## PHYS 442: Quantum Mechanics

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| Course Title/Number | PHYS 442: Quantum Mechanics |
| Semester/Year | Spring 2017 |
| Days/Time | T &R, 9:30-10:45 |
| Location | S281 |
| Instructor | Que Huong Nguyen |
| Office | S 251 |
| Phone | 62756 |
| E-Mail | nguyenh@marshall.edu |
| Office/Hours | 1-3pm T&R |
| University Policies | By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy be going to [www.marshall.edu/academic-affairs](http://www.marshall.edu/academic-affairs) and clicking on “Marshall University Policies.” Or, you can access the policies directly by going to <http://www.marshall.edu/academic-affairs/?page_id=802>  Academic Dishonesty/ Excused Absence Policy for Undergraduates/ Computing Services Acceptable Use/ Inclement Weather/ Dead Week/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/ Academic Rights and Responsibilities of Students/ Affirmative Action/ Sexual Harassment |

**Course Description:**

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| This course is the introduction to quantum mechanics, the most prominent physical theory of the twentieth century, which underlies all solid state technology and forms the basis of all modern physics. Quantum mechanics becomes a working language and an important tool of all physicists.  The course will start by the basic theoretical principles and then progress to physical applications. |

**Required Texts, Additional Reading, and Other Materials**

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| The required text book is *"Introduction to Quantum Mechanics"*, David J. Griffiths, 2nd ed., 2005 (Prentice Hall Publishing, ISBN 0-13-111892-7)  ***Bibliography:***  Other text books for reference:   1. *“Quantum Mechanics: Non-Relativistic Theory”,* [L. D. Landau](http://www.amazon.com/exec/obidos/search-handle-url/002-6020682-0413656?%5Fencoding=UTF8&search-type=ss&index=books&field-author=L.%20D.%20Landau) , [L. M. Lifshitz](http://www.amazon.com/exec/obidos/search-handle-url/002-6020682-0413656?%5Fencoding=UTF8&search-type=ss&index=books&field-author=L.%20M.%20Lifshitz) Vol. 3, 3rd ed, (Butterworth-Heinemann, **ISBN-10:** 0750635398) 2. “*Quantum Mechanics*” [Eugen Merzbacher](http://www.amazon.com/exec/obidos/search-handle-url/002-6020682-0413656?%5Fencoding=UTF8&search-type=ss&index=books&field-author=Eugen%20Merzbacher), 3rd ed. 1997 (Wiley; ISBN-10: 0471887021) 3. “*Modern Quantum Mechanics*”, [J. J. Sakurai](http://www.amazon.com/exec/obidos/search-handle-url/002-6020682-0413656?%5Fencoding=UTF8&search-type=ss&index=books&field-author=J.%20J.%20Sakurai) 2nd ed. 1994; (Addison Wesley; ISBN 0201539292) |

**Goals & Outcomes:**

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| **Course Student Learning Outcomes** | **How students will practice each outcome in this Course** | **How student achievement of each outcome will be assessed in this Course** |
| Students will learn theoretical background of basic principles of quantum mechanics. | Methods and theory will be discussed in classroom, examples will be solved as classwork. | Students will be given quizzes on theories they learn. |
| Students will learn problem solving techniques. | Students will practice the techniques through classwork and homework. | Three semester exams will be given to assess student knowledge. |
| Student will concentrate on physical application of each method. | Homework will be assigned every week. Students will work on real physics problems using methods they learn in class.  Graduate students will work on a graduate project using these methods. | Final exam will be accumulative. Evaluation of student work will be based on homework, quiz and exam performance, and also graduate project for graduate students. |
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**Homework** :

Home work will usually be assigned every week and are due in one week. Two to four problems plus one or two additional extra-credit problems will be assigned each week. You are expected not to copy any homework solution from anyone else. After you have tried hard to do it all by yourself, teamwork is encouraged for solving the homework assignments, but solutions must be handed in separately. Homework problems are a very important part of the course. Cheating on the homework will result at minimum in zero grades, and could lead to failing the entire course.

**Course Requirements / Due Dates**

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| There will be 3 midterms and one final. Quizzes will be given every 2- week period   1. Exam 1: February 14 2. Exam 2: March 14 3. Exam 3: April 18 4. Final: May 2 |

**Grading Policy**

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| Homework: 10%  Quizzes 15%  Exam I 15%  Exam II 15 %  Exam III 15%  Final Exam 30%  ***For graduate student***: Final Exam 15% and Graduate Project 15% |

**Attendance Policy**

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| Students are expected to attend all scheduled classes. Lectures and class discussions are vital for learning and understanding. Any absence from exams and quizzes can be excused only if the instructor is informed in advance with reasonable excuses. See University policy above. |

### COURSE OUTLINE:

* 1. The basic concepts of quantum mechanics
  2. The time-independent Schrodinger equations.
  3. The formalism and function spaces.
  4. Spherical coordinates, Hydrogen atoms, angular momentum and spin.
  5. Identical particles