



Course Syllabus

MSE3500J Structure of Materials

Summer 2025

Course Description:

The properties of materials are intimately linked to the structures of materials. This course first introduces the basic principles of bonding in materials, laying the foundation for understanding and characterizing materials structures. We take a bottom-up approach, starting with interatomic bonds in materials. This is followed by a detailed description of crystal structure (crystallography), which deals with the essential topics of unit cells, crystal systems, and symmetry in crystallography. Next, we discuss diffraction techniques, particularly X-ray diffraction, for probing crystal structures. We finally move to soft matter materials and cover topics such as liquid crystals, surfactants, polymers, colloidal materials, and soft biological materials.

Instructor:

Name: Wendong Wang

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Office: Room 508, Longbin BLDG

Office hour: by appointment

Reference Books (Author, Book Title, Publisher, Publication Year, ISBN):

Rohrer, G. S. *Structure and bonding in crystalline materials*. (Cambridge University Press, 2009). 978-0-521-66328-1

Naumann, R. J. *Introduction to the Physics and Chemistry of Materials*. (CRC Press, 2008). 978-1-4200-6134-5

Hirst, L. S. *Fundamentals of Soft Matter Science*. (CRC Press, 2012). 978-1-4665-9092-2

Lecture:

Students are expected to attend every lecture.

Time:

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8:55 – 11:40 on Wednesdays

8:00 – 9:40 on Fridays

Course prerequisites:

VC209/VC210 & VK250/VM382

Classroom:

DSY403

Grading Policy (Assignments %, Exams, etc.):

Project report (20%)

Quizzes (40%)

Final exam (40%)

Honor Code Policy:

We follow the guidelines set out by the JI honor code:

<https://www.ji.sjtu.edu.cn/academics/academic-integrity/honor-code/>

Some more specific requirements:

You are encouraged to discuss with your classmates about the problems in the homework and the proposals, but you must complete these assignments on your own. Presentations will be judged by both content and clarity of delivery.

Tentative schedule:

No.	Date	Lectures	Notes
1	14 May	Introduction (Rohrer, chapter 1) & fundamental principles (Naumann, chapter 2)	



2	16 May	Fundamental principles (Naumann, chapter 2)	
3	21 May	Chemical bonding (Naumann, chapter 3)	
4	23 May	Chemical bonding (Naumann, chapter 3)	
5	28 May	Basic structural concept (Rohrer, chapter 2)	
6	30 May	Basic structural concept (Rohrer, chapter 2)	
7	4 Jun	Symmetry in crystal structures (Rohrer, chapter 3)	
8	6 Jun	Symmetry in crystal structures (Rohrer, chapter 3)	
9	11 Jun	Symmetry in crystal structures (Rohrer, chapter 3)	
10	13 Jun	Review and quiz	
11	18 Jun	Crystal structures (Rohrer, chapter 4)	
12	20 Jun	Crystal structures (Rohrer, chapter 4)	
13	25 Jun	Crystal structures (Rohrer, chapter 4)	
14	27 Jun	Diffraction (Rohrer, chapter 5)	
15	2 Jul	Diffraction (Rohrer, chapter 5)	
16	4 Jul	Diffraction (Rohrer, chapter 5)	
17	9 Jul	Defects in crystals (Naumann, chapter 8)	
18	11 Jul	Defects in crystals (Naumann, chapter 8)	
19	16 Jul	Review and quiz	
20	18 Jul	Liquid crystals (Hirst, chapter 2)	
21	23 Jul	Surfactants (Hirst, chapter 3)	
22	25 Jul	Polymers (Hirst, chapter 4)	
23	30 Jul	Colloidal materials (Hirst, chapter 5)	
24	1 Aug	Soft Biological materials (Chapter 6)	
25	6 Aug	Review	

Note: