General Information

Unit convenor and teaching staff
Unit Convenor
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Thursdays 10--11am; other times by appointment.

Lecturer
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Credit points
4

Prerequisites
Admission to MRes

Corequisites

Co-badged status

Unit description
This unit will provide students with a bespoke learning path to fully prepare them for entry into specific advanced subject units at 700 level offered by the Department of Physics and Astronomy. The program will draw on a mixture of existing lecture content and established teaching laboratories further enriched by individually guided study to provide a program tailored to the students' individual development needs.

Important Academic Dates
Information about important academic dates including deadlines for withdrawing from units are available at http://students.mq.edu.au/student_admin/enrolmentguide/academicdates/
Learning Outcomes

1. Obtain a more advanced understanding of the workings of the quantum world
2. Be able to use the acquired knowledge to solve advanced problems in quantum mechanics
3. Understand and be able to apply quantum science to more advanced topics e.g. quantum optics.

Assessment Tasks

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<td>Mid-Unit Project</td>
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Weekly Exercises

Due: **14/11/14**
Weighting: **25%**

1 moderate question each week to stay current with the lecture material

This Assessment Task relates to the following Learning Outcomes:
- Obtain a more advanced understanding of the workings of the quantum world
- Be able to use the acquired knowledge to solve advanced problems in quantum mechanics

Mid-Unit Project

Due: **19/9/2014**
Weighting: **15%**

One mid-unit three week PROJECT (individual work), with written (<10 pages) and oral presentation (<15 mins) on an advanced topic in quantum mechanics.

This Assessment Task relates to the following Learning Outcomes:
- Obtain a more advanced understanding of the workings of the quantum world
- Be able to use the acquired knowledge to solve advanced problems in quantum mechanics
Final Project
Due: 14/11/2014
Weighting: 15%

One Final three week PROJECT (individual work), with written (<10 pages) and oral presentation (<15 mins) on an advanced topic in quantum mechanics.

This Assessment Task relates to the following Learning Outcomes:
- Obtain a more advanced understanding of the workings of the quantum world
- Be able to use the acquired knowledge to solve advanced problems in quantum mechanics
- Understand and be able to apply quantum science to more advanced topics e.g. quantum optics.

Final Examination
Due: 29/11/14
Weighting: 45%

Final Exam - which focuses on demonstrating a clear understanding and facility in problem solving in advanced QM based on course lecture materials, projects and directed reading. This is a separate, more penetrating exam than that given PHYS304 which will probe the student’s understanding of advanced quantum mechanics at the MRES level.

This Assessment Task relates to the following Learning Outcomes:
- Obtain a more advanced understanding of the workings of the quantum world
- Be able to use the acquired knowledge to solve advanced problems in quantum mechanics
- Understand and be able to apply quantum science to more advanced topics e.g. quantum optics.

Delivery and Resources
Lectures/Videos
Various Lecture Demonstrations
Directed Reading

Unit Schedule
Lectures:
Mon: 16:00-18:00 W5C 312
Fri: 9-10 W5C 210

Tute:
Thur: 14:00-15:00 CB3 312

**Learning and Teaching Activities**

**Lectures**

**Personal Reading**
Reading textbook and associated texts/websites

**Projects**
Mid-unit and final projects on a topic exploring advanced quantum mechanics

**Directed Reading and Presentation**
Directed reading on topics in advanced QM

**Policies and Procedures**

Macquarie University policies and procedures are accessible from [Policy Central](http://mq.edu.au/policy/docs/). Students should be aware of the following policies in particular with regard to Learning and Teaching:


In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

**Student Code of Conduct**

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: [https://students.mq.edu.au/support/student_conduct/](https://students.mq.edu.au/support/student_conduct/)
Student Support

Macquarie University provides a range of support services for students. For details, visit [http://students.mq.edu.au/support/](http://students.mq.edu.au/support/)

**Learning Skills**

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

**Student Enquiry Service**

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

**Equity Support**

Students with a disability are encouraged to contact the [Disability Service](http://students.mq.edu.au/eqsupport) who can provide appropriate help with any issues that arise during their studies.

**IT Help**


When using the University’s IT, you must adhere to the [Acceptable Use Policy](http://students.mq.edu.au/eqsupport). The policy applies to all who connect to the MQ network including students.

**Graduate Capabilities**

**PG - Discipline Knowledge and Skills**

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

**Learning outcomes**

- Obtain a more advanced understanding of the workings of the quantum world
- Be able to use the acquired knowledge to solve advanced problems in quantum mechanics
- Understand and be able to apply quantum science to more advanced topics e.g quantum optics.
Assessment tasks

• Weekly Exercises
• Mid-Unit Project
• Final Project
• Final Examination

Learning and teaching activities

• Lectures
• Reading textbook and associated texts/websites
• Mid-unit and final projects on a topic exploring advanced quantum mechanics
• Directed reading on topics in advanced QM

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

• Obtain a more advanced understanding of the workings of the quantum world
• Be able to use the acquired knowledge to solve advanced problems in quantum mechanics
• Understand and be able to apply quantum science to more advanced topics e.g quantum optics.

Assessment tasks

• Weekly Exercises
• Mid-Unit Project
• Final Project
• Final Examination

Learning and teaching activities

• Lectures
• Reading textbook and associated texts/websites
• Mid-unit and final projects on a topic exploring advanced quantum mechanics
• Directed reading on topics in advanced QM
PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

Learning outcomes

• Be able to use the acquired knowledge to solve advanced problems in quantum mechanics
• Understand and be able to apply quantum science to more advanced topics e.g quantum optics.

Assessment tasks

• Mid-Unit Project
• Final Project

Learning and teaching activities

• Mid-unit and final projects on a topic exploring advanced quantum mechanics
• Directed reading on topics in advanced QM

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

• Obtain a more advanced understanding of the workings of the quantum world
• Be able to use the acquired knowledge to solve advanced problems in quantum mechanics
• Understand and be able to apply quantum science to more advanced topics e.g quantum optics.

Assessment tasks

• Weekly Exercises
• Mid-Unit Project
• Final Project
Learning and teaching activities

- Lectures
- Reading textbook and associated texts/websites
- Mid-unit and final projects on a topic exploring advanced quantum mechanics
- Directed reading on topics in advanced QM

PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

Learning outcome

- Understand and be able to apply quantum science to more advanced topics e.g quantum optics.

Assessment task

- Final Project

Learning and teaching activity

- Reading textbook and associated texts/websites
- Mid-unit and final projects on a topic exploring advanced quantum mechanics
- Directed reading on topics in advanced QM