
3. Structures of Metals and Ceramics
4. Polymer Structures
5. Imperfections in Solids
6. Diffusion
7. Mechanical Properties
8. Deformation and Strengthening Mechanisms
9. Failure
10. Phase Diagrams
11. Phase Transformations
12. Electrical Properties
13. Types and Applications of Materials
14. Fabrication of Materials
15. Composites
16. Corrosion and Degradation
17. Thermal Properties
18. Magnetic Properties
19. Optical Properties

Note that the course schedule may be subject to change depending on the class progress.

Homework

Sets of homework will be handed out and graded. Homework exercises are intended to help the student to understand the material. That is why it is important that you do this work independently. There is typically a strong correlation between effort on the homework and exam scores.

Your homework will be graded on a completion basis. You will receive full credit for attempting to complete each problem regardless of whether your answers are correct. To receive credit for a problem you must show all necessary diagrams, equations and steps. **Homework Guidelines** have to be observed in every submittal.

Your homework will also be graded on the basis of correctness in the same way as exams will be graded. Hence, the instructor will add helpful comments about your work and the mistakes you may have made and you will become familiar with the grading criteria for midterms and finals that of course will be on a correctness basis.

Therefore, students will get two different grades on each Homework assignment:

- **Red grade** on a correctness basis, as though it was an exam.
- **Black grade** on a completion basis, this will be the grade for your homework.

Homework is expected to be handed in on time. Late submissions will be penalized with a 10 % grade reduction if handed in the first class after the deadline. Solutions will be provided for you to check your work.

Exams

There will be 3 midterm exams and a comprehensive final exam covering the full content of the course:

- **Midterm Exam 1 (Units from 1 to 4):** Monday, February 5th 2018 (Class hour).
- **Midterm Exam 2 (Units from 1 to 9):** Monday, March 5th 2018 (Class hour).
- **Midterm Exam 3 (Units from 1 to 14):** Wednesday, April 11th 2018 (Class hour).
- **Final Exam (Units from 1 to 19):** Tuesday, May 8th 2018 (**15:30 – 18:30**). According to SLU-Madrid Final Exam Schedule (see table below taken from SLU-Madrid website).

SPRING 2018					
	4 May (Fr)	7 May (Mn)	8 May (Tu)	9 May (Wd)	10 May (Th)
08:30-11:30	Mn classes that meet at 9:00 & 9:30	Mn classes that meet at 10:00	Mn classes that meet at 11:00 & 11:30	Tu classes that meet at 9:30	Tu classes that meet at 8:00
12:00-15:00	Tu classes that meet at 11:00	Mn classes that meet at 13:00	Tu classes that meet at 14:30	Mn classes that meet at 12:00 & 12:30	Tu classes that meet at 12:30
15:30-18:30	Mn classes that meet at 14:30	Tu classes that meet at 17:00 & 17:30	Mn classes that meet at 16:00	Tu classes that meet at 16:00	Mn classes that meet at 17:30
19:00-22:00	---	---	Mn classes that meet at 18:30 & 19:00	Tu classes that meet at 19:00	---

Grading System

The grade will be obtained from the following areas:

Homework	10 %
Midterm 1	10 %
Midterm 2	15 %
Midterm 3	25 %
Final exam	40 %

Grading scale will be as follows:

A	> 90 %	A-	87-89 %	B+	84-86 %	B	80-83 %
B-	77-79 %	C+	74-76 %	C	70-73 %	C-	66-69 %
D	60-65 %	F	< 60 %				

Course Policies

1. Students are encouraged to participate in class discussions and to ask questions at any moment in order to improve the understanding of explanations.
2. Announcements may be made during the semester.
3. Students are expected to be on time unless a reasonable excuse is given.

4. Students are expected to attend all classes unless a reasonable excuse is given. Any unexcused absences in excess of 3 will result in a lowered grade and even in automatic failure in the course.
5. The use of laptops and mobile devices is not allowed in class.
6. Useful information for the course may be found on the SLU web.
7. Syllabus, reading and homework problems are subject to change.
8. Students are responsible for all lecture material, handouts, homework and assigned reading.
9. Make up exams are not given. Students who legitimately miss an exam, due to a doctor's visit or family emergency must provide written documentation of the circumstances. A letter from the university counselor is accepted. Exams that are missed illegitimately result in a score of F. Grades for these students will be based on the remaining exams. Missing more than one exam results in an F grade.

Course Goals and Student Learning Outcomes

At the end of the course, students will:

- Understand the means by which engineering materials are classified.
- Understand the significance of the following scientific concepts in the interpretation of material performance: atomic bonding, crystal structure, thermodynamics (phase diagrams), kinetics (diffusion), redox reactions, electromagnetic phenomena...
- Understand the physical mechanisms by which engineering materials are modified to obtain desired physical and mechanical properties.
- Be able to select an appropriate material for a given application based on their understanding of the mechanical, physical, and chemical property requirements of the desired component.

Academic Honesty and Plagiarism

Academic integrity is honest, truthful and responsible conduct in all academic endeavors. The mission of Saint Louis University is "the pursuit of truth for the greater glory of God and for the service of humanity." Accordingly, all acts of falsehood demean and compromise the corporate endeavors of teaching, research, health care and community service via which SLU embodies its mission. The University strives to prepare students for lives of personal and professional integrity, and therefore regards all breaches of academic integrity as matters of serious concern.

The governing University-level Academic Integrity Policy can be accessed on the Provost's Office website at

https://www.slu.edu/Documents/provost/academic_affairs/University-wide%20Academic%20Integrity%20Policy%20FINAL%202015-16-15.pdf.

Additionally, SLU-Madrid has posted its academic integrity policy online: <http://www.slu.edu/madrid/academics>. As a member of the University community, you are expected to know and abide by these policies, which detail definitions of violations, processes for reporting violations, sanctions and appeals. The professor will review these policies during the first weeks of the term: please direct questions about any facet of academic integrity to

your professor, the chair of the department of your academic program or the Academic Dean of the Madrid Campus.

Students with Special Needs

In recognition that people learn in a variety of ways and that learning is influenced by multiple factors (e.g., prior experience, study skills, learning disability), resources to support student success are available on campus. Students who think they might benefit from these resources can find out more about:

- Course-level support (e.g., faculty member, departmental resources, etc.) by asking your course instructor.
- University-level support (e.g., tutoring/writing services, Disability Services) by visiting the Academic Dean's Office (San Ignacio Hall) or by going to <http://www.slu.edu/madrid/learning-resources>

Students with a documented disability who wish to request academic accommodations **must** contact Disability Services to discuss accommodation requests and eligibility requirements. Once successfully registered, the student also **must** notify the course instructor that they wish to access accommodations in the course. Please contact Disability Services at disabilityservices-madrid@slu.edu or +915 54 58 58, ext. 230 for an appointment. Confidentiality will be observed in all inquiries. Once approved, information about the student's eligibility for academic accommodations will be shared with course instructors via email from Disability Services. For more information about academic accommodations, see "Student Resources" on the SLU-Madrid webpage.

Note: Students who do not have a documented disability but who think they may have one are encouraged to contact to Disability Services.

Title IX statement

Saint Louis University and its faculty are committed to supporting our students and seeking an environment that is free of bias, discrimination, and harassment. If you have encountered any form of sexual misconduct (e.g. sexual assault, sexual harassment, stalking, domestic or dating violence), we encourage you to report this to the University. If you speak with a faculty member about an incident of misconduct, that faculty member must notify SLU's Title IX deputy coordinator, Marta Maruri, whose office is located on the ground floor of Padre Rubio Hall, Avenida del Valle, 28 (mmaruri@slu.edu; 915-54-5858 ext. 213) and share the basic fact of your experience with her. The Title IX deputy coordinator will then be available to assist you in understanding all of your options and in connecting you with all possible resources on and off campus.

If you wish to speak with a confidential source, you may contact the counselors at the SLU-Madrid's Counseling Services on the third floor of San Ignacio Hall (counselingcenter-madrid@slu.edu; 915-54-5858 ext. 230) or Sinews Multipletherapy Institute, the off-campus provider of counseling services for SLU-Madrid (www.sinews.es; 91-700-1979). To view SLU-Madrid's sexual misconduct policy and for resources, please visit the following web address:

<http://www.slu.edu/Documents/Madrid/campus-life/SLUMadridSexualMisconductPolicy.pdf>

Collection of student work for assessment

Saint Louis University - Madrid Campus is committed to excellent and innovative educational practices. In order to maintain quality academic offerings and to conform to relevant accreditation requirements, the Campus regularly assesses its teaching, services, and programs for evidence of student learning outcomes achievement. For this purpose anonymized representative examples of student work from all courses and programs is kept on file, such as assignments, papers, exams, portfolios, and results from student surveys, focus groups, and reflective exercises. Thus, copies of student work for this course, including written assignments, in-class exercises, and exams may be kept on file for institutional research, assessment and accreditation purposes. If students prefer that Saint Louis University - Madrid Campus does not keep their work on file, they need to communicate their decision in writing to the professor.