THE UNIVERSITY OF THE WEST INDIES MONA

DEPARTMENT OF LIFE SCIENCES

PROGRAMMES & SYLLABUSES
ACADEMIC YEAR 2010/2012

ANY REFERENCE IN THIS BROCHURE TO CXC (CSEC) QUALIFICATIONS SHOULD BE INTERPRETED TO MEAN GENERAL PROFICIENCY GRADES I OR II AND ALSO GRADE III OBTAINED SINCE 1998

INTRODUCTION

Teaching in the Science Faculty commenced at Mona in 1949 with students in the Departments of Botany, Chemistry, Mathematics, Physics, and Zoology. The 1960s saw a period of rapid expansion of the Faculty. At St. Augustine and Cave Hill, teaching commenced in 1963 and 1964 respectively in the then College of Arts and Sciences in Chemistry, Mathematics and Physics. These subjects were incorporated into the Faculty in 1972. Today the Science Faculty is among the largest in the University with teaching in Biochemistry, Biology, Botany, Chemistry, Computer Science, Geography, Geology, Mathematics, Meteorology, Physics and Zoology (some subjects are offered only at one campus). The first eleven graduates appeared in 1952 and by 2000 over 9,000 graduates had been produced. The last academic year (2009/2010) had a student registration (graduate and undergraduate) of 2,415 at Mona, 3,730 at St. Augustine and 1,234 at Cave Hill. Relationships with Tertiary level Colleges are increasing and students at such Colleges in Antigua, The Bahamas and St. Lucia read the Part I courses of our Faculty. Community Colleges in Jamaica offer our Preliminary Courses. In addition to undergraduate teaching, postgraduate teaching and research form an important aspect of the work of the Faculty. In addition to Diploma and MSc programmes, the Faculty offers programmes for the MPhil and PhD degrees in all Departments.

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DEPARTMENT OF LIFE SCIENCES

LIST OF UNDERGRADUATE COURSES

CODES	TITLES	CREDIT	SEMESTER OFFERED	Level	PREREQUISITES
PRELIMINARY LEVEL					
BL05A/ BIOL0011	**PRELIMINARY BIOLOGY I**	6-P Credits	Semester 1	0	CSEC Biology or equivalent
BL05B/ BIOL0012	**PRELIMINARY BIOLOGY II**	6-P Credits	Semester 2	0	CSEC Biology or equivalent
LEVEL I					
BL12C/BIOL1016 **OR** **BIOL1017** **&** **BIOL1018**	**CELLS, MOLECULAR BIOLOGY & GENETICS** **CELL BIOLOGY** **MOLECULAR BIOLOGY AND GENETICS**	6 Credits 3 Credits 3 Credits	Semester 1	1	A pass in one of the following: Preliminary Biology I and II (BL05A/BIOL0011) and BL05B/BIOL0012) **or** CAPE Unit 1 & 2 ('A' level) Biology **or** equivalent
BL12B/BIOL1261 **OR** **BIOL1262** **&** **BIOL1263**	**DIVERSITY OF ORGANISMS** **LIVING ORGANISMS I** **LIVING ORGANISMS II**	6 Credits 3 Credits 3 Credits	Semester 2	1	A pass in one of the following: Preliminary Biology I and II (BL05A/BIOL0011) and BL05B/BIOL0012) **or** CAPE Unit 1 & 2 ('A' level) Biology **or** equivalent

CODES	TITLES	CREDIT	SEMESTER OFFERED	Level	PREREQUISITES
LEVEL II					
BL20J/BIOL2011	**GENERAL AND MOLECULAR GENETICS**	4 Credits	Semester 2	2	BL10J/ BIOL1013 and either BL10L/BIOL1063 OR BL10M/BIOL1015or BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and BIOL1018
BL20K/BIOL2012	**EVOLUTIONARY BIOLOGY**	4 Credits	Semester 1	2	BL 10L/BIOL1063 AND BL 10J/ BIOL1013 or BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and BIOL1018
BL20L/BIOL2013	**DIVING TECHNOLOGY FOR AQUATIC SCIENTISTS**	4 Credits	Summer	2	Completion of Level 1 in the FPAS (Regulation 15) and successful completion of a swim test.
BL20N/BIOL2014	**ECOLOGY**	4 Credits	Semester 1	2	BL10L/BIOL1063 and BL10M/BIOL1015 OR BL12B or BIOL1262 and BIOL1263
BL20P/BIOL2015	**BIOMETRY**	4 Credits	Semester 1	2	BL10L/BIOL1063 and BL10M/BIOL1015 OR BL12B or BIOL1262 and BIOL1263
BL23D/MICR2252	**EUKARYOTIC MICROORGANISMS**	4 Credits	Semester 1	2	*Mona* BL10J/BIOL1013 **and** either BL10L/BIOL1063 or BL10M/BIOL1015 OR BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and BIOL1018 *Cave Hill* MICR2251 General Microbiology
BT21B/BOTN2011	**SEED PLANTS**	4 Credits	Semester 2	2	BL10M/BIOL1015 and BL10J/ BIOL1013 OR BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and BIOL1018
BT22A/BOTN2012	**PLANT PHYSIOLOGY**	4 Credits	Semester 1	2	BL10J/BIOL1013 and BL10M/BIOL1015 OR BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and BIOL1018
Z20G/ZOOL2012	**FUNCTIONAL ORGANIZATION I: ANIMAL MAINTENANCE SYSTEMS**	4Credits	Semester 2	2	BL10J/BIOL1013 and BL10L/BIOL1063 OR BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and BIOL1018
Z20H/ZOOL2013	**FUNCTIONAL ORGANIZATION II: ANIMAL COORDINATION, PROTECTION AND MOVEMENT**	4 Credits	Semester 2	2	BL10J/BIOL1013 and BL10L/BIOL1063 OR BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and BIOL1018

CODES	TITLES	CREDIT	SEMESTER OFFERED	Level	PREREQUISITES
LEVEL III					
BL30K/BIOL3012	**SOIL BIOLOGY**	4 Credits	Semester 1	3	BL12C/BIOL1016 or BIOL1017 & BIOL1018 and BL20N/BIOL2014
BL30M/BIOL3011	**MYCOLOGY**	4 Credits	Semester 1	3	BL23D / MICR2252
BL31A/BIOL3013	**COASTAL MANAGEMENT**	4 Credits	Semester 2	3	BL20N/BIOL2014 **Co-requisite:** BL31F/BIOL3015 OR BL31G/BIOL3023
BL31E/BIOL3014	**MARINE ECOLOGY I: BIOLOGICAL OCEANOGRAPHY**	4 Credits	Semester 1	3	BL20N/BIOL2014. Admission to this course is limited due to the restriction of boat space on field trips.
BL31F/BIOL3015	**MARINE ECOLOGY II: BENTHIC COMMUNITIES**	4 Credits	Semester 1	3	BL20N/BIOL2014. Admission to this course is limited due to the restriction of boat space on field trips. **Co-requisite**: BL31E/BIOL3014.
BL31G/BIOL3023	**CORAL REEF BIOLOGY**	4 Credits	Semester 2	3	BL20N/BIOL2014 **Co-requisite:** BL31E/BIOL3014 and BL31F/BIOL3015
BL33D/BIOL3021	**FRESHWATER ECOLOGY**	4 Credits	Semester 2	3	BL20N/BIOL2014
BL38A/BIOL3017	**VIROLOGY**	4 credits	Semester 2	3	BL 20J/BIOL2011 or BC21C/BIOL2312
BL39C/BIOL3018	**RESEARCH PROJECT**	4 credits	Semester 1 or 2	3	**Co-requisite:** BL20P/BIOL2015
BL39D/BIOL3019	**CARIBBEAN BIODIVERSITY**	4 credits	Semester 1	3	BL20N/BIOL2014 and BL20K/ BIOL 2012
BL39E/BIOL3020	**CONSERVATION BIOLOGY**	4 Credits	Semester 2	3	BL 20N/BIOL2014 and BL20K/BIOL2012

CODES	TITLES	CREDIT	SEMESTER OFFERED	Level	PREREQUISITES
BT33A/BOTN3014	**FOREST ECOLOGY, AGROFORESTRY & SUSTAINABLE DEVELOPMENT**	4 credits	Semester 2	3	BL20N/BIOL2014
BT33B /BOTN 3018	**MEDICINAL AND ECONOMIC BOTANY**	4 Credits	Semester 2	3	BT21B/BOTN2011 and BT22A/ BOTN2012
BT34A/BOTN3015	**PRINCIPLES OF PLANT BREEDING**	4 Credits	Semester 2	3	BL 20J/BIOL2011
BT37Q/BIOL3016	**PLANT HEALTH**	4 Credits	Semester 2	3	BL10J/ BIOL1013, BL10L/BIOL1063,BL10M/BIOL1015 and BL23D / MICR2252
BT38B/BOTN3016	**PLANT BIOTECHNOLOGY**	4 Credits	Semester 1	3	BT 22A/BOTN2012 OR BC 21C/BIOL2312
BT38K/BOTN3017	**PRINCIPLES OF HORTICULTURE**	4 Credits	Semester 2	3	BT 21B/BIOL2011 AND BT22A/BIOL2012
Z 30A/ZOOL3011	**SENSORY AND NEUROMUSCULAR PHYSIOLOGY**	4 Credits	Semester 1	3	Z20G/ZOOL2012 and Z20H/ZOOL2013, C06J/CHEM0901 and C06K/ CHEM0902 or 'A' level Chemistry or equivalent.
Z 30B/ZOOL3012	**METABOLIC PHYSIOLOGY**	4 Credits	Semester 1	3	Z20G/ZOOL2012 and Z20H/ZOOL2013, C06J/ CHEM0901 AND C06K/ CHEM0902 or 'A' level Chemistry or equivalent.
Z 30G/ZOOL3015	**GENERAL PARASITOLOGY**	4 Credits	Semester 1	3	Z20G/ZOOL2012 and Z20H/ZOOL2013
Z 30M/ZOOL3017	**IMMUNOLOGY**	4 Credits	Semester 2	3	Z20G/ZOOL2012 and Z20H/ZOOL2013
Z31B/ ZOOL3024	**FISHERIES**	4 Credits	Semester 1	3	Z 20G/ZOOL2012 and Z 20H/ZOOL2013 **Co-requisite:** BL31E/BIOL3014

CODES	TITLES	CREDIT	SEMESTER OFFERED	Level	PREREQUISITES
Z 31C/ZOOL3018	**FISH BIOLOGY**	4 Credits	Semester 1	3	Z 20G/ZOOL2012 and Z 20H/ZOOL2013
Z 31F/ZOOL3019	**FISHERIES AND AQUACULTURE TECHNOLOGIES**	4 Credits	Semester 1	3	Z 20G/ZOOL2012 and Z 20H/ZOOL2013 **Co-requisite:** Z 31C/ZOOL3018
Z 32C/ZOOL3020	**INSECT BIOLOGY AND SYSTEMATICS**	4 Credits	Semester 1	3	BL10L/BIOL1063or BL12B or BIOL2163
Z 32G/ZOOL3021	**PEST MANAGEMENT**	4 Credits	Semester 2	3	BL 20N/BIOL2014

DEPARTMENT OF LIFE SCIENCES

PROGRAMME OFFERINGS

The Department of Life Sciences currently offers 5 B.Sc. Majors (Botany, Zoology, Experimental Biology and Environmental Biology and Marine Biology) and 2 B.Sc. Options (Microbiology, and Biology with Education) and two Minors (Botany and Zoology).

The Botany Major

Aim: To enable students to gain detailed knowledge of selected aspects of the plant sciences through practical and theoretical studies and to foster the desire for their continued exploratory investigations in the plant sciences.

A **Major in Botany** requires a minimum of 24 credits from Level I and must include:

Either
BL12C/BIOL1016 Cells, Molecular Biology and Genetics
or
BIOL1017 Cell Biology
and
BIOL1018 Molecular Biology and Genetics
either
BL12B/BIOL1261 Diversity of Organisms
or
BIOL1262 Living Organisms I
and
BIOL1263 Living Organisms II

(in addition BC10M/BIOC1011 Introductory Biochemistry is highly recommended), and a total of 32 credits from Level II which must include:

BL20J/BIOL2011 General & Molecular Genetics
BL20N/BIOL2014 Ecology
BT21B/BOTN2011 Seed Plants
BT22A/BOTN2012 Plant Physiology
and
8 credits from Advanced Level 'BT/BOTN' courses
and
8 credits from Advanced Level 'BT/BOTN' or 'BL/BIOL' Courses or MICR2252.

The Botany Minor

Aim: To enable students to gain a fundamental knowledge in the plant sciences through practical and theoretical studies of the interrelationships between plants and their environment; the anatomy, morphology, taxonomy, classification and physiology of higher plants; the principles of genetics.

A **Minor in Botany** requires a minimum of 24 credits from Level I and must include:

Either
BL12C/BIOL1016 Cells, Molecular Biology and Genetics
or
BIOL1017 Cell Biology
and
BIOL1018 Molecular Biology and Genetics
either
BL12B/BIOL1261 Diversity of Organisms
or
BIOL1262 Living Organisms I
and
BL12B/BIOL1263 Living Organisms II

And a total of 16 credits from Level II comprising:
BL20J/BIOL2011 General & Molecular Genetics,
BL20N/BIOL2014 Ecology,
BT21B/BOTN2011 Seed Plants and
BT22A/BOTN2012 Plant Physiology.

The Zoology Major

Aim: To provide a detailed understanding and appreciation of the interrelatedness of the processes of evolution, natural selection and ecosystem functions, as well as the structural and functional organization of animals and animal-like protists. The graduate will also be equipped with the resources, capacity and foundation to further explore the animal kingdom.

A **Major in Zoology** requires a minimum of 24 credits at Level I and must include:

Either
BL12C/BIOL1016 Cells, Molecular Biology and Genetics
or
BIOL1017 Cell Biology
and
BIOL1018 Molecular Biology and Genetics
either
BL12B/BIOL1261 Diversity of Organisms
or
BIOL1262 Living Organisms I
and
BIOL1263 Living Organisms II

(in addition BC10M/BIOC1011 Introductory Biochemistry is highly recommended),

And a total of 32 credits from Level II, which must include:

BL20K/BIOL2012	Evolutionary Biology,
BL20N/BIOL2014	Ecology,
Z20G/ZOOL2012	Functional Organisation of Animals I (Maintenance Systems),
Z 20H/ZOOL2013	Functional Organisation of Animals II (Coordination, Protection & Movement),

PLUS 8 credits from Advanced Level 'Z/ZOOL' courses and 8 credits from Advanced Level 'Z/ZOOL' or 'BL/BIOL' Courses or MICR2252.

The Zoology Minor

Aim: To provide a basic understanding of the processes of evolution, natural selection, interrelationships with the environment, as well as the structural and functional organization of animals and animal-like protists.

A **Minor in Zoology** requires a minimum of 24 credits at Level I and must include:

Either	BL12C/BIOL1016	Cells, Molecular Biology and Genetics
Or	BIOL1017	Cell Biology
And	BIOL1018	Molecular Biology and Genetics
Either	BL12B/BIOL1261	Diversity of Organisms
Or	BIOL1262	Living Organisms I
And	BIOL1263	Living Organisms II

and a total of 16 credits from Part Level II comprising:

BL20K/BIOL2012	Evolutionary Biology,
BL20N/BIOL2014	Ecology,
Z 20G/ZOOL2012	Functional Organisation of Animals I (Maintenance Systems) and
Z 20H/ZOOL2013	Functional Organisation of Animals II (Coordination, Protection & Movement).

Double Major in Botany and Zoology

Aim: The double major in botany and zoology is a combination of the aims for the individual majors and will therefore enable students to gain detailed knowledge of selected aspects of the animal and plant sciences as well as the requisite skills to further explore the structure and functional organization of these organisms.

A **Double Major in Botany and Zoology** requires a total of 64 credits from Level II; these must include 32 credits from:

BL20J/BIOL2011	General & Molecular Genetics,
BL20N/BIOL2014	Ecology,
BT21B/BOTN2011	Seed Plants,

BT22A/BOTN2012	Plant Physiology,
BL20K/BIOL2012	Evolutionary Biology,
Z 20G/ZOOL2012	Functional Organisation of Animals I (Maintenance Systems),
Z 20H/ZOOL2013	Functional Organisation of Animals II (Coordination, Protection & Movement),
BL20P/BIOL2015	Biometry PLUS

32 credits from Level III with no more than 16 credits from either the Environmental Biology or Experimental Biology Double Major syllabuses.

Marine Biology Major

Aim: To enable students to gain detailed knowledge of selected aspects of the marine ecosystem so as to provide understanding of the concepts, strategies and practices available to scientifically investigate, analyse and manage marine species and communities.

A **Major in Marine Biology** requires:

A minimum of 24 credits from Level I and must include:

Either	BL12C/BIOL1016	Cells, Molecular Biology and Genetics
Or	BIOL1017	Cell Biology
And	BIOL1018	Molecular Biology and Genetics
Either	BL12B/BIOL1261	Diversity of Organisms
Or	BIOL1262	Living Organisms I
And	BIOL1263	Living Organisms II

The following 32 credits from Level II:

- BL20N/BIOL2014 Ecology,
- BL20P/BIOL2015 Biometry,
- Z 20G/ZOOL2012 Functional Organisation of Animals I (Maintenance Systems),
- Z 20H/ZOOL2013 Functional Organisation of Animals II (Coordination, Protection & Movement),
- BL31E/BIOL3014 Marine Ecology I: Biological Oceanography,
- BL31F/BIOL3015 Marine Ecology II: Benthic Communities,
- BL31G/BIOL3023 Coral Reef Biology and
- BL31A/BIOL3013 Coastal Management.

Major in Experimental Biology

Aim: To provide a detailed understanding of the principles, mechanisms and techniques available to explore through scientific experimentation the physiology, immunology, parasitology, virology, pathology, and genetic/propagative potential of selected organisms.

A **Major in Experimental Biology** cannot be taken with any other major or minor because of the number of credits required.

The Experimental Biology major requires a minimum of 24 credits from Level I and must include:

Either	BL12C/BIOL1016	Cells, Molecular Biology and Genetics
Or	BIOL1017	Cell Biology
And	BIOL1018	Molecular Biology and Genetics
Either	BL12B/BIOL1261	Diversity of Organisms
Or	BIOL1262	Living Organisms I
And	BIOL1263	Living Organisms II

(in addition BC10M/BIOC1011 is highly recommended) and 64 credits from Level II which must include:

BL20N/BIOL2014	Ecology,
BL20K/BIOL2012	Evolutionary Biology,
BL20J/BIOL2011	General & Molecular Genetics,
BL20P/BIOL2015	Biometry,
BT22A/BOTN2012	Plant Physiology,
BT21B/BOTN2011	Seed Plants,
Z 20G/ZOOL2012	Functional Organisation of Animals I (Maintenance Systems),
Z 20H/ZOOL2013	Functional Organisation of Animals II (Coordination, Protection & Movement) and

32 credits from the following courses:

BC21M/MICR2211	Microbiology**,**
BL38A/BIOL3017	Virology,
Z32C/ZOOL3020	Insect Biology & Systematics,
*BL30M/BIOL3011	Mycology,
BT37Q/BIOL3016	Plant Health,
Z32G/ZOOL3021	Pest Management,
Z30G/ZOOL3015	General Parasitology,
*Z31C/ZOOL3018	Fish Biology,
Z30M/ZOOL3017	Immunology,
Z30B/ZOOL3012	Metabolic Physiology,
*Z30A/ZOOL3011	Sensory & Neuromuscular Physiology,
*BL30K/BIOL3012	Soil Biology,
BT38B/BOTN3016	Plant Biotechnology,
BT34A/BOTN3015	Principles of Plant Breeding,
BT38D/BOTN3017	Principles of Horticulture,
BT33B/BOTN3018	Medicinal & Economic Botany,
BL39C/BIOL3018	Project.

Not all elective courses are available every year, and certain combinations of courses are limited by timetable constraints.

*** Not offered in 2010/11 academic year.**

Major in Environmental Biology

Aim: To provide a detailed understanding of the concepts, strategies and practices available to scientifically investigate and analyse species, communities and ecosystems towards the successful monitoring, management and development of strategies for sustainable use of these systems.

A **Major in Environmental Biology** cannot be taken with any other major or minor because of the number of credits required.

The Environmental Biology major requires a minimum of 24 credits from Level I and must include:

Either	BL12C/BIOL1016	Cells, Molecular Biology and Genetics
Or	BIOL1017	Cell Biology
And	BIOL1018	Molecular Biology and Genetics
Either	BL12B/BIOL1261	Diversity of Organisms
Or	BIOL1262	Living Organisms I
And	BIOL1263	Living Organisms II

(in addition BC10M/BIOC1011 is highly recommended)

PLUS

a total of 64 credits from Level II which must include:

BL20N/BIOL2014	Ecology,
BL20K/BIOL2012	Evolutionary Biology,
BL20J/BIOL2011	General & Molecular Genetics,
BL20P/BIOL2015	Biometry,
BT22A/BOTN2012	Plant Physiology,
BT21B/BOTN2011	Seed Plants,
Z 20G/ZOOL2012	Functional Organisation of Animals I (Maintenance Systems),
Z 20H/ZOOL2012	Functional Organisation of Animals II (Coordination, Protection & Movement) and

32 credits from the following courses:

Z 32C/ZOOL3020	Insect Biology & Systematics,
Z32G/ZOOL3021	Pest Management,
BL32E/BIOL3020	Conservation Biology,
BL39D/BIOL3019	Caribbean Biodiversity,
BT33A/BOTN3014	Forestry, Agroforestry & Sustainable Development,
*Z 31C/ZOOL3018	Fish Biology,
Z 31F/ZOOL3019	Fisheries & Aquaculture Technologies,
BL33D/BIOL3021	Freshwater Ecology,
*BT31A/BOTN3011	Phycology,
BL31E/BIOL3014	Marine Ecology I: Biological Oceanography,
BL31F/BIOL3015	Marine Ecology II: Benthic Communities,
BL31G/BIOL3023	Coral Reef Biology
BL31A/BIOL3012	Coastal Management,
*BL30K/BIOL3012	Soil Biology,
BT37Q/BIOL3016	Plant Health,
BL39C/BIOL3018	Project,
BC21M/ BIOC2211	Microbiology,

BC31M/MICR3213	Applied & Environmental Microbiology,	
GL32A/GEOL3002	Caribbean Geology,	
GL39J/GEOL3005	Marine Geology and Geophysics.	

Not all elective courses are available every year, and certain combinations of courses are limited by timetable constraints.

*** Not offered in 2010/11 academic year.**

BIOLOGY WITH EDUCATION OPTION

Aim: To provide a solid foundation in selected aspects of plant and animal science and expose students to the practice of science pedagogy

The Option was designed to focus on biology with less emphasis on education courses as it is aimed at students lacking in biology but who, through experience or previous courses, had exposure to the requisite teaching skills.

Year I

Semester 1

BL12C/BIOL1016	Cells, Molecular Biology and Genetics	(6 credits)
or		
BIOL1017	Cell Biology	(3 credits)
and		
BIOL1018	Molecular Biology and Genetics	(3 credits)
ED20C/EDPS2003	Motivation and the Teacher	(6 credits)
either		
ED20M/EDCU2013	Introduction to the Curriculum	(3 credits)
or		
ED10T/EDTL1020	Introduction to Teaching & Learning	(3 credits)

Semester 2

FPAS Level I course	(BC10M/BIOC1011 highly recommended)	(6 credits)
BL12B/BIOL1261	Diversity of Organisms	(6 credits)
or		
BIOL1262	Living Organism I	(3 credits)
and		
BIOL1263	Living Organisms II	(3 credits
ED30D/EDTK3004	Educational Technology	(3 credits)
either		
ED34H/EDSC3408	Environmental Education	(3 credits)
or		
ED10U/EDTL1021	Planning for Teaching	(3 credits)

Part II

A **major in Biology (Life Sciences)** 32 credits consisting of:

BL20J/BIOL2011	General & Molecular Genetics	(4 credits)
BL20P/BIOL2015	Biometry	(4 credits)
BL20N/BIOL2014	Ecology	(4 credits)
BL20K/BIOL2012	Evolutionary Biology	(4 credits)
BT21B/BOTN2011	Seed Plants	(4 credits)
BT22A/BOTN2012	Plant Physiology,	(4 credits)
Z 20G/ZOOL2012	Functional Organisation of Animals I (Maintenance Systems), and	(4 credits)
Z 20H/ZOOL2013	Functional Organisation of Animals II (Coordination, Protection & Movement)	(4 credits)

plus 6 credits from the Department of Educational Studies each semester as follows:

Year II

Semester 1

BL20J/BIOL2011	General & Molecular Genetics	(4 credits)
BL20P/BIOL2015	Biometry	(4 credits)
ED24G/EDSC2407	Teaching Methodologies in Science	(3 credits)
ED 24E/EDSC2405	The Psychology of Science Teaching and Learning	(3 credits)

Semester 2

BT21B/BOTN2011	Seed Plants	(4 credits)
BT22A/BOTN2012	Plant Physiology	(4 credits)
ED34Q/EDSC3417	Introduction to Secondary Science Practicals	(3 credits)
ED20U/EDTL2021	School Based Experience I	(3 credits)

Year III

Semester 1

BL20K/BIOL2012	Evolutionary Biology	(4 credits)
BL20N/BIOL2014	Ecology	(4 credits)
ED30T/EDSC3020	The Teacher as Researcher	(3 credits)
ED34C/EDSC3403	Assessment in Science Teaching	(3 credits)

Semester 2

Z 20G/ZOOL2012	Functional Organisation of Animals I (Maintenance Systems)	(4 credits)
Z 20H/ZOOL2013	Functional Organisation of Animals II (Coordination, Protection & Movement)	(4 credits)
ED30Q/EDTL3017	School Based Experience II	(3 credits)
ED30S/EDSC3019	Classroom Enquiry	(3 credits)

MICROBIOLOGY OPTION

Aim: To provide a comprehensive knowledge of the biology, phylogeny, ecology, and diversity of microorganisms, and to develop laboratory skills and familiarity with the basic microbiological methods.
This Option is taught jointly between the Department of Life Sciences and the Biochemistry Section, Department of Basic Medical Sciences.

Level I

Level I credits as follows:

Either		
BC10M/BIOC1011	Introductory Biochemistry	(6 credits)
BL12C/BIOL1016	Cells, Molecular Biology and Genetics	(6 credits)
or		
BIOL1017	Cell Biology	(3 credits)
and		
BIOL1018	Molecular Biology and Genetics	(3credits)
either		
BC10M/BIOC1011	Introductory Biochemistry	(6 credits)
BL12B/BIOL1261	Diversity of Organisms	(6 credits)
or		
BIOL1262	Living Organisms I	(3 credits)
and		
BIOL1263	Living Organisms II	(3 credits)
C10J/CHEM1901	Introductory Chemistry A	(6 credits)
C10K/CHEM1902	Introductory Chemistry B	(6 credits)

Level II

Sixty four (64) credits as follows:

Forty (40) core credits:

BC21C/BIOC2312	Molecular Biology I	(4 credits)
BC21D/BIOC2014	Bioenergetics & Cell Metabolism	(8 credits)
BC21M/MICR2211	Microbiology	(4 credits)
BL20J/BIOL2011	General & Molecular Genetics	(4 credits)
BL38A/BIOL3017	Virology	(4 credits)
BL30M/BIOL3011	Mycology	(4 credits)
BC31M/MICR3213	Applied & Environmental Microbiology	(4 credits)
******BT31A/BOTN3011	Phycology	(4 credits)
either		
BL39C/BIOL3018	Project	(4 credits)
or		
BC36A/BIOC3413	Laboratory Project	(4 credits)

*** Students should take**
either
BL30M/BIOL3011
or
BL23D/MICR2252
NOT BOTH

** **Not offered in 2010/11 academic year- replaced with BC34M/MICR3214 Molecular Microbiology**

Plus Twenty four (24) credits from courses listed below:

BC34C/BIOL3312	Molecular Biology II	(4 credits)
BC35C/BIOT3113	Biotechnology I	(4 credits)
BC35D/BIOT3114	Biotechnology II	(4 credits)
BL20P/BIOL2015	Biometry	(4 credits)
Z 30G/ZOOL3015	General Parasitology	(4 credits)
Z 30M/ZOOL3017	Immunology	(4 credits)
*BL30K/BIOL3012	Soil Biology	(4 credits)
BT37Q/BIOL3016	Plant Health	(4 credits)
BT38B/BOTN3016	Plant Biotechnology	(4 credits)
*Z 30H/ZOOL3016	Applied Parasitology	(4 credits)
MICR3215	Food Microbiology	(4 credits)

*** Not offered in 2010/11 academic year**

Not all elective courses are available every year, and certain combinations of courses are limited by from timetable constraints.

COURSE DESCRIPTIONS

PRELIMINARY COURSES

BL05A/ BIOL0011 PRELIMINARY BIOLOGY I
(6 P-Credits) Semester 1 Level 0

Aim**:** To equip students with a basic knowledge of biological principles and processes.

Objectives**:** Upon successful completion of the course the students should be able to:

- describe the chemical and biological foundation for life;
- describe the role of cell division mechanisms in the processes of sexual and asexual reproduction;
- explain the basic principles involved in evolution;
- distinguish between the various forms of prokaryotic and eukaryotic organisms.

Pre-requisites**:** CSEC Biology or equivalent

Course Content**:**

Biological Techniques

- Biological Chemistry: Chemicals of Life; Enzymes; Cells and Tissues; Cell Division; Genetics
- Evolution; Mechanisms of Speciation
- Variety of life: Bacteria, Protists, Fungi, Plants and Animals

Mode of Delivery:

36 hours of lectures, 12 hours of tutorials and 72 hours of laboratory exercises involving experiments demonstrating biochemical and biological processes and principles; studies of living/fresh and preserved protist, fungi, plants and animals to demonstrate biodiversity.

Evaluation**:**

Final Examinations:	60%
One 2-hour theory paper	30%
One 2-hour comprehensive paper	30%
Coursework:	40%
One in-course theory test	6%
Two in-course practical tests	24%
Laboratory reports	10%

Prescribed text:

Purves, W., Sadava, D., Orians, G. & Heller, H. 2003. Life: The science of Biology 7th Edition. Sinauer Associates Inc. Press, California. ISBN: 0-7167-9856-5

BL05B/ BIOL0012 PRELIMINARY BIOLOGY II
(6 P-Credits) Semester 2 Level 0

Aim: To equip students with a basic knowledge of the systems in plants and animals.

Objectives**:** Upon successful completion of the course the students should be able to:

- explain the relationships between organisms and the environment and between each other;
- describe the role of energy flow and the cycling of nutrients in the sustenance of ecosystems;
- describe the general form and function of plant life;
- describe the general form and function of animal life.

Pre-requisites**:** CSEC Biology or equivalent

Course Content:

- Organisms and the environment:
  Levels of Ecological Organisation
  Energy Flow
  Biogeochemical Cycles
- Systems in plants and animals:
  Plant Structure
  Transpiration, Translocation, Photosynthesis
  Animal structure
  Respiration, Transport, Nutrition
  Coordination and Control, Excretion and Osmoregulation
  Movement and Support
  Reproduction, Growth and Development

Mode of Delivery:

36 hours of lecture, 12 hours of tutorials and 72 hours of laboratory exercises involving the study of living/fresh and preserved organisms and prepared slides to demonstrate the relationship between structure and function of the systems in plants and animals.

Evaluation**:**

Final Examinations:	60%	
One 2-hour theory paper		30%
One 2-hour comprehensive paper		30%
Coursework:	40%	
One in-course theory test		6%
Two in-course practical tests		24%
Laboratory reports		10%

Prescribed text:

Purves, W., Sadava, D., Orians, G. & Heller, H. 2003. Life: The science of Biology 7th Edition. Sinauer Associates Inc. Press, California. ISBN: 0-7167-9856-5

LEVEL 1 COURSES

BIOL1017 CELL BIOLOGY
(3 credits) Semester 1 Level I

Aims:
1. To expose students to a variety of mechanisms involved in the functioning of eukaryotic and prokaryotic cells, and the identification, replication and transmission of genetic material.

2. To develop skills in microscopy and other basic biological skills.

Objectives: Upon successful completion of this course, students should be able to:

1. identify and characterize various types of cells and their levels of biological organization.
2. mount living organisms for proper examination under the various types of light microscopes.
3. explain how the cellular components are used in the transfer and utilization of energy and information in cells.
4. interpret experimental data derived from hypothetical investigations into cell function.
5. analyze the effectiveness of the mechanisms utilized by cells to maintain internal thermodynamic stability.
6. apply their knowledge of cell biology to selected examples of response(s) that take place within cells consequent upon defined environmental or physiological changes.
7. outline the processes by which cells gather raw materials from the environment, construct out of these a new cell in its own image, complete with a new copy of the hereditary information.
8. describe the basic functional events involved in cell reproduction and the factors that regulate this process.

Pre-requisites: A pass in one of the following:
Preliminary Biology I and II (BL05A/BIOL0011 and BL05B/ BIOL0012) or CAPE ('A' level) Biology or equivalent

Course Content:

Microscopical techniques to study living and fixed cells.
Structural organization of cells.
Specialization in cells.
Basic functional processes in cells and their regulation.
Mitosis and Meiosis.

- **Practical Work:**
  Observation of living cells and permanent microscopical preparations.
  Making microscopical preparations.
  Interpretation of electron micrographs

Mode of Delivery:

Lectures	18 hours	Didactic and interactive
Tutorials	6 hours	Interactive
Practicals	33 hours	

Evaluation:

Final Examination:	50%
One 2-hour comprehensive paper	
Course Work:	50%
Laboratory reports	20%
Tutorial attendance and incourse writing assignments	10%
One 1-hour incourse test	20%

Recommended Text:

Verma, P.S. and Agarwal, V.K. 2005. Cell biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Co. Ltd. ISBN 81-219-2442-1

Useful websites

http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=mboc4
http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=stryer

BIOL1018 MOLECULAR BIOLOGY AND GENETICS

(3 credits) Semester 1 Level I

Aim: To provide an introduction to the identification, replication and transmission of genetic material of eukaryotic and prokaryotic cells and the essential concepts of the genetic theory

Objectives: Upon successful completion of this course, students should be able to:

1. Outline the essential principles and processes of molecular biology
2. Analyze the outcome of experiments that involve the use of recombinant DNA technology and other common gene analysis techniques
3. Explain Mendelian inheritance, quantitative traits, linked genes, crossing-over, gene mapping, sex determination, and gene frequencies in natural populations
4. Apply genetic concepts to solving problems on classic mechanisms of inheritance and those mechanisms of inheritance that extend beyond Mendel

Pre-requisites: A pass in one of the following:
Preliminary Biology I and II (BL05A/BIOL0011 and BL05B/ BIOL0012) or CAPE ('A' level) Biology or equivalent

Course Content:

- **Molecular Biology**
  - The nature of genes
  - DNA replication
  - Transcription
  - Protein synthesis
  - Control of gene expression
  - PCR, cloning and DNA sequencing
- **Genetics**
  - Mendelian inheritance.
  - Probability, binomial theorem and chi-square test.
  - Quantitative traits.
  - Linkage, crossing over and mapping.
  - Sex linkage and sex determination.
  - Gene frequencies in natural populations.
- **Practical Work:**
  - DNA isolation, restriction digestion and agarose electrophoresis
  - Exercises on Mendelian crosses and gene frequencies

Mode of Delivery:

Lectures	18 hours	Didactic and interactive
Tutorials	6 hours	Interactive
Practicals	33 hours	

Evaluation:

Final Examination:	50%	
One 2-hour comprehensive paper		
Course Work:	50%	
Laboratory reports		20%
Tutorial attendance and incourse writing assignments		10%
One 1-hour incourse test		20%

Recommended Text:

Verma, P.S. and Agarwal, V.K. 2005. Cell biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Co. Ltd. ISBN 81-219-2442-1

Useful websites:

http://ourvle.mona.uwi.edu/file.php/1889/Nucleic_Acid_Structure_and_DNA_Replication.pdf
http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=mboc4
http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book=iga

BIOL1262 LIVING ORGANISMS I
(3 credits) Semester 2 Level I

Aim:
1. Introduce students to the major groups of prokaryotes, autotrophic protists and plants, their evolutionary associations, and adaptive radiation
2. Develop skills appropriate to the study of plants and prokaryote in the laboratory

Learning Outcomes: Upon successful completion of this course, students should be able to:
1. Describe the characteristic features of selected prokaryotes
2. Compare the biology of autotrophic protists and plants.
3. Classify common plants that occur in the Caribbean using the Linnaean system
4. Explain the functional consequences of different types of body and tissue organization in plants
5. Outline the main associations between the major taxonomic groups of plants
6. Describe the adaptive radiation of the major groups of plants
7. Solve simple problems in plant science
8. Demonstrate laboratory skills appropriate to the study and interpretation of living and preserved botanical specimens

Pre-requisites: A pass in: Preliminary Biology I and II (BIOL0011 and BIOL0012), OR CAPE Biology (Units 1 and 2), OR equivalent training.

Course Content:

Evolutionary Concepts
Archaebacteria & Eubacteria
Autotrophic protists
Phylogeny and classification of plants
Bryophytes
Seedless vascular plants
Seed plants – Gymnosperms
Seed plants – Angiosperms (form and function)
Photosynthetic systems
Reproductive systems
Ecology

Practical Work:

Structure of bacteria and protists
Classification of plants
Studies of the structure of the main groups of plants
Demonstrations of adaptive radiation of main groups of plants
The virtual and actual herbarium
The dichotomous key

Mode of Delivery:

Lectures	18 hours	Didactic; interactive
Tutorials	6 hours	Interactive; mind maps; problem-solving
Laboratory classes	33 hours	Interactive practical tasks; problem-solving

Evaluation:

Final Examination:	50%
One 2-hour Comprehensive paper	
Course Work:	50%
Writing across the curriculum exercises	5%
Laboratory reports (10 x 2% each = 20%)	20%
One in-course test	20%
Tutorial Attendance and participation	5%

Prescribed Text:

Kingsley R. Stern, Shelley Jansky, James Bidlack (2007). Introductory Plant Biology, 11th Ed. McGraw-Hill Companies.

Recommended Texts:

- James D. Mauseth (2008). Botany: An Introduction to Plant Biology, 4th Ed. Jones & Bartlett Publishers.
- Peter H. Raven, Ray F. Evert, Susan E. Eichhorn (2004). Biology of Plants, 7th Ed. W. H. Freeman.

Useful Websites

http://highered.mcgraw-hill.com/sites/0072830670/information_center_view0/
http://bcs.whfreeman.com/raven7e/

BIOL1263 LIVING ORGANISMS II

(3 credits) Semester 2 Level I

Aim:

1. Introduce students to the major groups of:
   (a) animals, their evolutionary associations, and adaptive radiation; and
   (b) fungi as decomposers, symbionts, and pathogens

2. Develop practical skills appropriate to the study of animals and fungi in the laboratory

Learning Objectives: Upon successful completion of this course, students should be able to:

1. Classify common animals and fungi using the Linnaean system
2. Explain the functional consequences of different types of body organization of animals
3. Outline the main associations between the major groups of animals based on neo-Darwinian evolution

4. Describe the adaptive radiation of the major groups of animals and fungi
5. Solve simple problems in zoology
6. Compare the roles of fungi as primary decomposers, symbionts, and pathogens
7. Demonstrate laboratory skills appropriate to the study and interpretation of living and preserved specimens of animals and fungi

Pre-requisites: A pass in: Preliminary Biology I and II (BIOL0011 and BIOL0012); OR CAPE Biology (Units 1 and 2); OR equivalent training

Course Content:

Origin of animals
Evolution of diversity
Classification and phylogeny of animals
Ecological principles
Animal-like protists
Animal Architecture
Invertebrate animals
Vertebrate animals
Major groups of fungi

Practical Work:
Classification of animals
Studies of the morphology of the main groups of animals and fungi
Dissection of selected animals to show internal anatomy and evolutionary development of the taxonomic group
Demonstrations of adaptive radiation of main groups of animals and fungi

Mode of Delivery:

Lectures	18 hours	Didactic; interactive
Tutorials	6 hours	Interactive; mind maps; problem-solving
Laboratory classes	33 hours	Interactive practical tasks; problem-solving

Evaluation:

Final Examination:	50%	
One 2-hour Comprehensive paper		
Course Work:	50%	
Writing across the curriculum exercises		5%
Laboratory reports (10 x 2% each = 20%)		20%
One in-course test		20%
Tutorial Attendance and participation		5%

Prescribed Text:

Hickman CP, Roberts LS, Keen SL, Larson A, and Eisenhower DJ (2007). Animal Diversity. Fourth edition. McGraw Hill Higher Education.

Useful website (animals): ***www.mhhe.com/hickmanad4e***
Useful website (fungi): ***http://tolweb.org/fungi***

LEVEL II COURSES

In order to proceed to Level 2 courses in Life Sciences, candidates must have successfully completed BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and BIOL1018 PLUS *ANOTHER 12 CREDITS OF LEVEL 1 IN- FACULTY COURSES.*

BL20J/BIOL2011 GENERAL AND MOLECULAR GENETICS

(4 credits) Semester 2 Level II

Aim: To provide a comprehensive and balanced account of genetics and genomics by integrating the subfields of classical genetics, molecular genetics, cytogenetics and population genetics.

Objectives: Upon successful completion of this course students should be able to:

- explain the basic processes of gene transmission, mutation, expression, regulation, cloning, recombination and genome mapping
- describe the experimental methods used by geneticists
- explain the development of genetics and genomics over time and current trends

Pre-requisite: BL10J/ BIOL1013 and either BL10L/BIOL1063 **or** BL10M/BIOL1015 **or** BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and BIOL1018

Course Content:

1. The course deals primarily with the physical and molecular basis of heredity
2. The nature of the genetic apparatus from molecules to chromosomes of viruses, bacteria and higher organisms
3. Gene controlled pathways and morphogenesis
4. Gene regulation and differentiation in higher organisms
5. Gene mutations
6. Genetic consequences of structural and numerical changes in chromosomes
7. Extra-nuclear inheritance

8.Recombinant DNA and gene manipulation
9.Gene mapping quantitative traits
10. Gene frequency and genetics of populations
11. Dynamics of micro-evolution
12. The role of new, improved varieties (cultivars) of crops in agriculture crop improvement through genetics

Mode of Delivery:

24 hours of lecture, 6 hours of tutorials, 36 hours of field and laboratory work which emphasizes the preparation of the root tip squashes (mitosis), preparation of the anther squashes (meiosis), mapping of the prokaryotic and eukaryotic genomes, chromosomal mutations, electrophoresis of DNA and proteins, genetic structure of natural plant/animal populations.

Evaluation:

Final Examination:
One 2-hour theory paper 70%

Coursework: 30%
One 2-hour practical test 20%
Laboratory reports 10%

Prescribed text:

Klug, W. S., Cummings, M. R. & Spencer, C. A., 2006. Concepts of Genetics. 8th edition, Prentice Hall, ISBN 0-13-169944-X

BL20K/BIOL2012 EVOLUTIONARY BIOLOGY
(4 credits) Semester 1 Level II

Aim:
1. To establish the fact of evolution and present natural selection as an observable process.
2. To demonstrate in a dynamic and interdisciplinary fashion the relevance of evolution to global issues.

Objectives: Upon successful completion of this course student should be able to:

1. identify the mechanisms of evolutionary changes;
2. describe the experimental and analytical methods used in evolutionary science;
3. explain how population and genetic models can be applied to real life issues.

Pre-requisites: BL 10L/BIOL1063 AND BL 10J/ BIOL1013 **or** BL12B/BIOL1261 or BIOL1262 and BIOL1263 and BL12C/BIOL1016 or BIOL1017 and BIOL1018

Course Content:

- A historical perspective to evolution and variation
- Polymorphism, Hardy-Weinberg equilibrium, selection, migration and genetic drift in relation to population size
- Evolution below the species level, clines, deception and sex-ratio, with special reference to man
- Speciation, phylogeny, and the evolution of the hominids

Mode of Delivery:

24 hours of lectures, 6 hours of tutorials, 36 hours of field and laboratory work, which emphasizes the quantitative approach to evolutionary biology with the consideration of design of experiments, simple statistics and the presentation of results from laboratory and field exercises.

Evaluation:

Final Examination:		
One 2-hour theory paper		65%
Course Work:		35%
One 2-hour practical test	20%	
Comprehensive tests (2 X 5%)	10%	
Laboratory report	5%	

Prescribed text: Freeman, S., and Jon C. Herron. 2004. Evolutionary Analysis, 3rd Edition. Prentice Hall. ISBN 0-13-144279-1

BL20L/BIOL2013 DIVING TECHNOLOGY FOR AQUATIC SCIENTISTS
(4 credits) Summer Level II

Aim: To train students in SCUBA diving to CMAS (The World Underwater Federation) 2 star diver standard and expose them to techniques for conducting scientific work underwater.

Objectives: On successful completion of this course students will be able to:

1. explain the principles of the physiology of diving and safe diving practices
2. SCUBA dive safely to a depth of 20 meters
3. perform a complete in-water rescue including CPR and oxygen administration
4. conduct an underwater survey of marine life using SCUBA diving skills

Pre-requisite: Completion of Level 1 in the FPAS (Regulation 15) and successful completion of a swim test.

Course Content:

- **Principles of diving**
  Pressure and buoyancy; atmospheric and water pressure; factors affecting buoyancy
  Diving equipment; the aqualung and accessory apparatus
  Decompression tables; planning and conducting no-stop dives and dives requiring decompression stops

- **Physiology of diving**
  The human life support system; physiology of circulatory and respiratory systems.
  Effect of pressure on human body; adverse effects of gases; role of nitrogen in decompression sickness (DCS); signs and symptoms of DCS

- **Safe diving practices**
  Dive planning and preparation; entry and exit methods
  Diver self-help techniques; situation avoidance and assessment
  Diver rescue techniques; emergency ascents
  Artificial ventilation; cardiopulmonary resuscitation; oxygen administration; first aid
  Adventurous diving; deep diving; night diving; wreck diving; drift diving;
  Diving from small boats

- **Diving with a purpose**
  Fauna and flora of the coral reef
  Underwater search techniques
  Underwater navigation; natural navigation and use of underwater compass
  Underwater sampling, survey and recovery methods
  Underwater photography

Mode of delivery:

22 hours of lecture, 4 of tutorial and 47 hours of practical involving snorkeling and diving, aqualung diving skills, diver self-help, diver rescue, underwater navigation, diving with a surface marker buoy and boat diving procedures. Each student must complete 10+ dives with confidence-building exercises progressing to 20 m depth.
Exercises in underwater scientific survey techniques.

Evaluation :

Final Examination:

One 2 hour theory paper	50 %

Course Work: 50%

One 1-hour MCQ paper (practical questions)	10 %
Open water Competence Assessments	30 %
Project	10 %

Prescribed text:

Graver, D.K. 2003. Scuba Diving. 3rd Ed. Human Kinetics Publishers. ISBN- 0736045392.

Recommended text:

YMCA 2001. Scuba Diving. 3rd Ed. Human Kinetics Publishers. ISBN- 0736045392

BL20N/BIOL2014 ECOLOGY

(4 credits) Semester 1 Level II

Aim: To introduce the scientific study of the interrelationships between and among organisms and between organisms and all aspects of the living and non-living environment.

Objectives: Upon successful completion of this course, students should be able to:

1. outline population distributions and the abiotic and biotic factors which influence them
2. identify species interactions and evaluate the interdependence of species
3. design and execute basic sampling techniques appropriate for any population or community of organisms
4. describe concepts of community productivity, succession, cycling and transformation

Pre-requisites: BL10L/BIOL1063 and BL10M/BIOL1015 **or** BL12B/BIOL1261 or BIOL1262 and BIOL1263 and BL12C/BIOL1016 or BIOL1017 and BIOL1018

Course Content:

- Ecology and its domain, autecology and synecology; distribution and abundance
- Geographic range habitat and niche. Abiotic and biotic environment, populations communities and ecosystems
- Ecological role of abiotic factors (climatic and edaphic) on plant and animal populations Population performance along physical gradients
- Population structure and demography; population change over time, growth models, dispersal, life tables and resource allocation patterns
- Species interactions: competition, predation, herbivory, commensalism, ammensalism, protocooperation and mutualism
- Photosociology methods of describing communities; community classification, concepts and attributes

- World biomes, adaptive features of the vegetation of world biomes and the worldwide distribution of vegetation; Major vegetation formations of Jamaica
- Community metabolism, photosynthesis, ecophysiology, nutrient cycling and energy flow Primary and secondary production, ecological efficiency and energy transfers
- Primary and secondary succession, allogenic and autogenic succession, xerarch and hydrarch succession

Mode of Delivery:

24 hours of lecture, 6 hours of tutorials, 36 hours of field and laboratory work including a **weekend** field trip.

Evaluation:

Final Examination:

One 2-hour theory paper	60%

Course Work: 40%

One 2-hour practical test	20%
Laboratory and field reports	10%
MCQ Test	10%

Prescribed text:

Smith, T.M. and Smith, R.L. 2006. Elements of Ecology 6th Edition. ISBN-8053-4830-1

BL20P/BIOL2015 BIOMETRY

(4 credits) Semester 1 Level II

Aims:

1. To provide a foundation in statistical concepts applicable to biological experiments.
2. To give an overview of descriptive methods and tests for one and two variables, using biological examples.
3. To introduce testing relationships between multiple variables.

Objectives: Upon successful completion of this course the students should be able to:

- explain basic statistical concepts;
- summarise quantitative biological data using methods of descriptive statistics;
- based on specified criteria, identify appropriate statistical tests for one and two variables;
- apply statistical test procedures and interpret the results;
- describe relationships among multiple independent variables.

Prerequisites: BL10L/BIOL1063 and BL10M/BIOL1015 **or** BL12B/BIOL1261 or BIOL1262 and BIOL1263 and BL12C/BIOL1016 or BIOL1017 and BIOL1018

Course Content:

- Data in Biology: types of variables; accuracy and significant figures; data Management
- Populations and Samples: statistical populations; the need for samples; sampling procedures
- Descriptive Statistics: frequency distributions; measures of central tendency; measures of dispersion
- The Normal Distribution: probability density functions; properties of the norma distribution; the distribution of sample means; confidence intervals
- Statistical Hypothesis Testing: making decision about populations based on samples; null and alternative hypotheses; alpha and beta error
- One-Sample Hypotheses: hypotheses concerning population parameters; testing goodness of fit
- Testing the relationship between two variables: the nature of a statistical relationship; criteria used to select appropriate tests; overview of major tests
- Applying tests for two variables: contingency tests; analysis of variance; regression and correlation; rank tests; multiple comparisons; assessing validity of statistical assumptions.
- Tests for more than two variables: separating the influences of multiple independent variables on a dependent variable; statistical interaction

Mode of Delivery:

24 hours of lectures, 6 hours of tutorials, 36 hours of practical work involving exercises in solving statistical problems using a software application and by hand.

Evaluation:

Final Examination:

One two-hour theory paper	60%

Course Work: 40%

One 2-hour practical test	20%
Laboratory reports	20%

Prescribed texts:

Zar, J.H. 2009. Biostatistical analysis, 5th Ed. Prentice Hall
ISBN: 10:0131008463 or 13:978-0131008465.

Triola, M.M. & M.F. Triola. 2006. Biostatistics for the Biological and Health Sciences, International Ed. Pearson Education Inc. ISBN 0-321546490

BL23D/MICR2252 EUKARYOTIC MICROORGANISMS

4 (credits) Semester 1 Level II

Aim: To expose students to the nature and properties of eukaryotic microorganisms, their effects on humans and the environment, and how they can be exploited to provide useful products.

Objectives: Upon successful completion of this course the students should be able to:

- describe the structure of eukaryotic microorganisms and be able to distinguish them from prokaryotes
- classify eukaryotic microorganisms
- describe growth and metabolism in eukaryotic microbes
- identify and explain strategies for controlling eukaryotic microorganisms
- outline the role of eukaryotic microorganisms in diseases, the environment, and food industries

Pre-requisites:

Mona

BL10J/BIOL1013 **and** either BL10L/BIOL1063 or BL10M/BIOL1015 **or** BL12B/BIOL1261 or BIOL1262 and BIOL1263 and BL12C/BIOL1016 or BIOL1017 and BIOL1018

Cave Hill

MICR2251 General Microbiology

Course Content:

An introduction to the biology of the eukaryotic microorganisms: algae, fungi, and protists: their structure and function, reproduction, physiology, behaviour, and ecology.

Mode of delivery:

24 hours of lectures, 6 hours of tutorials and 36 hours of practical work involving laboratory techniques to isolate, culture, and examine the basic characteristics of eukaryotic microorganisms, inclusive of making media, inoculation techniques, aseptic technique, sterilization, and staining.

Evaluation**:**

Mona

Final Examination:		
One 2-hour theory paper		60%
Coursework:		40%
One 2-hour practical test	20%	
Laboratory reports	20%	

Cave Hill

Final Examination: 60%
One 3-hour theory paper

Coursework: 40%
In-course test(s)/Assignments 10%
Practical reports 30%

Prescribed Text:

There is no text currently available that covers all the topics at the appropriate level.

Recommended Reading:

Alexopoulos, C. J., Mims, C. W. and Blackwell. M., 1996. Introductory Mycology. John Wiley and Sons, New York. 868 pp. ISBN 0-471-52229-5

Madigan, M. T., Martinko, J. M. and Parker, J., 2006. Brock Biology of Microorganisms. Prentice Hall, New Jersey. 1088 pp. ISBN: 0-13-219226-8

Maton, A., Hopkins, J., McLaughlin, C. W., Johnson, S., Warner, M. Q., LaHart, D. and Wright, J. D. 1993. Parade of Life: Monerans, Protists Fungi and Plants. Pearson Prentice Hall. 176 pp. ISBN: 0-13-979816-1

Vashishta, B. R., 2001. Botany for Degree Students: Algae. S. Chand & Co. Ltd. 456 pp. ISBN: 81-219-0827-2

Hickman, C.P., Roberts, L.S. and Larson, A. 2003. Animal Diversity. McGraw-Hill. ISBN: 0070119549-1

BT21B/BOTN2011 SEED PLANTS

(4 credits) Semester 2 Level II

Aim: To provide students with the knowledge that is fundamental to the classification of the gymnosperms and angiosperms

Objectives: Upon successful completion of this course students should be able to:

- identify the morphological and reproductive structures of both living and fossilized gymnosperms
- identify the possible ancestors of the angiosperms
- describe the evolution of floral structures
- outline the modern trends in plant taxonomy
- collect, describe and identify plant specimens

Pre-requisites: BL10M/BIOL1015 and BL10J/ BIOL1013 **or**
BL12B/BIOL1261 or BIOL1262 and BIOL1263 and
BL12C/BIOL1016 or BIOL1017 and BIOL1018

Course Content:

1. Structure, evolution and significance of the seed plants illustrated by reference to select Gymnosperm and Angiosperm groups
2. The significant biological distinction between major groups and the formal processes by which species and higher taxa are derived
3. Development of classification systems: Artificial, Natural and Phylogenetic
4. Taxonomic value of characters: Morphological, Anatomical, Cytological, Phytochemical, Ecological and Geographical
5. Numerical Taxonomy

Mode of delivery:

24 hours of lectures, 6 hours of tutorials, 36 hours of laboratory work involving macroscopic and microscopic examination of plant specimens and slide preparations to illustrate the characteristics taxonomic features of the various groups of the seed-bearing plants; introduction to taxonomic/ phylogenetic keys and to the reproductive and morphological structures of seed plants.

Evaluation:

Final Examination:		
One 2-hour theory paper		60%
Coursework		40%
One 2-hour practical test	30%	
Plant collection	10%	

Prescribed texts:

Vashishta, V. S., 2006. Botany for Degree Students: Gymnosperms. S. Chand & Co. Ltd. ISBN: 81-219-0880-9.

Pandey, B. P., 2005. Textbook of Botany: Angiosperms. S. Chand & Co. Ltd. ISBN: 81-219-0404-8.

Pandey, B. P., 1999. Taxonomy of Angiosperms. S. Chand & Co. Ltd. ISBN: 81-219-0932-5.

BT22A/BOTN2012 PLANT PHYSIOLOGY
(4 credits) Semester 1 Level II

Aims:

- To provide a foundation in the fundamental concepts of plant physiology by describing the functioning, growth and development of flowering plants.
- To introduce experimental plant science using methods that illustrate basic principles of plant physiology.

Objectives: Upon successful completion of the course, students should be able to:

- identify the main processes and controls of plant cell growth and differentiation
- describe developmental stages from germination to flowering, fruiting and senescence and how they are regulated by plant hormones and environmental factors
- explain water, mineral nutrient and carbohydrate movement in plants
- explain the difference between the three main pathways of carbon fixation and assimilation and identify their benefits under various environmental conditions
- undertake, interpret and report basic plant physiological experiments in the laboratory and greenhouse

Pre-requisites: BL10J/BIOL1013 and BL10M/BIOL1015 **or** BL12B/BIOL1261 or BIOL1262 and BIOL1263 and BL12C/BIOL1016 or BIOL1017 and BIOL1018

Course Content:

How plants function at the level of cells, tissues, organs and the whole plant. The physiology of:

- seed germination and dormancy
- growth and differentiation, growth analysis
- control of growth by plant growth regulators
- water relations; mineral nutrition; carbon assimilation; translocation
- photomorphogenesis and photoperiodism
- flowering and fruit development; senescence.

Delivery mode: 24 hours of lectures, 6 hours of tutorials, 36 hours of laboratory and greenhouse work.

Evaluation: Final Examination:

One 2-hour theory examination		60%
Coursework:		40%
One 2-hour practical test	20%	
Practical quizzes (X 2)	10%	
Practical reports	10%	

Prescribed text:

Taiz, L. and Zeiger, E. 2002. Plant Physiology 4th Ed. Sinauer Associates Inc. ISBN: 0878938567

Z20G/ZOOL2012 FUNCTIONAL ORGANIZATION I: ANIMAL MAINTENANCE SYSTEMS

(4 credits) Semester 2 Level II

Aims:

1. To equip students with knowledge of the major maintenance systems involved in the functioning of animals and the evolutionary development of these systems
2. To develop knowledge of these systems by examination of appropriate biological materials in the practical classes
3. To develop and improve dissection and other practical zoological skills

Objectives: Upon completion of this course students should be able to:

1. describe the variety of maintenance systems in animals of different organizational levels
2. explain the design and performance of maintenance systems
3. discuss the advantages and disadvantages of the different designs of maintenance systems
4. outline the evolutionary trends visible within these systems
5. dissect and display basic animal systems

Pre-requisites**:** BL10J/BIOL1013 and BL10L/BIOL1063 **or** BL12B/BIOL1261 or BIOL1262 and BIOL1263 and BL12C/BIOL1016 or BIOL1017 and BIOL1018

Course Content**:**

- Respiration and respiratory structures
- Circulatory systems
- Feeding and Digestive systems

- Excretory systems and the process of excretion
- Reproduction and reproductive systems

Mode of Delivery:

24 hours of lectures, 6 hours of tutorials and 36 hours of practical work involving laboratory exercises that will parallel the lecture course.

Evaluation**:**

Final Examination:

One 2-hour theory paper	70%

Course Work: 30%

One 2-hour practical test	20%
Laboratory reports	10%

Prescribed Texts:

Hilderbrand, M. Analysis of Vertebrate Structure and Function. 3rd Ed. John Wiley. ISBN- 0-471-62976-6

Kardong, K.V. (2002) Vertebrates, comparative anatomy, function, evolution. 3rd Ed. Mcgraw-Hill. ISBN 0-07-290956-0.

Liem K.F., Bemis W.E., Walker W.F. and L. Grande (2001) Functional Anatomy of the Vertebrates an evolutionary perspective Thomson Learning ISBN0-07-290956-0

Barnes, RSK, Calow, P and Olive, PJW. The Invertebrates a new synthesis. 3rd Ed. Blackwell Scientific. ISBN- 0-632-01638-8

Z20H/ZOOL2013 FUNCTIONAL ORGANIZATION II. ANIMAL COORDINATION, PROTECTION AND MOVEMENT

(4 credits) Semester 2 Level II

Aims:

- To provide an introduction to the structure and evolutionary development of selected systems (nervous, endocrine, support, integument) in vertebrates and invertebrates.

- To develop knowledge of these systems by reference to appropriate biological materials in the practical classes.

- To develop and improve dissection and other practical zoological skills.

Objectives: Upon successful completion of the course students should be able to:

1. describe and explain the structure and evolutionary development of the nervous, endocrine, support and integument systems

2. describe the embryological development of selected structures related to the above mentioned systems

3. recognize and identify the cellular structure of tissues and organs associated with the above systems

4. dissect and display selected animal systems

Pre-requisites**:** BL10J/BIOL1013 and BL10L/BIOL1063 **or** BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and BIOL1018

Course Content:

- Coordination and control: nervous systems, endocrine systems
- Support and locomotion: exoskeleton, endoskeleton, muscular and non-muscular movement.
- Integument

Mode of Delivery:

24 hours of lectures, 6 hours of tutorials and 36 hours of practical work involving laboratory exercises that will parallel the lecture course.

Evaluation**:**

Final Examination:		
One 2-hour theory exam		70%
Course Work:		30%
One 2-hour practical exam	20%	
Laboratory reports	10%	

Prescribed texts:

Hilderbrand, M. Analysis of Vertebrate Structure and Function. 3rd Ed. John Wiley. ISBN- 0-471-62976-6

Kardong, K.V. (2002) Vertebrates, comparative anatomy, function, evolution. 3rd Ed. Mcgraw-Hill. ISBN 0-07-290956-0.

Liem K.F., Bemis W.E., Walker W.F. and L. Grande (2001) Functional Anatomy of the Vertebrates an evolutionary perspective Thomson Learning ISBN0-07-290956-0

Barnes, RSK, Calow, P and Olive, PJW. The Invertebrates a new synthesis. 3rd Ed. Blackwell Scientific. ISBN- 0-632-01638-8

LEVEL III COURSES

BL30K/BIOL3012 SOIL BIOLOGY (Not offered in 2010/11 academic year)
(4 credits) Semester 1 Level III

Aim: To increase students' knowledge of soil as a habitat for diverse forms of life and how environmental factors affect soil biological processes.

Objectives: Upon successful completion of the course, students should be able to:

1. describe the main biotic and abiotic components of the soil environment
2. identify the important biological processes in the soil and effects of changing environmental factors
3. apply laboratory techniques to study the effects of various environmental factors on the activities of soil organisms

Pre-requisites: BL10J/BIOL1013 **or** BL12C/BIOL1261 or BIOL1262 and BIOL1263 and BL20N/BIOL2014

Course Content:

- The soil environment: soil formation, soil abiotic components, soil organisms: prokaryotic and eukaryotic microorganisms, animals and plant parts; biological processes occurring in soil.
- Environmental issues affecting life in the soil: acid rain, metal toxicity, salinity, radioactivity, pesticides, and the introduction of organisms.
- The impact of human activities on soil ecology and biodiversity.

Delivery mode: 24 hours of lectures, 6 hours of tutorials, 36 hours of laboratory and field work.

Evaluation:			
	One 3-hour Theory examination		60%
	Course work		40%
	Consisting of:		
	In-course test (1 hour)	15%	
	Project	15%	
	Laboratory reports	10%	

Highly Recommended Text:

Bardgett, Richard D. 2005. The Biology of Soil: A Community and Ecosystem Approach. Oxford University Press. ISBN: 0198525036.

BL30M / BIOL3011 MYCOLOGY

(4 credits) Semester 1 Level III

Aim: That students will gain an understanding of the behaviour and function of fungi

Objectives: Upon successful completion of the course, students should be able to:

- Describe the biological characteristics of the major groups of fungi
- Conduct studies to investigate the behaviour of fungi under various conditions
- Explain the significance of fungi and their interactions
- Give accounts of current and developing uses of fungi to man
- Identify suitable methods for obtaining and preserving various types of fungi

Pre-requisites: BL23D / MICR2252

Course Content**:**

- The structural and ultrastructural characteristics and the ecological significance of the major groups of fungi of importance in the West Indies
- The influence of genetic, nutritional and environmental factors on fungal growth,
- differentiation, reproduction and dispersal and germination of spores
- The practical exploitation by man of fungal interactions; of fungal metabolite
- production; of fungi as sources of food; of the roles of fungi in biotechnology
- Prevention and control of fungal growth responsible for the biodeterioration of commercial products
- Collection and preservation of fungi

Mode of Delivery:	Lectures	24 hours	
	Laboratory studies	36 hours	
	Tutorials	4 hours minimum	
Evaluation:	Theory examination (2 hours)		60%
	Course work		40%
	Consisting of:		
	In-course test (1 hour)	15%	
	Laboratory work	10%	
	Group project	15%	

Prescribed text: Deacon, J. W. 2006. Fungal Biology Blackwell Publishing Ltd. 371 pp. ISBN-13: 987-1-4051-3066-0; ISBN-10: 1-4051-3066-0

Recommended reading:

Moore-Landecker, Elizabeth. 1996. Fundamentals of the Fungi. Prentice Hall 574 pp. ISBN: 0-13-376864-3

Alexopoulos, C. J., Mims, C. W. and Blackwell, M. 1996. Introductory Mycology. John Wiley 868 pp. ISBN: 0-471-52229-5

BL31A/BIOL3013 COASTAL MANAGEMENT
(4 credits) Semester 2 Level III

Aim: To introduce the investigation of natural coastal processes, human interference with natural processes and how plans and actions may protect conserve and restore coastal environments.

Objectives: Upon successful completion of the course, students should be able to:

1. identify the limits, types and contents of the coastal zone
2. know the physical regime and natural processes of the coastal zone
3. evaluate the activities, demands and uses of the coastal zone
4. outline and evaluate management frameworks applicable to the coastal zone.

Pre-requisite: BL20N/BIOL2014
Co-requisite: BL31F/BIOL3015 OR BL31G/BIOL3023

Course Content:

- Coastal Resources
  An examination of the natural resources associated with beaches, reefs, wetlands, estuaries, harbours and off-shore features.
- An examination of the kinds of pollution affecting coastal resources especially organic, oil, pesticide, heavy metal, physical and thermal pollution, their sources, effects and remedies.
- Resource Management Practices
  Coastal surveys, environmental monitoring, water quality criteria, zoning, legislation and enforcement.
  Marine Parks and Conservation Areas
  Their purpose, criteria, development and management.

Mode of Delivery:

24 hours of lecture, 6 hours of tutorials, 36 hours of field and laboratory exercises to illustrate the principles of coastal management.

Evaluation:

One 3-hour theory paper	60%
Course Work	40%
Consisting of:	
One 2-hour practical test	10%
Laboratory and field reports	20%
Research and oral presentation	10%

Prescribed texts:

Beatley, T. Brower, D.J. and Schwab, A.K. 2002. An Introduction to Coastal Zone Management 2nd Edition. ISBN 1559639156.

Yvan Breton, David Brown, Brian Davy, Milton Haughton, and Luis Ovares. 2006. Coastal resource management in the wider Caribbean. Resiliance, Adaptation and Community Diversity. ISBN 9-76637-262-4

BL31E/BIOL3014 MARINE ECOLOGY I: BIOLOGICAL OCEANOGRAPHY

(4 credits) Semester 1 Level III

Aims:

1. Impart knowledge of the organisms as well as the physical and chemical processes associated with the marine pelagos.

2. Introduce the appropriate methods of measuring and sampling the oceans.

Objectives: Upon successful completion of this course students should be able to:

1. identify the types of organisms associated with the marine pelagos- their biology, associations and distribution.

2. describe and evaluate the physical and chemical processes associated with the marine pelagos.

3. adequately investigate the organisms, habitats and processes of the marine pelagos through “hands on” practical exercises.

4. analyse, interpret and present their investigations in a scientific report.

Pre-requisite**:** BL20N/BIOL2014. Admission to this course is limited due to the restriction of boat space on field trips.

Course Content:

- Ocean basins- their origin and structure.
- Chemical and physical properties of ocean water.
- Circulation and mixing: currents, waves & tides.
- Marine sediments- their origin and deposition.
- Form and function of planktonic organisms
- Distribution of planktonic organisms
- Primary production and its measurement
- Secondary production and its measurement
- Food chains/food webs in the pelagic province
- Vertical migration and the deep sea pelagos

Mode of Delivery:

24 hours of lecture, 6 hours of tutorial and 36 hours of laboratory and field exercises involving sampling from small boats which illustrate the major aspects of the lecture course. Laboratory sessions which involve field trips off campus necessitate adding 2 hours of travel time to the 6 hours normally used for the practical exercise.

Evaluation:

One 3-hour theory paper		60%
Coursework		40%
Consisting of:		
Laboratory reports	20%	
End of course practical test	20%	

Prescribed text: Nybakken, J. and Bertness, M. 2005. Marine biology, an ecological and environmental approach. 6th Ed. Benjamin Cummings. 516 pp. ISBN- 0-321-03076-1

Recommended: Thrujillo, A. and Thruman, H. 2005. Essentials of Oceanography. 8th Ed. Prentice Hall. 532 pp. ISBN- 0-13-144773-4

BL31F/BIOL3015 MARINE ECOLOGY II: BENTHIC COMMUNITIES
(4 credits) Semester 1 Level III

Aim: To impart knowledge of the range of habitats, organisms and ecological processes associated with the marine benthic environment as well as introduce the appropriate methods of investigation.

Objectives: Upon successful completion of this course students should be able to:

1. identify and categorise the range of marine benthic habitats.
2. identify the organisms in each habitat as well as their biology and interactions.

3. describe the important physical and chemical processes associated with benthic marine habitats.
4. adequately sample and investigate the organisms, habitats and processes through "hands on" practical exposure.
5. analyse, interpret and present their investigations in a scientific report.

Pre-Requisite: BL20N/BIOL2014. Admission to this course is limited due to the restriction of boat space on field trips.

Co-requisite: BL31E/BIOL3014.

Course Content:

1. The nature of the intertidal and sub-tidal benthic environment
2. The communities associated with sandy shores
3. The communities associated with rocky shores
4. Mangrove swamp communities
5. Seagrass communities
6. Meiofauna
7. Symbioses in the sea
8. Deep Sea ecology.

Mode of Delivery:

24 hours of lecture, 6 hours of tutorial and 36 hours of laboratory and field exercises involving the range of habitats which illustrate the major aspects of the lecture course.
Laboratory sessions which involve field trips off campus necessitate adding 2 hours of travel time to the 6 hours normally used for the practical exercise.

Evaluation:

One 3-hour theory paper		60%
Coursework		40%
Consisting of:		
Laboratory reports	20%	
End of course practical test	20%	

Prescribed Text: Nybakken, J. and Bertness, M. 2005.
Marine biology, an ecological and environmental approach. 6th Ed. Benjamin Cummings. 516 pp. ISBN- 0-321-03076-1

BL31G/BIOL3023 CORAL REEF BIOLOGY
(4 credits) Semester 2 Level III

Aim: To provide an introduction to the biology of reef building corals, the ecology of coral communities, and the natural phenomena and anthropogenic factors that impact coral reefs.

Objectives: Upon successful completion of this course students should be able to:

1. Identify Caribbean coral species and describe their biology, distribution and interactions.

2. Describe how reefs are formed and explain the role of the non-coral organisms associated with them.

3. Conduct laboratory and field exercises involved in the investigation of coral reefs.

Pre-Requisite: BL20N/BIOL2014
Co-requisite: BL31E/BIOL3014 and BL31F/BIOL3015

Course content:

- Biology of scleractinian corals: Anatomy, skeletal morphology, calcification and skeletogenesis, endosymbiosis with zooxanthellae, modes of feeding, reproduction and recruitment, environmental factors that influence growth and distribution.
- Ecology of coral communities: Theory of coral reef formation, types of reef. Reef community structure and zonation. Dynamics of coral communities including diversity/stability relationships, keystone species, algal-herbivore and predator-prey interactions, inter-specific competition, succession, and disturbance.
- A survey of the major groups of reef-associated organisms including other coelenterates, porifera, echinoderms, fishes, and algae.

Throughout the course the emphasis will be on Caribbean coral reefs, but comparisons will be made to reefs from other regions.

Mode of Delivery:

24 hours of lectures, 6 hours of tutorial and 36 hours of laboratory exercises on taxonomy and physiology of corals and other reef-associated organisms, and field exercises on coral reef assessment and monitoring.

Evaluation:

One 3-hour theory examination		60%
Course Work:		40%
Laboratory reports	30%	
In-course practical tests	10%	

Prescribed Text:

Kaplan, E.H., Kaplan, S.L. and Peterson, R.T. 1999. A field guide to coral reefs: Caribbean and Florida. Haughton Miffin. ISBN-618002111.

BL33D/BIOL3021 FRESHWATER ECOLOGY
(4 credits) Semester 2 Level III

Aims:
1. To introduce students to the diversity and taxonomy of freshwater fauna and flora.

2. To introduce the biotic and abiotic factors responsible for controlling the dynamics of freshwater communities.

3. To have students develop the necessary practical skills to undertake basic research in fresh water ecology.

Objectives: Upon successful completion of the course students should be able to:

1. Recognize and identify the common benthic macro invertebrates taxa found in Jamaica freshwaters.
2. Describe the physico-chemical factors and biotic interactions affecting freshwater communities with special emphasis on effects of anthropogenic disturbance.
3. Demonstrate the skills needed to assess and monitor water quality in fresh water systems.

Pre-requisite: BL20N/BIOL2014

Course Content:

- Introduction and definitions. Classification of freshwaters. Classification of rivers. Physico-chemical composition of river water. Longitudinal zonation of rivers, River Continuum Concept and the applicability of these concepts to the tropics. Breakdown of allochthonous material in rivers.Macroinvertberates in rivers as consumers and their feeding, strategies. Riverine freshwater fishes and their feeding strategies. Adaptations of fishes and macroinvertebrates in riverine habitat.
- Categorization of lentic habitats. Stratification in lakes and its biological consequences. Classifications of lake types. Primary productivity and nutrients (phytoplankton and marginal vegetation). Comparison temperate and tropical lake productivity.
- Zooplankton: composition, biology, production. Cascade effect. Biomanipulation. Benthos of lakes; composition; distribution in temperate and tropical lakes. Feeding of benthic invertebrates.
- Man made lakes: effect of damming on rivers. Freshwater pollution; definition, sources. Outline of sewage treatment processes. Effects of organic pollution on rivers and riverine communities. Biomonitoring systems: principles, choice of organisms, different systems.
- Other aspects of freshwater pollution. Pesticides, heavy metals, biomagnification, bioaccumulation. Acidification, Habitat degredation. Channelization. Abstraction. Deforestation/logging. Aquaculture effluents, Establishment of exotics. Conservation. Zoogeography of freshwaters.

Mode of Delivery:

24 hours of lecture, 6 hours of tutorials and 36 hours of mainly field based practical work utilizing a variety of techniques to illustrate freshwater habitats and communities.
Laboratory based analysis of biological material and other data.

Evaluation:	One 3-hour theory examination		60%
	Course Work:		40%
	Consisting of:		
	One 2-hour practical test	20%	
	Practical reports	20%	

Prescribed texts: Allen, J.D. 2009. Stream Ecology 2nd Edition. Springer. ISBN-0412355302
Giller P. And B, Malmqvist(1998) The Biology of Streams and Rivers 2nd Edition. Oxford University Press. ISBN -978-0-19-8549772

BL38A/BIOL3017 VIROLOGY
(4 credits) Semester 2 Level III

Aim: To introduce students to the fundamental concepts of viral structure, classification and pathogenesis.

Objectives: Upon successful completion of the course students should be able to:

1. explain the basic principles of viral structure
2. describe major animal and plant viral groups and the processes of virus replication
3. identify and describe commonly occurring viral diseases of plants and animals and methods of control

Pre-requisite: BL 20J/BIOL/2011 or BC21C/BIOL2312

Course Content:

- Introduction to virology and the nature of viruses and sub-viral entities
- Structure and replication of RNA viruses, DNA viruses, and viroids
- Methods in Virology: detection, quantification and characterization
- Virus transmission
- Host cell-virus interactions: morphological alterations, biochemistry and molecular biology of the infection process
- Biological consequences of viral infections on organisms and populations; development of control strategies

Mode of delivery:

24 hours of lectures, 6 hours of tutorials, and 36 hours of laboratory exercises involve plant virus transmission, virus purification, electron microscopy, and serology

Evaluation:	Written theory exam (3 hours)		60%
	Coursework		40%
	Two 1-hour In-course tests	20%	
	Laboratory reports	20%	

Prescribed texts:

Cann, A., 2001. Principles of Molecular Virology. Elsevier Academic Press. ISBN: 0-12-158533-6

Hewlett, M. and Wagner, E. 2004. Basic Virology. Blackwell Science. ISBN: 1-4051-0346-9

BL39C/BIOL3018 RESEARCH PROJECT

(4 credits) Semester 1 or 2 Level III

Aim: To equip students with the basic knowledge and skills required to undertake and report on scientific research in the field of biology.

Objectives: On completion of the course students should be able to:

- Search information bases for appropriate supporting literature for a given topic.
- Formulate hypotheses for a proposed piece of scientific research and design appropriate means for testing the same.
- Collate and analyse data from their research and prepare a report in standard scientific format.

Co-requisite: BL20P/BIOL2015

This course is available to students at the discretion of the Department.

Course Content:

- The basics of scientific writing, experimental design, project reporting and presentation.
- Aims and means of assessing feasibility of projects.
- Techniques in data collection, collation and analysis.
- Investigation and written report on an approved topic.

Mode of Delivery:

8 hours of lectures, 2 hours of interactive tutorial sessions and 56 hours of student driven research under the supervision of a member of the academic staff.

Evaluation:	Project report	75%
	Oral Examination	25%

BL39D/BIOL3019 CARIBBEAN BIODIVERSITY
(4 credits) Semester 2 Level III

Aims: The course is designed to:

1. Introduce concepts, patterns and processes in biogeography
2. Develop an appreciation of the uniqueness and diversity of Caribbean flora, fauna and ecosystems.
3. Develop an understanding of the evolution, biogeography and classification of the Caribbean biota.

Objectives: Upon successful completion of this course students should be able to:

1. identify and describe the major ecosystems in the Caribbean;
2. provide an overview of the diversity of selected Caribbean taxa;
3. describe and evaluate models addressing island biogeography, patterns and the origin of the Caribbean biota;
4. relate species distributions to geographic and site factors including human disturbance;
5. evaluate the relevance of Caribbean biodiversity from a regional and global perspective.

Prerequisite: BL20N/BIOL2014 and BL20K/ BIOL 2012

Course Content:

1. Major biomes of the Caribbean islands
2. Characteristics of the Caribbean biota
3. Island gradients in species diversity
4. Adaptive radiation within islands
5. Ecology and conservation status of selected taxonomic groups.

Mode of Delivery:

24 hours of lectures applying audiovisual methods including presentation software and video, 6 hours of tutorials, 3 one-day field trips to study the biological diversity in selected habitats and taxonomic groups. and 18 hours for the conduction of a Group project (with 3/4 students per group) studying a biodiversity pattern in the field (18 hours). Project works accounts for 50% of the practicals.

Evaluation:	One 3 hour theory exam		65%
	Course Work		35%
	Project report	25%	
	Lab reports	10%	

Prescribed Text:

Whittaker, R. (1999). Island Biogeography: Ecology, Evolution and Conservation. Oxford University Press. ISBN: 098500203

BL 39E/BIOL3020 CONSERVATION BIOLOGY

(4 credits) Semester 2 Level III

Aims:

1. To evaluate sources of species extinctions and current threats to biodiversity.
2. To demonstrate strategies for the conservation of threatened species and habitats.
3. To establish the theoretical basis for managing small populations.
4. To establish the social context in which conservation efforts must proceed.

Objectives: On successful completion of the course students should be able to:

1. Describe the history and current status of the human-mediated extinction crisis.
2. Explain how population genetic models can be used to inform conservation efforts directed at endangered species.
3. Outline the values of and threats to biodiversity.
4. Show why island species are particularly vulnerable to anthropogenic impacts such as invasive species.
5. Describe techniques used to control or eradicate invasive species.
6. Explain the theoretical and practical aspects of designing protected areas.

Pre-requisites: BL 20N/BIOL2014 and BL20K/BIOL2012

Course Content:

- Biological diversity and its values.
- Threats to biological diversity: habitat destruction, exotic species, and over-exploitation.
- Population biology of threatened species.
- Managing threatened species: *in-situ* and *ex-situ.*
- Establishing and managing protected areas. Social framework for the conservation of biodiversity

Mode of Delivery:

24 hours of lecture, 6 hours of tutorials and 36 hours of field work in the form of a 2 night camping field trip (Friday to Sunday), which involves an assessment of conservation needs and the implementation of conservation measures in the Hellshire Hills and along the Hellshire coast as well as visiting current conservation projects in the field.

Evaluation:			
	One three-hour theory exam		65%
	Course Work		35%
	Laboratory report	10%	
	Project report	15%	
	In course test	10%	

Prescribed text:

Primack, R. B. 2002. Essentials of conservation biology, 3rd Edition. Sinauer Associates, Inc. ISBN 0-87893-719-6

BT33A/BOTN3014 FOREST ECOLOGY, AGROFORESTRY & SUSTAINABLE DEVELOPMENT

(4 credits) Semester 2 Level III

Aim: To provide an introduction to the world's tropical rain forests, specifically to describe their structure and functioning, dynamics, succession and regeneration processes, their role in water and nutrient cycling and how disturbance affects these processes.

Objectives: Upon successful completion of this course the students should be able to:

- identify different forest types, where they occur and how environmental factors influence forest type.
- identify the role of natural disturbance in forest dynamics and the maintenance of species diversity.
- explain the importance of forests in the hydrological and nutrient cycles and the effects of anthropogenic disturbance on these cycles.

- explain how trees improve the soil and ways in which these enhancements can be incorporated in present agricultural systems.
- use various methods for forest inventory and monitoring.

Pre-requisite: BL20N/BIOL2014

Course Content:

1. Origins of tropical rain forests
2. Origins of tropical forest diversity
3. Contemporary diversity
4. Characteristics of tropical rain forests
5. Tropical rainforest formations
6. Tropical dry forests
7. Forests of Jamaica
8. Reproductive ecology of tropical rain forest trees
9. Reproductive ecology of tropical dry forest trees
10. Principles of tropical forest hydrology
11. Tropical forest nutrient cycles
12. Trees and soil fertility
13. Agroforestry systems

Mode of delivery:

24 hours of lectures, 6 hours of tutorial and 36 hours of laboratory sessions in which students will gain an understanding, through class sessions and field trips, data collection and analysis about the ecological information needed for the management and conservation of tropical forests, what research methods are used and how the results of this research can be applied. The field trips will include weekend camping to study types of forests.

Evaluation:		
	One 3-hour theory examination (Paper I)	70%
	Fieldwork report	30%

Prescribed text: TBA

BT33B/BOTN3018 MEDICINAL AND ECONOMIC BOTANY
(4 credits) Semester 2 Level III

Aim: The course is designed to develop students' understanding about the economic and ethnobotanical aspects of plant resource utilization medicinal properties of the various plant groups

Objectives: Upon successful completion of this course the students should be able to:

- describe the non-agricultural uses of plants
- identify and describe commonly occurring plants of medicinal value

- assess the use of phytochemicals in medicinal and industrial applications
- outline the ways in which plants may be sustainably exploited for crop diversification

Pre-requisite: BT21B/BOTN2011 and BT22A/BOTN2012

Course Content:

Plant families of medicinal and economic importance Ethnobotany
Medicinal Plants

- Phytochemicals
- Herbs and spices
- Nutraceuticals
- Plant Products: flavours and fragrances, gums, resins, oils, fibres
- Aromatherapy
- Under-utilized tropical plant food
- Timber and non-timber forest products
- Economic uses of algae, bryophytes and pteridophytes
- Conservation of medicinal and economically important plant genetic resources.

Mode of Delivery:
24 hours of lectures, 6 hours of tutorials and 36 hours of laboratory exercises and field work.

Evaluation:	One 3-hour theory examination (paper I)	60%
	Course work	40%
	Consisting of:	
	Practical Course test (2 hour)	20%
	Laboratory reports	20%

Prescribed text:
Simpson, B. B. & Ogarzaly, M. C., 2001. Economic Botany: Plants in Our World. (3rd ed.) McGraw-Hill. 529 pp. ISBN: 0-07-290938-2

BT34A/BOTN3015 PRINCIPLES OF PLANT BREEDING
(4 credits) Semester 2 Level III

Aims: To provide an understanding of genetic manipulation of sexually and asexually propagated crops with an emphasis on sustainable agricultural production.

To prepare students for employment in plant breeding

Objectives: Upon successful completion of the course the students should be able to:

1. formulate breeding strategies that would lead to an increase in productivity and profitability in agriculture and horticulture.

2. use plant breeding to mitigate the impact of pests and diseases avoiding pesticide damage to the environment.

3. discuss the use of plant breeding in developing sustainable agricultural production systems that satisfy the increasing demand for food, fiber and plant based industrial products.

Pre-requisite: BL 20J/BIOL2011

Course Content: The course is designed to convey basic methods used in genetic improvement of crop plants and includes:

1. plant domestication
2. mating systems in crop plants
3. continuous versus discontinuous variation traits
4. heritability of economically important traits, genetics of self and cross pollinated crops
5. breeding methods with self and cross-pollinated crops
6. design of field experiments
7. genetics of disease and insect pest resistance in crop plants
8. induced mutations and chromosome manipulation in crop improvement
9. genetic diversity in crops and gene banks
10. seed production industry
11. crop improvement through genetic engineering
12. general breeding problems associated with regional crops.

Mode of delivery:

24 hours of lectures, 6 hours of tutorial and 36 hours of Laboratory exercises, inclusive of field exercises.

Evaluation:		
	1 Theory examination (paper I)	65%
	1 Practical test (2 hours)	20%
	Laboratory report	15%

BT37Q/BIOL3016 PLANT HEALTH
(4 credits) Semester 2 Level III

Aims: To expose students to the ways in which a changing environment can affect the activities of beneficial and pathogenic macro- and micro-organisms, plants, and the interactions amongst them.

To demonstrate how the manipulation of the environment can promote plant health.

Objectives: On successful completion of this course, students will be able to:

- Identify the factors that promote plant health or cause disease development, and explain how environmental change may affect these factors
- Conduct field, greenhouse and laboratory tests to evaluate the influence of changing environmental factors on plant health

Pre-requisites: BL10J/ BIOL1013, BL10L/BIOL1063, BL10M/BIOL1015 **or** BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and BIOL1018**and** BL23D / MICR2252

Course Content:

- Abiotic factors (e.g. nutrients, frost, sunscorch, herbicides, machinery) and biotic factors (e.g. fungi, bacteria, protists, nematodes, insects) contributing to plant health or disease development for plants in undisturbed land and various horticultural and agricultural systems
- The significance of the interactions between the environment, macro- and micro-organisms, and plants on plant health
- The effects of climate change, radiation, salinity, atmospheric, water and soil pollution, the introduction of genetically-modified organisms, and other environmental changes on plant health
- The environmental challenge to the management of plant diseases and remediation of disorders.
- Practical work conducted in the laboratory, greenhouse and field to demonstrate how changes in the atmosphere, water and soil can promote plant health or disease development

Evaluation:	Theory examination (2 hours)		60%
	Course work		40%
	Consisting of:		
	In-course test (1 hour)	15%	
	Laboratory work	10%	
	Group project	15%	
Mode of Delivery:	Lectures		24 hours
	Field, greenhouse and laboratory studies		36 hours
	Tutorials		4 hours minimum

Prescribed texts:

None. A list of useful references is supplied and includes the following:

Highly recommended:

Agrios, G. N. 2005. Plant Pathology. Elsevier Academic Press, London, Burlington, San Diego. 922 pages. ISBN 0-12-044565-4

Perry, R. N. and Moens, M. 2006. Plant Nematology. CAB International. 528 pages. ISBN1845930568

Principles and Applications of Soil Microbiology. 2004. Sylvia, D.M., Fuhrmann, Hartel, P.G. and Zuberer, D.A. (Editors) Prentice Hall. 672 pages.ISBN: 0130941174

Plant Pathologist's Pocketbook 2002. Waller, J. M., Lenne, J. M., and Waller, S. J. (Editors) CABI Publishing, Wallingford, UK, New York. 516 pp.ISBN 085199 459 8

BT38B/BOTN3016 PLANT BIOTECHNOLOGY
(4 credits) Semester 1 Level III

Aim: To introduce students to the basic principles and applications of plant tissue culture and genetic engineering.

Objectives: Upon successful completion of the course the students should be able to:

- describe the underlying principles of aseptic culture of plant cells, tissues and organs outline the use of specialized plant cell culture techniques in plant science research and industry
- explain the principles of plant genetic engineering; describe the development and applications of transgenic plants
- discuss the role of patents and ethical issues associated with plant genetic engineering

Pre-requisite: BT 22A/BOTN2012 OR BC 21C/BIOL2312

Course Content:

- Overview of plant tissue culture
- Principles of aseptic culture, basic media components
- Organ culture, callus culture, cell suspension culture, organogenesis, somatic embryogenesis, micropropagation, anther culture, protoplast isolation, culture and regeneration
- Applications of plant tissue culture
- Overview of gene structure, regulation, and expression
- Methods of plant transformation
- Development and analysis of genetically modified plants
- Ethical, safety, social, legal and environmental issues associated with the technology

Mode of delivery:

24 hours of lectures, 6 hours of tutorials, and 36 hours of laboratory exercises including the aseptic culture of plant tissues, plant transformation and molecular analysis of regenerants.

Evaluation:	Written theory exam (3 hours)		60%
	Coursework		40%
	Two 1-hour In-course tests	20%	
	Laboratory reports	20%	

Prescribed texts:

Dodds, J. and Roberts, L. 1995. Experiments in Plant Tissue Culture. Cambridge University Press. ISBN: 0-521-47892-8

Slater, A., Scott, N., and Fowler, M. 2003. Plant Biotechnology: The Genetic Manipulation of Plants. Oxford University Press. ISBN: 0-19-925468-0

BT38K/BOTN3017 PRINCIPLES OF HORTICULTURE
(4 credits) Semester 1 Level III

Aim: To provide training in principles and practices of horticulture, especially as they relate to the Caribbean and the tropics.

Objectives: Upon successful completion of the course the students should be able to:

- propagate vegetable, ornamental and fruit tree crops.
- organize the cultivation of horticultural crops in nurseries, greenhouses and the field.
- explain the factors involved in the harvesting and handling of horticultural crops.

Pre-requisites: BT 21B/BIOL2011 AND BT22A/BIOL2012

Course Content:

- Horticultural Plants (as distinct from routine agricultural plants): morphology, taxonomy, environmental physiology
- Propagation of Horticultural Plants
  - Sexual propagation
  - Seed production and certification, methods of seeding, seed nursery, transplantation
  - Asexual propagation: cuttings, grafting, budding, layering, specialised underground structures, micropropagation
- Nursery Management
- Controlled Environment Horticulture

- Greenhouse design and construction
- Internal environment control
- Light, irrigation, temperature, humidity, substrate, pot and bed culture

- Out-door Environment Horticulture: principles of landscaping, nursery production, bedding plants, ground cover/grasses, trees and shrubs
- Growing Garden Crops: ornamentals, vegetables, herbs, fruit trees
- Post-Harvest Handling and Marketing of Horticultural Produce
- Computers in Horticulture

Mode of delivery:

24 hours of lectures, 6 hours of tutorials, and 36 hours of laboratory and field exercises. Practical work includes plant propagation techniques, field trips to, and work at, various horticultural entities..

Evaluation:	One 3-hour Theory examination (paper I)		60%
	Coursework		40%
	Laboratory/Field report	20%	
	In-course test	20%	

Prescribed text:

Acquaah, G., 2004. Horticulture: principles and practices. (3rd edition) Pearson/Prentice Hall. ISBN: 013114412X

Z 30A/ZOOL3011 SENSORY AND NEUROMUSCULAR PHYSIOLOGY
(Not offered in 2010/11 academic year)
(4 credits) Semester 1 Level III

Aim:

1. To expose students to the variety of mechanisms involved in animal sensory and neuromuscular physiology.

2. To expose students to a range of techniques used in the study of animal sensory and neuromuscular physiology.

Objectives: Upon successful completion of this course students should be able to:

- explain the mechanism of transport across cell membranes, membrane potential;
- explain membrane potential and the equations used to describe it;
- explain and demonstrate action potentials and their propagation;
- explain chemical and electrical synapses;

- describe and explain sensory coding, pain, and animal learning and memory; and

- explain motor control of muscular contraction, the sliding filament theory, excitation contraction coupling, and the characteristics of isometric and isotonic contractions.

Pre-requisites: Z20G/ZOOL2012 and Z20H/ZOOL2013, C06J/**CHEM0901 and** C06K/ **CHEM0902** or 'A' level Chemistry or equivalent.

Course Content:

- Structure of the neurone
- Input systems
- Ionic basis of neuronal activity
- Synaptic transmission
- Effector systems
- Aggregates of neurones
- Co-ordination
- Plasticity of the central nervous system

Mode of delivery: 24 hours of lectures, 6 hours of tutorial and 36 hours of practical work involving laboratory exercises in experimental physiology

Evaluation:

One 3-hour theory paper		60%
Course Work:		40%
One 2-hour practical coursework test	20%	
Laboratory Reports	20%	

Prescribed Text: French, K. Randall, D. and Burgren, W. 2001. Ekert Animal Physiology. W.H. Freeman-Publisher. ISBN- 07-16738635

Z 30B/ZOOL3012 METABOLIC PHYSIOLOGY
(4 credits) Semester 1 Level III

Aims
1. To expose students to the variety of mechanisms involved in animal metabolic physiology.

2. To expose students to a range of techniques used in the study of the mechanisms involved in animal metabolic physiology.

Objectives: Upon successful completion of this course students should be able to:

- make a comparative analysis of the use of air and water as respiratory media

- explain respiratory regulation, oxygen and carbon dioxide transport in animals
- describe regulation of cardiac output and vasomotor tone in vertebrates
- describe thermoregulatory, osmoregulatory and ionoregulatory mechanisms
- explain urine formation and its regulation
- describe mechanisms of hormone action
- explain the process of ageing in animals
- design and execute physiological research on animal metabolism

Pre-requisites: Z20G/ZOOL2012 and Z20H/ZOOL2013, C06J/ **CHEM0901** AND C06K/ **CHEM0902** or 'A' level Chemistry or equivalent.

Course content:

- Energy metabolism of the whole animal
- Respiration
- Circulation
- Water and solute metabolism
- Nitrogen metabolism
- Body temperature and energy metabolism
- Control of metabolism

Mode of delivery:

24 hours of lectures, 6 hours of tutorial and 36 hours of practical work involving laboratory exercises in experimental physiology

Evaluation:

One 3-hour theory paper	60%
Course Work:	40%
One 2-hour practical coursework test	20%
Laboratory Reports	20%

Prescribed Text: French, K. Randall, D. and Burgren, W. 2001. Ekert Animal Physiology. W.H. Freeman-Publisher. ISBN- 07-16738635

Z 30G/ZOOL3015 GENERAL PARASITOLOGY
(4 credits) Semester 1 Level III

Aims The course seeks to increase awareness of the impact of the major parasites on the health of man and domesticated animals, and economic significance of the major parasites.

Objectives Upon successful completion of this course, students will be able to:

1. identify the major types of protist, helminth and arthropod parasites of man and domestic animals;

2. describe the life cycles of these parasites and pathology of infections;

3. determine the current health and economic costs of these parasites;

4. propose basic control strategies for infections.

Pre-requisites: Z20G/ZOOL2012 and Z20H/ZOOL2013

Course Content

- Introduction to parasitism: inter-specific associations; endo- and ecto-parasitism; hosts and host specificity
- Distribution, prevalence, life cycle, transmission, nutrition, immunology, pathology and control of the main protist, helminth and arthropod parasites of man and domestic animals.
- The cost of parasitism.

Mode of delivery:

24 hours of lectures, 10 hours of tutorials and 32 hours of laboratory exercises which include the identification and functional morphology of the major protist, helminth and arthropod parasites of man and domestic animals from living and preserved materials; stained whole mount preparations of helminth parasites; epidemiological exercises.

Evaluation:	One 2-hour theory examination		50%
	Course Work:		50%
	One 2-hours comprehensive test (Mix of practical and theory)	25%	
	Laboratory reports	25%	

Prescribed text: Roberts LS & Janovy J (2009). Foundations of Parasitology. McGraw Hill Publishers. ISBN 978 0 07 302827 9

Useful URL: http://www.med.sc.edu:85/book/parasit-sta.htm

Z 30M/ZOOL3017 IMMUNOLOGY
(4 credits) Semester 2 Level III

Aims: This course is designed to present the principles of immunology and to highlight the major functional operations and applications of immune responses.

Objectives: Upon successful completion of this course students should be able to:

1. describe the basic concepts in immunology

2. explain the role of immunology in real life situations e.g. transplantation, allergy, autoimmunity, HIV infection, vaccination, etc

Pre-requisites: Z20G/ZOOL2012 and Z20H/ZOOL2013

Course Content

- **Basic Immunology**
  Evolution of immune responses; Components of innate and acquired immunity; Immunogens and antigens; Antibody structure and function; Antibody-antigen interactions; The complement system; Ontogeny of immune cells; Triggering the immune response; The major histocompatibility complex in immune responses; Control mechanisms in the immune response

- **Immunity in action**
  Immunoassays; Hypersensitivity reactions; Disorders of the immune response; HIV Infection; Autoimmunity; Transplantation immunology; Tumor immunology

Mode of delivery:
24 hours of lectures, 10 hours of tutorials and 32 hours of laboratory exercises which include histology of lymphoid organs of the mouse, viable counts of splenic lymphocytes, precipitation & agglutination reactions, diagnostic immunology - IFA, ELISA and use of a Computer-assisted learning package (Ammit program)

Evaluation**:**

One 2-hour theory paper		50%
Course Work:		50%
One 2-hour MCQ paper	25%	
Laboratory reports (5 x 5% ea)	25%	

Prescribed text: Coico R & Sunshine G (2009). Immunology: a short course. Wiley-Blackwell Publishers. ISBN978 0 470 08158 7

Useful URL: http://pathmicro.med.sc.edu/book/immunol-sta.htm

Z31B/ ZOOL3024 FISHERIES (Not offered in 2010/11 academic year)
(4 credits) Semester 1 Level III

Aims: This course is designed to familiarize the student with the basic principles of fisheries science and how these may be applied to the sustainable harvesting of fishable resources in actual situations. Examples are selected to demonstrate a variety of real life situations around the world.

Objectives: Upon successful completion of this course students should be able to:

1. describe the main types of fishable resources
2. explain the principles of fish populations dynamics and stock assessment
3. apply the principles of fish population dynamics and stock assessment to the integrated management of fishable resources.

Prerequisite: Z 20G/ZOOL2012 and Z 20H/ZOOL2013
Co-requisite: BL31E/BIOL3014

Course Content:

- **Fish population dynamics and stock assessment**
  Stock, gear selection, growth recruitment, stock assessment, yield and yield models, mortality.
- **Caribbean Fisheries**
  Distribution of regional fisheries resources regional fishing methods: Jamaican fishing industry.
- **World Fisheries**
  An examination of important features of world fisheries resources, fishing methods of the world, selected case studies.
- **Fisheries Management**
  Principles of fisheries management, fisheries legislation, recent developments in fisheries, fishing industry practices.

Mode of Delivery:

24 hours of lecture, 6 hours of tutorial and 36 hours of practicals involving field and laboratory exercises

Evaluation:	One 3 –hour theory examination		60%
	Course Work:		40%
	One 2-hour practical course test	20%	
	Laboratory reports	20%	

Prescribed Text:

Jobling, M. 1995. Environmental Biology of Fishes. Chapman Hall.
ISBN- 0-412-58080-2

Z 31C/ZOOL3018 FISH BIOLOGY (Not offered in 2010/11 academic year)
(4 credits) Semester 1 Level III

Aims:

1. To provide an introduction to the diversity and taxonomy of living fishes.
2. To give an introduction to various aspects of the biology and economy of fishes and fish communities.
3. To provide students with the necessary practical skills to undertake basic research in fish biology.

Objectives: Upon successful completion of the course students should be able to:

1. recognize and identify the common fish families found in Jamaica.
2. identify the basic elements of taxonomy, anatomy, physiology and ecology of fishes.
3. identify and assess feeding habits, fecundity and to ageing of fishes using practical skills.

Prerequisite: Z 20G/ZOOL2012 and Z 20H/ZOOL2013

Course Content:

- Classification and characteristics of main groups of Chondrichthyes and Osteichthyes.
- Body structure and its modifications.
- Digestive structure and physiology. Nutrition. Feeding ecology. Optimal foraging theory.
- Circulatory system. Gills and gaseous exchange system.
- Muscles and swimming. Osmoregulation. Aspects of the endocrine system.
- Reproductive anatomy. Reproductive strategies. Growth and fecundity. Embryonic and larval development.
- Aspects of behaviour.
- Ecology and structure of fish communities associated with the marine pelagic, estuarine and coral reef habitats.
- Threats to fish communities.

Mode of Delivery:

24 hours of lectures, 6 hours of tutorials and 36 hours of practicals consisting of mainly laboratory based classes demonstrating a variety of basic techniques used in fish biology.
Field excursion(s) for collection of fishes.

Evaluation:	One 3-hour theory examination	60%
	Course Work:	40%
	Consisting of:	
	One 2-hour practical test	20%
	Practical reports	20%

Prescribed Text:

Jobling, M. 1995. Environmental Biology of Fishes. Chapman Hall.
ISBN- 0-412-58080-2

Z 31F/ZOOL3019 FISHERIES AND AQUACULTURE TECHNOLOGIES
(4 credits) Semester 1 Level III

Aims:

1. To expose students to the basic principles related to natural production in Enclosed aquatic systems
2. To familiarize them with the main issues surrounding production and maintenance of these aquatic resources.

Objectives: Upon successful completion of this course students will be able to:

1. describe the basic principles related to sustainable harvesting of fishable resources
2. outline and evaluate the issues surrounding their assessment and management
3. outline the principles underlining the culture of aquatic animals and selected plants
4. evaluate the advantages as well as disadvantages surrounding aquaculture and mariculture practices.

Pre-requisite: Z 20G/ZOOL2012 and Z 20H/ZOOL2013
Co-requisite: Z 31C/ZOOL3018 **if available**

Course Content:

***Part A*.**

- Fisheries dynamics, assessment and management.
  Age and growth. Fishable stock, populations and recruitment. Gear Selectivity and fishing effort. Yield models and their value. Introduction to principles of fisheries management.

- World and Caribbean Fisheries
  Review of world fisheries and status, fishing techniques. Fisheries and El Nino/ENSO phenomenon. Conch and lobster fisheries, Jamaica fisheries.

Part B.

- Principles of Fin-fish Aquaculture
- Reproductive cycle, maturation, gamete production and control. Fry and fingerling production. Gender manipulation. Culture site selection and construction. Nutrition and feeds. Diseases and treatment.
- Non-Finfish Culture Principle
  Penaeid shrimp and freshwater prawn culture. Oyster and seaweed culture.

Mode of Delivery:

24 hours of lectures, 6 hours of tutorials and 36 hours of practicals consisting of mainly laboratory based classes involving mainly field and some laboratory-based classes demonstrating major aspects of theory.

Evaluation:	One 3-hour theory examination		60%
	Course Work :		40%
	Consisting of:		
	One 2-hour practical test	20%	
	Practical reports	20%	

Prescribed Text:

Parker, R. 2000. Aquaculture Science. Thompson Delmar Learning, USA. ISBN-07-66813215.

Z 32C/ZOOL3020 INSECT BIOLOGY AND SYSTEMATICS
(4 credits) Semester 1 Level III

Aims:

1. To equip students with a general knowledge of the biology and taxonomy of insects.

2. To develop an understanding of the general principles of systematics with special emphasis on the rules governing insect taxonomy.

Objectives: Upon successful completion of this course students should be able to:

1. Identify and classify insects to the level of family.

2. Describe the biology of the different insect orders.

3. Explain the principles and techniques of insect systematics.

Pre-requisite: BL10L/BIOL1063 **or** BL12B/ BIOL1261or BIOL1262 and BIOL1263

Course Content:

- External and internal morphology in relation to taxonomy and evolution.
- The biology, life histories and, where applicable, social organization of the insect orders with special reference to economically important groups.
- The diversity of insects, with emphasis on Caribbean fauna and economically important groups.
- Principles of systematics, including important regulations. Theories of phylogenetics. Techniques in contemporary insect taxonomy.

Mode of Delivery:

24 hours of lectures, 6 hours of tutorials and 36 hours of practicals including hands-on laboratory sessions and field trips which emphasize the collection of insects and the study of insect *in situ*. Students are expected to produce a collection of 100 insect species.

Evaluation:			
	One 3-hour theory paper		65%
	Course Work		35%
	Insect collection	20%	
	Laboratory reports (5 X 3%)	10%	
	Oral presentation	5%	

Prescribed text:

Tippledorn, C.A. and Johnson, N.F. 2005. Borrow and DeLong's introduction to the study of insects. 7th Edition. Thompson Books/Cole. ISBN 0-03-096835-6

Z 32G/ZOOL3021 PEST MANAGEMENT

(4 credits) Semester 1 Level III

Aim: To equip students with a general knowledge of arthropod and other pests of economic importance in the region and the appropriate management strategies of these pests.

Objectives: At the end of the course students will display knowledge of:

- the biology and behaviour of selected agriculture and urban pests of economic importance to the Caribbean;
- assessing the economic importance of these pests;
- past and present control strategies of these pests;
- techniques of formulating suitable pest management strategies.

Pre-requisite: BL 20N/BIOL2014

Course Content:

- Definition and evolution of arthropod and other pests
- Historical perspective of pest problems and the attempts by man to deal with them
- Pest identification techniques and the nature of damage associated with insect pests of tropical importance
- The biology, behaviour and economic importance of pests in tropical ecosystems like Jamaica
- Assessing pest populations and related loss
- Determination of Economic Injury Levels (EIL), and Action or Economic Thresholds (AT or ET)
- The pest control options available (legislative, physical, cultural, biological and chemical control).
- The principles of Integrated Pest Management (IPM)
- IPM of selected tropical pests

Mode of Delivery:

24 hours of lectures 4 hours of interactive tutorial sessions, 36 hours of practicals involving the collection of 20 economically important insect species, field and laboratory exercises on, pest identification and diagnostics, loss and damage assessment, determination of EIL and ET, assessment of the efficiency of different control strategies and the development of IPM programmes for selected pests.

Evaluation:

One 3-hour theory paper		65%
Course Work:		35%
Consisting of laboratory reports	20%	
Insect Collection	10%	
Oral Presentation	5%	

Prescribed Text: Pedigo, P. L. and Rice, M. E. 2005. Entomology and Pest Management 5th Edition. Prentice-Hall Inc. ISBN 0131525638

Recommended Text: Dent, D. 2000. Insect Pest Management. CABI Publishing. ISBN

B.Sc. (Agriculture – Tropical Horticulture)

LEVEL	TITLES	No. of CREDITS	SEMESTER OFFERED
FOUNDATION			
FOUN1011	Caribbean Civilization	3	1
FOUN1001	English for Academic Purposes	3	2
FOUN1301	Law, Governance, Economy and Society	3	Any
FOUN1401	Writing in the Disciplines	3	1
LEVEL I			
BIOL1017	Cell Biology	3	1
BIOL1018	Molecular Biology and Genetics	3	1
BIOL1262	Diversity of Organisms I	3	2
BIOL1263	Diversity of Organisms II	3	2
CHEM1901	Introductory Chemistry A	6	1
GEOG1101	Introduction to Human Geography	6	1
CHEM1902	Introductory Chemistry B	6	2
GEOG1201	Introduction to Physical Geography	6	2
LEVEL II			
BOTN3017/BT38K	Principles of Horticulture	4	1
BOTN2012/BT22A	Plant Physiology	4	1
BIOL2011/BL20J	General & Molecular Genetics	4	2
AGSL2001/AS21D	Soil and Water Management	4	2
AGCP2001/AC24B	Principles of Crop Science and Production	4	2
AGBU2002/AM23B	Management & Economics of Agric. Production and Marketing	4	2
AGBU3008	Internship (taken at the end of Level II)	4	Summer
Electives			
BIOL2015/BL20P	Biometry	4	1
BIOL2014/BL20N	Ecology	4	1
LEVEL III			
AGRI2001/AG21C	Tropical Crop Protection	3	2
BOTN3016/BT38B	Plant Biotechnology	4	1
AGCP3006/AC32J	Principles of Fruit Crop Production	4	1
AGCP3007/AC33A	Post Harvest Technology	3	1
BIOL3016/BT37Q	Plant Health	4	2
AGBU3007/AM37A	New Venture Creation and Management	4	2
AGBU3012/AM312	Research Project	4	Year-Long
Electives			
ZOOL3021/Z32G	Pest Management	4	1
AGCP2003/AC26B	Mechanization for Crop Production	4	2
AC38A	Ornamental Horticulture	3	2
BOTN3015/BT34A	Principles of Plant Breeding	3	1
AGCP3005/AC32H	Landscape and Turf Grass Management	3	2
AGSL3001/AS31A	Irrigation and Drainage Technology	3	1
AGBU3000/AM30C	Farm Business Management	4	2

Total Credits = 109

Summary of credits:

Foundation Courses	9 credits
Level I Courses	36 credits
Level II Courses	32 credits
Level III Courses	32 credits

COURSE DESCRIPTIONS (HORTICULTURE)

AGSL 2001 (AS21D) **Soil and Water Management**
(4 credits) Semester 2 Level II

Prerequisites: AGSL 1000 (AS16B)

Syllabus: Methods of land clearing and their effects on soil structure; soil tillage and the management of soil structure for plant growth; management of soil structure to improve water intake, transmission and storage; water management for salinity control; soil erosion and the management of hillsides; management of dry and wet lands; management of forest soils; management of specific problem soils: soil management and its effects on microbes, microbial activity and soil fertility; soil fertility management; case studies.

Assessment:

Coursework	25%
Final Examination	75%

AGCP 2001 (AC24B) **Principles of Crop Science and Production**
(4 credits) Semester 2 Level II

Syllabus: Cropping and cropping systems in the tropics with specific reference to the cropping systems in the Caribbean. Cultural practices employed in the production of tropical crops with emphasis on cereals and legumes. Methods of propagation, sexual and asexual, micro and macro propagation techniques. Seed production and storage. Principles involved in breeding and maintaining economic crops. Genetic engineering for crop improvement.

Assessment:

Coursework	40%
Final Examination	60%

AGBU 2002 (AM23B) **Management and Economics of Agricultural Production and Marketing**

(4 credits) Semester 2 Level II

Syllabus: Basic theory of agricultural production with particular respect to technology and economic and technical efficiency in resource use. The basic theory of the consumer. The nature and scope of marketing. The functions of marketing intermediaries. The organization of agricultural markets in the Caribbean. Basic concepts in the management of farms and agri-business firms. Managerial functions. Forms of business organizations. Accounting and record keeping systems. Personnel management.

Assessment: Course work (midterm) 20%
Final Examination 80%

AGRI 2001 (AG21C) **Tropical Crop Protection**

(3 credits) Semester 2 Level III

Syllabus: The nature and extent of pest damage in the tropics and the roles of various pest agents – insects, mites, nematodes, weeds, pathogens, vertebrate pests. Biology and ecology of tropical pests and the concept of pest threshold levels. Principles of pest control-cultural, biological, chemical, legislative. Pesticide for crop pest Management, formulations and application. Pesticide safety concepts. Integrated pest management.

Assessment: Coursework 40%
Final Examination 60%

AGCP 3006 (AC32J) **Principles of Fruit Crop Production**

(4 credits) Semester 1 Level III

Prerequisites: AGCP 2001 (AC24B)

Syllabus**:** Introduction to the status of fruit crop industry with specific reference to tropical crops. The role of fruits in human nutrition. The scientific principles of fruit crop growth and yield development. Production principles and technologies used in commercial fruit crop enterprises for selected fruits. Assessment of the commercial potential of minor fruits. Current issues and research needs of tropical fruit crops.

Assessment: Coursework 40%
Final Examination 60%

AGCP 3007 (AC33A) **Post Harvest Technology**
(3 credits) Semester 1 Level III

Syllabus: The post harvest physiology and biochemistry of selected tropical fruits, vegetables, root crops and grains. The post harvest environment including pathological agents, with particular reference to these crops. Physiological disorders. Post harvest handling systems. Introduction to basic equipment used in evaluation, refrigeration and storage systems, and general post harvest produce management.

Assessment:
Coursework 40%
Final examination 60%

AGBU 3007 (AM37A) **New Venture Creation and Management**
(4 credits) Semester 2 Level III

Prerequisites: AGBU 1005 (AM15A), AGBU 1006 (AM15B)

Syllabus: The "hands-on" tools and techniques for launching and managing a sustainable small business. Frameworks and guidelines that can be used to formulate strategies relevant in the contemporary business environment. Emphasis will be placed on real world application of business theory through the building of an effective business plan, case study analysis and interaction with entrepreneurs.

Assessment:
Coursework 40%
Final Examination 60%

AGBU 3012 (AM312) **Research Project**
(4 credits) Semester 1 & 2 Level III

Prerequisites: none

Syllabus: A project within a subject area relevant to the student's degree option.

Assessment:
Project Report 80%
Oral Presentation 20%

*See Project Booklet for detailed guidelines
NOTE: Students will be examined at the end of the semester in which they are registered

AGCP 2003 (AC26B) **Mechanisation for Crop Production**
(4 credits) Semester 2 Level III

Prerequisites: AGRI 1003 (AG14C) and AGCP 2000 (AC23A)

Syllabus: Principles of design, construction, operation and maintenance of power units and machinery for crop production. Management of machinery; determination of machinery requirements; machinery selection, performance and costs of use. Machinery for field operations; tillage, seed bed preparation, cultivation seeding and planting, chemical application and harvesting. Analysis and development of mechanised production systems with special reference to crop production in the Caribbean.

Assessment: Coursework 20%
Final Examination 80%

AGCP 3005 (AC32H) **Landscape and Turfgrass Management**
(3 credits) Semester 2 Level III

Prerequisites: AGCP 2001 (AC24B)

Syllabus: The role of plants in human well-being, the importance of the landscape industry and the use of plants in private and public spaces. The history of gardens and garden design. Plant identification techniques. Tree and shrub growth, development selection, establishment and maintenance. Turfgrass and ground cover growth and development, selection, establishment and maintenance. The elements and principles of landscape design, design process; uses of plant materials in landscape design. Landscape installation and maintenance.

Assessment: Coursework 40%
Final Examination 60%

AGBU 3000 (AM30C) **Farm Business Management**
(4 credits) Semester 2 Level III

Syllabus: Management styles and strategies. Decision making in Agribusiness. The Agri-business system. Competitive Analysis and strategic planning with particular reference to agro industry. Cooperatives and other organizational forms. Business control and analysis. Management of factors of production.

Assessment: Coursework 20%
Final Examination 80%

Descriptions for other courses are provided in the course offerings for the respective Departments.

SCHOLARSHIPS AND AWARDS

DEPARTMENT OF LIFE SCIENCES

Preliminary Level Life Sciences Departmental Prize

Introductory Level Life Sciences Departmental Prize

Second Year Zoology Prize

Don Skelding Prize

L. B. Coke Prize in Plant Physiology

Vincent Hugh Mckie Prize