THE UNIVERSITY OF THE WEST INDIES

FACULTY OF PURE AND APPLIED SCIENCES MONA

Part B (Addendum)
ACADEMIC YEAR 2008/2010

DEPARTMENT OF BASIC MEDICAL SCIENCES
BIOCHEMISTRY SECTION

BIOC1011/BC10M: **Introductory Biochemistry**
Semester 2 Credits 6 Level 1

Aim: This course is to prepare students from a chemistry background to enter programmes leading majors in Biochemistry, Biotechnology, and Molecular Biology, and to introduce Microbiology.

Pre-requisite: Passes in both units of Chemistry and Biology/Zoology at CAPE (or equivalent)

Syllabus:

1. The structures and biochemical properties of the common biomolecule:
   - Mono-di-olio- and polysaccharides
   - Amino acids peptides and proteins
   - Nucleotides and nucleic acids
   - Fatty acids acyl glycerols and phosphatidates,
   - Sterols and other polyisoprenoids
2. Simple enzyme kinetics:
   - Chemical reaction kinetics
   - The Michaelis-Menten rate equation
   - Reversible enzyme inhibition, the Linewear-Burke plot
   - Regular enzyme: allosteric and covalently modified
3. The homolactic fermentation pathway reactions, other pathways and metabolic regulation in general
4. Simple biochemical thermodynamics; Gibbs Free Energy Electron transport chains; proton gradients and chemiosmosis.
5. Introductory molecular biology
6. The molecular basis of microbial growth, relatedness and diversity
7. Introductory applied and environmental microbiology
8. Microbial biotechnology

A practical course of 72 hours

Evaluation:

Practical reports	20%
Two in-course tests	20%
Two 2 hour written final examination papers	60%

MICR3215: **Food Microbiology and Biotechnology**
Semester 2 Credits 4 Level 3

Course Summary: This course will consider how biotechnology exploits microorganisms in the production of foods. The course will review both traditional as well as modern biotechnological inputs in the food processing industry. The biotechnology of enzymes, fats, oils, flavour and recombinant DNA

technology used in production of novel food ingredients or new food products will be explored. The course will also cover the main characteristics, diagnosis and control of commonly encountered food-borne pathogens, and the significance of currently important and emerging pathogens. Current issues related to genetically modified foods will also be discussed.

Pre-requisite: BIOC2014/BC21D and MICR2211/BC21M
Other qualified students may be admitted by the Head of Department

Syllabus:

1. Microbial ecology of foods
    a. Importance of microbes in foods
    b. Intrinsic factors affecting microbial growth
    c. Microbial growth, death and survival in foods: meat, poultry, seafoods, dairy, fruits, vegetable and grains

2. Microbial examination of foods
    a. Indicator organisms
    b. Rapid methods for identification of microbes or GMOs in foods

3. Overview of food-borne pathogens
    a. Bacteria, yeasts and moulds, parasites, viruses and prions
    b. Recent and potential food-borne pathogens

4. Food technology
    a. Chemical, physical and biological preservation
    b. Sanitation
    c. HACCP/ISO standards

5. Introduction to Food Biotechnology
    a. Importance, advances and trends
    b. Starter cultures
    c. Ethical perspectives of food biotechnology: Environmental impact, safety, intellectual property rights, animal welfare, risk analysis, consumer perceptions, industry perspectives;
    DNA-based methods for food authentication

6. Microbial Synthesis and Production
    a. Flavours
    b. Vitamins

7. Enzyme Biotechnology
    a. Applications of Enzymes in Food Industry: dairy, baking, meat and meat processing
    b. Enzymic processing of fruit juices
    c. Enzymes in Organic Solvents, e.g., Lipases
    d. Enzyme Generation of Flavour and Aroma Compounds
    e. Phytase in animal feeds
    f. Impact of enzyme technology (bioethanol, protein hydrolysates, bioactive peptides).

8. Biotechnology Applied to Fats and Oils
    a. Nutritional Value
    b. Flavour
    c. Lipid Modifications

A practical course of 36 hours

Evaluation:	One 2-hr written paper	60%
	Ten Laboratory and reports	20% (equally weighted)
	Two in-course tests	20% (equally weighted)

NB: *This course will be offered adjacent to BIOT3116/BC35F Biotechnology of Ethanol Fermentation, therefore students will have to choose between BIOT3116 and MICR3215.*

DEPARTMENT OF CHEMISTRY

C31M/CHEM3102: METAL IONS IN SOLUTION

Semester 2 Credits 4 Level 3

Pre-requisite: C21J/CHEM2101 and Permission of HOD

Syllabus: Solubility and the nature of solvents. The environment of metal ions in solutions; studies using spectroscopic and non-spectroscopic techniques. Metal ions in mixed solvents; transfer chemical potentials and ground state-transition state salvation studies. Redox potentials of cations. Acidity of aquo-cations. Polymerisation of aquocations. Reaction mechanisms involving coordinated metal ions; substitution reactions. Electron transfer reaction.

A practical course of 36 hours

Evaluation:

One 2-hr written paper	70%
In-course tests	10%
Practical work	20%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hour duration. Candidates must provide the ORIGINAL notebooks of their laboratory work at the practical examination. These must be duly certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

DEPARTMENT OF CHEMISTRY

OCCUPATIONAL AND ENVIRONMENTAL SAFETY AND HEATH (OESH)

Bachelor of Science

The Bachelors Programme delivers the knowledge and skills to apply OESH competencies in business enterprises and government agencies. These generalists are able to develop, implement and manage basic programmes and to assist in the provision of training and consultancy services.

Minimum Qualifications

In order to be admitted into the Bachelor's programme, candidates must satisfied the general Faculty entry requirements in additional, candidates must have passed two two-units of Chemistry, Biology or Physics at CAPE (or equivalent).

Graduates of this programme will form a core of professionals who will be competent in:

- The recognition, evaluation and provision of basic control options for workplace hazards
- The development, implementation and management of basic OESH programmes
- The provision of OESH training
- Assisting the provision of OESH consultancy services

Programme Structure

The programme runs for three (3) years full-time and is divided into two (2) levels. Level I consists of seven (7) courses which must be completed in year one, while Level II consists of twenty (20) courses plus a practicum, which are completed in years 2 and 3. Most year three courses focus on professional development in OESH. The part-time option runs over six (6) years.

The B.Sc. OESH (Occupational and Environmental Safety and Health) requires 122 credits.

Course Outline

Year 1		**(39 Credits)**
Semester 1		
SH10J/OESH1000	Introduction to OESH	(6 Credits)
BL12B	Diversity of Organisms	(6 Credits)
C10J	Introduction to Chemistry A	(6 Credits)
Semester 2		
C10K	Introduction to Chemistry B	(6 Credits)
BL10L	Cells, Microbiology and Genetics	(6 Credits)

GG10B	Introduction to Physical Geography	(6 Credits)
	Foundation Course	(3 Credits)
Summer	This period maybe used to do any make-up courses.	
Year 2		**(41 Credits)**
Semester 1		
C20J	Chemical Analysis I	(4 Credits)
SH21J/OESH2000	Environmental Contaminants and Control	(8 Credits)
MC29Z	Organizational Communication (Dept. of Media and Communication)	(3 Credits)
BL20N	Ecology (Level II)	(4 Credits)
Semester 2		
C30J	Chemical Analysis II	(4 Credits)
BM-23	Epidemiology and Biostatistics (Department. of Medical Sciences)	(4 Credits)
BM-PH35	Toxicology (Department. of Medical Sciences)	(4 Credits)
BL23D	Eukaryotic Microorganisms	(4 Credits)
	Foundation Course	(3 Credits)
Summer		
PS10C	Introduction to Industrial/Organizational Psychology	(3 Credits)
Year 3		**(42 Credits)**
Semester 1		
SH32J/OESH3200	Occupational Safety Assessment and Measurement	(4 Credits)
SH31J/OESH3100	Environment Hazard Assessment and Risk Management and Control	(4 Credits)
SH30J/OESH3010	Occupational and Environmental Health Disorders	(4 Credits)
SH30K/OESH3020	OESH Measurement Methods	(4 Credits)
M32F	Labour and Employment (and Environmental) Laws	(3 Credits)
Semester 2		
SH32K/OESH3210	Ergonomics	(4 Credits)
SH30L/OESH3030	Workplace Survey and Evaluation	(4 Credits)
SH30M/OESH3040	Disaster and Emergency Management	(4 Credits)
SH32M/OESH3220	Occupational Hygiene	(4 Credits)
	Foundation Course	(3 Credits)
Summer		
SH34J/OESH3430	4 Practicum	(4 Credits)

DEPARTMENT OF GEOGRAPHY & GEOLOGY
Courses Available, 2009/2010

SEMESTER I

Geography

GEOG1101	Introduction to Human Geography	6 credits
GEOG2101	Urban Geography	4 credits
GEOG2202	Atmosphere & Biosphere	4 credits
GEOG3301	Geography of the Caribbean	4 credits
GEOG3103	Tropical Agricultural Systems & Development	4 credits
GGEO3201	Geomorphic Processes & Landforms	4 credits
GGEO3301	Introduction to Geographical Information Systems & Remote Sensing	4 credits

Geology

GEOL1001	Introduction to Earth Sciences I	6 credits
GEOL2001	Palaeontology	4 credits
GEOL2002	Sedimentology	4 credits
GEOL3002	Caribbean Geology	4 credits
GEOL3006	Ore Geology & Industrial Minerals	4 credits
GEOL3010*	Hydrogeology	4 credits
GGEO3201	Geomorphic Processes & Landforms	4 credits
GGEO3301	Introduction to Geographical Information Systems & Remote Sensing	4 credits

SEMESTER II

Geography

GEOG1201	Introduction to Physical Geography	6 credits
GEOG2301	Geographical Thought & Research Methods	4 credits
GEOG2102	Geography & Development	4 credits
GEOG2201	Geosphere & Hydrosphere	4 credits
GEOG3106	Geographies of Tourism	4 credits
GGEO3203	Climate Change in the Tropics	4 credits
GGEO3302	Disaster Management	4 credits
GEOG3401	Geography Research Project	4 credits
GEOG3302	Urban and Regional Planning	4 credits

Geology

GEOL1002	Introduction to Earth Sciences II	6 credits
GEOL2003	Igneous & Metamorphic Petrology	4 credits
GEOL2004	Structural Geology & Geological Mapping	4 credits
GEOL3001	Research Project in Field Geology	4 credits
GEOL3004	Applied Sedimentology & Petroleum Geology	4 credits
GEOL3005	Marine Geology & Geophysics	4 credits
GGEO3203	Climate Change in the Tropics	4 credits
GGEO3302	Disaster Management	4 credits

Please note:

- **GEOG refers to Geography courses, GEOL to Geology courses, and GGEO to courses available to both Geography & Geology students in Level III.**

DEPARTMENT OF LIFE SCIENCES

Major in Marine Biology

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 Part I and must include:

- BL12C / BIOL1016 Cells, Molecular Biology and Genetics
- BL12B / BIOL1261 Diversity of Organisms

The following 32 credits from Part II:

- BL20N/BIOL2014 Ecology
- BL20P/BIOL2015 Biometry
- Z 20G/ZOOL2012 Functional Organization of Animals I (Maintenance Systems)
- Z 20H/ZOOL2013 Functional Organization 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
- BL31A/BIOL3012 Coastal Management.

NB: *In the 2008-2010 Faculty Handbook on Pages 114 and 115 the courses Z20G/ ZOOL2012 and Z20H/ZOOL2013, respectively should be 4 credits each and not 8.*

DEPARTMENT OF MATHEMATICS

MATH1190/M10C MATHEMATICS FOR PURE AND APPLIED SCIENCES
Semester 2 Credits 6 Level I

Pre-requisite: CAPE or GCE A-Level Mathematics, or M08B/MATH0100 and M08C/MATH0110, or equivalent

Syllabus: Review of Algebra and Trigonometry. Vectors in 2 and 3 – dimensions: lines, planes, dot product, cross products. Functions, graphs of elementary functions. Differentiation of single variable functions: First principles, Rolle's theorem, mean - value theorem, L'Hopital's rule, extrema. Anti-derivatives of single variable functions: by parts, chain rule, trigonometric substitution. Fundamental theorem of calculus, definite integral; Introduction to ordinary differential equations: first order equations; second order linear equation. Series: divergence, ratio, root, comparison and limit comparison tests (only what is necessary for '8'). Power Series: radius of convergence, Taylor series, Mclaurin series; Functions of 2 variables: Limits, partial derivatives, continuity, extrema. Complex numbers; polar representation; Matrices: definition, properties solution of linear equation.

Evaluation:		
	One 3-hour paper	85%
	In-course test	15%

NB: This course is designed for students *majoring in Electronics Engineering* only**.**

DEPARTMENT OF PHYSICS

ELET1400: **Introduction to Electronics**
(3 Credits) Semester 2 Level I

Course Description:

This course will adequately review the electronics content of CAPE Physics with extensions into slightly more advanced topics. Students will be introduced to basic concepts in analog and digital electronics, basic semiconductor theory, and analog communication systems (AM, FM, and PM). This course is required for all electronics engineering students and electronics majors and minors. The lab component for this course is offered as a separate teaching lab course (ELET1405).

Prerequisites: CAPE/A-Level Physics or P04A/PHYS0410 and P04B/PHYS0420 or CSEC Physics with CAPE/A-Level Maths or M08B/MATH0100 and M08C/MATH0110

Syllabus: The course consists of three main areas:

1. Introduction to Digital Electronics (8 hours):

   Analog and digital concepts; binary digits and logic levels; digital waveforms; logic gates and truth tables; physical realization of logic gates; Boolean algebra and logic simplification; DeMorgan's theorem; Circuit minimization using Karnaugh maps; Terminologies used in logic designs: Fan in, Fan out, rise time, fall time, propagation delay; debounced switching; Combinational logic circuits:- Decoders, encoders, multiplexers, demultiplexers, parity generators, adders; Number systems, operations and codes; Binary coded Decimal, ASCII, Gray code; Code converters; Lathes, Flip Flops.

2. Introduction to Analog Electronics and Communication Systems (8 hours):

   Introduction to alternating current (AC); Frequency dependent resistive (R), capacitive (C) and inductive (L) circuits; Resonance in RLC circuits; Determination of bandwidth and half-power points. First order response in RLC circuits; The Operational Amplifier; Op amp characteristics; Feedback in op amp circuits; The inverting, summing and non-inverting amplifiers; The differentiator and the integrator; RC filters; First order active filters; Fundamentals of Communication Systems; Amplitude modulation (AM) and demodulation, Frequency modulation (FM) and demodulation, and Digital Communications basic, Basic building block of Transmitters and Receivers.

3. Introduction to Semiconductor Theory and the P-N Junction (8 hours):

Review of the atomic structure and bonding, Conductor, insulator, and semiconductor; Semiconductor materials; Covalent bonded structures in semiconductor; Charge carriers and Energy levels; Energy level diagrams; Intrinsic and Extrinsic semiconductors; Doping; n-type and p-type semiconductors; Drift and Diffusion currents; Resistivity and conductivity; the Fermi Dirac Distribution function; The P-N Junction; P-N junction at Thermal Equilibrium; Junction capacitance; P-N junction diode; Characteristic curve of the p-n junction diode; Forward and reverse biasing; Diode circuits; Zener diodes; Diode data sheets; voltage doubler; Rectification: half wave and full wave; Light emitting diodes (LED); The Bipolar Junction Transistor (BJT); the Field Effect transistor; Biasing the transistor circuit; Transistor as a switch; Relay drivers; Logic gate design with transistors.

Evaluation:	One 2-hour theory examination paper	60%
	Two 1-hour in-course tests (2 x 20%)	40%

ELET1405: Practices in Basic Electronics
(3 Credits) Semester 2 Level I

Course Description:

This laboratory course will be presented in a teaching lab format and is meant to cover the laboratory components of the Introductory Electronics Course (ELET1400). Students will be guided in performing various explorations of the practical aspects of Basic Electronics. Three minor design projects will be an integral part of the course test requirements. Students will be required to write up their experimental results and submit at the end of each class session.

Co-Requisite: ELET1400

Syllabus:

Week 1: Measuring electronic circuit parameters using oscilloscopes and multimeters:
Week 2: Verifying truth tables of logic gates and combinational circuits
Week 3: Designing combinational circuit for special applications
Week 4: Digital circuit design project (in-class)
Week 5: Investigating circuit theorems
Week 6: Investigating Op Amp Circuits
Week 7: Investigating AM and FM communication circuits / systems
Week 8: Analog Circuit Design Project (in-class)
Week 9: Determining the characteristics curve of a p-n junction diode and the half wave rectifier.
Week 10: Evaluating the operation of Full Wave rectifiers and Zener diodes on Voltage regulation
Week 11: Investigating Transistor circuits: Logic operation; LED drivers
Week 12: Semiconductor circuit design project. (in-class)

Evaluation:	Nine Laboratory reports (equal weighting)	15%
	Three design projects (3 x 15%)	45%
	One 2-hour final examination paper	40%

P14B / ELET1420 **Introductory Physics B**
(6 Credits) Semester 2 Level 1

Course Description: This is calculus-based course covering the basic laws and phenomena in Electricity and Magnetism, and Modern Physics. It revises and expands on the CAPE unit 2 Physics topics so as to widen the students understanding and appreciation of this area of Physics.

Pre-requisites: CAPE/A-Level Physics or P04A/PHYS0410 and P04B/PHYS0420 or CSEC Physics with CAPE/A-Level Mathematics or M08B/MATH0100 and M08C/MATH0110

Syllabus: The course consists of two main areas:

1. Electricity and Magnetism (20 Lectures):

- **Electric field and potential:** The electric field E due to extended charge distributions; Integral and differential expressions relating the electric potential V to the E field; Potential due to a dipole and other extended charge distributions.
- **Gauss' Law:** Application to problems with spherical, cylindrical and rectangular symmetry.
- **Capacitance:** Calculation of the capacitance of various capacitors; Energy stored in a capacitor; RC circuits; Time constant.
- **Magnetism:** Magnetic force on current-carrying wire and its application to cases needing calculus treatment; Magnetic torque on a current loop; Magnetic moment of a current loop; The Hall-Effect; Biot-Savart Law and Ampere's Law, and their application to long current-carrying wire, loop, and solenoid.
- **Electromagnetic Induction:** Faraday's Law and Lenz's Law; Electro-magnetic induction and its applications; Self Induction; Inductance; RL circuits
- **Electromagnetic Oscillations and Alternating Currents:** LC Oscillation; Damped oscillation in an RLC circuit; Alternating current; Forced oscillation; RLC circuits; Power in AC circuits; the Transformer; Introduction to the Electromagnetic wave.

2. Modern Physics (16 Lectures)

- **Bohr Atom:** Spectral series for hydrogen, Bohr's postulates, derivation of energy levels, blackbody radiation and quantized energy levels (qualitative).
- **Waves & Corpuscles:** Wave-particle duality; photo-electric

effect; Compton-effect; energy, momentum and wavelength of a photon, deBroglie's equation, wave function, particle in a box.

- **Special Relativity:** Galilean relativity; Einstein postulates; Lorentz transformation; simultaneity; time dilation; length contraction; derivation of velocity transformations, the equation $E^2 = p^2c^2 + m_o^2c^4$ and its applications.

- **Particle Physics and the Big Bang:** Elementary particles; Three groups; Conservation Laws; Eightfold way; Quarks; Fundamental interactions and their unification; The standard model; The history of the universe.

Evaluation:	One 3-hour theory examination paper	70%
	Two 1-hour in-course tests (10% each)	20%
	Laboratory Report (Averaged of 10 labs at 10% each)	10%

N.B. *The Department of Physics will be launching a new programme, Bachelor of Science in Electronics Engineering for the 2009/2010 academic year. For further information kindly contact the department.*