Academic Programs Booklet

College of Science

2018

Prepared By: VP For Academic Programs and Graduate Studies Office

College of Science

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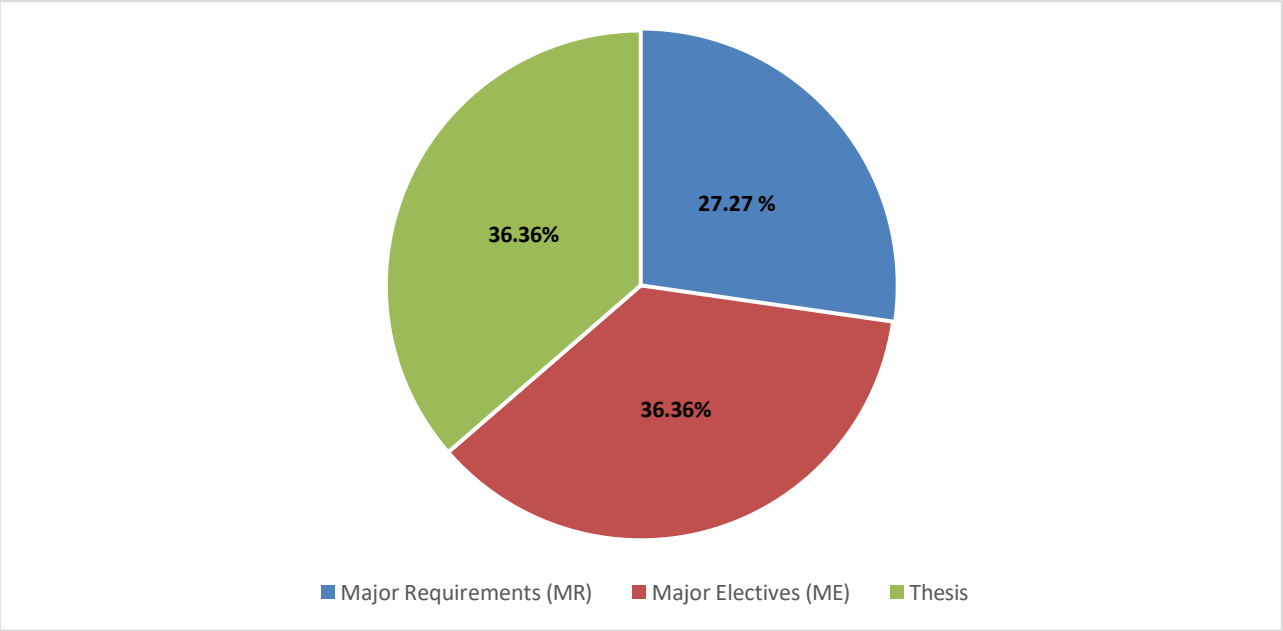
Master of Science in Biological Sciences (2018)

Program Components



Major Requirements (MR)	**9**
Major Electives (ME)[1]	**12**
Thesis	**12**
Total Credit (CRD)	**33**

Teaching Language: English

[1] Students are required to choose **four** elective courses from one pathway.

Detailed Study Plan

Year 1 - Semester 1

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
BIOLS 600	Seminar	3	0	3	MR	------	Yes
BIOLS 601	Research Methodology and ethics	3	0	3	MR	------	Yes
BIOLS 602	Biostatistics	2	3	3	MR	------	Yes

Year 1 - Semester 2

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
BIOLS 6XX	Pathway course 1	3	0	3	ME	------	Yes
BIOLS 6XX	Pathway course 2	3	0	3	ME	------	Yes
BIOLS 6XX	Pathway course 3	3	0	3	ME	------	Yes
BIOLS 6XX	Pathway course 4	3	0	3	ME	------	Yes

Year 2 – Semester 1

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
BIOLS 699	Thesis	0	36	12	Thesis	Department Approval	No

Year 2 – Semester 2

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
BIOLS 699	Thesis	0	0	0	Thesis	Department Approval	No

Major Elective Courses

Microbiology and Biotechnology Pathway

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
BIOLS 603	Biotechnology and Nano-biotechnology	3	0	3	ME	-----	Yes
BIOLS 604	Industrial Biotechnology	3	0	3	ME	-----	Yes
BIOLS 650	Molecular Microbiology	3	0	3	ME	-----	Yes
BIOLS 662	Bioinformatics	3	0	3	ME	-----	Yes

Ecology and Environmental Biology Pathway

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
BIOLS 640	Ecology	3	0	3	ME	-----	Yes
BIOLS 641	Biodiversity and Conservation Biology	3	0	3	ME	-----	Yes
BIOLS 642	Ecological Impact Assessment	3	0	3	ME	-----	Yes
BIOLS 643	Restoration Ecology	3	0	3	ME	-----	Yes

Cell and Molecular Biology Pathway

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
BIOLS 660	Cell and Molecular Biology	3	0	3	ME	-----	Yes
BIOLS 661	Genetics and Gene Regulation	3	0	3	ME	-----	Yes
BIOLS 662	Bioinformatics	3	0	3	ME	-----	Yes
BIOLS 663	Molecular Diagnostics of Inherited Diseases	3	0	3	ME	-----	Yes

Marine Biology Pathway

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
BIOLS 680	Marine Biology	3	0	3	ME	-----	Yes
BIOLS 681	Marine Fisheries Management	3	0	3	ME	-----	Yes
BIOLS 682	Integrated Coastal Management	3	0	3	ME	-----	Yes
BIOLS 683	Marine Pollution	3	0	3	ME	-----	Yes

Course Description

Course Code: BIOLS 600 **Course Title: Seminar** **(3-0-3)**
Selected reading, presentation and discussion of formal scientific colloquium on current various literature and research topics in biology.

Course Code: BIOLS 601 **Course Title: Research Methodology and Ethics** **(3-0-3)**
Proposal preparation; research approaches including descriptive, ecological, cross-sectional, case-control, and cohort studies; tools applied include empirical, questionnaire, survey, and interviews; use of library, analysis and presentation of research data. Students will explore ethical issues in biology in both professional and social realms including authorship, grants accounting, and academic misconduct.

Course Code: BIOLS 602 **Course Title: Biostatistics** **(2-3-3)**

Review of probability theory, Probability distribution, sampling distribution, hypothesis testing, design of experiments, and sampling techniques. Multivariate ANOVA, progression analysis, non-parametric methods, logistic regression, analysis of survival data, coordination, discrimination, and classification. Emphasis on analysis of public health, biological, environmental, and ecological data. Statistical software's and packages will be applied.

Course Code: BIOLS 662 **Course Title: Bioinformatics** **(3-0-3)**
Bioinformatics topics include genome and proteomes; comparative genome analysis; multiple structural alignment; genome annotation; sequence alignment and phylogenetic trees; DNA microarrays and mass spectrometry; prediction and mining of genetic networks and protein interaction networks.

Microbiology and Biotechnology Pathway

Course Code: BIOLS 603 **Course Title: Biotechnology and Nanobiotechnology** **(3-0-3)**

A multidisciplinary course focuses on design, synthesis, recognition and potential hazards of nanoparticles (NPs) produced through biological systems. Biosynthesis of NPs, molecular nanostructures, biosensors, and characterization techniques.

Course Code: BIOLS 604 **Course Title: Industrial Biotechnology** **(3-0-3)**
The course aims at introducing students to fundamental knowledge about microbes and enzymes for manufacturing industrial products via biochemical processes (fermentation and production of biodiesel, biofertilizers, biopreservatives). The focus is on the fundamental principles (basic concepts of upstream and downstream processing), potential and limitations of microbial activities in industry.

Course Code: BIOLS 650 **Course Title: Molecular Microbiology** **(3-0-3)**
The course is an overview of recent topics in molecular microbiology, with a special emphasis on: microbial pathogenesis, microbial evolution and antimicrobial resistance. Most topics shall cover disease aspects in humans and animals**.**

Ecology and Environmental Biology Pathway

Course Code: BIOLS 640 Course Title: Ecology (3-0-3)

Life history strategies; population distribution and abundance, dispersion, growth and regulation, interactions among organisms; community structure and species diversity, biogeography; production in ecosystems, energy flow and food webs.

Course

Course Code: BIOLS 641 Course Title: Biodiversity and Conservation Biology (3-0-3)
Diversity of living organisms and ecological systems; study of conservation biology; including biodiversity distribution, loss, causes, consequences, crisis, and solution. Ecological methods for monitoring and maintaining biodiversity, and sustainable development**.**

Course Code: BIOLS 642 Course Title: Ecological Impact Assessment (3-0-3)

Methods and approaches of identifying and evaluating the potential impacts of defined actions on ecosystems or their components for the purposes of environmental impact assessment, ecological monitoring, environmental management, and conservation biology.

Course Code: BIOLS 643 Course Title: Restoration Ecology (3-0-3)

Theory and practice of species and habitat ecological restoration; causes of ecosystem degradation; measures for enhancement, restoration, creation and management.

Cell and Molecular Biology Pathway
Course Code: BIOLS 660 Course Title: Cell and Molecular Biology (3-0-3)

It is a multi-staff taught course that covers advanced topics in molecular and cell biology including membrane organelles and protein trafficking; cytoskeleton and cell motility; cell cycle and cell signaling mechanisms; developmental biology; molecular based diseases.

Course Code: BIOLS 661 Course Title: Genetics and Gene Regulation (3-0-3)
Molecular genetics of eukaryotic gene activity and regulation; mechanisms of gene activation; current techniques applied in the fields of gene expression such as functional genomics, transcriptomics, and proteomics; model organisms used for genetic studies.

Course Code: BIOLS 663 Course Title: Molecular Diagnostics of Inherited Diseases (3-0-3)

Fundamental genetic concepts; molecular methods in disease diagnosis; analysis of genome structure using different tools for molecular diagnosis; advanced gene mapping and linkage analysis; selecting proper diagnostic approaches for common genetic disorders.

Marine Biology Pathway

Course Code: BIOLS 680 **Course Title: Marine Biology** **(3-0-3)**

Relationship between various marine environments and their inhabitants; intra- and inter-specific relationships between organisms; structure and function among marine communities.

Course Code: BIOLS 681 **Course Title: Marine Fisheries management** **(3-0-3)**

Marine ichthyology, population dynamics of selected species of major commercial marine living resources, including fishes, crustaceans, mollusks and jelly fishes. Methods of fishing, aquaculture, and legislation for sustainable fishery industry.

Course Code: BIOLS 682 **Course Title: Integrated Coastal Management** **(3-0-3)**

Objectives, concepts, principles and practice of integrated coastal management and their use in the assessment of options for sustainable use of coastal ecosystems and resources.

Course Code: BIOLS 683 **Course Title: Marine Pollution** **(3-0-3)**

In this course, the origin, pathways and consequences of anthropogenic pollutants in the environment and in the marine environment in particular are discussed, as well as presenting the various approaches to pollution control and bioremediation.

Course Code: BIOLS 699 **Course Title: Thesis** **(0-36-12)**

Students should choose a research topic that aligns with the pathway they have selected. The process includes writing a research proposal, designing experiments, planning and executing the research, analyzing data, testing hypotheses, and presenting findings. Additionally, students must write a thesis, deliver an oral presentation, and defend their research before both internal and external examiners.