Degree and Study Plan

College: Science
Department: Mathematics
Cohorts: 2016-20
Degree: Bachelor of Science
Major: Mathematics

Summary of Credits:

University Requirements (UR)		**6**
Foundation Program	NC[+]	
Arabic	3	
Omani Contemporary Society	1	
Oman & Islamic Civilization or Islamic Culture	2	
University Electives (UE)		**6**
See SQU Deanship of A&R website		
College Requirements (CR)		**3**
See list B		
College Electives (CE)		**16**
See list C		
Departmental Requirements (DR)		**16**
See list D		
Departmental Electives (DE)		**12**
See list E		
Major Requirements (AR)		**32**
See list F		
Major Electives (AE)		**31**
See list G		
Specialization Requirements (SR)		
See list H		
Specialization Electives (SE)		
See list I		
Minor Requirements (IR)		++
See list J		++
Minor Electives (IE)		
See list K		
TOTAL		**122**

[+] Not credited.

[++] Minor is optional: Total credits to earn a minor are 18. No more than 8 credits counting towards the major degree may count towards a minor.

For reference contact: Prof. Pallath Chandran Ext. 1414

HoD: Dr. Khidir M. Abdelbasit Date: 23/05/2016

Dean's Office: Prof. Salim Al-Hadj Date: 27/11/2016

Admissions and Registration: Date:

[Last updated: 10 May 2016]

Department of Mathematics & Statistics

Mathematics Study Plan for Cohorts 2016-2020

Categories	Credits
University Requirements (UR)	6
University Electives (UE)	6
College Requirement (CR)	3
College Electives (CE)	16
Departmental Requirements (DR)	16
Departmental Electives (DE)	12
Major Requirements (AR)	32
Major Electives (AE)	31
Total	**122**

	Course Code	Course Title	Cr.	Pre-Requisite/Co-Requisite*	Cat.
Semester 1	ARAB1001	Arabic	3		UR
	SOCY1001	Omani Contemporary Society	1		UR
	LANC2058	Communication in Science	3	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604	CR
	MATH2107	Calculus I	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604 and (FPMT0105 or FPMT0109)	CE
	STAT2101	Introduction to Statistics	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604 and (FPMT0105 or FPMT0109)	CE
	Total		15		

Semester 2	HIST1010 or ISLM 1010	Oman & Islamic Civilization or Islamic Culture	2		UR
	COMP2101	Introduction to Computer Science	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604 and (FPCS0101 or FPCS0102)	CE
	MATH2108	Calculus II	3	MATH2107	DR
	MATH2350	Foundations of Mathematics	3	MATH2107	DR
	STAT2102	Introduction to Probability	3	STAT1001 and MATH2108*	DR
	Total		15		

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Semester 3	MATH2202	Linear Algebra I	3	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604 and (FPMT0105 or FPMT0109)	DR
	MATH3110	Calculus III	4	LANC2058 and MATH2108	DR
	MATH3302	Ordinary Differential Equations	3	LANC2058 and MATH2108	AR
		College Elective	4		CE
		University Elective	2		UE
	Total		16		

Semester 4	MATH3303	Linear Algebra II	3	LANC2058 and MATH2202	AR
	MATH3360	Discrete Mathematics	3	LANC2058 and MATH2350	AR
	MATH3730	Computer Algebra System I	2	LANC2058 and MATH2202 and MATH3302	AR
	MATH4141	Numerical Analysis	3	MATH2202 and MATH3302	AR
		Major Elective	4		AE
	Total		15		

Semester 5	MATH4450	Real Analysis I	3	MATH2108 and MATH2350	AR
	MATH4453	Abstract Algebra I	3	MATH2202 and MATH2350	AR
		Departmental Elective	3		DE
		Major Elective	3		AE
		Major Elective	3		AE
	Total		15		

Semester 6	MATH4452	Introduction to Complex Variables	3	MATH3110	AR
	MATH4474	Introduction to Partial Diff. Equations	3	MATH3302	AR
		Departmental Elective	3		DE
		Major Elective	3		AE
		Major Elective	3		AE
	Total		15		

Semester 7	MATH5501	Project in Mathematics – Part I	3		AR
		Departmental Elective	3		DE
		Major Elective	3		AE
		Major Elective	3		AE
		University Electives (2 Courses)	4		UE
	Total		16		

Semester 8	MATH5502	Project in Mathematics – Part II	3		AR
		Departmental Elective	3		DE
		Major Elective	3		AE
		Major Elective	3		AE
		Major Elective	3		AE
	Total		15		

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Department of Mathematics & Statistics – Mathematics Degree Plan

Cohorts 2016-2020 Total Credits: 122

UNIVERSITY REQUIREMENTS (UR) (6 Credits)

Course code	Course Title	Credits	Pre-Requisite/Co-Requisite*
ARAB1001	Arabic	3	
HIST1010 or ISLM1010	Oman & Islamic Civilization or Islamic Culture	2	
SOCY1001	Omani Contemporary Society	1	

Department of Mathematics & Statistics – Math Degree Plan for Cohorts 2016-2020

LIST A: UNIVERSITY ELECTIVES (UR) (6 Credits)

See SQU Deanship of Admission and Registration website for the list of University Electives:

https://sis.squ.edu.om/sis/webreg/3s/electiveTimeTable.jsp

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LIST B: COLLEGE REQUIREMENTS (CR) (3 Credits)

Course Code	Course Title	Credits	Pre-Requisite / Co-Requisite *
LANC2058	Communication in Science	3	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604

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LIST C: COLLEGE ELECTIVES (CE) (16 Credits)

Course Code	Course Title	Credits	Pre-Requisite / Co-Requisite*
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)
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
MATH2107^{+}	Calculus I	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604 and (FPMT0105 or FPMT0109)

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PHYS2101	General Physics I	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604 and (FPMT0105 or FPMT0109)
STAT2101[+]	Introduction to Statistics	4	FPEL0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604 and (FPMT0105 or FPMT0109)

[+]MATH2107 and STAT2101 are important pre-requisite courses for Mathematics & Statistics departmental requirements. [++]COMP2101 is a required course for Mathematics and Statistics degrees.

Credits taken in excess of 16 in List C can be counted as Major Electives.

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LIST D: DEPARTMENTAL REQUIREMENTS (DR) (16 Credits)

Course Code	Course Title	Credits	Pre-Requisite / Co-Requisite*
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
STAT2102	Introduction to Probability	3	(STAT1001 or STAT2101) and MATH2108*

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LIST E: DEPARTMENTAL ELECTIVES (DE) (12 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite *
	12 credits from the following courses		
MATH3573	Graph Theory	3	LANC2058 and MATH3360
MATH3744	Introduction to Mathematical Modeling	3	LANC2058 and MATH3110 and MATH3302
MATH4456	Abstract Algebra II	3	MATH4453
MATH4473	Linear Programming	3	MATH2202 or MATH3171
MATH4481	Introduction to Optimization	3	MATH2108 and (MATH2202 or MATH3171)
MATH4552	Logic and Set Theory	3	MATH2350 or MATH3340
MATH4599	Introduction to Topology	3	MATH2350
MATH5451	Real Analysis II	3	MATH4450
MATH5470	Integral Transforms	3	MATH4474 and MATH4452*
MATH5551	Fluid Dynamics	3	MATH4474
MATH5553	Differential Geometry	3	MATH3110 and MATH3303
MATH5558	Introduction to Number Theory	3	MATH2350 or MATH3340

Credits taken in excess of 12 in List E can be counted as Major Electives.

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LIST F: MAJOR REQUIREMENTS (AR) (32 Credits)

Course Code	Course Title	Credits	Pre-Requisite / Co-Requisite*
MATH3302	Ordinary Differential Equations	3	LANC2058 and MATH2108
MATH3303	Linear Algebra II	3	LANC2058 and MATH2202
MATH3360	Discrete Mathematics	3	LANC2058 and MATH2350
MATH3730	Computer Algebra System I	2	LANC2058 and MATH2202 and MATH3302
MATH4141	Numerical Analysis	3	MATH2202 and MATH3302
MATH4450	Real Analysis I	3	MATH2108 and MATH2350
MATH4452	Introduction to Complex Variables	3	MATH3110 or MATH3171
MATH4453	Abstract Algebra I	3	MATH2202 and MATH2350
MATH4474	Introduction to Partial Differential Equations	3	MATH3302
MATH5501	Project in Mathematics – Part I	3	Stated by Supervisor
MATH5502	Project in Mathematics – Part II	3	Stated by Supervisor

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LIST G. MAJOR ELECTIVES (AR) (31 Credits)

Course Code	Course Title	Credits	Pre-Requisite / Co-Requisite*
BIOL2102	General Biology II	4	BIOL2101
BIOL3005	Ecology	3	BIOL2102 and LANC2058
BIOL3009	Introduction to Environmental Science	3	BIOL2102 and LANC2058
BIOL3011	Plant Physiology	3	BIOL2102 and LANC2058
BIOL3023	Animal Physiology	4	BIOL2102 and LANC2058
BIOL3025	Invertebrates	3	BIOL2102 and LANC2058
BIOL3030	Population Genetics	3	BIOL2102 and LANC2058
BIOL3202	Molecular Biology	3	BIOL2101 and LANC2058
BIOL3410	Angiosperm Biology	3	BIOL2102 and LANC2058
BIOL3441	Introductory Microbiology	3	BIOL2101 and LANC2058
BIOL4000	Generic Skills for Biologists	3	BIOL2101
BIOL4009	Waste Management	3	BIOL3009
BIOL4021	Vertebrate Zoology	3	BIOL2102
BIOL4023	Entomology	3	BIOL2102
BIOL4030	Bacteriology	3	BIOL3441
BIOL4034	Biochemistry	3	BIOL2101 and CHEM3324
BIOL4041	Animal Histology	3	BIOL2102 or BIOL2105
BIOL4042	Parasitology	3	BIOL2102
BIOL4046	Fundamentals of Biotechnology	3	BIOL3202 and BIOL3441
BIOL4054	Marine Biology	3	BIOL3005
BIOL4432	Genetics	3	BIOL 2101
BIOL4500	Cell Biology	3	BIOL2101 or MEDI2108
BIOL4501	Principles of Toxicology	3	BIOL2101
BIOL4600	Biofuels	3	BIOL3441 or BIOL4030
BIOL4640	Environmental Pollution	3	BIOL4009
BIOL4700	Environmental Biotechnology	3	BIOL3441
BIOL5010	Ecotoxicology	3	BIOL3009
BIOL5021	Desert Biology	3	BIOL3005

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BIOL5031	Enzyme Biochemistry	3	BIOL4034
BIOL5040	Genetic Engineering	3	BIOL3202
BIOL5042	Embryology	3	BIOL2102
BIOL5045	Economy Botany	3	BIOL2102
BIOL5052	Freshwater Biology	3	BIOL3005
BIOL5110	Special Topics in Biology	3	Instructor
BIOL5120	Microbial Biotechnology	3	BIOL3441and BIOL4046
BIOL5132	Tissue Culture	3	BIOL4500
BIOL5133	Plant biotechnology	3	BIOL4046
BIOL5144	Applied Mycology	3	BIOL3441
BIOL5244	Cytogenetics	3	BIOL4432
BIOL5400	Bio-Informatics	3	BIOL3202
BIOL5401	Environmental microbiology techniques	3	BIOL3009 and BIOL3201
BIOL5402	Immunology	3	BIOL3441and BIOL4500
BIOL5411	Fermentation Technology	3	BIOL4030
BIOL5501	Protein Production and Characterization	3	BIOL4034 and BIOL4046
BIOL5600	Techniques in Molecular Diversity	3	BIOL3202
BIOL5610	Environmental Impact Assessment	3	BIOL3009
CHEM2102	General Chemistry II	4	CHEM2101 or CHEM1071
CHEM2350	Chemical Safety: Protecting ourselves and the environment	3	CHEM2101 or CHEM1071 or CHEM2110
CHEM3311	Inorganic Chemistry I	3	LANC2058 and CHEM2102 and MATH2107
CHEM3324	Organic Chemistry	4	(LANC2058 or LANC2161) and (CHEM1071 or CHEM2101)
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	CHEM3324or 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
CHEM5526	Essentials of Heterocyclic Chemistry	2	CHEM3324 or CHEM4422
CHEM5537	Surfactants: Principles & Applications in the Petroleum Industry	3	CHEM3333 or CHPE3102
CHEM5539	Chemical Sensors	3	CHEM3333 and (CHEM3348 or CHEM4441)
CHEM5591	Chemistry Seminar I	1	CHEM3322 or CHEM3324
COMP2102	Problem Solving and Programming	3	COMP2101
COMP2105	Introduction to Problem Solving with Visual Basic	3	COMP2101

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COMP2200	Fundamentals of Object Oriented Programming	3	COMP2101
COMP3203	Introduction to Data Structures and Algorithms	3	COMP2200 and MATH3340 and LANC2058
COMP3204	Advanced Java Programming	3	COMP2200 and LANC2058
COMP3205	Database Systems	3	COMP3203 and LANC2058
COMP3302	Introduction to Multimedia	3	COMP2200 and LANC2058
COMP3401	Introduction to Software Engineering	4	COMP2200 and LANC2058
COMP3501	Computer Organization & Assembly Language	3	COMP2200 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
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
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
ERSC2102	Introduction to Geology II	4	ERSC2101
ERSC2211	Palaeontology I	3	LANC2058 and ERSC2101
ERSC2101	Introduction to Geology I	4	FPEL 0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604
ERSC2102	Introduction to Geology II	4	ERSC2101
ERSC2112	Historical Geology	3	ERSC2101
ERSC3000	Environmental Geology	3	LANC2058 and ERSC2101

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ERSC3002	Environmental Site Assessment and Remediation	3	LANC2058 and ERSC2102 and ERSC3000
ERSC3010	Mineralogy	3	LANC2058 and ERSC2102*
ERSC3021	Structural Geology	3	LANC2058 and ERSC2102
ERSC3041	Stratigraphy	3	LANC2058 and ERSC2102
ERSC3061	Introduction to Remote Sensing	3	LANC2058 and ERSC2102
ERSC3071	GIS and Geo-Spatial Applications	3	LANC2058 and ERSC2102
ERSC3210	Palaeontology II	3	LANC2058 and ERSC2211
ERSC3901	Sedimentary Petrology	3	ERSC2211 and ERS3010
ERSC4031	Geochemistry	3	ERSC2102 and CHEM2101
ERSC4032	Environmental Geochemistry	3	ERSC2101 and CHEM2101
ERSC4041	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
ERSC5051	Petroleum Geology	3	ERSC3041
ERSC5061	Exploration Geophysics	3	GEOP3041
ERSC5071	Image Processing and GIS	3	ERSC3061
ERSC5900	Advanced Diaenesis and Sedimentary Geochemistry	3	ERSC3901
GEOP3000	Earthquakes and Society	3	LANC2058 and ERSC2101
GEOP3041	General Geophysics	3	LANC2058 and ERSC2101 and MATH2107 and PHYS2101
GEOP3042	Principles of Geophysical Well Logging	3	GEOP3041
GEOP4001	Applied Geophysics I	3	GEOP3041 and PHYS3100
GEOP4002	Applied Geophysics II	3	GEOP3041 and PHYS3103
GEOP4003	Gravity and Magnetic Exploration Methods	3	GEOP3041
GEOP4010	Fundamentals of Signal Processing	3	GEOP4001 and (MATH3171 or MATH3302)
GEOP4011	Geophysical Data Processing	3	GEOP4010 and MATH3171
GEOP5021	Engineering and Environmental Geophysics	3	GEOP3041
GEOP5060	Interpretation of Seismic Reflection Data	3	ERSC3041 and GEOP3041
LANC2146	Academic Writing in Science	3	LANC2058
PHYS2102	General Physics II	4	PHYS2101 / MATH2107*
PHYS2901	Introductory Astronomy	3	
PHYS3001	Dynamics	3	LANC2058 and PHYS2102 and PHYS3101
PHYS3101	Theoretical Methods of Physics I	3	LANC2058 and MATH2108 /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
PHYS4018	Thermal & Statistical Physics	4	PHYS3104

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PHYS4030	Electromagnetic Theory	3	PHYS3101 and PHYS3103 and MATH3171
PHYS4100	Optics & Lasers	3	PHYS4020
PHYS4101	Quantum Physics I	3	PHYS3101 and PHYS3104
PHYS4601	Ionizing Radiation Detection	3	PHYS3601
PHYS4602	Nuclear Applications	3	PHYS3601
PHYS4901	Stellar Evolution & Nucleosynthesis	3	PHYS3901
PHYS5003	Condensed Matter Physics	3	PHYS4018
PHYS5106	Nuclear Physics	3	PHYS4101
PHYS5601	Introduction to Nuclear Power	3	PHYS3601
PHYS5901	Image Processing & Date Analysis	3	PHYS3100 and PHYS3907
STAT3331	Operations Research I	3	MATH2108 and LANC2058
STAT3334	Introduction to Inference	3	STAT2102 and LANC2058
STAT3335	Introduction to Sampling	3	STAT2102 and LANC2058
STAT3336	Computational Techniques in Statistics	3	STAT2102 and COMP2200 and LANC2058
STAT3337	Introduction to Actuarial Science I	3	STAT2102 and LANC2058
STAT3338	Statistical Methods	3	STAT3334 and LANC2058
STAT4422	Demographic and Health Care Statistics	3	STAT3334
STAT4432	Regression Analysis	3	STAT3334
STAT4433	Design of Experiments I	3	STAT3338
STAT4434	Non Parametric 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	MATH2202 and MATH3110 and STAT3334

Department of Mathematics & Statistics – Mathematics Degree Plan
Cohorts 2016-2020
MINORS AVAILABLE TO MATHEMATICS MAJORS

LISTS J and K: MINOR REQUIREMENTS and ELECTIVES (18 Credits)

	Minor*	College
1	Minor in Astronomy	Science
2	Minor in Biology	Science
3	Minor in Business	Economics and Political Science
4	Minor in Chemistry	Science
5	Minor in Computer Science	Science
6	Minor in Earth Sciences	Science
7	Minor in Nuclear Science	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: Required Courses (0 Credits)
K1. Minor in Astronomy: Electives (Minimum 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)
PHYS3907	Observational Techniques in Astronomy	3	LANC2058 and PHYS3901
PHYS4901	Stellar Evolution & Nucleosynthesis	3	PHYS3901
PHYS4902	Galactic Structure and Cosmology	3	PHYS3901
PHYS5901	Image Processing and Data Analysis	3	PHYS3100 and PHYS3907
Total (minimum)		**18**	

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2. MINOR IN BIOLOGY
DEPARTMENT OF BIOLOGY

J2. Minor in Biology: Required Courses (8 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
BIOL2101	General Biology I	4	FPE0560 or FPEL0600 FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604
BIOL2102	General Biology II	4	BIOL2101
Total		**8**	

K2. Minor in Biology: Electives (Minimum 10 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
BIOL3005	Ecology	3	LANC2058 and BIOL 2102
BIOL3009	Introduction to Environmental Science	3	LANC2058 and BIOL 2102
BIOL3011	Plant Physiology	3	LANC2058 and BIOL 2102
BIOL3023	Animal Physiology	3	LANC2058 and BIOL 2102
BIOL3025	Invertebrates	3	LANC2058 and BIOL 2102
BIOL3202	Molecular Biology	3	LANC2058 and BIOL 2101
BIOL3410	Angiosperm Biology	3	LANC2058 and BIOL 2102
BIOL3441	Introductory Microbiology	3	LANC2058 and BIOL 2101
BIOL4030	Bacteriology	3	BIOL 3441
BIOL4034	Biochemistry	3	BIOL 2101 and (CHEM3322 or CHEM3327)
BIOL4046	Fundamentals of Biotechnology	3	BIOL3202 and BIOL 3441
BIOL4432	Introduction to Genetics	3	BIOL2101
BIOL4500	Cell Biology	3	BIOL2101 or MEDI2108
BIOL5021	Desert Biology	3	BIOL 3005
BIOL5042	Embryology	3	BIOL 2102
BIOL5052	Freshwater Biology	3	BIOL 3005
BIOL5402	Immunology	3	BIOL 3441 and BIOL4500
Total (minimum)		**10**	

3. MINOR IN BUSINESS
College of Economics and Political Science

J3. Minor in Business: Required Courses (0 Credits)
K3. Minor in Business: Electives (Minimum 18 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
POMG2710	Operation Management	3	(STAT 1811 or equivalent) and STAT1001*
POMG3711	Principles of Management Science	3	(STAT 1811 or equivalent) and STAT1001*
ECON1211	Microeconomics	3	
ECON2221	Macroeconomics	3	
MRKT3611	Principles of Marketing	3	ECON 1211 (NREC 3104) and ECON 2221 (NREC 3103)
MNGT1515	Principles of Management	3	
ACCT1112	Introduction to Financial Accounting	3	
Total (minimum)		**18**	

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4. MINOR IN CHEMISTRY
DEPARTMENT OF CHEMISTRY

J4 Minor in Chemistry 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 FPMT0107)
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)
Sub Total		**12**	

K4 Minor in Chemistry Elective Courses (6 Credits)

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)
Sub Total		**6**	

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5. MINOR IN COMPUTER SCIENCE
DEPARTMENT OF COMPUTER SCIENCE

J5 Minor in Computer Science Required Courses (7 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
COMP2101	Introduction to Computer Science	4	FPEL0560 or FPEL0600 or FPEL0603 or FPEL0604) and (FPCS0101 or FPCS0102)
COMP2200	Fundamentals of Object Oriented Programming	3	COMP2101
Total		7	

K5 Minor in Computer Science Elective Courses (Minimum 11 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
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	COMP2200 and MATH3340 and LANC2058
COMP3204	Advanced Java Programming	3	COMP2200 and LANC2058
COMP3205	Database Systems	3	COMP3203 and LANC2058
COMP3302	Introduction to Multimedia	3	COMP2200 and LANC2058
COMP3401	Introduction to Software Engineering	4	COMP2200 and LANC2058
COMP3501	Computer Organization & Assembly Language	3	COMP2200 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

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COMP5509	Penetration Testing and Ethical Hacking	3	COMP4507
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
	Total (minimum)	11	

6. MINOR IN EARTH SCIENCES
DEPARTMENT OF EARTH SCIENCES

J6. Minor in Earth Sciences: Required courses (8 credits)			
Code	**Cr**	**Course Title**	**Prerequisite (Co-requisite)**
ERSC2101	4	Introduction to Geology I	FPEL0560 or FPEL0600 or FPEL0603 or FPEL0604
ERSC2102	4	Introduction to Geology II	ERSC2101
K6. Minor in Earth Sciences: Electives (Minimum 10 credits)			
ERSC2211	3	Palaeontology I	ERSC2101 and LANC2058
ERSC3000	3	Environmental Geology	ERSC2101 and LANC2058
ERSC3002	3	Environmental Site Assessment and Remediation	ERSC2102 and ERSC3000 and LANC2058
ERSC3010	3	Mineralogy	ERSC2102* and LANC2058
ERSC3021	3	Structural Geology	ERSC2102 and LANC2058
ERSC3041	3	Stratigraphy	ERSC2102 and LANC2058
ERSC3061	3	Introduction to Remote Sensing	ERSC2102 and LANC2058
ERSC3901	3	Sedimentary Petrology	ERSC2211 and ERSC3010
ERSC4031	3	Geochemistry	ERSC2102 and CHEM2101
ERSC4032	3	Environmental Geochemistry	ERSC2101 and CHEM2101
ERSC4041	3	Geological Interpretation of Well-logs	ERSC3041
ERSC4051	3	Hydrogeology	ERSC3000
ERSC4071	3	Economic Geology	ERSC3051
ERSC4311	3	Sedimentary Environments and Facies	ERSC3901
ERSC4321	3	Structural Geology II	ERSC3021
ERSC5011	3	Basin Analysis	ERSC3021 and ERSC4311
ERSC5012	3	Techniques in Sequence Stratigraphy	ERSC4311
ERSC5051	3	Petroleum Geology	ERSC3041
ESRC5061	3	Exploration Geophysics	GEOP3041
GEOP3041	3	General Geophysics	ERSC2101 and PHYS2101 and MATH2107 and LANC2058

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7. MINOR IN NUCLEAR SCIENCE
DEPARTMENT OF PHYSICS

J7. Minor in Nuclear Science: Required Courses (18 Credits)
K7. Minor in Nuclear Science: Electives (0 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
PHYS3601	Radiation Physics	3	LANC2058 and PHYS3104
PHYS3602	Fundamentals of Radiation Protection	3	LANC2058 and PHYS3601
PHYS3603	Operational Radiation Protection	3	LANC2058 and PHYS3602
PHYS4601	Ionizing Radiation Detection	3	PHYS3601
PHYS4602	Nuclear Applications	3	PHYS4601
PHYS5601	Introduction to Nuclear Power	3	PHYS3601
Total		**18**	

8. MINOR IN PHYSICS
DEPARTMENT OF PHYSICS

J8. Minor in Physics: Required Courses (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	LANC2058 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

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

J9. Minor in in Soil and Water Sciences: Required Course (3 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
SWAE2201	Introduction to Soil and Water	3	FPE0560 or FPEL0600 or FPEL0601 or FPEL0602 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 and Land Restoration	3	SWAE2201
SWAE3302	Environmental Soil Chemistry	3	CHEM2101 and SWAE2201
SWAE3304	Soil and Water Conservation	3	PHYS2101 and (SWAE2001 or SWAE2201)
SWAE3311	Environmental Soil Physics	3	PHYS2101 and (SWAE2001 or SWAE2201)
SWAE3411	Environmental Soil Microbiology	3	BIOL2101
SWAE4111	Hydrogeology for Soil-Water-Landscape Interactions	3	(SWAE2201 and SWAE 3303 and SWAE3311) + 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 1310L2101, CAMS2000, CAMS2003, CAMS3000, CAMS3001, CHEM2101, PHYS2101 or PHYS2107.

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10. MINOR IN STATISTICS
DEPARTMENT OF MATHEMATICS AND STATISTICS

J10. Minor in Statistics: Required Courses (10 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
STAT1001	Introduction to Statistics	4	(FPE0560 or FPEL0600 or FPEL0601 or FPEL0602 or FPEL0603 or FPEL0604) and (FPMT0105 or PMT0109)
STAT2102	Introduction to Probability	3	STAT1001 and MATH2108*
STAT3334	Introduction to Inference	3	STAT2102 and LANC2058
Total		**10**	

K10. Minor in Statistics: Electives (Minimum 8 Credits)

Code	Title	Credits	Pre-Requisite / Co-Requisite*
STAT3331	Operations Research 1	3	STAT1001and 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
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	STAT3334
STAT5537	Multivariate Techniques	3	STAT3334 and MATH2202 and MATH3110
Total (minimum)		**8**	

For reference contact: Prof. Pallath Chandran Ext. 1414

Approved by Dean of Science: Prof. Salma Al Kindy Date: 27/11/2016

Office of Admissions & Registration: _____

Confirmed: _____

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