



# PHYS3910

## Advanced Physics III

Full year 1, In person-scheduled-weekday, North Ryde 2022

*School of Mathematical and Physical Sciences*

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## General Information

Unit convenor and teaching staff Alexei Gilchrist <a href="mailto:alexei.gilchrist@mq.edu.au">alexei.gilchrist@mq.edu.au</a>
Credit points 10
Prerequisites (PHYS188 or PHYS1910) and (PHYS201(D) or PHYS2010(D)) and (PHYS202(D) or PHYS2020(D))
Corequisites
Co-badged status
Unit description This unit offers extended insight into unifying core principles of physics. Alternate years will focus on two key concepts that permeate nearly all of physics - probability (even years) and symmetry (odd years). These two key concepts affect much of modern physics including quantum mechanics, astronomy and astrophysics, lasers and photonics, and biophysics. Students are expected to engage in a research-related activity and produce a report in scientific format on their findings.

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

On successful completion of this unit, you will be able to:

**ULO1:** identify how symmetry/probability is used in many sub-areas of physics, in sometimes vastly different contexts.

**ULO2:** explain how symmetry/probability unifies many sub-areas of physics and provides a common structure.

**ULO3:** use symmetry/probability concepts to solve problems from particular sub-areas of physics.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">S1 assignments</a>	15%	No	Throughout S1
<a href="#">Problem-set creation</a>	5%	No	Throughout S1
<a href="#">Mid-unit exam</a>	30%	No	S1 Exam period
<a href="#">S2 Assignments</a>	20%	No	Throughout S2
<a href="#">Research project</a>	30%	No	End of S2

### S1 assignments

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 15 hours

Due: **Throughout S1**

Weighting: **15%**

A series of problem-solving assignments undertaken in session 1.

On successful completion you will be able to:

- identify how symmetry/probability is used in many sub-areas of physics, in sometimes vastly different contexts.
- explain how symmetry/probability unifies many sub-areas of physics and provides a common structure.
- use symmetry/probability concepts to solve problems from particular sub-areas of physics.

### Problem-set creation

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 5 hours

Due: **Throughout S1**

Weighting: **5%**

Each student supplies five solved problems related to the material taught in session 1, suitable for use as a learning resource for the rest of the class.

On successful completion you will be able to:

- identify how symmetry/probability is used in many sub-areas of physics, in sometimes vastly different contexts.

- explain how symmetry/probability unifies many sub-areas of physics and provides a common structure.
- use symmetry/probability concepts to solve problems from particular sub-areas of physics.

## Mid-unit exam

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 20 hours

Due: **S1 Exam period**

Weighting: **30%**

An examination on the content from the first half of the unit (end of session 1).

On successful completion you will be able to:

- identify how symmetry/probability is used in many sub-areas of physics, in sometimes vastly different contexts.
- explain how symmetry/probability unifies many sub-areas of physics and provides a common structure.
- use symmetry/probability concepts to solve problems from particular sub-areas of physics.

## S2 Assignments

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 15 hours

Due: **Throughout S2**

Weighting: **20%**

A series of problem-solving assignments undertaken in session 2.

On successful completion you will be able to:

- identify how symmetry/probability is used in many sub-areas of physics, in sometimes vastly different contexts.
- explain how symmetry/probability unifies many sub-areas of physics and provides a common structure.
- use symmetry/probability concepts to solve problems from particular sub-areas of physics.

## Research project

Assessment Type <sup>1</sup>: Project

Indicative Time on Task <sup>2</sup>: 30 hours

Due: **End of S2**

Weighting: **30%**

A research project on a topic agreed with the lecturer that fits the theme of the unit, completed in session 2.

On successful completion you will be able to:

- identify how symmetry/probability is used in many sub-areas of physics, in sometimes vastly different contexts.
- explain how symmetry/probability unifies many sub-areas of physics and provides a common structure.
- use symmetry/probability concepts to solve problems from particular sub-areas of physics.

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<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

## Delivery and Resources

In-person lectures and tutorials. Reading material provided online.

## Policies and Procedures

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

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/su\)](https://students.mq.edu.au/su)

[pport/study/policies](#)). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central](#) (<https://policies.mq.edu.au>) and use the [search tool](#).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

## Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)

## Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.