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| **Course Title** | **Introduction to Quantum Mechanics (QM)** |
| **Prerequisite** | Physics, Modern Physics I & II (suggested, not compulsory) |
| **Course Description** | To understand the failure of classical physics;<br>to understand the drawbacks of the old quantum theory and the subsequent development of quantum theory;<br>to learn the applications of quantum mechanics. |
| **Textbooks** | Handouts |
| **References** | *Quantum mechanics concepts and applications* Nouredine Zettili<br>*Molecular quantum mechanics* Peter Atkins, Ronald Friedman<br>*Essential quantum physics* Peter Landshoff, Allen Metherell, Gareth Rees<br>*Physics for computer science students* Narciso Garcia and Arthur Damask<br>*University Physics* Young and Freedman (13th edition) |
| **Modules** | • The importance and application of QM<br>• Dilemmas of classical physics<br>• The origin, history and development of QM<br>• Wave-particle duality<br>• Atomic structure<br>• Wave functions, probability, and Schrodinger's equation, particle in a box, tunnel effect, harmonic oscillator<br>• Hydrogen and hydrogenlike atoms<br>• Many-electron atoms<br>• Molecular structures<br>• Condense Matter<br>• Born-Oppenheimer approximation<br>• Electronic structure:<br>  • Hatree-Fock self-consistent field method<br>  • Density functional theory, electron correlation<br>- Molecular mechanics<br>- QM application in molecules<br>- QM applications in solids |
| **Methods** | Lecturing via the PowerPoint slides and blackboard |
| **Assessment** | Note, Homework, Report, Quiz (25%)<br>1st Midterm Written (20%) + Oral (5%) Exams<br>2nd Midterm Written (20%) + Oral (5%) Exams<br>Final Written (20%) + Oral (5%) Exams |