

# Handbook 2020

**Coursecode**

---

B1317A

**Murdoch University**

---

Correct as at: 6 December 2019 at 6:29am

Correct as at: 6 December 2019 at 6:29am

The information contained within this publication was correct as at the generated date shown above but is subject to amendment without notice.

Enquiries concerning its contents should be addressed to:

University Secretary  
Murdoch University  
South Street  
Murdoch  
Western Australia 6150

Telephone: (08) 9360 6000

Facsimile: (08) 9360 6847

<http://www.murdoch.edu.au>

TEQSA Number PRV12163; CRICOS Provider Code: 00125J

#### **Cancellation of Courses, Majors, Minors and Units**

The University reserves the right to cancel, without notice, any course, major, minor or unit if the number of students enrolled falls below limits set by the University or in other unforeseen circumstances.

#### **Alternative Formats**

Handbook home page:

<http://handbook.murdoch.edu.au>

This publication can also be provided in alternative formats by contacting the Equity and Social Inclusion Office at Murdoch University

Telephone: (08) 9360 6084

Facsimile: (08) 9360 6502

[equity@murdoch.edu.au](mailto:equity@murdoch.edu.au)

<http://goto.murdoch.edu.au/EquitySocialInclusion>

ISSN 0815-9068

Published by

University Secretary's Office

Murdoch University



© Murdoch University 2019

This Handbook, and its sections as individual works, is licensed under a Creative Commons Attribution Noncommercial No Derivative Works Australia 2.5 licence. You may download, reproduce, communicate, print and distribute copies of the Handbook (or any part of it) as long as it is for non-commercial purposes, you do not alter the content, and you attribute Murdoch University as the original author. For more information on this licence, see <http://creativecommons.org/licenses/by-nc-nd/2.5/au/>

**Cancellation of Courses, Majors, Minors and Units**

The University reserves the right to cancel, without notice, any course, major, minor or unit if the number of students enrolled falls below limits set by the University or in other unforeseen circumstances.

Group	Course	Offerings
Physics and Nanotechnology	Physics and Nanotechnology (BSc)	<ul style="list-style-type: none"> <li>• Murdoch campus (internal)</li> <li>• Murdoch campus (external)</li> </ul>

## PHYSICS AND NANOTECHNOLOGY

### PHYSICS AND NANOTECHNOLOGY (BSC)

#### Physics

##### Employment Prospects:

Graduates find employment in a wide variety of fields including universities, research institutions, government agencies and private companies in areas such as pure research, research and development, education, quality control, health and medical physics, environmental monitoring, meteorology and astronomy.

Duration: 3 years full-time or part-time equivalent

##### Admission Requirements (Onshore):

As per normal undergraduate admission requirements. Students who have not completed the necessary mathematics or physics at WACE-level may be required to complete introductory units in first year.

Murdoch's Bachelor of Science is a flexible degree which gives you the opportunity to build deep understanding and practical experience as well as to supplement your studies by engaging with industry and the community on relevant problems. You can even undertake studies through another discipline to broaden your understanding of the way in which science operates in relation to social, business, health and policy environments.

##### Availability:

- Murdoch campus (internal) Murdoch campus (external)

Physics has a long and distinguished history. It underpins our modern technology and can be found at the cutting edge of science in the field of nanotechnology.

The Physics and Nanotechnology major combines an essential core of classical and modern physics with units that provide the background for working in the rapidly developing area of nanoscience and nanotechnology. The three-year course covers mechanics and waves, quantum theory, electromagnetism, thermodynamics, the physics of materials and applications of nanotechnology. Study of these areas provides an understanding of natural processes, energy and materials not just at the macroscopic scale but also at the nanoscopic scale.

Students have the opportunity to extend their analytical and problem solving skills to related disciplines in areas such as Computer Science, Chemistry, Biology, Mathematical Modelling, Mathematics and Statistics, Ocean Science, Environmental Science, Sustainable/Renewable Energy or Science Communication. An additional year of study leads to an Honours degree, offering enhanced employment prospects and is the entry point into a Masters or Doctoral research degree.

Course Codes: B1317 B1317A

##### Special Requirements:

Computer access with a CD-ROM drive or Internet access is essential. Email is essential.

##### Recommended Double Majors:

Chemistry; Computer Science; Mathematics and Statistics

##### Excluded Minors:

Physics

Bachelor of Science (BSc) in Physics and Nanotechnology

##### Main Research Areas:

Renewable energy, surface physics, thin films, and nanotechnology with applications in medicine, resources, environment and energy.

#### Major Prerequisites

##### Chemistry Background

Students may need to complete prerequisite units depending upon their background in chemistry and their final scaled score in Chemistry 3A/3B or Chemistry ATAR within the past three years.

Chemistry 3A/3B or Chemistry ATAR with a final scaled score of 50 percent or more

OR

CHE140 Fundamentals of Chemistry - 3 points  
MURDOCH: S1-internal, S1-external, S2-internal, S2-external

Students who have completed previous chemistry not stated above should consult their Academic Chair for clarification of their enrolment requirements.

##### Mathematics Background

Students may need to complete a prerequisite unit depending on their background in mathematics and their final scaled score in Mathematics Specialist ATAR or Mathematics Specialist units or the equivalent Applicable Mathematics and Calculus within the past four years.

Students need to achieve a Pass in  
MAS182 Applied Mathematics - 3 points  
MURDOCH: S1-internal, S1-external, S2-internal, S2-external

OR

Mathematics Methods ATAR (or Mathematics 3A/3B/3C/3D)

OR

Students who achieve a minimum C grade in Mathematics Specialist ATAR (or Mathematics: Specialist 3C/3D)  
TEE Calculus with a final scaled score of 55 percent or more may seek an exemption from MAS182 Applied Mathematics from their Academic Chair.

Students who do not meet the prerequisite conditions for MAS182 Applied Mathematics will need a PASS in

MAS164 Fundamentals of Mathematics - 3 points  
MURDOCH: S1-internal, S1-external, S2-internal, S2-external

Students who have completed previous mathematics not stated above should consult the Academic Chair for clarification of their enrolment requirements.

##### Physics Background

Students may need to complete one prerequisite unit depending on their background in physics and their final scaled score in WACE Physics 3A/3B within the past four years.

Students must achieve a C grade in Physics 3A/3B

OR

TEE Physics with a final scaled score of 60 percent or more

OR

PEN120 General Physics - 3 points  
MURDOCH: S1-internal, S1-external, S2-internal, S2-external

Students who have completed previous physics not stated above should consult the Academic Chair for clarification of their enrolment requirements.

#### Course Structure - 72 credit points

##### Part I - 24 credit points

##### Year 1 - 24 credit points

##### Transition Unit - 3 credit points

BSC100 Building Blocks for Science Students - 3 points  
MURDOCH: S1-internal, S1-external, S2-internal, S2-external

**Breadth Unit for Degree - 3 credit points**

The following unit is no longer available - contact the Academic Chair for advice:

BSC150 What is Science? - 3 points  
Murdoch: S1-internal, S1-external, S2-internal, S2-external

**Core Units - 15 credit points**

PEN152 Principles of Physics - 3 points  
MURDOCH: S1-internal, S1-external, S2-internal, S2-external  
(Students who have not completed Physics 3A/3B will be required to undertake PEN120 General Physics prior to completing this unit.)

MAS161 Calculus and Matrix Algebra - 3 points  
MURDOCH: S1-internal, S1-external, S2-internal, S2-external  
(Students who have not completed Mathematics: Specialist 3C/3D will be required to undertake MAS182 Applied Mathematics prior to completing this unit.)

ENG192 Energy, Mass and Flow - 3 points  
MURDOCH: S2-internal, S2-external

MAS182 Applied Mathematics - 3 points  
MURDOCH: S1-internal, S1-external, S2-internal, S2-external

CHE144 Foundations of Chemistry - 3 points  
MURDOCH: S1-internal, S1-external, S2-internal, S2-external

**General Electives - 3 credit points**

Select from any 100-level units offered by the University, subject to individual unit prerequisites. Students are advised to consider using General Elective points to meet the requirements of a second major or minor. Any recommended double majors and minors will be included in the major's description.

**Part II - 48 credit points****University-Wide Breadth Units - 6 credit points**

Select from the prescribed list of University-Wide Breadth Units. A unit cannot be used to satisfy both this Breadth Unit requirement and the requirements of a major or minor. If taken at 100 level the unit(s) will be attributed to Part I. Note that no more than 30 credit points at Part I may be credited towards course completion requirements.

**Year 2 - 21 credit points****Research Skills Unit - 3 credit points**

The Research Skills unit to be taken will depend on the student's Primary Major enrolment. Select from the following.

**For Primary Major in Cognitive Neuroscience and Health Psychology**

BSC201 Psychology: Measurement, Design and Analysis - 3 points  
MURDOCH: S1-internal

**For Primary Majors in the Health Sciences, as listed**

Primary Major in Chiropractic Science, Exercise Physiology, Movement Science, or Sport and Health Science:

BSC206 Introduction to Research Methodology and Evidence Based Practice - 3 points  
MURDOCH: S2-internal

**For All Other Primary Majors excluding Information Technology**

Select from the Research Skills Unit List recommended for each major. A unit cannot be used to satisfy both this Research Skills Unit requirement and the requirements of a major or minor. If taken at 100 level the unit(s) will be attributed to Part I. Note that no more than 30 credit points at Part I may be credited towards course completion requirements.

**Core Units - 12 credit points**

PEN231 Modern Physics - 3 points  
MURDOCH: S1-internal, S1-external

PEN202 Thermodynamics for Physics and Nanotechnology - 3 points  
MURDOCH: S2-internal, S2-external

PEN261 Applications of Nanotechnology - 3 points  
MURDOCH: S1-internal, S1-external

MAS220 Mathematical Methods - 3 points  
MURDOCH: S1-internal, S1-external

**General Electives - 6 credit points**

Select from any 200- to 400-level units offered by the University, subject to individual unit prerequisites. Students are advised to consider using General Elective points to meet the requirements of a second major or minor. Any recommended double majors and minors will be included in the major's description.

**Year 3 - 21 credit points****Research Skills Unit - 3 credit points**

The Research Skills unit to be taken will depend on the student's Primary Major enrolment. Select from the following.

**For Primary Major in Cognitive Neuroscience and Health Psychology**

BSC302 Advanced Quantitative Research Methods - 3 points  
MURDOCH: S2-internal

**For Primary Majors in the Health Sciences, as listed**

Primary major in Chiropractic Science, Movement Science, Sport and Health Science:

BSC306 Research and Evidence Based Practice - 3 points  
MURDOCH: S1-internal

**For All Other Primary Majors excluding Information Technology**

Select from the Research Skills Unit List recommended for each major. A unit cannot be used to satisfy both this Research Skills Unit requirement and the requirements of a major or minor. If taken at 100 level the unit(s) will be attributed to Part I. Note that no more than 30 credit points at Part I may be credited towards course completion requirements.

**Core Units - 12 credit points**

PEN317 Physics of Materials - 3 points  
MURDOCH: S2-internal, S2-external

MAS221 Mathematical Modelling - 3 points  
MURDOCH: S2-internal, S2-external

OR

MAS351 Environmental and Biological Modelling - 3 points  
MURDOCH: S1-internal, S1-external

PEN332 Electromagnetism - 3 points  
MURDOCH: S1-internal, S1-external

PEN363 Experimental Physics and Nanotechnology - 3 points  
MURDOCH: S2-internal, S2-external

**General Electives - 6 credit points**

Select from any 200- to 400-level units offered by the University, subject to individual unit prerequisites. Students are advised to consider using General Elective points to meet the requirements of a second major or minor. Any recommended double majors and minors will be included in the major's description.

**Research Skills Unit List****Animal Health Major**

BSC200 Research in the Physical and Life Sciences - 3 points  
Not available this year

MAS223 Applied Statistics - 3 points  
MURDOCH: S2-internal, S2-external

MAS224 Biostatistical Methods - 3 points  
MURDOCH: S1-internal, S1-external

BIO282 Molecular Biology - 3 points  
MURDOCH: S1-internal

BIO394 Genetic Engineering - 3 points  
MURDOCH: S1-internal

ENV303 GIS for Environmental Management and Planning - 3 points  
<span data-type="offering" data-unit="ENV303">MURDOCH: S2-internal (quota of 70 places), S2-external (quota of 20 places)</span>

COM103 Foundations of Communication - 3 points  
MURDOCH: S2-internal, S2-external

BMS317 Human Pharmacology - 3 points  
MURDOCH: S1-internal

#### **Animal Science Major**

BSC200 Research in the Physical and Life Sciences - 3 points  
Not available this year

MAS223 Applied Statistics - 3 points  
MURDOCH: S2-internal, S2-external

MAS224 Biostatistical Methods - 3 points  
MURDOCH: S1-internal, S1-external

BIO246 Microbiology - 3 points  
MURDOCH: S1-internal

BMS316 Parasitology: People, Pets and Wildlife - 3 points  
MURDOCH: S2-internal

ENV303 GIS for Environmental Management and Planning - 3 points  
<span data-type="offering" data-unit="ENV303">MURDOCH: S2-internal (quota of 70 places), S2-external (quota of 20 places)</span>

BIO282 Molecular Biology - 3 points  
MURDOCH: S1-internal

BIO394 Genetic Engineering - 3 points  
MURDOCH: S1-internal

COM103 Foundations of Communication - 3 points  
MURDOCH: S2-internal, S2-external

#### **Crop and Pasture Science**

BSC200 Research in the Physical and Life Sciences - 3 points  
Not available this year

ENV303 GIS for Environmental Management and Planning - 3 points  
<span data-type="offering" data-unit="ENV303">MURDOCH: S2-internal (quota of 70 places), S2-external (quota of 20 places)</span>

BMS316 Parasitology: People, Pets and Wildlife - 3 points  
MURDOCH: S2-internal

MAS223 Applied Statistics - 3 points  
MURDOCH: S2-internal, S2-external

MAS224 Biostatistical Methods - 3 points  
MURDOCH: S1-internal, S1-external

BIO246 Microbiology - 3 points  
MURDOCH: S1-internal

BIO257 Australian Biodiversity - 3 points

MURDOCH: S2-internal

BIO282 Molecular Biology - 3 points  
MURDOCH: S1-internal

BIO394 Genetic Engineering - 3 points  
MURDOCH: S1-internal

#### **Biological Sciences Major**

BSC200 Research in the Physical and Life Sciences - 3 points  
Not available this year

ENV303 GIS for Environmental Management and Planning - 3 points  
<span data-type="offering" data-unit="ENV303">MURDOCH: S2-internal (quota of 70 places), S2-external (quota of 20 places)</span>

BMS316 Parasitology: People, Pets and Wildlife - 3 points  
MURDOCH: S2-internal

MAS223 Applied Statistics - 3 points  
MURDOCH: S2-internal, S2-external

MAS224 Biostatistical Methods - 3 points  
MURDOCH: S1-internal, S1-external

BIO282 Molecular Biology - 3 points  
MURDOCH: S1-internal

BIO394 Genetic Engineering - 3 points  
MURDOCH: S1-internal

BIO377 Marine Ecology - 3 points  
MURDOCH: S1-internal

BIO388 Forensic Science and Miscarriages of Justice - 3 points  
MURDOCH: W-internal

CHE207 Chemical Analysis - 3 points  
MURDOCH: S1-internal, S1-external

BIO393 Tropical Marine Biology - 3 points  
<span data-type="offering" data-unit="BIO393">MURDOCH: W-internal (quota of 40 places)</span>

#### **Conservation and Wildlife Biology Major**

BSC200 Research in the Physical and Life Sciences - 3 points  
Not available this year

ENV303 GIS for Environmental Management and Planning - 3 points  
<span data-type="offering" data-unit="ENV303">MURDOCH: S2-internal (quota of 70 places), S2-external (quota of 20 places)</span>

BIO246 Microbiology - 3 points  
MURDOCH: S1-internal

BMS316 Parasitology: People, Pets and Wildlife - 3 points  
MURDOCH: S2-internal

MAS223 Applied Statistics - 3 points  
MURDOCH: S2-internal, S2-external

MAS224 Biostatistical Methods - 3 points  
MURDOCH: S1-internal, S1-external

BIO282 Molecular Biology - 3 points  
MURDOCH: S1-internal

BIO394 Genetic Engineering - 3 points  
MURDOCH: S1-internal

BIO377 Marine Ecology - 3 points  
MURDOCH: S1-internal

ENV328 Environmental Policy and Law - 3 points  
MURDOCH: S1-internal, S1-external

SUS305 Economics of Sustainability - 3 points

MURDOCH: W-internal, W-external

COD302 Creative Ways to Work with Community - 3 points  
MURDOCH: S2-internal, S2-external

BIO247 Biochemistry - 3 points  
MURDOCH: S2-internal

ENV332 Managing Wetlands and Water - 3 points  
MURDOCH: S2-internal, S2-external

BIO393 Tropical Marine Biology - 3 points  
<span data-type="offering" data-unit="BIO393">MURDOCH:  
W-internal (quota of 40 places)</span>

#### **Environmental Management and Sustainability Major**

BSC200 Research in the Physical and Life Sciences - 3 points  
Not available this year

MAS223 Applied Statistics - 3 points  
MURDOCH: S2-internal, S2-external

MAS224 Biostatistical Methods - 3 points  
MURDOCH: S1-internal, S1-external

BIO393 Tropical Marine Biology - 3 points  
<span data-type="offering" data-unit="BIO393">MURDOCH:  
W-internal (quota of 40 places)</span>

MAS182 Applied Mathematics - 3 points  
MURDOCH: S1-internal, S1-external, S2-internal, S2-external

MAS353 Statistical Design and Data Analysis - 3 points  
MURDOCH: S2-internal, S2-external

ENV332 Managing Wetlands and Water - 3 points  
MURDOCH: S2-internal, S2-external

ENG341 Water Conservation and Auditing - 3 points  
MURDOCH: S1-internal, S1-external

COM103 Foundations of Communication - 3 points  
MURDOCH: S2-internal, S2-external

BIO257 Australian Biodiversity - 3 points  
MURDOCH: S2-internal

SUS305 Economics of Sustainability - 3 points  
MURDOCH: W-internal, W-external

COD302 Creative Ways to Work with Community - 3 points  
MURDOCH: S2-internal, S2-external

ENV241 Ecology - 3 points  
MURDOCH: S2-internal, S2-external

#### **Environmental Science Major**

BSC200 Research in the Physical and Life Sciences - 3 points  
Not available this year

ENV303 GIS for Environmental Management and Planning - 3  
points  
<span data-type="offering" data-unit="ENV303">MURDOCH:  
S2-internal (quota of 70 places), S2-external (quota of 20  
places)</span>

MAS223 Applied Statistics - 3 points  
MURDOCH: S2-internal, S2-external

MAS224 Biostatistical Methods - 3 points  
MURDOCH: S1-internal, S1-external

BIO393 Tropical Marine Biology - 3 points  
<span data-type="offering" data-unit="BIO393">MURDOCH:  
W-internal (quota of 40 places)</span>

ENV334 Environmental Restoration - 3 points  
<span data-type="offering" data-unit="ENV334">MURDOCH:  
S1-internal (quota of 60 places), S1-external (quota of 60  
places)</span>

ENG341 Water Conservation and Auditing - 3 points  
MURDOCH: S1-internal, S1-external

COM103 Foundations of Communication - 3 points  
MURDOCH: S2-internal, S2-external

BIO257 Australian Biodiversity - 3 points  
MURDOCH: S2-internal

MAS182 Applied Mathematics - 3 points  
MURDOCH: S1-internal, S1-external, S2-internal, S2-external

#### **Marine Science Major**

BSC200 Research in the Physical and Life Sciences - 3 points  
Not available this year

ENV303 GIS for Environmental Management and Planning - 3  
points  
<span data-type="offering" data-unit="ENV303">MURDOCH:  
S2-internal (quota of 70 places), S2-external (quota of 20  
places)</span>

BIO246 Microbiology - 3 points  
MURDOCH: S1-internal

BMS316 Parasitology: People, Pets and Wildlife - 3 points  
MURDOCH: S2-internal

MAS223 Applied Statistics - 3 points  
MURDOCH: S2-internal, S2-external

MAS224 Biostatistical Methods - 3 points  
MURDOCH: S1-internal, S1-external

ENV241 Ecology - 3 points  
MURDOCH: S2-internal, S2-external

BIO393 Tropical Marine Biology - 3 points  
<span data-type="offering" data-unit="BIO393">MURDOCH:  
W-internal (quota of 40 places)</span>

#### **Biomedical Science Major**

BSC200 Research in the Physical and Life Sciences - 3 points  
Not available this year

MAS223 Applied Statistics - 3 points  
MURDOCH: S2-internal, S2-external

MAS224 Biostatistical Methods - 3 points  
MURDOCH: S1-internal, S1-external

BIO282 Molecular Biology - 3 points  
MURDOCH: S1-internal

BIO394 Genetic Engineering - 3 points  
MURDOCH: S1-internal

BIO367 Forensic Toxicology - 3 points  
MURDOCH: S2-internal

BIO246 Microbiology - 3 points  
MURDOCH: S1-internal

BMS218 Haematology - 3 points  
<span data-type="offering" data-unit="BMS218">MURDOCH:  
S2-internal (quota of 80 places)</span>

BMS323 Clinical Biochemistry I - 3 points  
<span data-type="offering" data-unit="BMS323">MURDOCH:  
S2-internal (quota of 25 places)</span>

BMS316 Parasitology: People, Pets and Wildlife - 3 points  
MURDOCH: S2-internal

BMS317 Human Pharmacology - 3 points  
MURDOCH: S1-internal

#### **Clinical Laboratory Science Major**

BSC200 Research in the Physical and Life Sciences - 3 points  
Not available this year

MAS223 Applied Statistics - 3 points

MURDOCH: S2-internal, S2-external

MAS224 Biostatistical Methods - 3 points

MURDOCH: S1-internal, S1-external

BIO394 Genetic Engineering - 3 points

MURDOCH: S1-internal

BIO367 Forensic Toxicology - 3 points

MURDOCH: S2-internal

BIO246 Microbiology - 3 points

MURDOCH: S1-internal

BIO388 Forensic Science and Miscarriages of Justice - 3 points

MURDOCH: W-internal

BMS317 Human Pharmacology - 3 points

MURDOCH: S1-internal

### **Forensic Biology and Toxicology Major**

BSC200 Research in the Physical and Life Sciences - 3 points

Not available this year

MAS223 Applied Statistics - 3 points

MURDOCH: S2-internal, S2-external

MAS224 Biostatistical Methods - 3 points

MURDOCH: S1-internal, S1-external

BIO388 Forensic Science and Miscarriages of Justice - 3 points

MURDOCH: W-internal

BIO394 Genetic Engineering - 3 points

MURDOCH: S1-internal

BMS218 Haematology - 3 points

<span data-type="offering" data-unit="BMS218">MURDOCH: S2-internal (quota of 80 places)</span>

BMS323 Clinical Biochemistry I - 3 points

<span data-type="offering" data-unit="BMS323">MURDOCH: S2-internal (quota of 25 places)</span>

BMS317 Human Pharmacology - 3 points

MURDOCH: S1-internal

### **Genetics and Molecular Biology Major**

MAS223 Applied Statistics - 3 points

MURDOCH: S2-internal, S2-external

MAS224 Biostatistical Methods - 3 points

MURDOCH: S1-internal, S1-external

BIO388 Forensic Science and Miscarriages of Justice - 3 points

MURDOCH: W-internal

BMS211 Medical Immunology and Molecular Genetics - 3 points

MURDOCH: S2-internal

BMS327 Diagnostic Genomics - 3 points

<span data-type="offering" data-unit="BMS327">MURDOCH: S1-internal (quota of 30 places)</span>

BIO367 Forensic Toxicology - 3 points

MURDOCH: S2-internal

BIO359 Forensic DNA Analysis - 3 points

MURDOCH: S1-internal

BMS218 Haematology - 3 points

<span data-type="offering" data-unit="BMS218">MURDOCH: S2-internal (quota of 80 places)</span>

BMS323 Clinical Biochemistry I - 3 points

<span data-type="offering" data-unit="BMS323">MURDOCH: S2-internal (quota of 25 places)</span>

BMS317 Human Pharmacology - 3 points

MURDOCH: S1-internal

### **Chemistry Major**

MAS221 Mathematical Modelling - 3 points

MURDOCH: S2-internal, S2-external

CHE309 Advanced Projects in Chemistry and Mineral Science - 3 points

MURDOCH: S1-internal, S2-internal, SUM-internal

BSC304 Innovation and Ethics in Science - 3 points

MURDOCH: S1-internal, S1-external

### **Physics and Nanotechnology Major**

MAS223 Applied Statistics - 3 points

MURDOCH: S2-internal, S2-external

MAS222 Probability and Statistical Inference - 3 points

MURDOCH: S1-internal, S1-external

ICT289 Computer Graphics Principles and Programming - 3 points

MURDOCH: S1-internal, S1-external

ICT283 Data Structures and Abstractions - 3 points

MURDOCH: S1-internal, S1-external

ENG297 Circuits and Systems II - 3 points

MURDOCH: S1-internal

ENG207 Principles of Electronic Instrumentation - 3 points

MURDOCH: S2-internal, W-internal

ICT319 Intelligent Systems - 3 points

MURDOCH: S2-internal, S2-external

MAS221 Mathematical Modelling - 3 points

MURDOCH: S2-internal, S2-external

MAS351 Environmental and Biological Modelling - 3 points

MURDOCH: S1-internal, S1-external

MAS354 Modelling and Simulation - 3 points

MURDOCH: S2-internal, S2-external

BSC304 Innovation and Ethics in Science - 3 points

MURDOCH: S1-internal, S1-external

### **Mathematics and Statistics Major**

MAS220 Mathematical Methods - 3 points

MURDOCH: S1-internal, S1-external

MAS222 Probability and Statistical Inference - 3 points

MURDOCH: S1-internal, S1-external

ICT283 Data Structures and Abstractions - 3 points

MURDOCH: S1-internal, S1-external

MAS351 Environmental and Biological Modelling - 3 points

MURDOCH: S1-internal, S1-external

MAS352 Time Series Analysis - 3 points

MURDOCH: S1-internal, S1-external

ICT373 Software Architectures - 3 points

MURDOCH: S1-internal, S1-external

ICT374 Operating Systems and Systems Programming - 3 points

MURDOCH: S2-internal, S2-external

### **Engineering Technology Major**

MAS221 Mathematical Modelling - 3 points

MURDOCH: S2-internal, S2-external

The following unit is no longer available - contact the Academic Chair for advice:

BEN200 Scientific Method in Engineering - 3 points

MAS223 Applied Statistics - 3 points

MURDOCH: S2-internal, S2-external

BEN300 Innovation and Ethics in Engineering - 3 points

MURDOCH: S1-internal



BSC304 Innovation and Ethics in Science - 3 points  
MURDOCH: S1-internal, S1-external

MAS351 Environmental and Biological Modelling - 3 points  
MURDOCH: S1-internal, S1-external

MAS354 Modelling and Simulation - 3 points  
MURDOCH: S2-internal, S2-external

ENG336 Engineering Finance, Management and Law - 3 points  
MURDOCH: S2-internal

#### **Mineral Science Major**

ENG255 Chemical Process Kinetics - 3 points  
MURDOCH: S1-internal, S1-external

MAS221 Mathematical Modelling - 3 points  
MURDOCH: S2-internal, S2-external

The following unit is no longer available - contact the Academic Chair for advice:

BEN200 Scientific Method in Engineering - 3 points

ENG299 Control Systems and Process Dynamics - 3 points  
MURDOCH: S2-internal

BEN300 Innovation and Ethics in Engineering - 3 points  
MURDOCH: S1-internal

MAS351 Environmental and Biological Modelling - 3 points  
MURDOCH: S1-internal, S1-external

MAS354 Modelling and Simulation - 3 points  
MURDOCH: S2-internal, S2-external

ENG336 Engineering Finance, Management and Law - 3 points  
MURDOCH: S2-internal

#### **Marine Biology Major**

BSC200 Research in the Physical and Life Sciences - 3 points  
Not available this year

ENV303 GIS for Environmental Management and Planning - 3 points  
<span data-type="offering" data-unit="ENV303">MURDOCH: S2-internal (quota of 70 places), S2-external (quota of 20 places)</span>

BIO246 Microbiology - 3 points  
MURDOCH: S1-internal

BMS316 Parasitology: People, Pets and Wildlife - 3 points  
MURDOCH: S2-internal

MAS223 Applied Statistics - 3 points  
MURDOCH: S2-internal, S2-external

MAS224 Biostatistical Methods - 3 points  
MURDOCH: S1-internal, S1-external

BIO282 Molecular Biology - 3 points  
MURDOCH: S1-internal

## **PREREQUISITES**

**Advanced Projects in Chemistry and Mineral Science (CHE309)**  
Students need to have completed a minimum of 24 points at 200 and 300 level.

**Advanced Quantitative Research Methods (BSC302)**  
BSC201 Psychology: Measurement, Design and Analysis OR PSY212: Psychology: Measurement, Design and Analysis.

**Applications of Nanotechnology (PEN261)**  
PEN152/PEC152 Principles of Physics and MAS161 Calculus and Matrix Algebra.

**Applied Mathematics (MAS182)**

MAS164 Fundamentals of Mathematics OR at least a pass in the Year 11 course Introduction to Calculus together with a final scaled score of 55% or more in TEE Applicable Mathematics OR a final scaled score of 55% or higher in ATAR Mathematics Methods (WACE Mathematics 3C/3D).

#### **Applied Statistics (MAS223)**

MAS183 Statistical Data Analysis.

#### **Australian Biodiversity (BIO257)**

Nil.

#### **Biochemistry (BIO247)**

BIO152 Cell Biology/Foundations of Cell and Molecular Biology/Foundations of Cell Biology

#### **Biostatistical Methods (MAS224)**

MAS180 Introduction to Statistics or MAS183 Statistical Data Analysis.

#### **Building Blocks for Science Students (BSC100)**

Enrolment in a Bachelor of Science, Bachelor of Animal Science, Bachelor of Environmental Management, Bachelor of Environmental Science, Bachelor of Extractive Metallurgy, Bachelor of Forensics, Bachelor of Information Technology Management, Bachelor of Marine Science, Bachelor of Sports Science, Bachelor of Technology in Engineering Technology, Bachelor of Sustainability, Bachelor Of Sport And Exercise Science, Bachelor of Sport and Exercise Science + Psychology (BSportExSc, BSc) or Bachelor Of Sport And Exercise Science/Graduate Diploma In Clinical Exercise Physiology, B1355 Bachelor of Laws / Bachelor of Science (Psychology)

#### **Calculus and Matrix Algebra (MAS161)**

MAS182 Applied Mathematics OR a final scaled score of 55% or more in TEE Calculus or equivalent OR a final scaled score of 55% or higher in ATAR Mathematics Specialist (or WACE Mathematics: Specialist 3C/3D).

#### **Chemical Analysis (CHE207)**

CHE144 Foundations of Chemistry/PEC144 Chemical Principles.

#### **Chemical Process Kinetics (ENG255)**

All Part I units in the Chemical and Metallurgical Engineering Honours major.

#### **Circuits and Systems II (ENG297)**

ENG125 Circuits and Systems I AND MAS182 Applied Mathematics or equivalent.

#### **Clinical Biochemistry I (BMS323)**

BIO247 Biochemistry

#### **Computer Graphics Principles and Programming (ICT289)**

ICT167 Principles of Computer Science OR ICT104 Principles of Computer Science. Students are encouraged to also complete MAS162 Foundations of Discrete Mathematics AND ICT170 Foundations of Computer Systems.

#### **Control Systems and Process Dynamics (ENG299)**

PEC152/PEN152 Principles of Physics; MAS161 Calculus and Matrix Algebra or co-requisite MAS208 Mathematical Modelling; ENG109 Computing for Scientists and Engineers; ENG192 Energy, Mass and Flow or CHE144 Foundations of Chemistry.

#### **Creative Ways to Work with Community (COD302)**

Nil.

#### **Data Structures and Abstractions (ICT283)**

ICT167/ICT104 Principles of Computer Science. Students are encouraged to also complete MAS162 Foundations of Discrete Mathematics AND ICT170 Foundations of Computer Systems.

#### **Diagnostic Genomics (BMS327)**

BIO282 Molecular Biology

#### **Ecology (ENV241)**

BIO103 Environmental Biology/Introduction to Environmental Biology or BIO180 Introduction to Marine Biology.

**Economics of Sustainability (SUS305)**

Nil.

**Electromagnetism (PEN332)**

PEN152 Principles of Physics and MAS161 Calculus and Matrix Algebra.

Highly recommended: MAS220 Mathematical Methods.

**Energy, Mass and Flow (ENG192)**

Completion of, or concurrent enrolment in, MAS182 Applied Mathematics or MAS161 Calculus and Matrix Algebra; plus a final scaled score of 60% or more in WACE Physics 3A/3B or a pass in PEC120/PEN120 General Physics.

**Engineering Finance, Management and Law (ENG336)**

Nil.

**Environmental Policy and Law (ENV328)**

Nil.

**Environmental Restoration (ENV334)**

BIO103 Environmental Biology/Introduction to Environmental Biology. Students are strongly recommended to complete ENV268/ENV241 Ecology.

**Environmental and Biological Modelling (MAS351)**

MAS221/MAS208 Mathematical Modelling OR MAS220/MAS261 Mathematical Methods.

**Experimental Physics and Nanotechnology (PEN363)**

PEN261 Applications of Nanotechnology.

**Forensic DNA Analysis (BIO359)**

BIO202 Molecular Biology I or BIO212 Genetic Engineering or BIO282 Molecular Biology

**Forensic Science and Miscarriages of Justice (BIO388)**

PEC103/CHE103 Introduction to Forensic Science OR CRM100 Introduction to Criminology OR permission of the Unit Co-ordinator.

**Forensic Toxicology (BIO367)**

Successful completion of, or concurrent enrolment in, either BIO247/BIO270 Biochemistry/Biochemistry I or BMS261/VET272 Human and Comparative Biochemistry/Comparative Mammalian Biochemistry or CHE207 Chemical Analysis..

**Foundations of Chemistry (CHE144)**

A thorough knowledge of Chemistry ATAR is assumed. Students who did not achieve a final scaled score of 50 percent or more in Chemistry ATAR within the three years immediately preceding this enrolment are required to pass CHE140 Fundamentals of Chemistry before enrolling in this unit.

**Foundations of Communication (COM103)**

Nil.

**Fundamentals of Chemistry (CHE140)**

Knowledge of chemistry to the level of Year 10 (fourth year of WA secondary school) or equivalent and reasonable grounding in basic mathematics are assumed.

**Fundamentals of Mathematics (MAS164)**

Nil.

**GIS for Environmental Management and Planning (ENV303)**

Completion of 24 points or enrolment in an appropriate graduate qualification.

**General Physics (PEN120)**

Mathematics 3C/3D or MAS164 Fundamentals of Mathematics are strongly recommended. MAS164 Fundamentals of Mathematics may be taken concurrently.

**Genetic Engineering (BIO394)**

BIO282 Molecular Biology

**Haematology (BMS218)**

BIO152 Cell Biology/Foundations of Cell and Molecular Biology/Foundations of Cell Biology.

**Human Pharmacology (BMS317)**

Essential: BIO247 Biochemistry or BMS206 Biomedical Physiology OR VET272 Comparative Mammalian Biochemistry.

Recommended: BRD202 Drugs in Society

**Innovation and Ethics in Engineering (BEN300)**

BEN200 Engineering Research Skills; MAS261/MAS220 Mathematical Methods OR MAS208/MAS221 Mathematical Modelling.

**Innovation and Ethics in Science (BSC304)**

Completion of one 200-level research skills unit recommended for your major.

**Intelligent Systems (ICT319)**

ICT167 Principles of Computer Science OR ICT104 Principles of Computer Science.

**Introduction to Research Methodology and Evidence Based Practice (BSC206)**

100-level Transition Unit.

**Managing Wetlands and Water (ENV332)**

ENV241/ENV268 Ecology

**Marine Ecology (BIO377)**

BIO261/BIO244 Animal Diversity/Animal Speciation, Radiation, Evolution, or BIO287 Plant Diversity (Marine Science) / BIO254 Marine Botany or BIO265/BIO245 Plant Diversity/Plant Evolution, Radiation and Adaptation, or ENV268/ENV241 Ecology.

**Mathematical Methods (MAS220)**

MAS161 Calculus and Matrix Algebra OR MAS208/MAS221 Mathematical Modelling OR equivalent.

**Mathematical Modelling (MAS221)**

MAS182 Applied Mathematics or MAS161 Calculus and Matrix Algebra or equivalent.

**Medical Immunology and Molecular Genetics (BMS211)**

BIO152 Cell Biology/ Foundations of Cell and Molecular Biology.

**Microbiology (BIO246)**

BIO152 Cell Biology/Foundations of Cell and Molecular Biology/Foundations of Cell Biology

**Modelling and Simulation (MAS354)**

MAS161 Calculus and Matrix Algebra OR MAS221/MAS208 Mathematical Modelling OR both MAS182 Applied Mathematics AND MAS167 Computational Mathematics/MAS162 Foundations of Discrete Mathematics

**Modern Physics (PEN231)**

MAS161 Calculus and Matrix Algebra and PEC152/PEN152 Principles of Physics.

**Molecular Biology (BIO282)**

BIO152 Cell Biology/Foundations of Cell and Molecular Biology/Foundations of Cell Biology

**Operating Systems and Systems Programming (ICT374)**

ICT283/ICT209 Data Structures and Abstractions.

**Parasitology: People, Pets and Wildlife (BMS316)**

BIO152 Cell Biology/Foundations of Cell and Molecular Biology/Foundations of Cell Biology

**Physics of Materials (PEN317)**

CHE140 Fundamentals of Chemistry/PEC140 Introduction to Chemistry or CHE144 Foundations of Chemistry/PEC144 Chemical Principles; PEN231/PEC231 Modern Physics, PEC302/PEN202 Thermodynamics for Physics and Nanotechnology.

**Principles of Electronic Instrumentation (ENG207)**

ENG125 Circuits and Systems I and MAS182 Applied Mathematics.

**Principles of Physics (PEN152)**

Concurrent enrolment in MAS182 Applied Mathematics or MAS161 Calculus and Matrix Algebra; plus a minimum C score (60% or more) in WACE ATAR Physics or a pass in PEN120 General Physics.

**Probability and Statistical Inference (MAS222)**

MAS180 Introduction to Statistics OR MAS183 Statistical Data Analysis OR MAS223 Applied Statistics OR MAS224/MAS230 Biostatistical Methods OR MAS284 Applied Statistics and Process Management. In addition, students must have a calculus background equivalent to at least MAS182 Applied Mathematics.

**Psychology: Measurement, Design and Analysis (BSC201)**

PSY173 Introduction to Psychological Research Methods

**Research and Evidence Based Practice (BSC306)**

Completion of BSC206 Introduction to Research Methodology and Evidence Based Practice or special permission of Unit Coordinator.

**Research in the Physical and Life Sciences (BSC200)**

BSC100 Building Blocks for Science Students; OR enrolment in B1329 Bachelor of Education/Bachelor of Science and BED100 Ideas in Education.

**Software Architectures (ICT373)**

ICT104 Principles of Computer Science OR ICT167 Principles of Computer Science; ICT231 Systems Analysis and Design OR ICT284 Systems Analysis and Design.

**Statistical Design and Data Analysis (MAS353)**

MAS222/MAS278 Probability and Statistical Inference OR MAS223 Applied Statistics OR MAS224/MAS230 Biostatistical Methods OR MAS284 Applied Statistics and Process Management.

**Thermodynamics for Physics and Nanotechnology (PEN202)**

PEN152/PEC152 Principles of Physics and MAS161 Calculus and Matrix Algebra or MAS182 Applied Mathematics.

**Time Series Analysis (MAS352)**

MAS222/MAS278 Probability and Statistical Inference OR MAS223 Applied Statistics OR MAS224/MAS230 Biostatistical Methods OR MAS284 Applied Statistics and Process Management or enrolment in a postgraduate IT course. In addition students must have a calculus background equivalent to at least either MAS161 Calculus and Matrix Algebra OR MAS221/MAS208 Mathematical Modelling.

**Tropical Marine Biology (BIO393)**

BIO261/BIO244 Animal Diversity/Animal Speciation, Radiation, Evolution OR BIO265/BIO245 Plant Diversity/Plant Evolution, Radiation and Adaptation OR BIO287/BIO254 Plant Diversity (Marine Science) /Marine Botany OR ENV268/ENV241 Ecology OR permission of the Unit Coordinator.

**Water Conservation and Auditing (ENG341)**

Nil.

# Personal Study Plan

Unit Sets:

---

---

---

Year	Semester 1	Semester 2
1		
2		
3		
4		