COURSES INFORMATION FOR THE BSC. BIOLOGY

LEVEL I (24 CREDITS)

BIOC1015 Introduction to Biochemistry

BIOL1020 Diversity of Life I

BIOL1025 Diversity of Life II

BIOL1030 Introduction to Genetics

AND 12 Level I credits from any Faculty

LEVELS II & III (60 CREDITS)

BOTH courses (6 Credits):

BIOC2371 Molecular Techniques

BIOL2373 Skills for Biologists

AND Two courses (6 Credits) from:

BIOC2365 Primary Metabolism

ECOL2460 Essentials of Ecology

MICR2260 Essential Microbiology

AND Two courses (6 Credits) from:

BIOL2166 Advanced Genetics I

BIOL2370 Flowering Plant Physiology

BIOL2371 Ecophysiology of Animals

AND Six (6) Credits from Biological Sciences Elective Courses:

Level II BIOC/BIOL/ECOL/MICR courses

Level III BIOC/BIOL/ECOL/MICR courses

AND Six (6) credits from Biological Sciences Elective Courses:

Level III BIOC/BIOL/ECOL/MICR courses

AND Thirty (30) Levels II and III credits from any Faculty. Three (3) of these credits can come from a Co-Curricular course.

AND 9 CREDITS: FOUNDATION COURSES

FOUN1006 Exposition For Academic Purposes

OR

FOUN1008 An Introduction to Professional Writing

AND

*FOUN 1101 Caribbean Civilization

*FOUN1301 Law, Economy, Governance and Society

*A student may substitute one of these with a Foreign Language course.

LEVEL I BIOLOGY COURSES

BIOC1015 INTRODUCTION TO BIOCHEMISTRY (3 Credits)

Pre-requisite: CAPE Chemistry Unit 1 (or CHEM0615) and CAPE Chemistry Unit 2 (or CHEM0625) or an approved equivalent

Anti-requisite: BIOC1351 Introductory Biochemistry

Syllabus: Water and acid/base chemistry: properties of water and aqueous solutions, ionization of water, weak acids and bases, buffers, Henderson-Hasselbach equation. Structure and function of biological molecules: lipids, carbohydrates, amino acids and proteins. Cell biology: structure and function of bacterial, plant and animal cells, and membrane transport. Cell fractionation: differential and sucrose centrifugation. Thermodynamics/bioenergetics: free energy, energy changes in redox reactions, ATP, substrate-level phosphorylation. Electron transport-based phosphorylation: oxidative phosphorylation in mitochondria, photophosphorylation in chloroplasts, chemiosmotic theory. Biochemical techniques: chromatography, electrophoresis. Carbohydrate metabolism: glycolysis and TCA cycle.

Teaching: 20 lectures (1h each), 6 tutorials (1h each) and 6 practical sessions (3h each),

Method of Examination:

Theory: Final Examination (2 hours)	50%
Theory: In-course tests and assignments	25%
Practical reports	25%

BIOL1020 - DIVERSITY OF LIFE I (3 Credits)

Pre-requisite: CAPE Biology Unit 1 (or BIOL0051) and CAPE Biology Unit 2 (or BIOL0052)

OR

CAPE Environmental Science Units 1 & 2 and CSEC Biology

Anti-requisite: BIOL1051 Biodiversity I

Syllabus: Evolution: Evolutionary theories. Mechanisms of evolution. Evidence of evolution. Ecology: Introduction to ecology. Major terrestrial biomes. Trophic structure and energy flow in ecosystems. The biodiversity concept. Two-species interactions within communities. Systematics: Principles of taxonomy (description, identification, nomenclature, classification) and the study of phylogeny. Classification systems. Simple cladograms. Microbial diversity: Microscopy: theoretical and practical aspects. Bacteria, Archaea, eukaryotic microorganisms, viruses. Plant diversity: What is a plant? Green algae: diversity of form, life cycles and sexual reproduction. Mosses & liverworts: key features, life cycle, spore dispersal mechanisms. Ferns & Fern allies: key features, life cycles. Evolution of seeds. Cycads & conifers: key features, life cycles. Angiosperms: unique attributes, floral trends, adaptations.

Teaching: 24 lectures (1h each) and 8 practical sessions (3h each).

Method of Examination:

Theory: Final examination (2 hours)	50%
Theory: In-course test(s)	10%
Practical: Reports, quizzes	30%
Practical: Final practical test	10%

BIOL1025 - DIVERSITY OF LIFE II (3 Credits)

Pre-requisite: CAPE Biology Unit 1 (or BIOL0051) and CAPE Biology Unit 2 (or BIOL0052)

OR

CAPE Environmental Science Units I & 2 and CSEC Biology

Anti-requisite:BIOL1052 Biodiversity II

Syllabus: Sponges – cell aggregate body plan; filter feeding. Cnidarians and ctenophores - diploblastic, blind sac, radially symmetrical body plan; polymorphism. Flatworms – acoelomate, triploblastic, bilaterally symmetrical blind sac body plan; comparison of parasitic and free-living. Nematodes and rotifers – pseudocoelomate tube-within-a-tube body plan; eutely; parthenogenesis; life cycles. Molluscs – soft-bodied coelomates with a shell; adaptive radiation. Annelids – segmented worms. Arthropods - factors responsible for their success. Echinoderms – their unique features. The invertebrate chordates. Fish - evolution of bone, jaws and paired fins; adaptations to life in water. Amphibians - challenges to life on land and how these were met. Amniotes – the amniote egg; comparisons of amniote integuments. Birds – adaptations for flight. Mammals - reproductive patterns.

Teaching: 24 lectures (1h each) and 12 practical sessions (2 h each).

Method of Examination:

Theory: Final Examination (2 hours)	50%
Theory: In-course tests	10%
Practical: Quizzes, lab reports, and lab test	40%

BIOL1030 - INTRODUCTION TO GENETICS (3 Credits)

Pre-requisite: CAPE Biology Unit 1 (or BIOL0051) and CAPE Biology Unit 2 (or BIOL0052)

OR

CAPE Environmental Science Units 1 & 2 and CSEC Biology

OR

BCC Associate degree in Biology

OR

BCC Associate degree in Environmental Science and CSEC Biology

Anti-requisite: None

Syllabus: Cell division: The cell cycle, mitosis and meiosis. Heredity: Mendelian genetics, modifications from the basic principles, epistasis, linkage and sex-linked genes. The Nature of the Genetic Material: Experimental evidence implicating the nucleic acids. DNA structure and DNA conformation. Organization of eukaryotic chromatin. DNA Replication and Assortment: Semi-conservative replication. Modes of replication. The Genetic Material as an Information Carrier: The Central Dogma. Collinearity. Transcription and translation in prokaryotes & eukaryotes. Population Genetics: Gene pools; Transmission of genes between generations; Hardy-Weinberg (2 and 3 alleles); Selection pressures; selection against a recessive allele; mutation and migration.

Teaching: 18 lectures (1h each), 6 tutorials (1h each) and 8 practical sessions (3h each).

Method of Examination:

Theory: Final Examination (2 hours)	50%
Theory: In-course test(s) and assignments	25%
Practical: Quizzes, exercises and reports	25%

***NOTE: Twelve (12) Level I Credits from any Faculty also to be completed.**

LEVELS II & III BIOLOGY COURSES

BIOC2371 - MOLECULAR TECHNIQUES (3 Credits)

Pre-requisites: BIOL1030 Introduction to Genetics (or BIOL1151 Introductory Genetics)

Restrictions: Not to be taken by persons who have passed BIOL2152 General Molecular Biology

Syllabus: Isolation, detection and quantification of DNA, RNA and proteins. Gel electrophoresis and blotting techniques. Restriction and modification systems. Restriction mapping. Hybridization techniques. Gene and protein sequencing. Cloning and expression vectors. Cloning strategies. Construction of Gene libraries. Gene transfer systems. In vitro mutagenesis. Vector systems and detection tools. Selected new generation molecular techniques used in research.

Teaching: Eighteen (18) hours of lectures; Six (6) hours of tutorials and Twenty-four (24) hours of practicals.

Method of Examination:

Theory: Final Examination (2 hours)	50%
Theory: In-course Test(s)/Assignment(s)	25%
Practical:	25%

BIOL2373 - SKILLS FOR BIOLOGISTS (3 Credits)

Pre-requisites: 15 credits of level-1 courses including 6 credits from Level 1 BIOC/BIOL courses. Restricted to students majoring or minoring in Biology, Ecology, Microbiology or Biochemistry.

Restrictions: Not to be taken by persons who have passed BIOL1010 Basic Skills for Biologists.

Syllabus: Scientific enquiry, data handling and simple statistics: The scientific method. Developing a research plan. Simple experimental design. Categorical and continuous variables. Mode, median, mean, range, quartiles, variance and standard deviation. Hypothesis testing using p-values and confidence intervals. Frequency analysis (chi-square, odds ratio, relative risks). Separation of groups: Parametric tests (t-tests, ANOVA and LSD post-hoc test). Correlation analysis: Parametric (Pearson), Non-parametric (Spearman). Regression analysis (simple linear regression, multiple linear regression). Use of computer software tools for data analysis and presentation of results e.g. EXCEL, Genstat, R, SPSS. Data handling and graph preparation in Excel. Excel applications useful for descriptive statistics.

Dealing with numbers and simple mathematical relationships: Scientific notation, decimal places, significant figures. Simple calculations with number in scientific notation. Precision and accuracy. SI units and prefixes. The rules of exponents and logarithms. Simple calculations involving these. Scientific writing: The format of scientific reporting - Abstract, Introduction, Material and Methods, Results, Discussion, References. Finding relevant information on a topic using electronic and non-electronic sources. Citing and referencing sources. Understanding plagiarism. Common knowledge. Quotations. Use of text matching software, e.g. Turnitin.

Teaching: Twenty-four (24) hours of interactive lectures/tutorials AND Twelve (12) hours tutorials/assessments.

Method of Examination:

Coursework 100%

BIOC2365 PRIMARY METABOLISM (3 Credits)

Pre-requisites: BIOC1015 Introduction to Biochemistry (or BIOC1351 Introductory Biochemistry)

Restrictions: Not to be taken by persons who have passed BIOC2351 Biochemistry I

Syllabus: Glycolysis and TCA cycle; emphasis on thermodynamic favourability and regulation of pathways. Catabolism of hexoses other than glucose: disaccharides, glycogen and starch. Gluconeogenesis. Biosynthesis of sucrose, starch and glycogen. Glyoxylate shunt. Pentose phosphate pathways. Photosynthetic carbohydrate synthesis. Oxidation of fatty acids in mitochondria, peroxisomes, and glyoxysomes. Oxidation of unsaturated and odd-chain fatty acids. Ketone bodies. Fatty acid biosynthesis, including long chain and unsaturated fatty acids. Overview of amino acid catabolism. Nitrogen excretion and the urea cycle. Biosynthesis of amino acids. Nitrogen fixation and assimilation. Amino acids as biosynthetic precursors. DNA replication. Protein synthesis: transcription and translation. Regulation of prokaryotic gene expression, e.g. lac operon, trp operon and eukaryotic gene expression. Selected examples of water-soluble vitamins and lipid-soluble vitamins.

Teaching: Eighteen (18) hours of lectures; Six (6) hours of tutorials and Twenty-four (24) hours of practicals.

Method of Examination:

Theory: Final Examination (2 hours)	50%
Theory: In-course Test(s)/Assignment(s)	25%
Practical:	25%

ECOL2460 - ESSENTIALS OF ECOLOGY (3 Credits)

Pre-requisites: BIOL1020 Diversity of Life I (or BIOL1051 Biodiversity I) AND BIOL1025 Diversity of Life II (or Biodiversity II)

Restrictions: Not to be taken by persons who have passed ECOL2051 Population Ecology

Syllabus: Individuals: Coping with environmental variation. **Populations:** Life history, population distribution and abundance and population dynamics. **Interactions among organisms:** Competition, predation and herbivory, parasitism, mutualism and commensalism. **Communities:** The nature of communities, changes in communities and species diversity in communities. **Ecosystems:** Production, energy flow and food webs, nutrient supply and cycling.

Teaching: Twenty-four lectures/tutorials and twenty-four hours of practical per semester.

Method of Examination:

Theory: Final Examination (2 hours)	50%
Theory: In-course Test(s)/Assignment(s)	20%
Practical:	30%

MICR2260 - ESSENTIAL MICROBIOLOGY (3 Credits)

Pre-requisites: BIOL1020 Diversity of Life I (or BIOL1051 Biodiversity I) AND BIOC1015 Introduction to Biochemistry (or BIOC1351 Introductory Biochemistry)

Restrictions: Not to be taken by persons who have passed MICR2251 General Microbiology

Syllabus: An overview of microbial life. Pathways of discovery in microbiology. Microbial systematics. Microscopy. Microorganisms & their natural environments. Impact of microorganisms in human affairs. Cell structure and function. Microbial growth. Microbial control. Microbial diversity. The domain of *Bacteria*. The domain of *Archaea*. Laboratory culture of microorganisms.

Teaching: Twenty-four lectures/tutorials and twenty-four hours of practical per semester.

Method of Examination:

Theory: Final Examination (2 hours)	50%
Theory: In-course Test(s)/Assignment(s)	20%
Practical: Reports, quizzes, test	30%

BIOL2166 - ADVANCED GENETICS I (3 Credits)

Pre-requisites: BIOL1030 Introduction to Genetics

Restrictions: Not to be taken by persons who have passed BIOL2151 Genetics I

Syllabus: Mutation and DNA repair: Gene, point mutations, chromosomal mutations and genomic mutations: origins, consequences and uses. Mutagens, modes of action and uses in mutation analysis. Mechanisms of DNA repair and disease effects of mutations in DNA repair systems. Gene and genome structure: Gene and genome structure and organization in eukaryotes and prokaryotes. Transposons, types and uses in genetic analyses. The C-value paradox and its interpretation. Extranuclear genomes (chloroplasts and mitochondria): Inheritance, detection and consequences of genes in extranuclear genomes. Gene expression regulation and RNA processing: Introns, exons, promoters, leaders, trailers, enhancers and silencers. Bacterial and viral systems: horizontal gene transfer: conjugation, transduction, transformation, lytic and lysogenic infection in bacteriophages and genetic mapping. Introduction to “cutting edge” topics in modern genetics.

Teaching: Eighteen (18) hours of lectures; Six (6) hours of tutorials and Twenty-four (24) hours of practical

Method of Examination:

Theory: Final Examination (2 hours)	50%
Theory: In-course Test(s)/Assignment(s)	25%
Practical: Quizzes, exercises and reports	25%

BIOL2370 - FLOWERING PLANT PHYSIOLOGY (3 Credits)

Pre-requisites: BIOL1020 Diversity of Life I AND BIOC1015 Introduction to Biochemistry

Restrictions: Not to be taken by persons who have passed BIOL2053 Physiology of Plants & Animals or BIOL3053 Developmental Physiology.

Syllabus: Functional anatomy: plant cell types, tissues, primary and secondary growth. **Water movement:** water potential, xylem structure and function. **Mineral nutrition:** nutrient classification, ion movement. **Gas exchange:** guard cell structure and function. **Photosynthesis:** plastids, pigments, light reactions, C3/C4/CAM comparison. **Translocation:** phloem structure & function. **Major stages in plant development:** germination to senescence. **Plant movements:** nutation, tropisms and nasties. **Phytohormones:** major classes, roles in development. Practical experimental design and data analysis**.**

Teaching: Eighteen (18) hours of lectures; Six (6) hours of tutorials and Twenty-four (24) hours of practical.

Method of Examination:

Theory: Final Examination (2 hours)	50%
Theory: In-course Test(s)/Assignment(s)	20%
Practical:	30%

BIOL2371 - ECOPHYSIOLOGY OF ANIMALS (3 Credits)

Pre-requisites: BIOL1025 Diversity of Life II

Restrictions: Not to be taken by persons who have passed BIOL2053 Physiology of Plants & Animals or BIOL3053 Developmental Physiology.

Syllabus: The need for energy. Digestive systems. Acquisition of oxygen. Respiratory surfaces and ventilation in animals. Carriage of oxygen, respiratory pigments, oxygen dissociation curves. Components of circulatory systems; right to left shunting. Renal and extra-renal organs. Osmoregulation and nitrogenous excretion in marine and freshwater animals. The challenge of maintaining water balance on land. Heat transfer between animals and the environment. Ectothermy and endothermy. Adaptations to cold and to hot, dry environments. Experimental design and data analysis.

Teaching: Twenty-four lectures/tutorials and twenty-four hours of practical per semester.

Method of Examination:

Theory: Final Examination (2 hours)	50%
Theory: In-course Test(s)/Assignment(s)	20%
Practical: Laboratory/Field work	30%

***NOTE: Six (6) Credits from the Biological Sciences Elective Courses also to be completed from:**

- **Level II BIOC/BIOL/ECOL/MICR Courses**
- **Level III BIOC/BIOL/ECOL/MICR Courses**

AND

Six (6) other Credits from the Biological Sciences Elective Courses also to be completed from:

- **Level III BIOC/BIOL/ECOL/MICR Courses**

FOUNDATION COURSES INFORMATION

FOUN 1006 EXPOSITION FOR ACADEMIC PURPOSES (3 Credits)

This course is designed to: (1) equip students with the study and research skills they will need in order to get the maximum benefit from all their courses at the University; (2) familiarize them with the linguistic situation in the Caribbean and break down common misconceptions they usually have about it; (3) introduce students to the rhetorical modes of discourse; and (4) develop skill in critical thinking and reading.

(Cannot be taken with FOUN1008)

FOUN 1008 AN INTRODUCTION TO PROFESSIONAL WRITING (3 Credits)

This course is designed to help students develop skills common to all professional, workplace-oriented writing, whether in business or science.

(Cannot be taken with FOUN1006)

FOUN 1101 CARIBBEAN CIVILIZATION (3 Credits)

This course is designed to develop an awareness of the main process of cultural development in Caribbean societies, highlighting the factors, the problematics and the creative output that have fed the emergence of Caribbean identities; to develop a perception of the Caribbean as wider than island nations or linguistic blocs; to stimulate students' interest in, and commitment to Caribbean civilization and to further their self-determination.

FOUN 1301 LAW, GOVERNANCE, ECONOMY AND SOCIETY (3 Credits)

This is a multi-disciplinary course of the Faculty of Social Sciences which is designed mainly for non-Social Sciences students. The course will introduce students to some of the major institutions in Caribbean society. It will expose them to both historical and contemporary aspects of Caribbean society, including Caribbean legal, political and economic systems. In addition, Caribbean culture and Caribbean social problems are discussed.

REPLACING A FOUNDATION COURSE WITH A FOREIGN LANGUAGE COURSE

Students in the Faculty of Science and Technology may replace FOUN1101 Caribbean Civilization OR FOUN1301 Law, Governance, Economy and Society with a foreign language course in French, Spanish, Portuguese or Chinese. Students seeking to do such should notify the faculty office via use of Foundation Course Substitution Form on the student resources page of the faculty website.