Many-Body Theory
PHY 392N
Unique Number 58775
(Spring Semester, 2013)

Instructor: Prof. Greg Fiete. Office: RLM 13.316; Ph: 232-8084. fiete@physics.utexas.edu
TA: Mr. Xiang Hu
Classes: MWF 10:00 am-11:00 am, RLM 6.122.
Office hours: Wednesday 11:00 am-12:00 noon and by appointment.

Textbook: Condensed Matter Field Theory (Cambridge) Second edition, by Altland and Simons. This is a modern treatment of many-body field theory techniques applicable to condensed matter and atomic and molecular systems.

References: There are a number of other texts that are also useful references for many body theory. They include: Quantum Field Theory of Many-Body Systems (Oxford), by Wen; Quantum Theory of Many Particle Systems (McGraw-Hill) by Fetter and Walecka; Many-Particle Physics (Plenum) by Mahan. For one-dimensional many-body systems, there are specialized mathematical tools that are well described in: Quantum Physics in One Dimension (Oxford) by Giamarchi and Bosonization and Strongly Correlated Systems (Cambridge) by Gogolin, Nerseyan and Tsvelik.

Prerequisite: Graduate standing; graduate quantum mechanics; consent of instructor. Some solid state physics and graduate statistical mechanics highly desirable but not strict requirement.

Course Requirements and Grading Policy:

*CLASS ATTENDANCE. Class attendance is important to reinforce topics covered in the homework and vice-versa.

*Homework sets (assigned roughly every 2 weeks) to emphasize the most important ideas from class.

* Final presentation/paper or final exam. Depending on the final enrollment numbers we will either have a final exam or a final presentation/paper. This will be decided by the last day of February and announced in class.

The final grade will be based on attendance, homework, and the final.

Material to be covered:

We will cover selected topics from chapters 1-11 of our text. A few additional modern topics may be treated if time permits.

Perspective of instructor:

As the title suggests, this course is heavily weighted towards theoretical material and techniques. However, my goal is to make these ideas accessible to all in the course, regardless of specialization. The material covered here is the modern language of non-relativistic many-
body quantum theory which finds its main application in condensed matter and atomic and molecular physics.

Required University Notices and Policies

University of Texas Honor Code
The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community.

Use of E-Mail for Official Correspondence to Students
Email is recognized as an official mode of university correspondence; therefore, you are responsible for reading your email for university and course-related information and announcements. You are responsible to keep the university informed about changes to your e-mail address. You should check your e-mail regularly and frequently—I recommend daily, but at minimum twice a week—to stay current with university-related communications, some of which may be time-critical. You can find UT Austin’s policies and instructions for updating your e-mail address at http://www.utexas.edu/its/policies/emailnotify.php.

Documented Disability Statement
If you require special accommodations, you must obtain a letter that documents your disability from the Services for Students with Disabilities area of the Division of Diversity and Community Engagement (471-6259 voice or 471-4641 TTY for users who are deaf or hard of hearing). Present the letter to me at the beginning of the semester so we can discuss the accommodations you need. No later than five business days before an exam, you should remind me of any testing accommodations you will need. For more information, visit http://www.utexas.edu/diversity/ddce/ssd/.

Religious Holidays
By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, I will give you an opportunity to complete the missed work within a reasonable time after the absence.

Behavior Concerns Advice Line (BCAL)
If you are worried about someone who is acting differently, you may use the Behavior Concerns Advice Line to discuss by phone your concerns about another individual’s behavior. This service is provided through a partnership among the Office of the Dean of Students, the Counseling and Mental Health Center (CMHC), the Employee Assistance Program (EAP), and The University of Texas Police Department (UTPD). Call 512-232-5050 or visit http://www.utexas.edu/safety/bcal.

Emergency Evacuation Policy
Occupants of buildings on the UT Austin campus are required to evacuate and assemble outside when a fire alarm is activated or an announcement is made. Please be aware of the following policies regarding evacuation:
- Familiarize yourself with all exit doors of the classroom and the building. Remember that the nearest exit door may not be the one you used when you entered the building.
- If you require assistance to evacuate, inform me in writing during the first week of class.
- In the event of an evacuation, follow my instructions or those of class instructors.
- Do not re-enter a building unless you’re given instructions by the Austin Fire Department, the UT Austin Police Department, or the Fire Prevention Services office.