**The Hashemite University**
**Faculty of Science**
**Department of Physics**

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| **Department:** Physics | |
| **Year:** 2015/2016 | **Semester:** First |

| **Course Information** | |
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| **Course Title** | Quantum Mechanics I 110102362 |
| **Course Number** | 110102362 |
| **Course Credits** | Three credit hours |
| **Prerequisite** | Modern physics (110102261), Mathematical physics 2 (110102282) |
| **Course Duration** | 14-weeks |
| **Instructor(s)** | **Dr. Gassem Alzoubi** |
| **Course Time** | Sun, Tue, Thurs 12:00-1:00 pm |
| **Office Location** | Phys/room 107 |
| **Office Hours** | Sunday, Tuesday: 11-12 am<br>Monday and Wednesday: 12:30-1:30 pm |

| **Textbook** | |
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| **Title** | 1. Quantum Physics |
| **Authors** | *S. Gasiorowicz* |
| **Publisher** | John Wiley & Sons |
| **Edition** | *3rd Edition.* |

## References


1. Introduction to Quantum Mechanics, by B. H. Bransden and C.J. Joachain, Longman Scientific & Technical, 1990
2. Introductory Quantum Mechanics, by R. L. Liboff, 2nd edition, Addison Wesley, 1990.
3. Introduction to Quantum Mechanics, By D.J. Griffiths, Prentice Hall. Inc., 1995.
4. J. J. Sakurai, *Modern Quantum Mechanics*, Addison-Wesley, 1994.
5. E. Merzbacher, Quantum Mechanics, 3rd. Edition, John Wiley and sons, 1998.
6. M. Alonso and H. Valk, *Quantum Mechanics*, Addison-Wesley, 1973.
7. L. Landau and E. Lifschits, *Quantum Mechanics*, Addison-Wesley, 1958.
8. C. C. Tannoudji, B. Diu, and F. Laloë, ***Quantum Mechanics***, Two volumes, John Wiley and sons, 1977.


## Course Description

Quantum mechanics is the branch of physics that describes the behavior of microscopic particles, such as electrons, protons, neutrons, etc. The motion of such particles cannot be described in the framework of classical physics using Newtonian mechanics. This course aims to introduce the basic quantum mechanical concepts to the student. These are somewhat unusual from the classical point of view and will describe microscopic phenomena. Thus, The students will have an opportunity to employ the mathematical and

physical concepts they have acquired in previous courses. They are expected to improve their logical and scientific thinking by expressing the physical concepts in terms of mathematical formalism. Finally, this course constitutes the foundation for future courses in physics such as atomic and molecular physics, nuclear physics, solid state physics, quantum optics and others.

## Course Contents

| # of Lectures | Chapter | Description |
|---|---|---|
| 2 | 1 | **The Emergence of Quantum Physics** |
| 4 | 2 | **Wave Particle Duality, Probability, and the Schrödinger Equation** |
| 5 | 3 | **Eigenvalues, Eigenctions, and Expansion Postulate** |
| 5 | 4 | **One-Dimensional Potentials** |
| 5 | 5 | **The General Structure of Wave Mechanics** |
| 5 | 6 | **Operator Methods in Quantum Mechanics** |
| 4 | 7 | **Angular Momentum** |

**Grading Plan:**

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| 1st Exam | 30 Points | **TBA** |
| 2nd Exam | 30 Points | **TBA** |
| Final exam | 40 Points | **TBA** |

**General Notes:** **Attendance Policy:** students are expected to attend every class and arrive on time in compliance with HU regulations. In case you find yourself in a situation that prevents you from attending class or exam, you have to inform your instructor. If you miss more than 6 classes for the (Sunday, Tuesday, and Thursday model) or 4 classes for the (Monday and Wednesday Model), you cannot pass the course. Makeup excuses will be accepted only for very limited justified cases, such as illness and emergencies.