

# School of Science and Mathematics

The School of Science and Mathematics offers a three-year Bachelor of Science degree with a range of eight majors, ten minors, a specialisation and the Bachelor of Science/Bachelor of Teaching. The School has science related articulation arrangements in place with the University of Newcastle, Charles Sturt University and the University of New England. Students are able to enrol for appropriate food and nutrition units at the University of Newcastle (Ourimbah campus) to complete their Avondale Food and Nutrition major. Students who complete a Bachelor of Science at Avondale may transfer, with advanced standing, to the Bachelor of Medical Science (Pathology) at Charles Sturt University and complete the degree with one further year of study. A psychology specialisation is available by distance mode through the University of New England.

The School offers units that specifically service the needs of other Academic Organisational Units at Avondale .

## Research Centre

### Centre for Interdisciplinary Studies in Science

*Head of Centre:*

A/Prof Kevin de Berg  
BSc, DipEd, BEd, PhD, MAppSc, MRACI, CChem, MACS

## Staff

### Head of School

A/Prof Kevin C de Berg  
BSc Qld, DipEd Qld, BEd Qld, PhD Qld, MAppSc Curtin

### Associate Professor

A/Prof Kevin C de Berg  
BSc Qld, DipEd Qld, BEd Qld, PhD Qld, MAppSc Curtin  
*Chemistry*

### Senior Lecturers

Dr Jason Morton  
BSc(Hons) Ncle, BSc Avondale, BEd PhysEd Ballarat, PhD Ncle,  
*Biology*

Dr Lynden J Rogers  
BSc(Hons) Lond, MSc Ncle, PhD Ncle  
*Physics*

Anton R Selvaratnam  
BSc (Hons) Jaffna, GradDipTch Massey, MSc Massey  
*Mathematics*

Dr Ewan Ward  
BSc(Hons) NSW, PhD NSW, Grad Dip Theology, Grad Dip  
Ministry  
*Biomedical Science*

### Associate Lecturer

Carmen Booyens  
BSc Avondale, BSc (Hons) Ncle, BTch Avondale  
*Biology, Geography*

### Laboratory Supervisors

Jodie Beecroft  
BSc Avondale

### Sessional Lecturers

Dr Terence J Annable  
SRN Lond, DCR(T) Lond, BSc(Hons) Lond, CEd(Tech) Lond,  
MSc UNE, PhD Sydney  
*Applied Biology*

Dr Robert J Drewer  
BSc Adel, BSc(Hons) Adel, PhD Adel  
*Chemistry*

Dr Bevan Hokin  
COP, BSc, MAppSc, PhD  
*Biomedical Science*

Dr Wilfred J Pinchin  
BA PUC, BSc(Hons) Lond, PhD Ncle  
*Mathematics*

Prof. Brian Timms  
BSc (Hons), PhD, DSc  
*Biology*

Dr Colin Waters  
BEd(Sc), DipSc(Hons) PhD  
*Physics*

## Bachelor of Science

Head of School: A/Prof Kevin de Berg

The Bachelor of Science degree prepares graduates for careers in a wide range of public or private organisations, including science laboratories, industrial, health and commercial organisations. The degree also provides a foundation for postgraduate study. The course is designed to enhance students' knowledge of science in the contemporary world, to provide opportunities for critical thinking and problem-solving in a context of Christian values, and to give laboratory/field experiences that develop appreciation for the joint role of theory and experimentation in furthering knowledge of the world around us.

### Duration

Three years full-time or equivalent part-time

### Credit points

144 credit points

### Mode of delivery

On campus for the majority of units

- BMS242 Human Cytogenetics studied by distance mode
- FSHN units studied on the Ourimbah campus of the University of Newcastle
- PSYC Psychology units studied by distance mode
- ITC units by distance mode
- Some PHYS units studied on Callaghan campus of the University of Newcastle

### Abbreviations of course titles

BSc

### Accreditation

The degree is accredited by the NSW Department of Education and Training.

### Entry requirements

The general entry requirements for Avondale degree courses are stated in the Academic Policies section of the Handbook. These requirements apply to all the majors in the BSc with the following additional requirements for specific majors/minors:

#### Biological Science

- 1 HSC (or equivalent) Science unit and Chemistry Bridging Course, *or*
- 2 Recommendation of the School of Science and Mathematics
- 3 HSC (or equivalent) Biology is recommended.

#### Chemistry

- 1 HSC (or equivalent) Chemistry, or recommendation of the School of Science and Mathematics, *and*
- 2 HSC (or equivalent) Mathematics, *or* recommendation of the School of Science and Mathematics.

#### Food and Nutrition

- 1 HSC (or equivalent) Science unit and Chemistry Bridging Course, *or*
- 2 Recommendation of the School of Science and Mathematics.
- 3 HSC (or equivalent) Biology is recommended.

#### Mathematics

Recent HSC (or equivalent) Mathematics Extension 1, *or* recommendation of the School of Science and Mathematics.

#### Physics

- 1 HSC (or equivalent) Physics, or recommendation of the School of Science and Mathematics *and*
- 2 HSC (or equivalent) Mathematics Extension 1, *or* recommendation of the School of Science and Mathematics.

### Course structure

The BSc degree consists of a minimum of twenty-four 6-credit point units (144 credit points) over six semesters. The course is comprised of three Christian Studies units, and at least 21 units (126 credit points) in a combination of majors, minors, a specialisation, required units, and electives.

The BSc *major* is an approved sequence in a specific Science discipline or multi-discipline area comprised of at least eight units (48 credit points) including not more than two units (12 credit points) at 100-Level, and at least three units (18 credit points) at 300-Level.

The BSc *minor* is an approved sequence in a different Science discipline area or multi-discipline area to that chosen for the major comprised of at least four units (24 credit points) including not more than two units (12 credit points) at 100-Level, and at least two units (12 credit points) at 200/300-Level.

Majors and minors must be selected from different Science disciplines.

A BSc *specialisation* is available only in the field of psychology and is an approved sequence of 10 units (60 credit points) studied by distance education through the University of New England (UNE). This sequence is accredited with the Australian Psychology Accreditation Council (APAC) and if adequate grades are obtained may lead on to an honours year and subsequent qualifications in clinical psychology.

*Required* units are the prerequisites/corequisites for a major or minor that are not part of that major or minor sequence of units. They also include units which are part of a special sequence but not necessarily prerequisites/corequisites. The table below shows the required units for major/minor study in the listed discipline areas.

*Electives* are undergraduate units which may be chosen from the areas listed for major and minor studies in the BSc as well as other approved undergraduate units.

All units are worth 6 credit points (unless otherwise specified) with a notional semester workload of 150 hours, averaging 10–12 hours per week (including contact hours).

### Christian Studies units

CSTD14300	Christian Studies I
CSTD24300	Christian Studies II*#
SCSP34300	Christian Studies III—Scientific Perspectives in the Modern World

\*SDA students may select the following alternative to CSTD24300:  
THCH16500 SDA History and Ministry of Ellen White

#The following alternatives to CSTD24300 are available to students of other faiths:

BBNT16000	Gospels A
BBNT17000	New Testament Epistles A
ENGL21000	The Bible as Literature
ENGL25000	Literature and Religion (odd years)
THWR36400	World Religions

All students may substitute an approved unit from the School of Ministry and Theology for either CSTD14300 or CSTD24300.

### Required units

<i>Discipline</i>	<i>Required Units</i>
Biological Chemistry	BIOL16000 Biology I; BIOL16100 Comparative Functional Biology; BIOL26100 Biochemistry
Biological Science—Environmental	MATH16200 Introduction to Statistics
Biological Science—Biomedical	CHEM16000 Chemistry IA <i>or</i> CHEM16300 General Chemistry <i>or</i> CHEM16100 Chemistry IB
Chemistry	MATH16000 Mathematics IA <i>or</i> MATH16400 General Mathematics
Food and Nutrition/ Biological Science	CHEM16000 Chemistry IA <i>or</i> CHEM16300 General Chemistry

<i>Discipline</i>	<i>Required Units</i>
Geography	BIOL26200 Ecology <i>for</i> GEOP33000 Biogeography <i>if</i> GEOP21000 Physical Geography A <i>and</i> GEOP22000 Physical Geography B not studied
Medical Laboratory Science sequence	MATH16000 Mathematics IA <i>or</i> MATH16400 General Mathematics; MATH16200 Introduction to Statistics; PHYS16300 General Physics <i>or</i> PHYS16000 Physics IA; <i>BMS242 Human Cytogenetics (CSU);</i> 200-Level Chemistry
Mathematics	Nil
Physics	MATH16000 Mathematics IA; MATH16100 Mathematics IB; MATH26000 Calculus II
Psychology	Statistics study already part of specialisation

### Majors

Biological Science—Biomedical Major  
Biological Science—Environmental Major  
Chemistry  
Food and Nutrition (requires a Biological Science minor - see grid structure)  
Geography  
Mathematics  
Physics  
Psychology

### Minors

Biological Chemistry  
Biological Science—Biomedical Major  
Biological Science—Environmental Major  
Chemistry  
Food and Nutrition (requires a Biological Science minor—see grid structure)  
Geography  
Information Technology  
Mathematics  
Physics  
Psychology

At least one Science minor must be undertaken (apart from modes 1 and 6). Other minors may be available from other degrees, subject to timetable constraints and with the approval of the Course Convenor and the Head of the School offering the proposed minor.

## Specialisation

Psychology

### Major seminar units

The offering of a major seminar/independent topic in the third year is normally subject to the student having satisfactorily completed at least three 200 or 300-Level units in the major area. These units are normally 6 credit points; but may be offered as double sequence across two semesters (worth 12 credit points) if the project undertaken is large enough. Major seminars are also subject to staff availability and are offered at the discretion of the Head of School.

BIOL39000	Seminar in Biology
CHEM39000	Seminar in Chemistry
SCRT39000	Research Topic in the Sciences
MATH39000	Seminar in Mathematics
PHYS39000	Seminar in Physics

### Guided reading units

These units are units of guided reading and critical reflection in an area that supplements the student's field of study. They provide the student with an opportunity to critically review and interrogate the literature in their area of interest. Regular tutorial periods are required for the review of the chosen reading materials. These units are normally only offered when for some reason beyond the control of Avondale a normal unit cannot be offered in a given semester.

### Electives

Electives may be chosen from the areas listed for major and minor studies in the BSc as well as other degree-level units. Science electives can be chosen from Biological Science (coded BIOL), Biological Chemistry (coded BIOL and CHEM), Chemistry (coded CHEM), Food and Nutrition (coded HPFH and DTFN), Geography (coded GEOH and GEOP), Information Technology (coded ICTM, ITC, INFS), Mathematics (coded MATH), Physics (coded PHYS), Psychology (coded PSYC) and other science units (coded SCAP, SCCH, SCSP and SCEV). Students anticipating postgraduate studies in the area of their major discipline are strongly advised to take the electives available in their major. No more than 12 credit points of electives outside the sciences (science units are coded BIOL, CHEM, ICTM, ITC, INFS, DTFN, GEOH, GEOP, HPFH, MATH, PHYS, SCAP, SCCH, SCSP, SCEV and PSYC) are allowed. Only certain HPFH units will be allowed as electives. Electives must be chosen so that no more than ten 100-Level units are studied in the 24-unit degree. Electives may also be restricted if prerequisites are required for the major/minor sequences. The Head of School is to be consulted regarding the choice of electives, particularly those outside the major/minor sequences, as not all units may be taken.

## Articulations with other institutions

*Food and Nutrition Major—The University of Newcastle units*  
A memorandum of agreement exists between the School of Science and Mathematics (Avondale) and the School of Science and Technology (The University of Newcastle Central—Coast Campus). Avondale students who have successfully completed the science units across the first four semesters shown in the Food and Nutrition Major/Biological Science Minor Grid Structure will be eligible to enrol in The University of Newcastle units shown in semesters 6 and 7 of the same Structure.

*Articulation with Charles Sturt University Bachelor of Medical Science (Pathology)*

A memorandum of understanding exists between the School of Science and Mathematics (Avondale) and the School of Biomedical Sciences (Charles Sturt University). Avondale Bachelor of Science (Biological Sciences—Biomedical major and biological chemistry minor) graduates who have successfully completed the Charles Sturt University distance unit BMS242 while at Avondale are eligible to enrol in the Charles Sturt University Bachelor of Medical Science (Pathology) and complete this degree after an additional year of full-time study (see Grid Structure).

*Articulation with The University of New England (Psychology)*

A memorandum of understanding exists between Avondale and The University of New England, whereby Avondale students enrol in the psychology specialisation by distance mode as a component of their Avondale degree.

### Major/minor unit sequences

NOTE: Discipline Electives may replace units in the major/minor sequences in consultation with the Head of the School of Science and Mathematics

#### Biological Science

##### Biological Science—Environmental major

BIOL16000	Biology I
BIOL16100	Comparative Functional Biology
BIOL26200	Ecology
BIOL26300	Mammalogy
BIOL26600	Ecophysiology of Animals (even years)
GEOP33000	Biogeography
BIOL36600	Conservation Ecology (even years)
BIOL36800	Marine Biology

NOTE: Advised electives with this major:  
MATH16200 Introduction to Statistics

##### Biological Science—Environmental major electives

BIOL26100	Biochemistry
BIOL39000	Seminar in Biology

##### Biological Science—Environmental minor

BIOL16000	Biology I
BIOL16100	Comparative Functional Biology
BIOL26200	Ecology

and one of

BIOL26300	Mammalogy
BIOL36600	Conservation Ecology ( <i>even years</i> )
BIOL36800	Marine Biology

#### Biological Science—Biomedical major

BIOL16000	Biology I
BIOL16100	Comparative Functional Biology
BIOL26000	General Human Physiology
BIOL26100	Biochemistry
BIOL26400	General Microbiology
BIOL36000	Investigative Biochemistry ( <i>odd years</i> )
BIOL36400	Advanced Human Physiology
BIOL36500	Molecular Biology ( <i>even years</i> )

#### Biological Science—Biomedical major electives

BIOL39000	Seminar in Biology
HPPD30100	Exercise Physiology

#### Biological Science—Biomedical minor

BIOL16000	Biology I
BIOL16100	Comparative Functional Biology

and any two of:

BIOL26000	General Human Physiology
BIOL26100	Biochemistry
BIOL26400	General Microbiology

#### Biological Chemistry minor

BIOL26700	Histotechniques ( <i>odd years</i> )
BIOL35800	Clinical Biochemistry ( <i>even years</i> )
CHEM16000	Chemistry IA <i>or</i>
CHEM16300	General Chemistry
CHEM16100	Chemistry IB

#### Chemistry

##### Chemistry major

CHEM16000	Chemistry IA
CHEM16100	Chemistry IB
CHEM21000	Organic Chemistry ( <i>even years</i> )
CHEM26000	Physical and Inorganic Chemistry IIA ( <i>odd years</i> )
CHEM26100	Physical and Inorganic Chemistry IIB ( <i>odd years</i> )
CHEM31000	Advanced Organic Chemistry ( <i>even years</i> )
CHEM32500	Solid State Chemistry and Spectroscopy ( <i>odd years</i> )
CHEM32600	Environmental Chemistry ( <i>odd years</i> )

##### Chemistry major electives

*Additional units for the major can be chosen from the following:*

CHEM21500	Biomolecular Chemistry ( <i>even years</i> )
CHEM32700	Organometallic and Bioinorganic Chemistry ( <i>even years</i> )
CHEM32800	Food Chemistry ( <i>even years</i> )
CHEM39000	Seminar in Chemistry

#### Chemistry minor

CHEM16000	Chemistry IA <i>or</i>
CHEM16300	General Chemistry
CHEM16100	Chemistry IB

and at least two of the following:

CHEM21000	Organic Chemistry ( <i>even years</i> )
CHEM21500	Biomolecular Chemistry ( <i>even years</i> )
CHEM26000	Physical and Inorganic Chemistry IIA ( <i>odd years</i> ) ( <i>prerequisite CHEM16000</i> )
CHEM26100	Physical and Inorganic Chemistry IIB ( <i>odd years</i> ) ( <i>prerequisite CHEM16000</i> )

#### Food and Nutrition

Units in italics offered by arrangement with the University of Newcastle.

##### Food and Nutrition major

DTFN11100	Food, Nutrition and Health
DTFN21100	Food Production Systems
HPFH20100	Nutrition, Development and Performance
DTFN21200	Food Science and Innovation
<i>FSHN3010</i>	<i>Food Processing and Quality Management</i>
DTFN31100	Food Industry Experience <i>or</i>
<i>FSHN3080</i>	<i>Professional Practice</i>
DTFN31200	Food Product Design Project <i>or</i>
<i>FSHN3210</i>	<i>Food Product Development</i>
HPFH36300	Health Promotion <i>or</i>
BIOL37000	Food Microbiology <i>or</i>
<i>FSHN3420</i>	<i>Food Packaging <i>or</i></i>
<i>FSHN3100</i>	<i>Research Methods</i>

##### Food and Nutrition electives

(units from *The University of Newcastle*, timetable permitting):

CHEM32800	Food Chemistry ( <i>even years</i> )
<i>FSHN3070</i>	<i>Functional Food and Health Claims</i>
<i>FSHN3100</i>	<i>Research Methods</i>
<i>FSHN3230</i>	<i>Food Analysis</i>
<i>FSHN3420</i>	<i>Food Packaging</i>

#### NOTES:

- 1 It is mandatory that a Food and Nutrition major be studied in association with an appropriate Biological Science minor. See the grid structure.
- 2 Units in italics are offered from The University of Newcastle—Central Coast Campus. Students should consult with the Head of School in relation to any changes in the units offered by The University of Newcastle.

##### Food and Nutrition minor

DTFN11100	Food, Nutrition and Health
DTFN21100	Food Production Systems

and two of:

- DTFN21200 Food Science and Innovation
- DTFN31200 Food Product Design Project
- HPFH20100 Nutrition, Development and Performance
- HPFH36300 Health Promotion

NOTE: It is mandatory that a Food and Nutrition minor be studied in association with appropriate Biological Science units. See the Head of School for details.

## Geography

### Geography major

- GEOH11000 Global Issues and Humanitarian Responses
- GEOH12000 Environmental Issues
- GEOH23000 Asia Pacific in the Global Economy
- GEOH35000 Development Geography and Practice
- GEOH36000 Urban Places and Society
- GPOP21000 Physical Geography A
- GPOP22000 Physical Geography B
- GPOP33000 Biogeography

Note: Students contemplating a Geography major or minor should consult with the Head of the School of Science and Mathematics. Not all units may be offered in a given year.

### Geography electives

- GETR24000 Asian Fieldwork (*not offered every year*)
- SCRT39000 Research Topic in the Sciences

### Geography minor

- GEOH11000 Global Issues and Humanitarian Responses
- GEOH12000 Environmental Issues

and at least two of the following:

- GETR24000 Asian Fieldwork
- GEOH23000 Asia Pacific in the Global Economy
- GPOP21000 Physical Geography A
- GPOP22000 Physical Geography B

### Physical Geography minor

- GEOH12000 Environmental Issues
- GPOP21000 Physical Geography A
- GPOP22000 Physical Geography B
- GPOP33000 Biogeography

## Information Technology

### Information Technology minor

- ITC182 *Foundations in IT (CSU)\**
- ITC106 *Programming Principles (CSU)\**
- INFS21600 Management Information Systems
- 4th unit to be chosen in consultation with the Course Convenor*

\* Studied by distance education through Charles Sturt University

Note: Students should consult with the Head of the School of Science and Mathematics regarding choice of units

## Mathematics

### Mathematics major

- MATH16000 Mathematics IA
- MATH16100 Mathematics IB

- MATH26000 Calculus II
- MATH26100 Algebra II
- MATH26200 Statistics II (*odd years*)
- MATH36100 Algebra III
- MATH36200 Mathematical (Adv) Analysis (*even years*)
- MATH36300 Advanced Mathematical Methods

### Mathematics electives

- MATH26300 Numerical Analysis (*even years*)
- MATH36000 Calculus III (*odd years*)
- MATH39000 Seminar in Mathematics

### Mathematics minor

- MATH16000 Mathematics IA
- MATH16100 Mathematics IB
- MATH26000 Calculus II

and at least one of:

- MATH26100 Algebra II
- MATH26200 Statistics II (*odd years*)
- MATH26300 Numerical Analysis (*even years*)

## Physics

Units in italics are offered by arrangement with the University of Newcastle

### Physics major

- PHYS16000 Physics IA
- PHYS16100 Physics IB
- PHYS22500 Classical Physics and Special Relativity*
- PHYS26100 From Quantum to Quark
- PHYS22600 Electromagnetism*
- PHYS36300 Electronics Applications

and any two of:

- PHYS32900 Special Relativity*
- PHYS33100 Lasers & Applications*
- PHYS33500 Quantum, Atomic & Molecular Physics*
- PHYS33900 Solid State and Nanoscience*

NOTE: Units in italics are offered from The University of Newcastle. Students should consult with the Head of School regarding updates to units offered by The University of Newcastle. Unit alterations may vary according to student demand.

### Physics electives

- PHYS36100 Quantum Physics (*odd years*)
- PHYS39000 Seminar in Physics

### Physics minor

- PHYS16000 Physics IA
- PHYS16100 Physics IB
- PHYS26100 From Quantum to Quark
- PHYS26300 Electronics and Data Acquisition

## Psychology

Psychology specialisation (by distance education through The University of New England). Check the UNE website for the current list of units

PSYC101	Introductory Psychology I
PSYC102	Introductory Psychology II
PSYC200	Social Psychology
PSYC202	Research Methods and Statistics
PSYC206	Cognitive Psychology
PSYC213	Lifespan Developmental Psychology
PSYC301	Psychological Testing
PSYC302	Advanced Research Methods and Statistics
PSYC366	Biopsychology

and at least one of the following;

PSYC304	Health Psychology
PSYC309	Human Neuropsychology
PSYC316	Perception and Perceptual Impairment
PSYC321	Psychology of Language (not offered 2011)
PSYC363	Abnormal Psychology
PSTC399	Special Topics in Psychological Research

## Mode of study and degree structure

The major, minor, specialisation, required electives and Christian Studies units may be studied in one of six modes as follows:

Mode 1	Two majors plus other units (required plus electives plus Christian Studies)
Mode 2	Two majors plus one minor plus other units (required plus electives plus Christian Studies)
Mode 3	One major plus two minors (at least one Science minor) plus other units (required plus electives plus Christian Studies)
Mode 4	One major plus one minor plus other units (required plus electives plus Christian Studies)
Mode 5	Psychology specialisation plus two Science minors plus other units (required plus electives plus Christian Studies)
Mode 6	Psychology specialisation plus one major

Mode		Number of units				
		Christian Studies	Major/s minimum specialisation	Minor/s minimum	Required plus electives	Total
1	Two majors plus others	3	16 (8 x 2)	0	5	24
2	Two majors plus one minor plus others	3	16 (8 x 2)	4 (4 x 1)	1	24
3	One major plus two minors plus others	3	8 (8 x 1)	8 (4 x 2)	5	24
4	One major plus one minor plus others	3	8 (8 x 1)	4 (4 x 1)	9	24
5	One specialisation plus two minors plus others	3	10 (10 x 1)	8 (4 x 2)	3	24
6	One specialisation plus one major plus others	3	10 (10 x 1) 8 (8 x 1)	0	3	24

<b>Course sequence for Mode 1</b>				
<b>Mode 1—Two majors (16) plus Avondale Core (3) plus required and/or electives (5)</b>				
<b>Sem</b>	Units for a Physics major (1) and a Mathematics major (2) by way of example of Mode 1			
1	Major 1 PHYS16000 Physics IA	Major 2 MATH16000 Mathematics IA	Elective ICTM16400 Introduction to Information Management	Elective CHEM16000 Chemistry IA
2	Major 1 PHYS16100 Physics IB	Major 2 MATH16100 Mathematics IB	CSTD14300 Christian Studies I	Elective ICTM16800 Introduction to Programming
3	Major 1 PHYS26100 From Quantum to Quark	Major 1 <i>PHYS22500</i> <i>Classical Physics and</i> <i>Special Relativity</i>	Major 2 MATH26000 Calculus II	Major 2 MATH26200 Statistics II ( <i>odd years</i> ) or MATH36200 Mathematical Analysis ( <i>even years</i> )
4	Major 1 <i>PHYS22600</i> <i>Electromagnetism</i>	Major 2 MATH36300 Advanced Mathematical Methods	CSTD24300 Christian Studies II	Major 2 MATH26100 Algebra II
5	Major 1 <i>PHYS33500</i> <i>Quantum, Atomic &amp;</i> <i>Molecular Physics</i>	Major 1 PHYS36300 Electronics Applications	Major 2 MATH36100 Algebra III	Major 2 MATH36200 Mathematical Analysis ( <i>even years</i> ) or MATH26200 Statistics II ( <i>odd years</i> )
6	Major 1 <i>PHYS33100</i> <i>Lasers &amp; Applications</i> or <i>PHYS33900</i> <i>Solid State and</i> <i>Nanoscience</i>	Elective	SCSP34300 Scientific Perspectives in the Modern World	Elective

NOTE: Units in italics offered by the University of Newcastle (Central Coast campus)

## Course sequence for Mode 2

**Mode 2—Two majors (16) plus one minor (4) Avondale Core (3) plus required and/or electives (1)**

Sem	Units for a Mathematics major (1), a Chemistry major (2) and a Biological Science/Environmental minor by way of example of Mode 2			
1	Major 1 MATH16000 Mathematics IA	Major 2 CHEM16000 Chemistry IA	CSTD14300 Christian Studies I	Minor BIOL16000 Biology I
2	Major 1 MATH16100 Mathematics IB	Major 2 CHEM16100 Chemistry IB	Required MATH16200 Introduction to Statistics	Minor BIOL16100 Comparative Functional Biology
3	Major 1 MATH26000 Calculus II	Major 2 CHEM26000 Physical and Inorganic Chemistry IIA ( <i>odd years</i> ) or Major 1 MATH36200 Mathematical (Adv) Analysis ( <i>even years</i> )	Major 2 CHEM26100 Physical and Inorganic Chemistry IIB ( <i>odd years</i> ) or CHEM21000 Organic Chemistry ( <i>even years</i> )	CSTD24300 Christian Studies II
4	Major 1 MATH26100 Algebra II	Minor BIOL26300 Mammalogy	Major 2 CHEM32500 Solid State Chemistry and Spectroscopy ( <i>odd years</i> ) or CHEM31000 Advanced Organic Chemistry ( <i>even years</i> )	Major 2 CHEM32600 Environmental Chemistry ( <i>odd years</i> ) or Major 1 MATH26300 Numerical Analysis ( <i>even years</i> )
5	Major 1 MATH36100 Algebra III	Major 1 MATH36200 Mathematical (Adv) Analysis ( <i>even years</i> ) or CHEM26000 Physical and Inorganic Chemistry IIA ( <i>odd years</i> )	Major 2 CHEM21000 Organic Chemistry ( <i>even years</i> ) or CHEM26100 Physical and Inorganic Chemistry IIB) ( <i>odd years</i> )	Minor BIOL26200 Ecology
6	Major 1 MATH36300 Advanced Mathematical Methods	SCSP34300 Scientific Perspectives in the Modern World	Major 2 CHEM31000 Advanced Organic Chemistry ( <i>even years</i> ) or CHEM32500 Solid State Chemistry and Spectroscopy ( <i>odd years</i> )	Major 1 MATH26300 Numerical Analysis ( <i>even years</i> ) or Major 2 CHEM32600 Environmental Chemistry ( <i>odd years</i> )

### Course sequence for Mode 3

Mode 3—One major (8) plus two minors (8) Avondale Core (3) plus required and/or electives (5)

Sem	Units for a Food and Nutrition major, a compulsory Biological Science/Biomedical minor, and a Chemistry minor by way of example of Mode 3			
1	CSTD14300 Christian Studies I	Minor 1 BIOL16000 Biology I	Minor 2 CHEM16000 Chemistry IA	Required MATH16000 Mathematics IA or MATH16400 General Mathematics
2	Major DTFN11100 Food Nutrition and Health	Minor 1 BIOL16100 Comparative Functional Biology	Minor 2 CHEM16100 Chemistry IB	Elective MATH16200 Introduction to Statistics
3	Major DTFN21100 Food Production Systems	Elective CHEM21500 Biomolecular Chemistry ( <i>even years</i> ) or Minor 2 CHEM26000 Physical and Inorganic Chemistry IIA ( <i>odd years</i> )	Minor 1 BIOL26100 Biochemistry	Minor 2 CHEM21000 Organic Chemistry ( <i>even years</i> ) or Minor 1 BIOL26400 General Microbiology ( <i>odd years</i> )
4	Major DTFN21200 Food Science and Innovation	Required BIOL26000 General Human Physiology	CSTD24300 Christian Studies II	<i>Elective</i>
5	Major HPFH20100 Nutrition Development and Performance	Major <i>FSHN3010</i> <i>Food Processing and Quality Management</i>	Minor 2 CHEM22000 Physical and Inorganic Chemistry IIA ( <i>odd years</i> ) or CHEM21500 Biomolecular Chemistry ( <i>even years</i> )	Minor 1 BIOL26400 General Microbiology ( <i>odd years</i> ) or Minor 2 CHEM21000 Organic Chemistry IIA ( <i>even years</i> )
6	Major HPFH36300 Health Promotion or BIOL37000 Food Microbiology or <i>FSHN3420</i> <i>Food Packaging</i> or <i>FSHN3100</i> <i>Research Methods</i>	Major <i>FSHN3210</i> <i>Food Product Development</i>	SCSP34300 Christian Studies III— Scientific Perspectives in the Modern World	Major DTFN31100 Food Industry Experience or <i>FSHN3080</i> <i>Professional Practice*</i>

NOTE: Units in italics offered by the University of Newcastle (Central Coast campus)

### Course sequence for Mode 4

**Mode 4—One major (8) plus one minor (4) Avondale Core (3) plus required and/or electives (9)**

Sem	Units for a Biological Science/Biomedical major and a Biological Chemistry minor for semesters 1 to 6 for Avondale BSc. Units for Semesters 7 and 9 are Charles Sturt University units to be completed for a BMedSc(Pathology) on the Wagga Wagga campus, by way of example of Mode 4.			
1	Major BIOL16000 Biology I	Minor CHEM16000 Chemistry IA <i>or</i> CHEM16300 General Chemistry	Required MATH16400 General Mathematics <i>or</i> MATH16000 Mathematics IA	Required ICTM16400 Introduction to Information Management
2	Major BIOL16100 Comparative Functional Biology	Minor CHEM16100 Chemistry IB	Required MATH16200 Introduction to Statistics	CSTD14300 Christian Studies I
3	Major BIOL26100 Biochemistry	Major BIOL26400 General Microbiology	Required PHYS16300 General Physics	CSTD24300 Christian Studies II
4	Major BIOL36500 Molecular Biology ( <i>even years</i> ) <i>or</i> BIOL36000 Investigative Biochemistry ( <i>odd years</i> )	Major BIOL26000 General Human Physiology	Minor BIOL35800 Clinical Biochemistry‡ ( <i>even years</i> ) <i>or</i> BIOL26700 Histotechniques‡ ( <i>odd years</i> )	Required BMS242 Human Cytogenetics*
5	Major BIOL36400 Advanced Human Physiology	Required 200-level Chemistry	Elective WESC38000 Work Experience in the Sciences	Elective BIOL39000 Seminar in Biology
6	Major BIOL36000 Investigative Biochemistry ( <i>odd years</i> ) <i>or</i> BIOL36500 Molecular Biology ( <i>even years</i> )	Elective SCCH26900 Contemporary Health Issues	Minor BIOL26700 Histotechniques‡ ( <i>odd years</i> ) <i>or</i> BIOL35800 Clinical Biochemistry‡ ( <i>even years</i> )	SCSP34300 Christian Studies III— Scientific Perspectives in the Modern World

\* offered by Charles Sturt University (Distance mode) from Wagga Wagga campus

‡ offered at Sydney Adventist Hospital Clinical Laboratories

**BMedSc (Pathology)** at Charles Sturt University (Wagga Wagga campus) semesters 7 and 8 (final year)

7	BMS308 Immunology	BMS314 Bacteriology/Mycology	BMS216 Introductory Haematology	BMS302 Clinical Biochemistry II
8	BMS336 Advanced Haematology and Blood Transfusion		BMS309 Cancer Cytopathology	BMS315 Virology/Parasitology

### Course sequence for Mode 5

**Mode 5—One specialisation (10) plus two minors (8) Avondale Core (3) plus required and/or electives (3)**

Sem	Units for a BSc with a Psychology Specialisation (10 units)(UNE by distance), a Biological Science/ Biomedical minor (1) and a Biological Chemistry minor (2) with electives (Avondale) used to enhance the minors, by way of example of Mode 5			
1	Minor 1 BIOL16000 Biology I	AC CSTD14300 Christian Studies I	Minor 2 CHEM16000 Chemistry IA <i>or</i> CHEM16300 General Chemistry	SP PSYC101 Introductory Psychology I
2	Minor 1 SCAP16200 Anatomy and Physiology	AC CSTD24300 Christian Studies II	Minor 2 CHEM16100 Chemistry IB	SP PSYC102 Introductory Psychology II
3	Minor 1 BIOL26100 Biochemistry	Minor 1 BIOL26499 General Microbiology	SP PSYC202 Research Methods and Statistics	SP PSYC200 Social Psychology
4	Elective BIOL36500 Molecular Biology <i>(even years)</i> <i>or</i> SCSP34300 Scientific Perspectives in the Modern World <i>(odd years)</i>	Minor 2 BIOL35800 Clinical Biochemistry <i>(even years)</i> <i>or</i> BIOL26700 Histotechniques <i>(odd years)</i>	SP PSYC206 Cognitive Psychology	SP PSYC213 Lifespan Developmental Psychology
5	Science elective	Science elective	SP 300-level Psychology elective	SP PSYC302 Advanced Research Methods and Statistics
6	AC SCSP34300 Scientific Perspectives in the Modern World <i>(odd years)</i> <i>or</i> Elective BIOL36500 Molecular Biology <i>(even years)</i>	Minor 2 BIOL26700 Histotechniques <i>(odd years)</i> <i>or</i> BIOL35800 Clinical Biochemistry <i>(even years)</i>	SP PSYC301 Psychological Testing	SP PSYC366 Biopsychology

### Course sequence for Mode 6

**Mode 6—One specialisation (10) plus one major (8) Avondale Core (3) plus required and/or electives (3) where one unit serves the specialisation and the major**

Sem	Units for BSc with Psychology Specialisation (10), Biological Science Biomedical Major (8) by way of example of Mode 6			
1	Major BIOL16000 Biology I	AC CSTD14300 Christian Studies I	Required CHEM16000 Chemistry IA <i>or</i> CHEM16300 General Chemistry	SP PSYC101 Introductory Psychology I
2	Major BIOL16100 Comparative Functional Biology	AC CSTD24300 Christian Studies II	Elective CHEM16100 Chemistry IB	SP PSYC102 Introductory Psychology II
3	Major BIOL26100 Biochemistry	Major BIOL26400 General Microbiology	SP PSYC202 Research Methods and Statistics	SP PSYC200 Social Psychology
4	Major BIOL36500 Molecular Biology <i>(even years)</i> <i>or</i> BIOL36000 Investigative Biochemistry <i>(odd years)</i>	Major BIOL26000 General Human Physiology	SP PSYC206 Cognitive Psychology	SP PSYC213 Lifespan Developmental Psychology
5	Major BIOL36400 Advanced Human Physiology	CHEM21000 Organic Chemistry <i>(even years)</i> <i>or</i> CHEM26000 Physical and Inorganic Chemistry IIA <i>(odd years)</i> <i>or</i> 200/300 Science elective <i>or</i> 200/300 Psychology elective	SP 300-level Psychology elective	SP PSYC302 Advanced Research Methods and Statistics
6	AC BIOL36000 Investigative Biochemistry <i>(odd years)</i> <i>or</i> BIOL36500 Molecular Biology <i>(even years)</i>	AC SCSP34300 Scientific Perspectives in the Modern World	SP PSYC366 Biopsychology	SP PSYC301 Psychological Testing

NOTE: Psychology may be studied as an 8-unit major or 4-unit minor in Modes 1 to 4 but will not constitute an APAC accredited sequence which required the 10-unit specialised sequence.