San José State University  
Department of Physics and Astronomy  
Phys 163, Quantum Mechanics, Sect. 1, Fall 2017

Course and Contact Information

Instructor: Ken Wharton  
Office Location: SCI 308  
Telephone: 408-924-5257  
Email: Kenneth.wharton@sjsu.edu  
Office Hours: TR 1:30-2:30pm  
Class Days/Time: TR 12:00-1:15pm  
Classroom: SCI 242  
Prerequisites: Phys 122, Phys 130 (or equivalent Linear Algebra Math Course)

Course Format

Faculty Web Page

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on my faculty web page at http://www.sjsu.edu/people/kenneth.wharton, or http://tinyurl.com/9czdnp3. You are responsible for regularly checking the webpage to learn of updates.

Course Description

This is a one semester course on Quantum Mechanics. We will cover solutions of the Schrödinger equation (Wells, harmonic oscillator, H-atom, etc.), the mathematical formalism of quantum mechanics, and angular momentum.

Course Learning Outcomes (CLO)

Your learning objectives are to learn the concepts behind the above topics with sufficient understanding as to solve new quantitative problems that you have not yet encountered. This includes learning the mathematical approaches necessarily for solving such problems.

Upon successful completion of this course, students will be able to:

1. Utilize solutions to the Schrödinger equation to time-evolve single-particle quantum states
2. Calculate allowable measurement outcomes and associated probabilities
3. Approach multi-particle states in the context of adding angular momentum
Required Texts/Readings

Textbook
The required textbook for this course is "Introduction to Quantum Mechanics" by David Griffiths, 2nd edition, ISBN-10: 0131118927. Cheaper paperback editions are acceptable.

Other Readings
Will be linked to the course website as needed.

Course Requirements and Assignments

Solving a vast majority of the homework problems is crucial for success in this course; one cannot achieve the course learning outcomes without spending the necessary hours working through the problems. Homework will be assigned on a weekly basis; in general late homework will not be accepted. The total homework score is 25% of the final grade.

You are also expected to participate in class-based problem-solving, both on your own and in a small group. On occasion you will have to explain your work to the class.

There will be two midterm exams, and one comprehensive final exam.

Final Examination
The final exam will be a comprehensive test, in the same style as the midterms (multi-step problem solving).

Grading Information

- Not all homework problems receive the same weight; more complicated solutions get more points. For each homework problem scoring below 80%, please review the material, as such a score indicates at least some lack of conceptual understanding (as opposed to small mathematical errors).
- A similar grading approach applies to the problems on exams.

Determination of Grades

- The mean grade for this class is usually a B; other grades are distributed above and below based on the total percentage score only.
- Extra credit is usually not available; when it is offered, it will be offered to the entire class.
- The final grade is determined by the following: Homework (25%), First midterm (20%), Second midterm (25%), Final (30%).
- Missed work will receive no credit. Late work may be accepted, but usually with a substantial penalty.

Classroom Protocol
I expect you to attend class, as this material is almost impossible to learn directly from a textbook, and there is a very strong relationship between class attendance and performance. Cell phones, of course, must be silenced.
Phys 163, Fall 2017 Course Schedule

This schedule and the exam dates are approximate and subject to change with fair notice (via class and email).

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics, Readings (Always one homework each week)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>8/24</td>
<td>Intro, Motivation of Schrodinger Equation</td>
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<tr>
<td>2</td>
<td>8/29,8/31</td>
<td>Probability, normalization, position and momentum (chapter 1)</td>
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<tr>
<td>3</td>
<td>9/5,9/7</td>
<td>Stationary States, Infinite Square Well (2.1, 2.2)</td>
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<tr>
<td>4</td>
<td>9/12,9/13</td>
<td>Infinite Square Well (2.2)</td>
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<tr>
<td>5</td>
<td>9/19,9/21</td>
<td>Harmonic Oscillator (2.3.1)</td>
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<td>6</td>
<td>9/26,9/28</td>
<td>Harmonic Oscillator (2.3.1), Review</td>
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<tr>
<td>7</td>
<td>10/3,10/5</td>
<td><strong>Midterm #1 Tues 10/4.</strong> Free particle (2.4)</td>
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<td>8</td>
<td>10/10,10/12</td>
<td>Hilbert Space, Dirac notation (2.4, 3.1, 3.6)</td>
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<tr>
<td>9</td>
<td>10/17,10/19</td>
<td>Observables, Measurements (3.2, 3.3, 3.4, Appendix A)</td>
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<tr>
<td>10</td>
<td>10/24,10/26</td>
<td>General Formalism (rest of chapter 3)</td>
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<tr>
<td>11</td>
<td>10/31,11/2</td>
<td>Angular momentum, Spin (4.3,4.4)</td>
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<tr>
<td>12</td>
<td>11/7,11/9</td>
<td>Spin, Addition of angular momentum (4.4)</td>
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<tr>
<td>13</td>
<td>11/14,11/16</td>
<td>Addition of angular momentum, Review</td>
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<tr>
<td>14</td>
<td>11/21</td>
<td><strong>Midterm #2, Tues 11/21 -- (no class on Thurs 11/23)</strong></td>
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<tr>
<td>15</td>
<td>11/28,11/30</td>
<td>Hydrogen atom (4.1, 4.2), periodic table (5.2.2)</td>
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<tr>
<td>16</td>
<td>12/5,12/7</td>
<td>Quantum Foundations, Review for Final</td>
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<tr>
<td></td>
<td>Final Exam</td>
<td>Sci 242, 9:45am-Noon</td>
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