

## Degree and Study Plan

College: Agricultural & Marine Sciences  
Department: Animal and Veterinary Sciences  
Cohort: 2020  
Degree: Bachelor of Science  
Major: Animal Science

### Summary of Credits:

<b>University Requirements (UR)</b>	<b>6</b>
Arabic	2
Contemporary Omani Society	2
Oman & Islamic Civilization or Islamic Culture	2
<b>University Electives (UE)</b>	<b>6</b>
See List A	
<b>College Requirements (CR)</b>	<b>29</b>
See list B	
<b>College Electives (CE)</b>	<b>9</b>
See list C	
<b>Departmental Requirements (DR)</b>	
See list D	
<b>Departmental Electives</b>	
See list E	
<b>Major Requirements (AR)</b>	<b>54</b>
See list F	
<b>Major Electives (AE)</b>	<b>21</b>
See list G	
<b>Specialization Requirements (SR)</b>	
See list H	
<b>Specialization Electives (SE)</b>	
See list I	
<b>Minor Requirements (IR)</b>	<b>6</b>
See list J	
<b>Minor Electives (IE)</b>	<b>12</b>
See list K	
<b>TOTAL</b>	<b>125</b>

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EXT: 3730

HOD: Dr. Muhammad Nadeem Asi

Date:

Dean's Office: Abdullah M. Al-Sadi

Date:

Admission & Registration:

Date:

## DEPARTMENT OF ANIMAL AND VETERINARY SCIENCES

### ANIMAL SCIENCE

#### Study Plan: for Cohort 2020

Sem.	Course Code	Course Title	Cr.	Pre-req./Co-req.*	Cat.
ONE FALL		Foundation Program	0		UR
	<b>TOTAL</b>		<b>0</b>		

TWO SPRING	ARAB1060	Arabic	2	= ARAB1019 (for non-Arabic speaker), 3 Cr.& Offered in Fall semester only	UR
	CAMS2000	Intro. CAMS	0		CR
	CAMS2003	Intro. to Food & Resource Economics	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)	CR
	CHEM2101	General Chemistry I	4	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604), FPMT(0105 or 0109)	CR
	LANC2145	Communication in Agricultural Sciences	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)	CR
		University Elective	2		UE
	<b>TOTAL</b>		<b>14</b>		

THREE FALL	HIST1010	Oman & Islamic Civilization	2	=ISLM1010	UR
	BIOL2101	General Biology I	4	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)	CR
	LANC2146	Academic Writing in Science	3	LANC2145	CR
		University Elective	2		UE
		University Elective	2		UE
	ANVS2101	Introduction to Animal Science	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)	CE
	<b>TOTAL</b>		<b>16</b>		

FOUR SPRING	CAMS3000	Seminar & Presentation Skills	2	CAMS2000, FPCS(0101 or 0102), FPMT(0105 or 0109), LANC2146	CR
	SOCY1005	Contemporary Omani State & People	2	= SOCY1007 (for non-Omanis)	UR
	CAMS3001	Biometry & Experimental Design in AMS	3	CAMS2000, FPCS(0101 or 0102), FPMT(0105 or 0109), LANC2146	CR
	PHYS2101	General Physics I	4	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604), FPMT(0105 or 0109)	CR
	ANVS2201	Introduction to Veterinary Technology	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)	CE
		College Elective	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)	CE
	<b>TOTAL</b>		<b>17</b>		

FIVE FALL	ANVS3101	Genetics and Animal Breeding	3	ANVS(2101 or 2201), BIOL2101	AR
	ANVS3102	Animal Health	3	ANVS(2101 or 2201), BIOL2101	AR
	ANVS3104	Anatomy and Histology	3	ANVS(2101 or 2201), BIOL2101	AR
	ANVS3108	Farm Sanitation, Disease Control & Preventive Medicine	3	ANVS(2101 or 2201), BIOL2101	AR
	ANVSXXXX	Major Elective	3	Check pre-requisites	AE
		<b>TOTAL</b>		<b>15</b>	

SIX SPRING	ANVS3105	Fundamentals of Nutrition	3	(ANVS(2101 or 2201)), BIOL2101	AR
	ANVS3106	Systemic Physiology	3	ANVS(2101 or 2201), BIOL2101	AR
	ANVS4102	Poultry Production	3	ANVS(2101 or 2201) + CR*	AR
	ANVSXXXX	Major Elective	3	Check pre-requisites	AE
	ANVSXXXX	Major Elective	3	Check pre-requisites	AE
<b>TOTAL</b>			<b>15</b>		

SEVEN FALL	ANVS3107	Animal Reproductive Physiology	3	ANVS(2101 or 2201), BIOL2101	AR
	ANVS3208	Veterinary Immunology	3	ANVS(2101 or 2201), BIOL2101	AR
	ANVS4113	Animal Biotechnology	3	ANVS(2101 or 2201) + CR*	AR
	ANVSXXXX	Major Elective	3	Check pre-requisites	AE
	ANVSXXXX	Major Elective	3	Check pre-requisites	AE
<b>TOTAL</b>			<b>15</b>		

EIGHT SPRING	ANVS4124	Dairy and Beef Production	3	ANVS(2101 or 2201) + CR*	AR
	ANVS4106	Sheep and Goats Production	3	ANVS(2101 or 2201) + CR*	AR
	ANVS4108	Meat Science	3	ANVS(2101 or 2201) + CR*	AR
	ANVS4111	Horse Management and Care	3	ANVS(2101 or 2201) + CR*	AR
	ANVSXXXX	Major Elective	3	Check pre-requisites	AE
<b>TOTAL</b>			<b>15</b>		

SUMMER	ANVS 4800	Animal Science Internship	3	CR*	AR
	<b>TOTAL</b>			<b>3</b>	

NINE FALL	CAMS4101	Management & Business Skills	3	CR*	CR
	ANVS3109	Farm Practicum	3	ANVS(2101 or 2201) + CR*	AR
	ANVS4107	Animal Nutrition	3	ANVS3105 + CR*	AR
	ANVS4104	Camel Physiology and Husbandry	3	ANVS(2101 or 2201) + CR*	AR
	ANVSXXXX	Major Elective	3	Check pre-requisites	AE
<b>TOTAL</b>			<b>15</b>		

\* CR - CAMS college requirement courses which are BIOL2101, CAMS2000, CAMS2003, CAMS3000, CAMS3001, CHEM2101, PHYS(2101 or 2107).

<sup>1</sup> Non-Arabic speakers should register for ARAB1019 (3 credits), offered only during fall semesters.

<sup>2</sup> Non-Omanis should register for SOCY1007 (2 credits)

**DEPARTMENT OF ANIMAL AND VETERINARY SCIENCES**

**ANIMAL SCIENCE**

**LIST B: College Requirements (29 Credits)**

Course Code	Course Title	Cr.	Pre-Requisite	Equivalents
BIOL2101	General Biology I	4	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)	
CAMS2000	Introduction to Agricultural and Marine Sciences	0		
CAMS2003	Introduction to Food and Resource Economics	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)	
CAMS3000	Seminar and Presentation Skills	2	CAMS2000, FPCS(0101 or 0102), FPMT(0105 or 0109), LANC2146	
CAMS3001	Biometry and Experimental Design in AMS	3	CAMS2000, FPCS(0101 or 0102), FPMT(0105 or 0109), LANC2146	
CAMS4001	Management and Business Skills	3	CR*	
CHEM2101	General Chemistry I	4	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604), FPMT(0105 or 0109)	
LANC2145	Communication in Agricultural	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)	
LANC2146	Academic Writing in Science	3	LANC2145	
PHYS2101	General Physics I	4	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604), FPMT(0105 or 0109)	

**LIST C: College Electives (9 Credits)**

Course Code	Course Title	Cr.	Pre-Requisite	Equivalents
ANVS2101	Introduction to Animal Science	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)	ANVS2001
ANVS2201	Introduction to Veterinary Technology	3		ANVS2002
PLNT2515	Introduction to Plant Sciences	3		CROP2510, CROP2515
FSHN2101	Principles of Food Science	3		FSHN2071
FSHN2301	Introduction to Human Nutrition and Dietetics	3		
MASF2003	Introduction to Marine Science and Fisheries	3		
SWAE2001	Introduction to Agricultural Engineering	3		
SWAE2201	Introduction to Soils and Water	3		

\* CR - CAMS college requirement courses which are BIOL2101, CAMS2000, CAMS2003, CAMS3000, CAMS3001, CHEM2101, PHYS(2101 or 2107).

**DEPARTMENT OF ANIMAL AND VETERINARY SCIENCES**

**ANIMAL SCIENCE**

**LIST F: Major Requirements (54 Credits)**

Course Code	Course Title	Cr.	Pre-Requisite	Equivalents
ANVS3101	Genetics and Animal Breeding	3	ANVS(2101 or 2201), BIOL2101	
ANVS3102	Animal Health	3	ANVS(2101 or 2201), BIOL2101	
ANVS3104	Anatomy and Histology	3	ANVS(2101 or 2201), BIOL2101	
ANVS3105	Fundamentals of Nutrition	3	(ANVS(2101 or 2201), BIOL2101	
ANVS3106	Systemic Physiology	3	ANVS(2101 or 2201), BIOL2101	
ANVS3107	Animal Reproductive Physiology	3	ANVS(2101 or 2201), BIOL2101	
ANVS4113	Animal Biotechnology	3	ANVS(2101 or 2201) + CR*	
ANVS3208	Veterinary Immunology	3	ANVS(2101 or 2201), BIOL2101	
ANVS4124	Dairy and Beef Production	3	ANVS(2101 or 2201) + CR*	
ANVS4102	Poultry Production	3	ANVS(2101 or 2201) + CR*	
ANVS4104	Camel Physiology and Husbandry	3	ANVS(2101 or 2201) + CR*	
ANVS3109	Farm Practicum	3	ANVS(2101 or 2201) + CR*	
ANVS4106	Sheep and Goat Production	3	ANVS(2101 or 2201) + CR*	
ANVS4107	Animal Nutrition	3	ANVS3105 + CR*	
ANVS4108	Meat Science	3	ANVS(2101 or 2201) + CR*	
ANVS4111	Horse Management and Care	3	ANVS(2101 or 2201) + CR*	
ANVS4800	Animal Science Internship	3	After 87 credits + CR*	
ANVS3108	Farm Sanitation, Disease Control & Preventive Medicine	3	ANVS(2101 or 2201), BIOL2101	

**LIST G: Major Electives (21 Credits)\*\***

Course Code	Course Title	Cr.	Pre-Requisite	Equivalents
ANVS2204	Veterinary Parasitology	3	ANVS(2101 or 2201), BIOL2101	
ANVS2206	Veterinary Microbiology	3	ANVS(2101 or 2201), BIOL2101	
ANVS3211	Veterinary Hematology	3	ANVS(2101 or 2201), BIOL2101	
ANVS3212	Clinical Chemistry, Cytology & Urology	3	ANVS3211, BIOL2101	
ANVS4110	Veterinary Pathology & Necropsy Techniques	3	ANVS3104 + CR*	
ANVS4112	Diseases of Large Animals	3	ANVS3106 + CR*	
ANVS4213	Diagnostic Microbiology	3	ANVS2206 + CR*	
ANVS4902	Research Project in Animal & Veterinary Sciences	3	Manual Registration, GPA≥2.0 + CR*	

\* CR - CAMS college requirement courses which are BIOL2101, CAMS2000, CAMS2003, CAMS3000, CAMS3001, CHEM2101, PHYS(2101 or 2107).

\*\* Courses from any Department (preferably related to a Minor) of the College of Agricultural and Marine Sciences or another College, may be selected with the approval of Academic Advisor, Head of Department and Assistant Dean of Undergraduate Studies. **No course will be approved without filling the substitution form and getting all necessary approvals prior registering any course not listed in the above degree plan.**

**DEPARTMENT OF ANIMAL AND VETERINARY SCIENCES****ANIMAL SCIENCE****LIST J: Minor Requirements (3 Credits)**

<b>Course Code</b>	<b>Course Title</b>	<b>Cr.</b>	<b>Pre-Requisite</b>
ANVS2101	Introduction to Animal Science	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)

**LIST K: Minor Electives (15 Credits)**

<b>Course Code</b>	<b>Course Title</b>	<b>Cr.</b>	<b>Pre-Requisite</b>
ANVS3208	Veterinary Immunology	3	ANVS(2101 or 2201), BIOL2101
ANVS3101	Genetics and Animal Breeding	3	ANVS(2101 or 2201), BIOL2101
ANVS3102	Animal Health	3	ANVS(2101 or 2201), BIOL2101
ANVS3104	Anatomy and Histology	3	ANVS(2101 or 2201), BIOL2101
ANVS3105	Fundamentals of Nutrition	3	(ANVS(2101 or 2201), BIOL2101
ANVS3106	Systemic Physiology	3	ANVS(2101 or 2201), BIOL2101
ANVS3107	Animal Reproductive Physiology	3	ANVS(2101 or 2201), BIOL2101
ANVS4124	Dairy and Beef Production	3	ANVS(2101 or 2201) + CR*
ANVS4102	Poultry Production	3	ANVS(2101 or 2201) + CR*
ANVS4104	Camel Physiology and Husbandry	3	ANVS(2101 or 2201) + CR*
ANVS4106	Sheep and Goat Production	3	ANVS(2101 or 2201) + CR*
ANVS4107	Animal Nutrition	3	ANVS3105 + CR*
ANVS4113	Animal Biotechnology	3	ANVS(2101 or 2201) + CR*
ANVS4111	Horse Management and Care	3	ANVS(2101 or 2201) + CR*

## LIST J: MINOR REQUIREMENTS

### Within CAMS (18 credits):

#### J1. Minor in Animal Science (18 credits)

Course Code	Course Title	Cr.	Pre-Requisite
ANVS2101	Introduction to Animal Science	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)
<b>Five courses from the following</b>			
ANVS3208	Veterinary Immunology	3	ANVS(2101 or 2201), BIOL2101
ANVS3101	Genetics and Animal Breeding	3	ANVS(2101 or 2201), BIOL2101
ANVS3102	Animal Health	3	ANVS(2101 or 2201), BIOL2101
ANVS3104	Anatomy and Histology	3	ANVS(2101 or 2201), BIOL2101
ANVS3105	Fundamentals of Nutrition	3	(ANVS(2101 or 2201), BIOL2101
ANVS3106	Systemic Physiology	3	ANVS(2101 or 2201), BIOL2101
ANVS3107	Animal Reproductive Physiology	3	ANVS(2101 or 2201), BIOL2101
ANVS4124	Dairy and Beef Production	3	ANVS(2101 or 2201) + CR*
ANVS4102	Poultry Production	3	ANVS(2101 or 2201) + CR*
ANVS4104	Camel Physiology and Husbandry	3	ANVS(2101 or 2201) + CR*
ANVS4106	Sheep and Goat Production	3	ANVS(2101 or 2201) + CR*
ANVS4107	Animal Nutrition	3	ANVS3105 + CR*
ANVS4113	Animal Biotechnology	3	ANVS(2101 or 2201) + CR*
ANVS4111	Horse Management and Care	3	ANVS(2101 or 2201) + CR*

#### J2. Minor in Plant Sciences (18 credits)

Course Code	Course Title	Cr.	Pre-Requisite
PLNT2515	Introduction to plant Sciences	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)
<b>Five courses from the following</b>			
PLNT2011	Ornamental Horticulture	3	BIOL2101
PLNT3502	Forages and Pastures	3	BIOL2101, PLNT2515
PLNT3512	Vegetable Production	3	PLNT2515
PLNT3514	Fruit Production	3	PLNT2515
PLNT3522	Plant Pathology	3	BIOL2101
PLNT3526	General Entomology	3	BIOL2101
PLNT3005	Field Crop Production	3	PLNT2515
PLNT4514	Landscape Design and Management	3	PLNT2011 + CR*

#### J3. Minor in Food Science (18 credits)

Course Code	Course Title	Cr.	Pre-Requisite
FSHN2101	Principles of Food Science	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)
<b>Five courses from the following</b>			
FSHN3101	Properties of Food & Agricultural Materials	3	(FSHN2101 or SWAE2001), PHYS(2101 or 2107)
FSHN3103	Food Analysis	3	CHEM3324, FSHN2302
FSHN3104	Food Chemistry I	3	CHEM3324, FSHN2302
FSHN3105	Food Microbiology I	3	BIOL3441
FSHN3106	Food Processing I	3	FSHN2101 or SWAE2001
FSHN3107	Food Sanitation and Quality Control	3	BIOL3441, FSHN2101

FSHN3108	Food Packaging	3	FSHN3102 or PHYS2102
FSHN3109	Sensory Evaluation of Food	3	FSHN2101, CAMS3001
FSHN4107	Milk and Milk Products	3	FSHN(3104, 3105, 3106) + CR*

#### J4. Minor in Human Nutrition (18 credits)

Course Code	Course Title	Cr.	Pre-Requisite
FSHN2301	Introduction to Human Nutrition and Dietetics	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)
FSHN2302	Principles of Biochemistry	3	BIOL2101, CHEM2101
<b>Five courses from the following</b>			
FSHN3305	Macronutrients in Human Nutrition	3	FSHN2301, (BIOL2101 or CHEM2101)
FSHN3306	Micronutrients in Human Nutrition	3	FSHN (2302, 3305)
FSHN3307	Nutrition Assessment and Planning	3	FSHN (2301, 2302)
FSHN3111	Public Sanitation****	3	BIOL3441, FSHN2101
FSHN3309	Life Cycle Nutrition	3	FSHN (2301, 3307)
FSHN4306	Community Nutrition	3	FSHN(2301, 3307) + CR*

\*\*\*\* Students who pass FSHN3075 cannot take FSHN3111

#### J5. Minor in Marine Science and Fisheries (18 credits)

Course Code	Course Title	Cr.	Pre-Requisite
MASF2003	Introduction to Marine Science and Fisheries	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)
MASFXXXX	Any MASF2000/3000/4000 level courses ( <b>excluding University Electives</b> )	15	Check pre-requisites

#### J6. Minor in Natural Resource Economics (18 credits)

Course Code	Course Title	Cr.	Pre-Requisite
CAMS2003	Introduction to Food and Resource Economics	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)
<b>Five courses from the following</b>			
NREC3011	Economics of Fisheries Management	3	CAMS2003
NREC3101	Marketing of Agricultural and Fisheries Products	3	CAMS2003
NREC3106	Social Survey Design and Analysis	3	CAMS(2003, 3001)
NREC3107	Food Service Systems- Operations Management	3	FSHN2072 or NREC3101
NREC3300	Natural Resource and Environmental Economics	3	CAMS2003
NREC4103	Agribusiness Entrepreneurships	3	CR*
NREC4230	Agricultural Finance	3	CR*
NREC4430	Benefit Cost Analysis	3	CR*
NREC4500	Extension Methods and Techniques	3	CR*

#### J7. Minor in Soil Sciences (18 credits)

Course Code	Course Title	Cr.	Pre-Requisite
SWAE2201	Introduction to Soil and Water	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)
<b>Five courses from the following</b>			
SWAE3002	Desertification & Land Restoration	3	SWAE2201
SWAE3302	Environmental Soil Chemistry	3	CHEM2101, SWAE2201
SWAE3304	Soil and Water Conservation	3	PHYS2101, (SWAE2001 or SWAE2201)
SWAE3311	Environmental Soil Physics	3	PHYS2101, (SWAE2001 or SWAE2201)
SWAE3411	Environmental Soil Microbiology	3	BIOL2101

SWAE4111	Hydropedology for Soil-Water-Landscape Interactions Water-Landscape Interactions	3	SWAE(2201, 3303, 3311) + CR*
SWAE4401	Water and Nutrients in Soil-Plant Environments	3	SWAE2201 + CR*
SWAE4404	Soil Genesis and Classification	3	ERSC2101 or SWAE2201 + CR*
SWAE4412	Management of Salt-Affected Soils	3	SWAE2201 + CR*

### J8. Minor in Water Technology (18 credits)

Code	Title	Cr.	Pre-Requisite
SWAE2201	Introduction to Soil and Water	3	FPEL(0560 or 0600 or 0601 or 0602 or 0603 or 0604)
<b>Five courses from the following</b>			
SWAE3303	Elements of Hydrology	3	PHYS(2101 or 2107), SWAE(2201 or 2001)
SWAE3310	Fundamentals of Fluid Mechanics	3	MATH2107, PHYS(2101 or 2107)
SWAE3315	Water Quality	3	CHEM2101, SWAE2201
SWAE3402	Irrigation Principles	3	SWAE2201
SWAE4217	Transport of Chemicals in Porous Media	3	SWAE(3303, 3311) + CR
SWAE4305	Water Control and Supply	3	SWAE(2201, 3310)+ CR*
SWAE4325	Water Treatment	3	CHEM2101, MATH2107, SWAE3315 + CR*
SWAE4400	Ground Water Hydrology	3	SWAE3303 + CR*
SWAE4402	Design & Management of Irrigation Systems	3	SWAE(3310, 3402) + CR*

### Minors outside CAMS (18 credits):

#### Minors from the College of Science

### J9. Minor in Biotechnology (18 credits)

<b>Required Courses (7 Credits)</b>			
Code	Course Title	Cr.	Prerequisite
BIOL2101	General Biology-I	4	FPEL 0560 or FPEL0600 or FPEL0603 or FPEL0604
BIOL3202	Molecular Biology	3	BIOL2101 + LANC2058
<b>Remaining credits from the following</b>			
BIOL3441	Introductory Microbiology	3	BIOL2101 + LANC2058
BIOL4034	Biochemistry	3	BIOL2101 & CHEM3322
BIOL4046	Fundamentals of Biotechnology	3	BIOL3202
BIOL4500	Cell Biology	3	BIOL2101
BIOL5120	Microbial Biotechnology	3	BIOL 4046 & BIOL3441
BIOL5132	Tissue Culture	3	BIOL 4046 & BIOL4500
BIOL5402	Immunology	3	BIOL4500
BIOL5040	Microbial Genetics and Genetic Engineering	3	BIOL3441

### J10. Minor in Environmental Biology (18 credits)

<b>Required Courses (8 Credits)</b>			
Course Code	Course Title	Cr.	Prerequisite
BIOL2101	General Biology-I	4	FPEL 0560 or FPEL0600 or FPEL0603 or FPEL0604
BIOL2102	General Biology-II	4	BIOL2101+ LANC2058
<b>Remaining credits from the following</b>			
BIOL2600	Biodiversity	3	BIOL2101 + LANC2058
BIOL3005	Ecology	3	BIOL2102+ LANC2058
BIOL3205	Invertebrates	3	BIOL2102+ LANC2058

BIOL3009	Introduction to Environmental Science	3	BIOL2102+ LANC2058
BIOL3410	Angiosperm Biology	3	BIOL2102+ LANC2058
BIOL4009	Waste management	3	BIOL2102
BIOL4021	Vertebrate Zoology	3	BIOL2102
BIOL4023	Entomology	3	BIOL2102
BIOL5010	Ecotoxicology	3	BIOL3009
BIOL4054	Marine Biology	3	BIOL3005
BIOL5052	Fresh Water Biology	3	BIOL3005
BIOL5021	Desert Biology	3	BIOL3005
BIOL5610	Environmental impact assessment	3	BIOL3005

### J11. Chemistry (18 credits)

Required Courses (12 Credits)			
Code	Title	Cr.	Pre-req./Co-req.*
CHEM2101	General Chemistry I	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 FPEL0603 or FPEL0604 and (FPMT0105 or FPMT0109)
CHEM2102	General Chemistry II	4	CHEM2101 or CHEM1071
CHEM3322 or CHEM3324	Organic Chemistry I or Organic Chemistry	4 4	LANC2058 and CHEM2101 (LANC2058 or LANC2161) and (CHEM1071 or CHEM2101)
Remaining credits from the following			
Code	Title	Cr.	Pre-req./Co-req.*
CHEM2350	Chemical Safety: Protecting ourselves and the environment	3	CHEM2101 or CHEM1071 or CHEM2110
CHEM3311	Inorganic Chemistry I	3	LANC2058 and CHEM2102 and MATH2107
CHEM3328	Green Chemistry	3	LANC2058 and (CHEM3322 or CHEM3324)
CHEM3333	Physical Chemistry I	3	LANC2058 and CHEM2101 and PHYS2101 and MATH2107
CHEM3337	Fundamentals of the Corrosion of Metals	3	LANC2058 and (CHEM2101 or CHEM1071)
CHEM3348	Introduction to Chemical and Instrumental Analysis	3	CHEM2102
CHEM3350	Environmental Chemistry	3	LANC2058 and CHEM2102
CHEM3400	Introduction to Chemical Process Industries	3	LANC2058 and CHEM2101 and CHEM3333*
CHEM3420	Petroleum Chemistry	3	LANC2058 and (CHEM3322 or CHEM3324)
CHEM4412	Inorganic Materials	3	CHEM3311
CHEM4414	Fundamentals of X-ray Crystallography	3	CHEM3311
CHEM4424	Introduction to Natural Products	3	CHEM3324 or CHEM4422
CHEM4429	Fundamentals of Medicinal Chemistry and Drug Design	3	CHEM3324 or CHEM4422
CHEM4433	Physical Chemistry II	3	CHEM3333 and MATH2108
CHEM4437	Electrochemistry: Fundamentals and Applications	3	CHEM3333
CHEM4445	Forensic Chemistry	3	CHEM3341 or CHEM3348
CHEM4472	Fine Chemicals	3	CHEM3324 or CHEM4422
CHEM4477	Essentials of Biological Chemistry	3	CHEM3324 or CHEM4422
CHEM5537	Surfactants: Principles & Applications in the Petroleum Industry	3	CHEM3333 or CHPE3102
CHEM5539	Chemical Sensors	3	CHEM3333 and (CHEM3348 or CHEM4441)

## J12. Computer Science (18 credits)

<b>Required Courses (7 Credits)</b>			
<b>Code</b>	<b>Title</b>	<b>Credits</b>	<b>Pre-Requisite / Co-Requisite*</b>
COMP2101	Introduction to Computer Science	4	FPEL0560 or FPEL0600 or FPEL0603 or FPEL0604) and (FPCS0101 or PCS0102)
COMP2201	Fundamentals of Object Oriented Programming	3	COMP2101
<b>Remaining credits from the following</b>			
<b>Code</b>	<b>Title</b>	<b>Credits</b>	<b>Pre-Requisite / Co-Requisite*</b>
COMP2102	Problem Solving and Programming	3	COMP2101
COMP2105	Introduction to Problem Solving with Visual Basic	3	COMP2101
COMP3203	Introduction to Data Structures and Algorithms	3	COMP2201 and MATH3340 and LANC2058
COMP3204	Advanced Java Programming	3	COMP2201 and LANC2058
COMP3205	Database Systems	3	COMP3203 and LANC2058
COMP3302	Introduction to Multimedia	3	COMP2201 and LANC2058
COMP3401	Introduction to Software Engineering	4	COMP2201 and LANC2058
COMP3501	Computer Organization & Assembly Language	3	COMP2201 and ECCE3206 and LANC2058
COMP3502	Computer Networks	3	COMP3501 and LANC2058
COMP3600	Intelligent Systems	3	COMP3203 and LANC2058
COMP3601	Bioinformatics Algorithms	3	BIOL2101 and COMP2101
COMP3700	Introduction to Web Computing	3	COMP3203 and LANC2058 / COMP3205*
COMP4100	Ethics and Skills for Computing Professionals	2	COMP3401
COMP4202	Database Development	3	COMP3205
COMP4204	Advanced Data Structures and Algorithms	3	COMP3203 and MATH3340
COMP4205	Competitive Programming	3	COMP3203
COMP4212	Introduction to Information Retrieval	3	COMP3203
COMP4300	Computer Graphics I	3	COMP3203 and MATH2202
COMP4402	Software Testing	3	COMP3401
COMP4404	Software Project Management	3	COMP3401
COMP4471	Computational Methods	3	COMP2101 and MATH2108 and MATH2202
COMP4501	Fundamentals of Operating Systems	3	COMP3203 and COMP3501
COMP4504	Wireless Networks	3	COMP3502
COMP4506	Systems and Networks Programming	3	COMP4501 and COMP3502
COMP4603	Machine Learning	3	COMP3600 and STAT2103
COMP4604	Digital Image Processing	3	COMP3600
COMP4701	Web Application Development	3	COMP3700 and COMP3205
COMP4704	Mobile Application Development	3	COMP3700 and COMP3205
COMP5101	Comparative Programming Languages	3	COMP3203 and COMP3501
COMP5400	Software Architecture and Design	3	COMP3401
COMP5401	Requirement Engineering	3	COMP3401
COMP5504	Distributed Systems	3	COMP4506
COMP5507	Cryptography and Network Security	3	COMP3203 and COMP3502
COMP5508	Interconnection Networks for Multiprocessor and Multicore Systems	3	COMP3502
COMP5509	Penetration Testing and Ethical Hacking	3	COMP4507

<b>Remaining credits from the following</b>			
<b>Code</b>	<b>Title</b>	<b>Credits</b>	<b>Pre-Requisite / Co-Requisite*</b>
COMP5511	Computer Forensics	3	COMP4507
COMP5521	Finite Automata & Formal Languages	3	MATH3340
COMP5522	Compiler Construction	3	COMP3501 and COMP5521
COMP5603	Computer Vision	3	COMP4603
COMP5605	Mobile Robotics	3	COMP3600 and MATH2108
COMP5701	Web Services	3	COMP3700
COMP5702	Semantic Web	3	COMP4701
COMP5704	Web Data Mining and Knowledge Discovery	3	COMP3700 and STAT2103

### J13. Earth Science (18 credits)

<b>Required Courses (8 Credits)</b>			
<b>Course Code</b>	<b>Course Title</b>	<b>Cr.</b>	<b>Prerequisite (Co-requisite*)</b>
ERSC2101	Introduction to Geology I	4	FPEL0560 or FPEL0600 or FPEL0603 or FPEL0604
ERSC2102	Introduction to Geology II	4	ERSC2101
<b>Remaining credits from the following</b>			
ERSC2211	Palaeontology I	3	ERSC2101 and LANC2058
ERSC3000	Environmental Geology	3	ERSC2101 and LANC2058
ERSC3002	Environmental Site Assessment and Remediation	3	ERSC2102 and ERSC3000 and LANC2058
ERSC3010	Mineralogy	3	ERSC2102* and LANC2058
ERSC3021	Structural Geology	3	ERSC2102 and LANC2058
ERSC3041	Stratigraphy	3	ERSC2102 and LANC2058
ERSC3051	Igneous Petrology	3	ERSC3010 and LANC2058
ERSC3061	Introduction to Remote Sensing	3	ERSC2102 and LANC2058
ERSC3901	Sedimentary Petrology	3	ERSC2211 and ERSC3010
ERSC4012	Metamorphic Petrology	3	ERSC3051
ERSC4031	Geochemistry	3	ERSC2102 and CHEM2101
ERSC4032	Environmental Geochemistry	3	ERSC2101 and CHEM2101
ERSC4040	Geological Interpretation of Well-logs	3	ERSC3041
ERSC4051	Hydrogeology	3	ERSC3000
ERSC4071	Economic Geology	3	ERSC3051
ERSC4311	Sedimentary Environments and Facies	3	ERSC3901
ERSC4321	Structural Geology II	3	ERSC3021
ERSC5011	Basin Analysis	3	ERSC3021 and ERSC4311
ERSC5012	Techniques in Sequence Stratigraphy	3	ERSC4311
ERSC5031	Tectonics	3	ERSC3021
ERSC5051	Petroleum Geology	3	ERSC3041
ERSC5061	Exploration Geophysics	3	GEOP3041
GEOP3041	General Geophysics	3	ERSC2101 and PHYS2101 and MATH2107 and LANC2058

#### J14. Mathematics (18 credits)

Required Courses (14 Credits)			
Code	Title	Cr	Pre-req./Co-req.*
MATH2107	Calculus I	4	FPEL0560 or FPEL0600 or FPEL 0601 or FPEL0602 or FPEL0603 or FPEL0604 and (FPMT0105 or FPMT0109)
MATH2108	Calculus II	3	MATH2107
MATH2202 <sup>†</sup>	Linear Algebra I <sup>†</sup>	3	FPEL0560 or FPEL0600 or FPEL 0601 or FPEL0602 or FPEL0603 or FPEL0604 and (FPMT0105 or FPMT0109)
MATH3110 <sup>†</sup>	Calculus III <sup>†</sup>	4	LANC2058 and MATH2108

<sup>†</sup> MATH 3171 Linear Algebra & Multivariate Calculus (3 credits; Pre-req.: MATH2108) can substitute both MATH2202 and MATH3110 above. However, students who have passed MATH 3171 cannot take MATH 2202 or MATH 3110, and vice versa.

Remaining credits from the following			
Code	Title	Cr	Pre-req./Co-req.*
MATH2350 or MATH3340	Foundations of Mathematic or Discrete Mathematics for Computer Sciences	3 3	MATH2107 MATH2107 and COMP2101
MATH3302 or MATH4174	Ordinary Differential Equations or Differential Equations and Applications for Engineers	3 3	LANC2058 and MATH2108 MATH2108
MATH3303	Linear Algebra II	3	LANC2058 and MATH2202
MATH3573	Graph theory	3	MATH2350 or MATH3360
MATH3744	Introduction to Mathematical Modelling	3	LANC2058 and MATH3110 and MATH3302
MATH4141	Numerical Analysis	3	MATH2202 and MATH3302
MATH4450	Real Analysis I	3	MATH2108 and (MATH2350 or MATH3340)
MATH4452	Introduction to Complex Variables	3	MATH3110 or MATH3171
MATH4453	Abstract Algebra I	3	MATH2202 and (MATH2350 or MATH3340)
MATH4473	Linear Programming	3	MATH2202 or MATH3171
MATH4474	Introduction to Partial Differential Equations	3	MATH3302
MATH4481	Introduction to Optimisation	3	MATH2108 and (MATH2202 or MATH3171)
MATH4599	Introduction to Topology	3	MATH2350
MATH5551	Fluid Dynamics	3	MATH4474
MATH5558	Introduction to Number Theory	3	MATH3340 and MATH3350 and MATH3357

### J15. Physics (18 credits)

Required Courses (14 Credits)			
Course Code	Course Title	Cr.	Pre-Requisite/Co-Requisite*
PHYS2101	General Physics I	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or
PHYS2102	General Physics II	4	PHYS2101 /MATH2017*
PHYS3103	Physics III	3	LANC2058 and PHYS2102 and MATH2107
PHYS3104	Modern Physics	3	LANC2058 and PHYS3103
Electives (min 4 Credits)			
Any other courses in Physics *		4 (min)	
*Excluding Physics courses offered as University Electives			

### J16. Statistics (18 credits)

Required Courses (10 Credits)			
Code	Title	Credits	Pre-Requisite / Co-Requisite*
STAT2101	Introduction to Statistics	4	(FPE0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604) and (FPMT0105 or PMT0109)
STAT2102	Introduction to Probability	3	STAT2101 and MATH2108*
STAT3334	Introduction to Inference	3	STAT2102 and LANC2058

Remaining credits from the following			
Code	Title	Credits	Pre-Requisite / Co-Requisite*
STAT3331	Operations Research 1	3	STAT2101 and MATH2108 and LANC2058
STAT3335	Introduction to Sampling	3	STAT2102 and LANC2058
STAT3336	Computational Techniques in Statistics	3	STAT2102 and COMP2200 and LANC2058
STAT3338	Statistical Methods	3	STAT3334 and LANC2058
STAT4432	Regression Analysis	3	STAT3334
STAT4433	Design and Analysis of Experiments	3	STAT3338
STAT4434	Nonparametric Statistics	3	STAT3334
STAT4436	Survey Design	3	STAT3335
STAT4533	Quality Assurance and Reliability	3	STAT2102
STAT5521	Categorical Data Analysis	3	STAT3338
STAT5536	Time Series Analysis	3	STAT4432
STAT5537	Multivariate Techniques	3	STAT3334 and MATH2202 and MATH3110

