

COURSE OUTLINE: PHYSICS 739

Fall 2013

Instructor: Dr. Duncan O'Dell, ABB 320, Ext. 23189, dodell@mcmaster.ca

Teaching Assistant: Peter Lunts, email: luntsp@mcmaster.ca

Text: J. J. Sakurai & J.J. Napolitano, **Modern Quantum Mechanics**, 2nd Edition.

The first meeting of this class will be Tuesday, September 17, 2013

Class times and Room: Tuesdays (10:00-11:30am) and Thursdays (10:00-11:30am), in ABB 272.

“The reader who has read the book but cannot do the exercises has learnt nothing” J.J. Sakurai

I will assume that you have already taken two courses in quantum mechanics at the undergraduate level, so that you are familiar with the motivation and underlying concepts.

The textbook contains more material than can be covered in one semester. Some of the later chapters, such as identical particles and scattering theory will be left to the second quantum mechanics course, Physics 740. The rest will be covered by a combination of lectures and assigned reading. A *tentative* schedule is as follows:

| Week | Chapter(s) | Topic |
|------|------------|----------------------------------|
| 1 | 1 | Review. Fundamental Concepts (1) |
| 2 | 1 | Fundamental Concepts (2) |
| 3 | 2 | Quantum Dynamics: Time Evolution |
| 4 | 2 | Quantum Dynamics: Pictures |
| 5 | 2 | Quantum Dynamics: Path integrals |
| 6 | 5 | Approximation Methods (1) |
| 7 | 5 | Approximation Methods (2) |
| 8 | 4 | Angular Momentum (1) |
| 9 | 3 | Angular Momentum (2) |
| 10 | 3 | Symmetry |
| 11 | 7 | Linear Response Theory? (1) |
| 12 | 7 | Linear Response Theory? (2) |

It is absolutely crucial that you read the corresponding part of the book *before* we cover the subject in class. This is what I will assume. My teaching philosophy is not to reproduce on the blackboard what is very elegantly and carefully presented the book. Rather, I will use the book as a launching point, and will only highlight/discuss/build upon what I consider to be the key topics.

Note also that I am considering covering a topic known as *linear response theory* at the end of the course. This topic is not explicitly covered in the book. However, it is a very useful application of perturbation theory that finds wide application. In fact it has a close relation to scattering theory. I will give the necessary material in the lectures.

The course grade will be based on: Bi-weekly Assignments (25%), Mid-Term (25%) and Final (50%). A tentative week for the Mid-Term is the last week in October.

Academic Ethics and Collaboration:

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, located at http://www.mcmaster.ca/senate/academic/ac_integrity.htm

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one's own or for which credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

DISCLAIMER: The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.