MSE 350/357 & PHYS 342 – SPRING 2022

Instructor Information:

Instructor: Prof. Ruixing Zhang, Department of Physics & Astronomy

Office: 203 South College

Email: ruixing@utk.edu or, via the Canvas message system

Class Location: 223 Nuclear Engineering Building (NEB)

Class Time: Tuesday and Thursday, 1:10 pm – 2:25 PM;

TA: Nan Tang (ntang1@vols.utk.edu)

Office Hours: Tuesday 3:00 – 4:00 PM via Zoom link

https://tennessee.zoom.us/j/91878089679

Communication: The majority of classroom communication will be conducted via the Canvas for this class. To ensure prompt response from me, follow the email policy:

- Please put "**Course #**" (i.e. MSE 350, MSE 357, or PHYS 342) in the subject line of all course related emails. This practice will help me identify course related emails and respond promptly.
- You can expect up to a 24-hour delay in responding to emails; I will try to minimize such delays, but do not email me on the evening an assignment is due or before an exam expecting an immediate response.
- Before emailing me with questions about the course, please ensure that the information is not already provided in the course syllabus or on Canvas.

Course Description & Goals:

Textbook: **Introduction to Solid State Physics** (8th edition) by Charles Kittel.

Course Overview: This is a ***3 credit-hour*** course on the introduction to solid state physics. This course will cover the following topics: **crystal lattice, reciprocal lattice, X-ray diffraction, crystal binding, phonon, free electron gas, and electronic band theory**. We will cover the first 7 chapters of the text book

Pre/corequisites: The course and text assume you are familiar with calculus, vector algebra, complex numbers, Newtonian mechanics, electricity & magnetism, and some atomic physics. Familiarity with matrix theory, Fourier analysis, differential equation, and basic quantum mechanics is preferred but not required.

Class Schedule: The following is a class schedule along with lecture topics, exams, etc. This is a **tentative** schedule, and might differ as our class speed. We will discuss in the class if there are any changes, and notices made in the classes/announcements supersede the schedule.

Class sessions:

1.	T Jan. 25	Introduction
2.	R Jan. 27	Crystal Lattice (Chap. 1)
3.	T Feb. 1	Crystal Lattice (Chap. 1)
4.	R Feb. 3	XRD & Reciprocal Lattice (Chap. 2)
5.	T Feb. 8	XRD & Reciprocal Lattice (Chap. 2)
6.	R Feb. 10	XRD & Reciprocal Lattice (Chap. 2)
7.	T Feb. 15	Crystal Binding (Chap. 3)
8.	R Feb. 17	Crystal Binding (Chap. 3)
9.	T Feb. 22	Crystal Binding (Chap. 3)
10.	R Feb. 24	**Midterm #1 (Tentative)**
11.	T Mar. 1	Phonon I (Chap. 4)
12.	R Mar. 3	Phonon I (Chap. 4)
13.	T Mar. 8	Phonon I (Chap. 4)
14.	R Mar. 10	Phonon II (Chap. 5)
15.	T Mar. 22	Phonon II (Chap. 5)
16.	R Mar. 24	Free Electron Gas (Chap. 6)
17.	T Mar. 29	Free Electron Gas (Chap. 6)
18.	R Mar. 31	Free Electron Gas (Chap. 6)
19.	T Apr. 5	**Midterm #2 (Tentative)**
20.	R Apr. 7	Band Theory (Chap. 7)
21.	T Apr. 12	Band Theory (Chap. 7)
22.	T Apr. 19	Band Theory (Chap. 7)
23.	R Apr. 21	Band Theory (Chap. 7)
24.	T Apr. 26	Special Topics
25.	R Apr. 28	Special Topics
26.	T May 3	Special Topics
27.	R May 5	Special Topics
28.	T May 10	N/A
Wednesday May 18		FINAL EXAM

Grading & Evaluation:

Homework Assignments: Problem sets and exercises will be assigned at regular intervals. These will contain a mix of short explanations, discussion questions, and calculations.

The assignments will be turned in during class on the indicated due date. If an assignment is turned in late, I will reduce the mark by 25% for each 24-hour period it is overdue (unless you have made prior arrangements to turn the material in at a later time).

Midterm Exams: There will be two midterm tests. The tentative dates for the midterms are indicated on the schedule. ***Please note that these dates are subject to change as we progress through the course material but they will be finalized at least a week prior so that you can plan accordingly.*** Each midterm exam will be **one hour** in length.

Final Exam: The final exam will be held on **1:00 pm to 3:00 pm on May 18th 2022** in our regular classroom. The Final Exam will be two hours in length and cumulative in scope.

Make-up Policy: If a known conflict exists you should contact me at least **two weeks** in advance to make alternate arrangements. If the final exam for the course is your third exam of the day, you should contact me by **Tuesday, April 26th** to make alternate arrangements.

Grading Scheme:

Grades: Your grade is calculated based on many elements of the course. See the table below for details on this.

Course Element	%
Mid Term 1	15%
Mid Term 2	15%
Final Exam	30%
Homework	40%
Total	100%

Letter grade will be obtained using the conversion below:

%	Grade
>90%	A

87% - 89%	A-
83% - 86%	B+
80% - 82%	B
77% - 79%	B-
73% - 76%	C+
70% - 72%	C
67% - 69%	C-
63% - 66%	D+
60% - 62%	D
57% - 59%	D-
<56%	F

Other Information:

Class Rules: Students need to follow the following guidelines and class room etiquette in order to ensure a positive and respectful learning environment for everyone:

- **Be respectful:** Act in a matured/polite manner and be respectful of the learning process (See the rules posted on Canvas).
- **Raise your hand:** If you have a question or comment during the class, please raise your hand.
- **Share the air:** If you have been dominating the discussion or participating disproportionately, let others participate. Alternatively, if you haven't said much, you are encouraged to participate more.
- Please use **respectful and (socially) inclusive language.**

Group work policy: I encourage students to work together and discuss the homework with each other. Such discussions are one of the most effective ways of assimilating the material. The work you turn in must be written up by you and **NOT** be a copy of your peers' work or some other source such as solutions found on the Internet. **Any homework assignment that is a direct copy of another person's work without attribution will count as plagiarism and will be dealt with accordingly. Do not take advantage of the work of other people, and do not let anybody benefit from yours.**

Your Feedback/Suggestions on the course: You are encouraged to provide feedback on any aspect of the course all through the semester using any communication method you prefer. Your **grades will not be impacted by any feedback** you provide, they will be purely based on your coursework and lab work. However, your discretion in these matters is expected. You will also have an opportunity to give feedback at the end of the semester through the Course Evaluation System. Your feedback is critical in improving the course!

Students with Disabilities:

If you need course adaptations or accommodations because of a documented disability, please contact the Student Disability Services (SDS). This will ensure that you are properly registered for the services provided by SDS. *University Policy forbids me from making special accommodations without a letter from the Office of Student Disability Services.*

Disability Services Contact Information:

2227 Dunford Hall

Knoxville, TN 37996-4020

Phone: (865) 974-6087 Fax: (865) 974-9552

Email: sds@utk.edu Website: https://sds.utk.edu/

Campus Syllabus

The campus syllabus provides additional important information, including academic integrity, UT alerts, wellness, etc. The campus syllabus can be found via **https://utk.instructure.com/courses/55015/pages/ut-knoxville-campus-syllabus-%7C-2021-2022.**

COVID-19 Guidelines

Masking

According to public health authorities, in areas where there is substantial or high COVID transmission, wearing masks in indoor spaces can help reduce transmission of the virus and keep communities healthy. Any individual can choose to wear a mask anywhere on campus, even when it is not required. The university expects everyone to protect others from the spread of COVID-19 and strongly recommends wearing masks in academic and administrative spaces.

For the most current information on masks, please check the COVID-19 website at utk.edu/coronavirus.

Vaccines

The university recommends that all members of the campus community be vaccinated for their own protection, to prevent disruption to the semester, and to prevent the spread of COVID-19. Vaccination information and appointment signups are available at tiny.utk.edu/vaccine. The Student Health Center medical staff is available to students to answer questions or discuss concerns about vaccines, and the center provides vaccines free of charge for anyone 18 years or older who would like one.

Sickness or exposure

If students think they are sick or have been exposed to COVID-19, they should contact the Student Health Center or their preferred health care provider. Students can also contact the university's COVID-19 support team for guidance by filling out the COVID-19 self-isolation form at covidform.utk.edu. Students are advised not to attend class in-person if they have tested positive for COVID-19 and are in the isolation period, if they have COVID-19 symptoms and have not been cleared by a medical provider, or if they are an unvaccinated close contact in the quarantine period. The university recommends that students and employees stay home anytime they do not feel well. If you need to miss class for illness, please contact your instructor.

You must not attend class if you have tested positive for COVID-19 and are in the isolation period, if you have COVID-19 symptoms and have not been cleared by a medical provider, or if you are an unvaccinated close contact in the quarantine period.

If you need to miss class for illness, contact me immediately via ruixing@utk.edu.

DISCLAIMER

The instructor reserves the right, when necessary, to alter the grading policy, change examination dates, and modify the syllabus and course content. Modifications will be announced in class. Students are responsible for announced changes.

Good luck and have a great semester :)