**Materials Structures and Properties 1 (ENGR 0022)**

**Fall 2018/Course Syllabus**

# Catalog Description

This course is designed to give the student a basic understanding and knowledge of the structure and properties of materials, the principles of the processing of materials, as well as the concepts of materials design and practical problem solving. The course, Materials Structures and Properties 1 covers the following topics: structure of solid state, mechanical and physicochemical properties of materials, fabrication and processing of materials, materials performance, materials degradation, characteristics and application of materials. Students will use MsWord and MsExcel to present and solve materials engineering problems, related to: materials structure, mechanical properties and performance of materials, materials degradation, physicochemical processes of materials, and so on. It is 3 credit hours course. No prerequisites are necessary.

# Schedule

## Lecture/Studio, Room 3-106

Section 01/MSE: Tuesdays 8:10 – 11:00 am

Section 02/IE: Tuesdays 1:50 – 4:25 pm

Section 03/ME: Thursdays 1:50 – 4:25 pm

# Instructor

Dr. Joanna Borowiec 1633092392@qq.com

Teaching Assistant will be announced on the Blackboard later on.

Email subject should include “ENGR-XXX” (where, XXX-stands for MSE, IE or ME student class) in the subject field of your message.

# Textbook *Materials Science and Engineering, 9th Edition, International Student Version* W.D. Callister, Jr. and *D.G. Rethwisch, 9th edition, John Wiley and Sons, Inc. (2014)*

Textbook reading assignments will be posted to the class website, on the Blackboard system at: [*https://learn.scupi.cn/*](https://learn.scupi.cn/)(the *https* is important to load the page). A course syllabus, studio and homework assignments (all homework assignments will be uploaded through Blackboard system), will be posted and available to download. Please check the Blackboard page on a daily basis.

# Software

We will use a Microsoft Excel software to perform calculations and to plot data on the graphs. For basic calculations you can use calculator. You will also use Microsoft Word to write up your assignments. Please, learn how to use the software in order to successfully accomplish assigned tasks.

# Studio and Homework Assignments

In some of the class, you will be assigned a studio problems and you will work to complete these problems as a team during the class. Your team will turn in a short writeup by 1:30pm (Section 01/MSE) and 6:00pm (Section 02/IE and Section 03/ME) the day of your class. The writeups will be graded on a 0 - 10 point scale. Writeups turned in after 1:30pm (Section 01/MSE) and 6:00pm (Section 02/IE and Section 03/ME) of the day of your class should be sent to an e-mail: [1633092392@qq.com](mailto:1633092392@qq.com) in a scanned version and will be penalized by 4 points. Writeups not submitted by specified above time will receive zero points.

The homework scores will be used to compute your final grade, for details see: *Exams and Grading* section below. Homework problems will be assigned every week and posted on Blackboard. These are to be solved and turned in by Thursday 6:00 PM of the following week. Homework assignments must be solved individually and will be graded individually. Homework will be graded on a 0-10 point scale. In a case of a holiday, if necessary, an appropriate deadline for homework turn in will be announced on Blackboard. All homework will be submitted in electronic form. Please keep your work consistent, it’s not the length of your homework but content that will be graded. When you solve a problem present clearly each step that led you to the solution. Late homework will not be accepted and will automatically receive 0 points.

# Exams and Grading

There will be a midterm exam on: October 30th (for Section 01/MSE)

November 1st for Section 02/IE and Section 03/ME),

and a final exam at the end of the semester (time will be confirmed on the Blackboard system). Exam is an individual work. You are not allowed to use any help, including: book, notes or cellphone. You should bring calculator and ruler.

Your grade will be computed as follows:

* homework (20%)
* midterm examination (30%)
* final examination (30%)
* studio assignments and class participation (20%)

# Office Hours

If you encounter problem in understand something you can come to our office during office hours.

**Current office hours are:**

Every

Tuesday 12:00 – 1:30 PM and 4:30 – 6:00 PM and

Thursday 4:30 – 6:00 PM,

except holidays.

Any changes of the office hours will be posted on the class website.

# Course Goals

* To acquire basic knowledge of materials engineering
* To develop skills in defining materials engineering problems and finding solutions
* To gain proficiency in communication through written reports
* To learn how to communicate and work in a team to efficiently solve problems
* To understand the relationship between material properties and processing for specific application
* To learn how to develop logical and critical thinking, as well as how to use your knowledge to solve problems

# Approximate Schedule

|  |  |  |
| --- | --- | --- |
| **Week** | **Topic** | **Textbook Chapter** |
| 1 | Interatomic bonding and introduction to structure of solid state | 1-3 |
| 2 | Crystallography and X-ray diffraction technique | 4 |
| 3 | Solid phase defects | 6 |
| 4 | Diffusion | 7 |
| 5 | Mechanical properties and strengthening mechanisms of materials | 8, 9 |
| 6 | Materials failure | 10 |
| 7 | Problems solving 1 | 1-8 |
| 8 | Problems solving 2 | 1-8 |
| 9 | Mid-term Exam | – |
| 10 | Materials failure – problems solving | 9, 10 |
| 11 | Phase diagrams | 11 |
| 12 | Phase diagrams – problems solving | 11 |
| 13 | Materials and their classification | 1 |
| 14 | Phase diagrams – problems solving (students competition) | 11 |
| 15 | Characteristics & Applications of Polymers (student’s presentations) | 5, 15 |
| 16 | Problems solving | 9, 10 |
| 17 | Review, problems solving and preparation to the final exam | 5, 9-11 |
| 18 | Final exam | – |

**Detailed time table:**

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| --- | --- | --- | --- |
| **Week** | **MSE** | **IE** | **ME** |
| 1 | 4.09 | | 6.09 |
| 2 | 11.09 | | 13.09 |
| 3 | 18.09 | | 20.09 |
| 4 | 25.09 | | 27.09 |
| 5 |  | | 29.09 |
| - | 2.10 | | 4.10 |
| 6 | 9.10 | | 11.10 |
| 5 | 13.10 | |  |
| 7 | 16.10 | | 18.10 |
| 8 | 23.10 | | 25.10 |
| 9 | 30.10 | | 1.11 |
| Mid-term Exam | 3.11.2018 | | |
| 10 | 6.11 | | 8.11 |
| 11 | 13.11 | | 15.11 |
| 12 | 20.11 | | 22.11 |
| 13 | 27.11 | | 29.11 |
| 14 | 4.12 | | 6.12 |
| 15 | 11.12 | | 13.12 |
| 16 | 18.12 | | 20.12 |
| 17 | 25.12 | | 27.12 |
| 18 | 1.01 | | 3.01 |
| Final Exam | 9.01.2019 | | |

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| --- | --- |
|  | No classes |
|  | Make up for missing classes |
|  | Exam week |