# PHYS 3007 QUANTUM PHYSICS

**Credit Points** 10

**Legacy Code** 301392

**Coordinator** Antonio Lauto (https://directory.westernsydney.edu.au/search/name/Antonio Lauto/)

**Description** The subject builds on quantum concepts that have been introduced in earlier subjects such Physics 1,2, Nanotechnology and Chemistry. It aims at developing the student's understanding of quantum principles as they apply to hard and soft matter systems, including atoms , molecules and extended arrays such as metal and semiconductors as well as biological tissue

**School** Science

**Discipline** Physics

**Student Contribution Band** HECS Band 2 10cp

Check your fees via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

**Level** Undergraduate Level 3 subject

**Pre-requisite(s)** PHYS 1006 - Physics 2

**Restrictions**

Successful completion of 60 credit points

**Assumed Knowledge**

Mathematics 1A, Mathematics 1B, Physics 1 and Physics 2.

## Learning Outcomes

On successful completion of this subject, students should be able to:

1. Explain the experimental evidence for a quantum theory
2. Explain the non commutativity of the product of physical magnitudes
3. Provide solutions to quantative problems in Quantum Mechanics
4. Explain the macroscopic applications of Quantum Mechanics
5. Explain the apparition of a new physical magnitude, the spin, in Relativistic Quantum Mechanics
6. Apply Quantum Mechanics to other disciplines

## Subject Content

1. Experimental evidence for quantisation
2. Wave particle duality and uncertainty
3. Introduction to basic quantum mechanical equations, the wave function
4. Solution of the time independent Schrodinger equation
5. Particle in a box, the tunnel effect
6. The harmonic oscillator, The Rotator
7. Angular momentum
8. The hydrogen atom and atomic wave function
9. Introduction to molecular-orbital theory
10. Introduction to quantum computing methods: chemical applications of semi empirical , ab initio and density function methods for molecular modelling

## Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

| Type | Length | Percent | Threshold | Individual/ Group Task | Mandatory |
|---|---|---|---|---|---|
| Practical | 300-600 words | 30 | N | Individual | N |
| Numerical Problem Solving | 300-600 words | 30 | N | Individual | N |
| Final Exam | 2 hours | 40 | N | Individual | N |

Teaching Periods

## Spring (2025)

### Campbelltown

**Hybrid**

**Subject Contact** Antonio Lauto (https://directory.westernsydney.edu.au/search/name/Antonio Lauto/)

View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=PHYS3007_25-SPR_CA_3#subjects)