

Degree and Study Plan

College: Science
 Department: Biology
 Cohort: 2016-2020
 Degree: Bachelor of Science
 Major: Biotechnology
 Specialization:

Summary of Credits:		
University Requirements (UR)		6
Foundation Program	NC ⁺	
Arabic	3	
Contemporary Omani Society	1	
Oman & Islamic Civilization or Islamic Culture	2	
University Electives (UE)		6
See List A		
College Requirements (CR)		3
See list B		
College Electives (CE)		16
See list C		
Departmental Requirements (DR)		28
See list D		
Departmental Electives (DE)		0
See list E		
Major Requirements (AR)		34
See list F		
Major Electives (AE)		29
See list G		
Specialization Requirements (SR)		0
See list H		
Specialization Electives (SE)		0
See list I		
Minor Requirements (IR)⁺⁺		0
See list J		
Minor Electives (IE)⁺⁺		0
See list K		
TOTAL		122

⁺ Not credited.

⁺⁺ Minor is optional: minimum total credits to earn a Minor are 18. Courses counting towards an approved Minor may substitute courses listed as Major Electives (List G) but no more than 8 credits counting towards the Major degree (lists C, D, E, F) may count towards a Minor.

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HoD: Elsadig Eltayeb

Dean's Office:

Admission and Registration:

Ext. 6882

Date: 1/5/2016

Date: 1/5/2016

Date:



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Categories	CR
University Requirements (UR)	6
University Electives (UE)	6
College Requirement (CR)	3
College Electives (CE)	16
Departmental Requirements (DR)	28
Major Requirements (AR)	34
Major Electives (AE)	29
TOTAL	122

Department of Biology - Biotechnology Degree Plan for Cohort 2016-2020

Study Plan: for Cohort 2016-2020

	Course Code	Course Title	Cr.	Pre-req./Co-req.*	Cat.
Semester 1 Fall	ARAB1001	Arabic	3		UR
	HIST1010 or ISLM1010	Oman & Islamic Civilization or Islamic Culture	2		UR
	LANC2058	Communication in Science	3	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604	CR
	BIOL2101	General Biology I	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604	CE
	CHEM 2101	General Chemistry I	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604 and FPMT0105 or FPMT0109	CE
	Total			16	

Semester 2 Spring	BIOL 2102	General Biology II	4	BIOL2101	DR
	CHEM3324	Organic Chemistry for Engineering	4	CHEM2101 and LANC2058	DR
	MATH2107	Calculus I	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604	CE
		University Elective	2		UE
	SOCY1001	Oman Contemporary Society	1		UR
	Total			15	

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Semester 3 Fall	CHEM 2102	General Chemistry II	4	CHEM 2101	DR
	BIOL3441	Introductory Microbiology	3	BIOL2101 and LANC2058	DR
	BIOL3202	Molecular Biology	3	BIOL2101 and LANC2058	DR
	BIOL3011	Plant Physiology	3	BIOL2102 and LANC2058	DR
		University Elective	2		UE
Total			15		

Semester 4 Spring	BIOL3023	Animal Physiology	4	BIOL2102 and LANC2058	DR
	BIOL4432	Genetics	3	BIOL2101	DR
		College Elective	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604	CE
		Major Elective	3		AE
		University Elective	2		UE
Total			16		

Semester 5 Fall	BIOL4034	Biochemistry	3	BIOL2101 and CHEM3324	AR
	BIOL4046	Fundamentals of Biotechnology	3	BIOL3202	AR
	BIOL4100	Biological Data handling	3	BIOL2102	DR
		Major Elective	3		AE
		Major Elective	3		AE
Total			15		

Semester 6 Spring	BIOL4030	Bacteriology	3	BIOL3441	AR
	BIOL4500	Cell Biology	3	BIOL2101	AR
	BIOL5040	Microbial Genetics and Genetic Eng	3	BIOL3441	AR
		Major Elective	3		AE
		Major Elective	3		AE
Total			15		

Semester 7 Fall	BIOL5104	Graduation Research Project	4	BIOL4100	AR
	BIOL5031	Enzyme Biochemistry	3	BIOL4034	AR
	BIOL5120	Microbial Biotechnology	3	BIOL 4046 and BIOL3441	AR
		Major Elective	3		AE
		Major Elective	3		AE
Total			16		

Semester 8 Spring	BIOL5132	Tissue Culture	3	BIOL4500	AR
	BIOL5400	Bioinformatics	3	BIOL3202	AR
		Major Elective	3		AE
		Major Elective	3		AE
		Major Elective	3		AE
Total			15		

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Department of Biology – Biotechnology Degree Plan for Cohort 2016-2020

Degree Plan : 122 credits

University Requirements: 6 Credits

Course code	Course Title	Cr	Prerequisites (Co-Requisite)
ARAB1001	Arabic	3	
HIST1010 or ISLM1010	Oman & Islamic Civilization or Islamic Culture	2	
SOCI1001	Contemporary Omani Society	1	

LIST A: UNIVERSITY ELECTIVES (6 Credits)

See SQU Deanship of Admission and Registration Web site for an updated list of University Electives

LIST B: COLLEGE REQUIREMENTS (3 Credits)

Code	Title	Credits	Pre-Requisite / Co-req. *
LANC2058 [†]	Communication in Science	3	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604
Total		3	

+LANC2058 is a pre-requisite for all 3000-level College of Science courses.

LIST C: COLLEGE ELECTIVES (16 Credits)

Course Code	Course Title	Credits	Pre-Requisite / Co-Req. *
BIOL2101 [†]	General Biology I	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604
CHEM2101 [†]	General Chemistry I	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604 and FPMT0105 or FPMT0109
MATH2107 [†]	Calculus I	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604 and FPMT0105 or FPMT0109
COMP2101	Introduction to Computer Science	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604 and FPCS0101 or FPCS0102
ERSC2101	Introduction to Geology I	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604
PHYS2101	General Physics I	4	FPEL0560 or FPEL0600 or FPEL0603 or FPEL0604 and FPMT0105 or FPMT0109
STAT1001	Introduction to Statistics	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604 and FPMT0105 or FPMT0109

[†] BIOL2101, CHEM2101 and MATH2107 are important pre-requisite courses for Biotechnology major requirements.

LIST D: BIOLOGY DEPARTMENTAL REQUIREMENTS (28 Credits)

Course Code	Course Title	Credits	Pre-Requisite / Co-req.
BIOL 2102	General Biology II	4	BIOL 2101
BIOL 3011	Plant Physiology	3	BIOL2102
BIOL 3023	Animal Physiology	4	BIOL2102
BIOL 3202	Molecular Biology	3	BIOL 2101
BIOL 3441	Introductory Microbiology	3	BIOL 2101
BIOL 4100	Biological Data Handling	3	BIOL 2102
BIOL 5104	Graduation Research project	4	BIOL 4100
CHEM3324	Organic Chemistry for Engineering	4	CHEM 2101 and LANC2058
Total		28	

LIST E: BIOLOGY DEPARTMENTAL ELECTIVES (0 Credits)**LIST F: BIOTECHNOLOGY MAJOR REQUIREMENTS (34 Credits)**

Code	Title	Credits	Pre-Requisite / Co-req.
CIEM 2102	General Chemistry II	4	CHEM 2101
BIOL 4030	Bacteriology	3	BIOL 3441
BIOL 4034	Biochemistry	3	BIOL2101+CHEM 3324
BIOL 4046	Fundamentals of Biotechnology	3	BIOL 3202
BIOL 4432	Genetics	3	BIOL 2101
BIOL 4500	Cell Biology	3	BIOL 2101
BIOL 5031	Enzyme Biochemistry	3	BIOL4034
BIOL 5040	Microbial Genetics and Genetic Engineering	3	BIOL 3441
BIOL 5120	Microbial Biotechnology	3	BIOL 3441 and BIOL.4046
BIOL 5132	Tissue Culture	3	BIOL 4500
BIOL 5400	Bioinformatics	3	BIOL 3202
Total		34	

Department of Biology – Biotechnology Degree Plan for Cohort 2016-2020**LIST G: BIOTECHNOLOGY MAJOR ELECTIVES (29 Credits)**

Biotechnology major student may choose any of the 12 credits from List G1 and 17 credits from G2 in consultation with the Advisor.

List G1. Major Electives from the College of Engineering (12 credits from the following)

Code	Title	Credits	Pre-requisite / Co-req.
CHEM3348*	Introduction to Chemical and Instrumental Analysis	3	CHEM2102
CHPE3112	Principles of Chemical Processes	3	CHEM1071
CHPE3102	Engineering Thermodynamics	3	CHEM1071, MATH2107
CHPE3302	Fluid Flow	3	CHPE3102
CHPE4512	Chemical Reaction Engineering	3	CHEM3324
CHPE5116	Biochemical Engineering	3	CHPE4512
PNGE5103	Engineering Economy	3	MATH2107
PNGE5203	Management for Petroleum and Chemical Engineers	3	PNGE5103

* Course offered by Department of Chemistry as a core course for Engineering students

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List G2. Major Electives from the College of Science (17 credits from the following)

Code	Title	Cr	Pre-req./Co-req.*
LANC2146	Academic Writing in Science	3	LANC2058
BIOL2600	Biodiversity	3	BIOL2101
BIOL3005	Ecology	3	BIOL2102 and LANC2058
BIOL3009	Introduction to Environmental Science	3	BIOL2102 and LANC2058
BIOL3025	Invertebrates	3	BIOL2102 and LANC2058
BIOL3410	Angiosperm Biology	3	BIOL2102 and LANC2058
BIOL4000	Generic Skills for Biologists	3	BIOL2101
BIOL4009	Waste Management	3	BIOL3009
BIOL4021	Vertebrate Zoology	3	BIOL2102
BIOL4023	Entomology	3	BIOL2102
BIOL4041	Animal Histology	3	BIOL2102 or BIOL2105
BIOL4042	Parasitology	3	BIOL2102
BIOL4054	Marine Biology	3	BIOL3005
BIOL4501	Principles of Toxicology	3	BIOL2101
BIOL4600	Biofuels	3	BIOL3441
BIOL4640	Environmental Pollution	3	BIOL4009
BIOL4700	Environmental Biotechnology	3	BIOL3441
BIOL5010	Ecotoxicology	3	BIOL3009
BIOL5021	Desert Biology	3	BIOL3005
BIOL5034	Plant Metabolites	3	BIOL4034
BIOL5042	Embryology	3	BIOL2102
BIOL5045	Economic Botany	3	BIOL2102
BIOL5052	Freshwater Biology	3	BIOL3005
BIOL5054	Biological Conservation	3	BIOL3005
BIOL5133	Plant biotechnology	3	BIOL4046
BIOL5144	Applied Mycology	3	BIOL3441
BIOL5244	Cytogenetics	3	BIOL4432
BIOL5401	Environmental microbiology techniques	3	BIOL3009, BIOL3201
BIOL5402	Immunology	3	BIOL4500
BIOL5411	Fermentation Technology	3	BIOL4030
BIOL5501	Protein Production and Characterization	3	BIOL4034, BIOL4046
BIOL5600	Techniques in Molecular Diversity	3	BIOL3202
BIOL5610	Environmental Impact Assessment	3	BIOL3009

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CHEM2350	Chemical Safety: Protecting ourselves and the environment	3	LANC2058 and (CHEM2101 or CHEM1071 or CHEM2110)
CHEM3310	Descriptive Inorganic Chemistry	3	LANC2058 and CHEM2101 and (MATH1106 or FPMT0105 FPMT0109)
CHEM3311	Inorganic Chemistry I	3	LANC2058 and CHEM2102 and MATH2107
CHEM3326	Applied Spectroscopy	3	LANC2058 and (CHEM3324 or CHEM3327 or CHEM2091)
CHEM3333	Physical Chemistry I	3	LANC2058 and CHEM2101 and PHYS2101 and MATH2107 and CHEM3335*
CHEM3337	Fundamentals of the Corrosion of Metals	3	LANC2058 and (CHEM2101 or CHEM1071)
CHEM3341	Analytical Chemistry I	3	LANC2058 and CHEM2102 and (FPMT0105 or FPMT0109)
CHEM3350	Environmental Chemistry	3	LANC2058 and CHEM2102
CHEM3391	Computers in Chemistry	3	LANC2058 and CHEM2102 and CHEM3324 and (COMP1200 or FPCS0101)
CHEM3400	Introduction to Chemical Process Industries	3	LANC2058 and CHEM2101 and CHEM3333*
CHEM3420	Petroleum Chemistry and Industrial Organic Processes	3	LANC2058 and CHEM3324
CHEM4412	Inorganic Materials	3	CHEM3311
CHEM4413	Organometallic Chemistry	3	CHEM4411
CHEM4414	Fundamentals of X-ray Crystallography	3	CHEM3311
CHEM4422	Organic Chemistry II	3	CHEM3324
CHEM4423	Organic Synthetic Methods	3	CHEM4421 or CHEM4422
CHEM4424	Introduction to Natural Products	3	CHEM4421 or CHEM4422
CHEM4425	Organic Chemistry Laboratory	3	CHEM3326 and CHEM4422*
CHEM4428	Heterocyclic Chemistry	3	CHEM4422
CHEM4429	Fundamentals of Medicinal Chemistry and Drug Design	3	CHEM3327 or CHEM4422 or CHEM4470 or CHEM4421
CHEM4433	Physical Chemistry II	3	MATH2108 and CHEM3333 and CHEM4435*
CHEM4437	Electrochemistry	3	CHEM3333 or CHEM3330
CHEM4441	Analytical Chemistry II	3	CHEM3341
CHEM4442	Instrumental Analysis	3	CHEM4441
CHEM4445	Forensic Chemistry	3	CHEM3341
CHEM4472	Fine Chemicals	3	CHEM4422
CHEM4474	Polymer Materials and Applications	3	CHEM3324
CHEM4476	Catalysis	3	CHEM4411
CHEM4477	Essentials of Biological Chemistry	3	CHEM4422
CHEM5522	Organic Chemistry III	3	CHEM4422 or CHEM4421
CHEM5537	Surfactants: Principles & Applications in the Petroleum Industry	3	CHEM3333 or CHEM3102
CHEM5539	Chemical Sensors	3	CHEM3333 and CHEM4441
CHEM5545	Analytical Methods in Proteomics	3	CHEM4441
CHEM5578	Chemical Quality Control and Assurance	3	CHEM4441
CHEM5591	Chemistry Seminar I	1	
COMP2102	Problem Solving and Programming	3	COMP2101
COMP2105	Introduction to Problem Solving with Visual Basic	3	COMP2101
COMP2206	Introduction to Java	3	COMP3200

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COMP3100	Ethical and Social Issues for Computing Profession	1	COMP3401 and LANC2058
COMP3200	Object Oriented Programming	3	COMP2102 and LANC2058
COMP3203	Introduction to Data Structures and Algorithms	3	COMP3200 and LANC2058
COMP3204	Advanced Java Programming	3	COMP2206 and LANC2058
COMP3302	Introduction to Multimedia	3	COMP3200 and LANC2058
COMP3401	Introduction to Software Engineering	4	COMP3200 and LANC2058
COMP3501	Computer Organization & Assembly Language	3	COMP2102 and ECCE3206 and LANC2058
COMP3601	Bioinformatics Algorithms	3	BIOL2101 and COMP2101
COMP3700	Introduction to Web Computing	3	COMP3200 and LANC2058
COMP3702	Principles of Web Applications	3	COMP3700 and LANC2058
COMP4201	Introduction to Database Systems	3	COMP3203
COMP4202	Database Development	3	COMP4201
COMP4204	Advanced Data Structures and Algorithms	3	COMP3203 and MATH3340
COMP4206	Mobile Applications Development	3	COMP2206 and COMP3700
COMP4212	Introduction to Information Retrieval		COMP3202
COMP4300	Computer Graphics I	3	COMP3202 and MATH2202
COMP4401	Analysis, Design, and Architecture of Software Systems	3	COMP3401
COMP4402	Software Testing	3	COMP3401
COMP4404	Software Project Management	3	COMP3401
COMP4471	Computational Methods I	3	COMP2101 and MATH2108 and MATH2202
COMP4501	Fundamentals of Operating Systems	3	COMP3203 and COMP3501
COMP4502	Networks & Communication	3	COMP3501
COMP4601	Introduction to Intelligent Systems	3	COMP3203
COMP4702	Advanced Web Applications Development	3	COMP3702
COMP4703	Web Data Mining and Social Networking	3	COMP3700 and (STAT2102 or STAT2103)
COMP5101	Comparative Programming Languages	3	COMP3203 and COMP3501
COMP5204	Computer Science Special Topics I	3	Instructor Consent
COMP5302	Digital Image Processing	3	COMP3202 or COMP3203
COMP5506	Wireless Networks and Mobile Computing	3	COMP4501 and COMP 4502
COMP5507	Cryptography and Network Security	3	COMP3203 and COMP4502
COMP5508	Interconnection Networks for Multiprocessor and Multicore Systems	3	COMP4502 or COMP5501
COMP5521	Finite Automata & Formal Languages	3	MATH3340
COMP5522	Compiler Construction	3	COMP3501 and COMP5521
COMP5601	Machine Learning	3	COMP3203 and MATH2202 and STAT2103
COMP5701	Web Services	3	COMP3702
ERSC2011	Palacontology I	3	ERSC2101
ERSC2102	Introduction to Geology II	4	ERSC2101
ERSC2112	Historical Geology	3	ERSC2101
ERSC3000	Environmental Geology	3	ERSC2101 and CHEM2101 and LANC2058
ERSC3002	Environmental Site Assessment and Remediation	3	ERSC2102 and ERSC 3000 and LANC2058
ERSC3010	Mineralogy	3	ERSC2102 and LANC2058

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ERSC3021	Structural Geology	3	ERSC2102 and LANC2058
ERSC3041	Stratigraphy	3	ERSC2102 and LANC2058
ERSC3061	Introduction to Remote Sensing	3	ERSC2102 and LANC2058
ERSC3071	GIS and Geo-Spatial Applications	3	ERSC2102
ERSC3210	Palaeontology II	3	ERSC2011
ERSC3901	Sedimentary Petrology	3	ERSC3010 and LANC2058
ERSC4031	Geochemistry	3	ERSC2102 and CHEM2101
ERSC4032	Environmental Geochemistry	3	ERSC2101 and CHEM2101
ERSC4051	Hydrogeology	3	ERSC2102
ERSC4071	Economic Geology	3	ERSC3051
ERSC4311	Sedimentary Environments and Facies	3	ERSC3901
ERSC4321	Structural Geology II	3	ERSC3021
ERSC5011	Basin Analysis		ERSC3021 and ERSC4311
ERSC5051	Petroleum Geology	3	ERSC3041
ERSC5061	Exploration Geophysics	3	GEOP3041
ERSC5071	Image Processing and GIS	3	ERSC3061
ERSC5900	Advanced Diagenesis and Sedimentary Geochemistry	3	ERSC3901
GEOP3000	Earthquakes and Society	3	ERSC2101 and LANC2058
GEOP3041	General Geophysics	3	ERSC2101 and PHYS2101 and MATH2107 and LANC2058
GEOP3042	Principles of Geophysical Well Logging	3	GEOP3041 and LANC2058
GEOP4001	Applied Geophysics I	3	GEOP3041 and PHYS3100
GEOP4002	Applied Geophysics II	3	GEOP3041 and PHYS3012
GEOP4003	Gravity and Magnetic Exploration Methods	3	GEOP3041
GEOP4010	Fundamentals of Signal Processing	3	GEOP4001 and PHYS3100 and (MATH3171 or MATH3302)
GEOP4011	Geophysical Data Processing	3	GEOP4001 and MATH3171
GEOP5021	Engineering and Environmental Geophysics	3	GEOP3041
GEOP5060	Interpretation of Seismic Reflection Data	3	ERSC3041 and GEOP3041
MATH2108	Calculus II	3	MATH2107
MATH2202	Linear Algebra I	3	(FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604) and (FPMT0105 or FPMT0109)
MATH2350	Foundations of Mathematics	3	MATH2107
MATH3110	Calculus III	4	LANC2058 and MATH2108
MATH3302	Ordinary Differential Equations	3	LANC2058 and MATH2108
MATH3303	Linear Algebra II	3	LANC2058 and MATH2202
MATH3360	Discrete Mathematics	3	LANC2058 and MATH2350
MATH3573	Graph Theory	3	LANC2058 and MATH3360
MATH3730	Computer Algebra System I	2	LANC2058 and MATH2202 and MATH3110
MATH3744	Introduction to Mathematical Modeling	3	LANC2058 and MATH3110 and MATH3302
MATH4141	Numerical Analysis	3	MATH2108 and MATH2202
MATH4450	Real Analysis I	3	MATH2108 and MATH2350
MATH4452	Introduction to Complex Variables	3	MATH3110 or MATH3171

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MATH4453	Abstract Algebra I	3	MATH2202 and MATH2350
MATH4473	Linear Programming	3	MATH2202 or MATH3171
MATH4474	Introduction to Partial Differential Equations	3	MATH3302
MATH4481	Introduction to Optimization	3	MATH2108 and (MATH2202 or MATH3171)
MATH4552	Logic and Set Theory	3	MATH2350 or MATH3340
MATH5451	Real Analysis II	3	MATH4450
MATH5470	Integral Transforms	3	MATH4474 and MATH4452*
MATH5551	Fluid Dynamics	3	MATH4474
MATH5553	Differential Geometry I	3	MATH3110 and MATH3303
MATH5558	Introduction to Number Theory	3	MATH2350 or MATH3340
PHYS2102	General Physics II	4	PHYS2101
PHYS2901	Introductory Astronomy	3	
PHYS3001	Dynamics	3	LANC2058 and PHYS2101 and PHYS3101
PHYS3012	Electromagnetism	3	LANC2058 and PHYS2102 and MATH3171
PHYS3101	Theoretical Methods of Physics I	3	LANC2058 and MATH3171
PHYS3103	Physics III	3	LANC2058 and PHYS2102 and MATH2107
PHYS3104	Modern Physics	3	LANC2058 and PHYS3103
PHYS3601	Radiation Physics	3	LANC2058 and PHYS3104
PHYS3602	Fundamentals of Radiation Protection	3	LANC2058 and PHYS3601
PHYS3603	Operational Radiation Protection	3	LANC2058 and PHYS3602
PHYS3901	Mysteries of the Universe	3	LANC2058 and (PHYS2801 or PHYS2901)
PHYS3903	Introduction to Space Science	3	LANC2058 and (PHYS2801 or PHYS2801)
PHYS3905	Essentials of Meteorology	3	LANC2058 and PHYS2102 and (PHYS2801 or PHYS2901)
PHYS3907	Observational Techniques in Astronomy	3	LANC2058 and PHYS3901
PHYS4100	Optics & Lasers	3	PHYS3103 and PHYS3012
PHYS4101	Quantum Physics I	3	PHYS3104 and PHYS3101
PHYS4108	Thermal & Statistical Physics	4	PHYS3104
PHYS4601	Ionizing Radiation Detection	3	PHYS3601
PHYS4602	Nuclear Applications	3	PHYS3601
PHYS4901	Stellar Evolution & Nucleosynthesis	3	PHYS3901
PHYS5003	Condensed Matter Physics	3	PHYS4101 and PHYS4018
PHYS5106	Nuclear Physics	3	PHYS4101
PHYS5601	Introduction to Nuclear Power	3	PHYS3601
PHYS5901	Image Processing & Data Analysis	3	PHYS3100 and PHYS3907
STAT2102	Introduction to Probability	3	STAT1001
STAT3331	Operations Research I	3	MATH2108 & LANC2058
STAT3334	Introduction to Inference	3	STAT2102 & LANC2058
STAT3335	Introduction to Sampling	3	STAT2102 & LANC2058
STAT3336	Computational Techniques in Statistics	3	STAT2102 & ENGR2216 & LANC2058
STAT3337	Introduction to Actuarial Science I	3	STAT2102 & LANC2058
STAT3338	Statistical Methods	3	STAT3334 & LANC2058

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STAT4432	Regression Analysis	3	STAT3334
STAT4433	Design of Experiments 1	3	STAT3338
STAT4434	Non Parametric Statistics	3	STAT3334
STAT4436	Survey Design	3	STAT3335
STAT4533	Quality Assurance and Reliability	3	STAT2102
STAT 4534	Simulation	3	STAT3336
STAT5521	Categorical Data analysis	3	STAT3338
STAT5522	Demographic and Health Care Statistics	3	STAT3334
STAT5536	Time Series Analysis	3	STAT3334
STAT5537	Multivariate Techniques	3	MATH2202 & MATH3110 &STAT3334

Department of Biology – Degree Plan for Cohort 2016-2020

LISTS J & K : MINOR REQUIRMENTS AND ELECTIVES (18 Credits)

Minors offered to Biotechnology Students

	Minor*	College
1	Minor in Astronomy	Science
2	Minor in Applied Nuclear Science	Science
3	Minor in Business	Economics and Political Science
4	Minor in Chemistry	Science
5	Minor in Computer Science	Science
6	Minor in Earth Science	Science
7	Minor in Mathematics	Science
8	Minor in Physics	Science
9	Minor in Soil and Water Sciences	Agriculture and Marine Science
10	Minor in Statistics	Science

* Students are required to complete 18 Credits in the minor courses to qualify for a minor.
 * Courses counting towards an approved Minor may substitute courses listed as Major Electives (List G) but no more than 8 credits counting towards the Major degree (lists C, D, E, F) may count towards a Minor.

**1- MINOR IN ASTRONOMY
DEPARTMENT OF PHYSICS**

J1. Minor in Astronomy Requirement (18 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
PHYS2901	Introduction to Astronomy	3	
PHYS3901	Mysteries of the Universe	3	LANC2058 and (PHYS2801 or PHYS2901)
PHYS3903	Introduction to Space Science	3	LANC2058 and (PHYS2801 or PHYS2901)
PHYS3905	Essentials of Meteorology	3	LANC2058 and PHYS2102 and (PHYS2801 or PHYS2901)

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	Visual Basic		
COMP2206	Introduction to Java	3	COMP3200
COMP3203	Introduction to Data Structures and Algorithms	3	COMP3200 and LANC2058
COMP3204	Advanced Java Programming	3	COMP2206 and LANC2058
COMP3302	Introduction to Multimedia	3	COMP3200 and LANC2058
COMP3401	Introduction to Software Engineering	4	COMP3200 and LANC2058
COMP3501	Computer Organization & Assembly Language	3	COMP2102 and ECCF3206 and LANC2058
COMP3601	Bioinformatics Algorithms	3	BIOL2101 and COMP2101
COMP3700	Introduction to Web Computing	3	COMP3200 and LANC2058
COMP3702	Principles of Web Applications	3	COMP3700 and LANC2058
COMP4201	Introduction to Database Systems	3	COMP3203
COMP4202	Database Development	3	COMP4201
COMP4206	Mobile Applications Development	3	COMP2206 and COMP3700
COMP4212	Introduction to Information Retrieval		COMP3202
COMP4300	Computer Graphics I	3	COMP3202 and MATH2202
COMP4401	Analysis, Design, and Architecture of Software Systems	3	COMP3401
COMP4402	Software Testing	3	COMP3401
COMP4404	Software Project Management	3	COMP3401
COMP4471	Computational Methods I	3	COMP2101 and MATH2108 and MATH2202
COMP4501	Fundamentals of Operating Systems	3	COMP3203 and COMP3501
COMP4502	Networks & Communication	3	COMP3501
COMP4601	Introduction to Intelligent Systems	3	COMP3203
COMP4702	Advanced Web Applications Development	3	COMP3702
COMP4703	Web Data Mining and Social Networking	3	COMP3700 and (STAT2102 or STAT2103)
COMP5302	Digital Image Processing	3	COMP3202 or COMP3203

**6- MINOR IN EARTH SCIENCES
DEPARTMENT OF EARTH SCIENCES**

Minor in Earth Sciences (18 Credits) (J6 + K6 = 8+10 = 18 Credits)

J6. Minor in Earth Sciences Requirement 8 credits

Code	Title	Credits	Pre-Requisite / Co-Requisite*
ERSC 2101	Introduction to Geology I	4	FPE0560 or FPEL0600 or FPEL0603 or FPEL0604
ERSC 2102	Introduction to Geology II	4	ERSC 2101
Total		8	

K6. Minor in Earth Sciences Electives (Minimum 10 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
ERSC2011	Palaeontology I	3	ERSC2101
ERSC3000	Environmental Geology	3	ERSC2101 and CHEM2101 and LANC2058
ERSC3002	Environmental Site Assessment and Remediation	3	ERSC2102 and ERSC 3000 and LANC2058
ERSC3010	Mineralogy	3	ERSC2102 and LANC2058
ERSC3021	Structural Geology	3	ERSC2102 and LANC2058
ERSC3041	Stratigraphy	3	ERSC2102 and LANC2058
ERSC3061	Introduction to Remote Sensing	3	ERSC2102 and LANC2058

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ERSC3901	Sedimentary Petrology	3	ERSC3010 and LANC2058
ERSC4031	Geochemistry	3	ERSC2102 and CHEM2101
ERSC4032	Environmental Geochemistry	3	ERSC2101 and CHEM2101
ERSC4051	Hydrogeology	3	ERSC2102
ERSC4071	Economic Geology	3	ERSC3051
ERSC4311	Sedimentary Environments and Facies	3	ERSC3901
ERSC4321	Structural Geology II	3	ERSC3021
ERSC5011	Basin Analysis		ERSC3021 and ERSC4311
ERSC5051	Petroleum Geology	3	ERSC3041
ERSC5061	Exploration Geophysics	3	GEOP3041
GEOP3000	Earthquakes and Society	3	ERSC2101 and LANC2058
GEOP3041	General Geophysics	3	ERSC2101 and PHYS2101 and MATH2107 and LANC2058
Total (minimum)		10	

**7- MINOR IN MATHEMATICS
DEPARTMENT OF MATHEMATICS AND STATISTICS**

Minor in Mathematics (18 Credits) (J7 + K7 = 11 or 13 + 5 or 7 = 18 Credits)

J7. Minor in Mathematics Requirement (11 or 13 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
MATH2107	Calculus I	4	(FPE0560 or FPEL0600 or FPEL0603 or FPEL0604) and (FPMT0105 or PMT0109)
MATH2108	Calculus II	3	MATH2107
MATH2202*	Linear Algebra I	3	(FPE0560 or FPEL0600 or FPEL0603 or FPEL0604) and (FPMT0105 or PMT0109)
MATH3110*	Calculus III	4	MATH2108 and LANC2058
MATH3171*	Linear Algebra & Multivariate Calculus for Engineers	3	MATH2108 and LANC2058
Total		11 or 13	

* MATH3171 can substitute for both MATH2202 and MATH3110 above. However, students who have passed MATH3171 cannot take MATH2202 or MATH3110, and vice versa.

K7. Minor in Mathematics Electives (Minimum 5 or 7 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
MATH3302 or MATH4174	Ordinary Differential Equations Differential Equations & Applications for Engineers	3 3	MATH2108 and LANC2058 MATH2108 and LANC2058
MATH3303	Linear Algebra II	3	MATH2202 and LANC2058
MATH2350 or MATH3340	Foundations of Mathematics Discrete Mathematics for Computer Science	3 3	MATH2107 MATH2107 and COMP2101 and LANC2058
MATH3573	Graph Theory	3	MATH2350 or MATH3340 and LANC2058
MATH3744	Introduction to Mathematical Modeling	3	MATH3110 and MATH3302 and LANC2058
MATH4141	Numerical Analysis	3	MATH2108 and MATH2202
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)

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MATH4473	Linear Programming	3	MATH2202 or MATH3171
MATH4474	Introduction to Partial Differential Equations	3	MATH3302
MATH4481	Introduction to Optimization	3	MATH2108 and (MATH2202 or MATH3171)
MATH5551	Fluid Dynamics	3	MATH4474
MATH5558	Introduction to Number Theory	3	MATH2350 or MATH3340
Total (minimum)		5 or 7	

**8- MINOR IN PHYSICS
DEPARTMENT OF PHYSICS**

Minor in Physics (18 Credits) (J8 + K8 = 14+4 = 18 Credits)

J8. Minor in Physics Requirement (14 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
PHYS2101	General Physics I	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604 and (FPMT0105 or FPMT0109)
PHYS2102	General Physics II	4	PHYS2101
PHYS3103	Physics III	3	LANC20158 and PHYS2102 and MATH2107
PHYS3104	Modern Physics	3	LANC2058 and PHYS3103
Total		14	

K8. Minor in Physics Electives (Minimum 4 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
Any other courses in Physics*		4	
Total (minimum)		4	

*Excluding Physics courses offered as University Electives

**9- MINOR IN SOIL AND WATER SCIENCES
From the College of Agriculture and Marine Sciences
(Department of Soil, Water and Agricultural Engineering, Soil Sciences)**

Minor in in Soil and Water Sciences (18 Credits) (J9 + K9= 3+15 = 18 Credits)

J9 Minor in Soil and Water Sciences Requirement (9 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
SWAE2201	Introduction to Soil and Water	3	FPE0560 or FPEL0600 or FPEL0603 or FPEL0604
Total		3	

K9. Minor in Soil and Water Sciences Electives (Minimum 15 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
SWAE3002	Desertification & Land Restoration	3	SWAE2201
SWAE3302	Environmental Soil Chemistry	3	CHEM2101, SWAE2201

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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	Hydrogeology for Soil-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*
Total (minimum)		15	

*CR - CAMS college requirement courses which are I310L2101, CAMS2000, CAMS2003, CAMS3000, CAMS3001, CHEM2101, PHYS2101 or PHYS2107.

**10- MINOR IN STATISTICS
DEPARTMENT OF MATHEMATICS AND STATISTICS**

Minor in Statistics 18 Credits (J10 + K10 = 10+8 = 18 Credits)

J10. Minor in Statistics Requirement (10 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
STAT1001	Introduction to Statistics	4	(FPE0560 or FPEL0600 or FPEL0603 or FPEL0604) and (FPMT0105 or PMT0109)
STAT2102	Introduction to Probability	3	STAT1001 and MATH2108*
STAT3334	Introduction to Inference	3	STAT2102
Total		10	

K10. Minor in Statistics Electives (Minimum 8 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
STAT3331	Operations Research I	3	STAT1001 and MATH2108 and LANC2058
STAT3335	Introduction to Sampling	3	STAT2102 and LANC2058
STAT3336	Computational Techniques in Statistics	3	STAT2102 and COMP2216 and LANC2058
STAT3338	Statistical Methods	3	STAT3334 and LANC2058
STAT4432	Regression Analysis	3	STAT3334 and MATH2202
STAT4433	Design and Analysis of Experiments	3	STAT3338
STAT4434	Nonparametric Statistics	3	STAT3334
STAT4436	Survey Design	3	STAT4435 or STAT3335
STAT4533	Quality Assurance and Reliability	3	STAT2102
STAT5521	Categorical Data Analysis	3	STAT3338
STAT5536	Time Series Analysis	3	STAT3334
STAT5537	Multivariate Techniques	3	STAT3334 and MATH2202 and MATH3110
Total (minimum)		8	

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HOD **Dr Elsadig Eltayeb**

Approved by Dean of Science:

Prof Salma Al-Kindy

Date:

27/11/2016

Office of Admissions & Registration: _____

Confirmed: _____

