

PHZ7427 Solid State II [Spring 2024] (3 credits)

Meeting times and place: Monday, Wednesday, Friday, period 7 (1:55 pm-2:45 pm), NPB 1011

Subject and Focus of the Course: This course, “Solid State II”, covers the “advanced” part of condensed-matter physics, focusing on such subjects as non-local and quantum transport, integer and fractional quantum Hall effects, topological matter, electron-electron interaction, magnetism, and superconductivity.

Inclusion, Diversity, and Equity: My intention is to provide each student with a safe, diverse, and inclusive atmosphere that affords a personalized opportunity to engage the material being presented. As the protocols for dealing with COVID conditions evolve, I will attempt to present the course material and graded assignments in a manner sympathetic to these conditions, while also being respectful of diversity of gender, sexuality, ethnicity, race, culture, socioeconomic status, age, and accommodations. To achieve this environment, I ask for suggestions and feedback from all students, as each perspective is important to me, and I will do my best to make adjustments that are needed.

Instructor: Prof. Dmitrii Maslov, Department of Physics, University of Florida

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Office Hours: Wednesday, 3:00 pm-4:00 pm, Friday, 3:00 pm-4:00 pm, or by appointment.

Note for COVID era: Appropriate face-coverings are always welcome. If you sense any symptoms that may be related to COVID, please do not come to class. Instead, please follow the university protocol (<https://coronavirus.ufl.edu/>), and as soon as reasonably possible, please contact the Instructor. Please note that if you are not allowed on campus, then do not come to class.

Prerequisite/Corequisite: *Prerequisite* – graduate core sequence (Classical Mechanics, Electromagnetism, Quantum Mechanics, and Statistical Physics) and Solid State I. ***If you do not meet these requisites, please discuss with the Instructor if it is advisable to follow this course.***

Recommended text: Steven M. Girvin and Kun Yang, “Modern Condensed Matter Physics”, Cambridge, 2019.

Coursework: (roughly) bi-weekly homework assignments (85%) and oral presentation (15%). No exams.

Late homework: Working out homework problems is a very important component of the educational process. Homework submitted late is better than no homework submitted at all. For this reason, late homework will be graded using the following scheme: submission within 72 hours after the deadline will be graded at 75% of the full credit; next 72 hours will lower the scale to 50%; etc.

Posting: Materials and information concerning the course, including important announcements and dates, along with an a schedule, will be posted on the Course Webpage within the UF ELS Canvas system.

Attendance: Attendance is required for the days of oral presentations and highly recommended for all other days.

Units rule: You will have to demonstrate that algebraic answers for homework problems have the right units. For example, if the problem asks to find a force, you will need to show that the result has indeed the units of force. Such checks are a simple but very important tool for spotting errors in derivations, and they are used routinely by professional researchers. **Without such a check a score will be reduced by 10%, even for a correct answer.** On the other hand, if you do not actually solve the problem but come up with an order-of-magnitude estimate by using dimensional analysis and other considerations, such as symmetry, analyticity, etc., you can earn up to 50% of the maximum credit.

Additional details about the UF grading policies can be found at found at:
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

Final Course Grade Scale

A	85% - 100%
A-	80% - 84.9%
B+	75% - 79.9%
B	70% - 74.9%
B-	65% - 69.9%
C+	60% - 64.9%
C	55% - 59.9%
C-	50% - 54.9%
D+	45% - 49.9%
D	40% - 44.9%
D-	35% - 39.9%
E	0% - 34.9%

Academic Honesty: Please review the University Policies on Academic Honesty, and links are <https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/> and <http://www.dso.ufl.edu/sccr/>. Here is an important excerpt: “*Academic honesty and integrity are fundamental values of the University. Students commit to holding themselves and their peers to the high standard of honor required by the Student Honor Code. Any Student who becomes aware of a violation of the Student Honor Code is encouraged to report the violation to the appropriate University Official.*”

Accommodations and Advising: Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://disability.ufl.edu/>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the Instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Advising and Counseling: Due to the nature of the environment at the university, it is not uncommon for students to experience stressful situations. You find yourself in this situation, you are encouraged to seek confidential counseling, see: <http://www.counseling.ufl.edu/cwc/>.

Incomplete Policy: A grade of incomplete is given only to students who endure a situation in which they are incapable of completing the coursework. The I-grade is not to be given to students who are simply dissatisfied with their performance in the course. If you find you are in a situation that might qualify you for an I-grade and you want to pursue this potential option, then you must contact the Instructor as soon as possible. A PDF of the policy is posted at: <http://www.phys.ufl.edu/downloads/gradepolicy.pdf>. Please note the agreement on an I grade must be reached **before** the end of classes.

Special Notes about the Syllabus: Please note that the dates for all graded materials are TENTATIVE. The schedule will be being adjusted during the course. Revisions will be announced in class and posted on the course Canvas page.

Course Evaluations: Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

CLASS SCHEDULE

LECTURE	SUBJECT	CHAPTER from GIRVIN&YANG
8-Jan	Quantum & non-local transport	10,11
10-Jan	Quantum & non-local transport	10,11

12-Jan	Quantum & non-local transport	10,11
15-Jan	Quantum & non-local transport	10,11
17-Jan	no class MLK day	10,11
19-Jan	Quantum & non-local transport	10,11
22-Jan	Quantum & non-local transport	10,11
24-Jan	Integer Quantum Hall Effect	12
26-Jan	Integer Quantum Hall Effect	12
29-Jan	Integer Quantum Hall Effect	12
31-Jan	Topological Matter	13,14
2-Feb	Topological Matter	13,14
5-Feb	Topological Matter	13,14
7-Feb	Topological Matter	13,14
9-Feb	Topological Matter	13,14
12-Feb	Topological Matter	13,14
14-Feb	Interacting Electrons	15
16-Feb	Interacting Electrons	15
19-Feb	Interacting Electrons	15
21-Feb	Interacting Electrons	15
23-Feb	Interacting Electrons	15
26-Feb	Interacting Electrons	15
28-Feb	Interacting Electrons	15
1-Mar	Interacting Electrons	15
	no class March meeting, makeup	
4-Mar	TBA	
	no class March meeting, makeup	
6-Mar	TBA	
8-Mar	Fractional Quantum Hall Effect	16
3/11-3/15	UF spring break	
18-Mar	Fractional Quantum Hall Effect	16
20-Mar	Fractional Quantum Hall Effect	16
22-Mar	Fractional Quantum Hall Effect	16
25-Mar	Magnetism	17
27-Mar	Magnetism	17
29-Mar	Magnetism	17
1-Apr	Magnetism	17
3-Apr	Superfluidity & Superconductivity	18-20
5-Apr	Superfluidity & Superconductivity	18-20
8-Apr	Superfluidity & Superconductivity	18-20
10-Apr	Superfluidity & Superconductivity	18-20
12-Apr	Superfluidity & Superconductivity	18-20

15-Apr	Superfluidity & Superconductivity	18-20
17-Apr	Superfluidity & Superconductivity	18-20
19-Apr	Superfluidity & Superconductivity	18-20
22-Apr	Superfluidity & Superconductivity	18-20
24-Apr	Superfluidity & Superconductivity	18-20