

# PX396-7.5 Nuclear Physics

**21/22**

**Department**

Physics

**Level**

Undergraduate Level 3

**Module leader**

Michal Kreps

**Credit value**

7.5

**Module duration**

5 weeks

**Assessment**

100% exam

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

This module shows how the properties of the stable nucleus can be understood in terms of elementary models using physics from earlier modules, but with the introduction of the strong nuclear force. It is shown that the main features of the decay of unstable nuclei can also be understood on the basis of these ideas, but that a further interaction, the weak interaction, has to be included.

[Module web page](#)

### Module aims

To introduce the concepts and models of nuclear physics. To describe experimental methods used to probe nuclear properties.

### Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Nuclear Properties: Nuclear radius; distribution of nuclear matter; nuclear mass and binding

energy

Nuclear force and the strong interaction: Properties of the deuteron; nucleon-nucleon scattering; Isospin and the structure of nuclear forces

Nuclear models: Nucleons in a central potential; the shell model

Radioactivity: Radioactive decay, beta-decay and the weak interaction

## Learning outcomes

By the end of the module, students should be able to:

- Describe the properties and structure of stable nuclei
- Explain the properties of the nuclear force
- Discuss the constraints on a quantum model of the nucleus
- Explain the shell model and how it accounts for radioactive processes including beta decay

## Indicative reading list

B.R. Martin, Nuclear and Particle Physics, Wiley, 2006

[View reading list on Talis Aspire](#)

## Subject specific skills

Knowledge of mathematics and physics. Skills in modelling, reasoning, thinking

## Transferable skills

Analytical, communication, problem-solving, self-study

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## Study

### Study time

Type	Required
Lectures	15 sessions of 1 hour (20%)
Private study	60 hours (80%)
Total	75 hours

### Private study description

Working through lecture notes, solving problems, wider reading, discussing with others taking the module, revising for exam, practising on past exam papers

## Costs

No further costs have been identified for this module.

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## Assessment

You must pass all assessment components to pass the module.

### Assessment group B1

	Weighting	Study time	Eligible for self-certification
<b>Assessment component</b>			
In-person Examination Answer 2 questions from 3	100%		No

Reassessment component is the same

### Feedback on assessment

Personal tutor, group feedback

[Past exam papers for PX396](#)

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## Availability

### Courses

This module is Option list A for:

- Year 3 of UPXA-F300 Undergraduate Physics (BSc)
- Year 3 of UPXA-F303 Undergraduate Physics (MPhys)
- Year 4 of UPXA-F301 Undergraduate Physics (with Intercalated Year)

This module is Option list B for:

- UMAA-G105 Undergraduate Master of Mathematics (with Intercalated Year)
  - Year 3 of G105 Mathematics (MMath) with Intercalated Year
  - Year 5 of G105 Mathematics (MMath) with Intercalated Year
- Year 3 of UMAA-G100 Undergraduate Mathematics (BSc)

- UMAA-G103 Undergraduate Mathematics (MMath)
  - Year 3 of G100 Mathematics
  - Year 3 of G103 Mathematics (MMath)
  - Year 4 of G103 Mathematics (MMath)
- UMAA-G106 Undergraduate Mathematics (MMath) with Study in Europe
  - Year 3 of G106 Mathematics (MMath) with Study in Europe
  - Year 4 of G106 Mathematics (MMath) with Study in Europe
- Year 3 of UPXA-FG33 Undergraduate Mathematics and Physics (BSc MMathPhys)
- Year 3 of UPXA-GF13 Undergraduate Mathematics and Physics (BSc)
- UPXA-FG31 Undergraduate Mathematics and Physics (MMathPhys)
  - Year 3 of GF13 Mathematics and Physics
  - Year 3 of FG31 Mathematics and Physics (MMathPhys)
- Year 4 of UPXA-GF14 Undergraduate Mathematics and Physics (with Intercalated Year)
- Year 4 of UMAA-G101 Undergraduate Mathematics with Intercalated Year
- Year 3 of UPXA-F303 Undergraduate Physics (MPhys)