



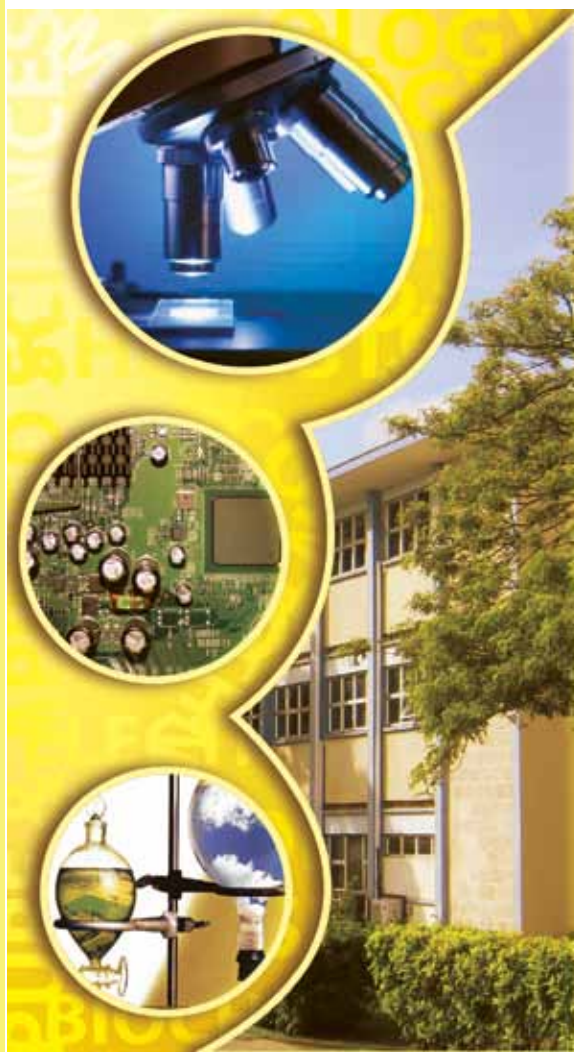
THE UNIVERSITY OF THE WEST INDIES  
CAVE HILL CAMPUS, BARBADOS

# THE FACULTY OF PURE & APPLIED SCIENCES

**PROGRAMMES & COURSES  
HANDBOOK**

# 2011-2012

## Information Guide







THE UNIVERSITY OF THE WEST INDIES  
CAVE HILL CAMPUS

FACULTY OF PURE AND APPLIED SCIENCES  
UNDERGRADUATE PROGRAMMES & COURSES HANDBOOK 2011-2012

<http://www.cavehill.uwi.edu/fpas>

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This booklet gives information on Courses offered in the Faculty of Pure and Applied Sciences at the Cave Hill Campus of the University of the West Indies (Barbados). For courses offered at the other Campuses, please see Faculty booklets for the Mona (Jamaica) and St. Augustine (Trinidad & Tobago) and the Open Campus.

This Guide is intended for students entering the Faculty of Pure and Applied Sciences from academic year 2011 – 2012. Continuing students must refer to Faculty Regulations that govern their year of entry – available on the Faculty website.

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THE UNIVERSITY RESERVES THE RIGHT TO MAKE SUCH CHANGES TO THE CONTENTS OF THIS PUBLICATION AS MAY BE DEEMED NECESSARY.

**Disclaimer:**

The information in this booklet is accurate at the time of printing. Subsequent publications may therefore reflect updated information. Students should consult their Dean where clarification is required.

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## INTRODUCTION TO THE FACULTY

The University of the West Indies is a regional and international institution primarily serving the needs of the Commonwealth Caribbean. Established in 1948 at Mona, Jamaica, as a college in special relationship with the University of London, it received full university status in 1962, as an independent degree-granting institution. In 1960, a second campus was established at St Augustine, Trinidad, and in 1963 teaching started in Barbados, first at a temporary site at the Bridgetown Port and then at the Cave Hill Campus.

Sciences have been taught at the Cave Hill Campus of the University of the West Indies from its inception. The Faculty was formerly known as the Faculty of Natural Sciences and later the Faculty of Science & Technology before settling on the current name of the Faculty of Pure & Applied Sciences. Our full-time Academic Staff are mainly Caribbean nationals but we are also very much an international Faculty with about one third of our lecturers drawn from countries far and wide. Our degree programmes are well-respected regionally and internationally with many of our graduates working or pursuing further studies overseas. The Faculty comprises three sections:-

- Department of Biological & Chemical Sciences – undergraduate & graduate programmes
- Department of Computer Science, Mathematics & Physics – undergraduate & graduate programmes
- Centre for Resource Management and Environmental Studies (CERMES) – graduate programmes

In the undergraduate BSc programme, courses are offered in all major scientific disciplines, with first year courses also taught at Tertiary Level Colleges in Antigua and St. Lucia. Students may Major in one or two disciplines and current enrollment in the Faculty is just over one thousand undergraduates, most of whom are full-time students.

Science graduates may register for the research degrees of M.Phil. and Ph.D. under the supervision of a member of the Academic Staff. The Faculty also offers two taught MSc. programmes, MSc. in Natural Resource and Environmental Management and MSc. in Electronic Commerce.

The research interests in the Faculty are diverse, addressing both fundamental questions in Science as well as finding scientific solutions to real life problems facing Caribbean people. Faculty members also constitute an unmatched source of expertise to Governments, Non-Governmental Organisations and the Private Sector in providing technical advice.

The Sports Agronomy Research Unit (SARU), within the Department of Biological & Chemical Sciences, conducts basic and contract research and provides consultancy services in the area of living grass surfaces for sporting and recreational activities. It complements the UWI Centre for Cricket Excellence.

Through collaboration with the Caribbean Institute for Meteorology and Hydrology, the Faculty offers a Major in Meteorology within the BSc degree.

## CALENDAR: 2011-2012

### Semester 1

Payment of Fees	by Sunday August 28, 2011
Registration Period	August 29 – September 02, 2011
	From 10:00am – Midnight, daily
Semester Begins	Sunday August 28, 2011
Teaching Begins	Monday September 05, 2011
Application for Leave of Absence	by Friday September 16, 2011
Change in Registration (Add/Drop)	by Friday September 16, 2011
Teaching Ends	Friday December 02, 2011
Examinations Begin	Monday December 05, 2011
Examinations Ends	Wednesday December 21, 2011
Semester Ends	Wednesday December 21, 2011

### Semester 2

Payment of Fees	by Sunday January 22, 2012
Semester Begins	Sunday January 22, 2012
Teaching Begins	Monday January 23, 2012
Application for Leave of Absence	by Friday February 10, 2012
Change in Registration (Add/Drop)	by Friday February 10, 2012
Teaching Ends	Friday April 20, 2012
Semester Break	April 23 - April 27, 2012
Examinations Begin	Friday April 20, 2012
Examinations Ends	Friday May 18, 2012
Semester Ends	Friday May 18, 2012

### Graduation

Cave Hill	October 22, 2011
St. Augustine	October 27-29, 2011
Mona	November 4-5, 2011
Open Campus	October 15, 2011

## APPENDIX I

### **(a) List of approved Science CAPE / GCE A-Level subjects.**

Applied Mathematics \*  
Biology  
Botany  
Chemistry  
Computer Science  
Environmental Science  
Further Mathematics \*  
Geography  
Geology  
Physics  
Pure & Applied Mathematics  
Pure Mathematics\*  
Zoology

\* The following cannot be counted together:

- (i) Further Mathematics with Applied Mathematics  
CAPE/GCE A-Level;
- (ii) Mathematics (Pure and Applied) with Pure  
Mathematics or Applied Mathematics at  
CAPE/GCE A-Level.

### **(b) List of Approved Science CSEC General Proficiency/GCE O-Level subjects:**

Additional Mathematics  
Biology  
Chemistry  
Computer Science  
Geography  
Information Technology (General)  
Integrated Science  
Physics

## APPENDIX II

### **List of Majors in the UWI Science Faculties:**

Agriculture  
Alternative Energy  
Applied Chemistry  
Biochemistry \*  
Biology\*  
Biotechnology  
Botany  
Chemistry \*  
Computer Science \*  
Earth Science  
Ecology \*  
Electronics \*  
Environmental Biology  
Experimental Biology  
Food Chemistry  
Geology  
Information Technology \*  
Mathematics \*  
Meteorology \*  
Microbiology \*  
Molecular Biology  
Physics \*  
Zoology

\* Offered at Cave Hill



## APPENDIX III

### FOUNDATION COURSES

FOUN 0100 – Fundamentals of Written English

<sup>1</sup>FOUN 1001 – English for Academic Purposes

<sup>1</sup>FOUN 1008 – Rhetoric II: Writing for Special Purposes

FOUN 1101 – Caribbean Civilization

<sup>2</sup>FOUN 1210 – Science, Medicine & Technology in Society

FOUN 1301 – Law, Governance, Economy & Society

<sup>1</sup> Both courses cannot be taken - students must choose one or the other

<sup>2</sup> Not normally available to Science Faculty Students

### FOUN 0100 FUNDAMENTALS OF WRITTEN ENGLISH (0 Credits)

This course is required for all students entering the University who are not exempted from the Proficiency Test and have not taken it or failed it.

### FOUN 1001 ENGLISH FOR ACADEMIC PURPOSES (3 Credits)

This course is designed to: 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; to familiarize them with the linguistic situation in the Caribbean and break down certain misconceptions they usually have about it and to introduce students to the rhetorical modes of discourse.

### FOUN 1008 RHETORIC II; WRITING FOR SPECIAL PURPOSES (3 Credits)

This course is designed to equip students across the disciplines (particularly the Social Sciences, Law, Pure and Applied Sciences) with skills in business, technical and scientific writing.

### 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 1210 SCIENCE, MEDICINE AND TECHNOLOGY IN SOCIETY (3 Credits)

The overall aim of the course is to develop the ability of the student to engage in an informed manner in public discourse on matters pertaining to the impact of science, medicine and technology on society. The course will help students to appreciate the essential characteristics of the scientific method as a mode of enquiry into nature and to understand why it provides the foundations of the technological world.

### 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.

## APPENDIX IV

### FPAS CREDIT TABLE

The following table describes the approximate weekly contact hours for one-semester (thirteen teaching weeks) courses. One credit is obtained for every hour of lecture/tutorial/problem class per week OR two hours laboratory sessions per week, for a semester. A normal full-time load in Part I is 16-18 credits per semester (excluding Foundation courses). A normal load for a student in Part II (Advanced) is 16 credits (four 4-credit courses) per semester (excluding Foundation courses).

		LABORATORY COURSES (WEEKLY HOURS)			NON-LABORATORY COURSES (WEEKLY HOURS)		
		LECTURE	TUTORIAL	LABORATORY	LECTURE	TUTORIAL	CREDITS
PART I	PRELIM	3	1	4-6	5	1	6
	LEVEL 1	3	0	4-6	5	1	6
		2	1	2-3	3	1	4
PART II	LEVELS 2 & 3	2	1	2-3	3	1	4
		2	0	4			4

## APPENDIX V

### GRADING SYSTEM

Table 1: Mark-to-Grade Conversion & Quality Points (GPA SYSTEM)

Grade	Mark (%)	QP	Grade	Mark (%)	QP
A+	86 – 100	4.3	C+	53 – 56	2.3
A	70 – 85	4.0	C	50 – 52	2.0
A-	67 – 69	3.7	C-	47 – 49	1.7
B+	63 – 66	3.3	D+	43 – 46	1.3
B	60 – 62	3.0	D	40 – 42	1.0
B-	57 – 59	2.7	F	0 – 39	0

Table 2: GPA to Honours Conversion

Class of Honours	Cumulative GPA
First	3.60 and above
Upper Second	3.00 – 3.59
Lower Second	2.00 – 2.99
Pass	1.00 – 1.99

## APPENDIX VI

### OPTIONS IN CONJUNCTION WITH OTHER FACULTIES

#### A. Programmes with the Faculty of Social Sciences

Under an agreement with the Faculty of Social Sciences, a limited number of students will be allowed to pursue the following cross-Faculty programmes, subject to timetable restrictions:-

- Computer Science & Accounting
- Computer Science with Accounting
- Computer Science & Economics
- Computer Science with Economics
- Computer Science & Management
- Computer Science with Management
- Information Technology & Accounting
- Information Technology with Accounting
- Information Technology & Economics
- Information Technology with Economics
- Information Technology & Management
- Information Technology with Management
- Mathematics & Economics
- Mathematics with Economics
- Mathematics and Accounting
- Mathematics with Accounting
- Science Major & Management
- Science Major with Management

#### COMPUTER SCIENCE AND ACCOUNTING:

##### LEVEL I

COMP1105	Computer Programming I
COMP1115	Computer Programming II
MATH1101	Basic Mathematics I
MATH1110	Applied Statistics
ACCT1002	Introduction to Financial Accounting
ACCT1003	Cost and Management Accounting I
ECON1001	Introduction to Microeconomics
ECON1002	Introduction to Macroeconomics
MGMT1001	Principles of Management

##### AND

ELET1110	Digital Electronics
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##### OR

FOUR (4) Level I Credits from any Faculty

##### AND

FOUN1001	English For Academic Purposes
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##### OR

FOUN1008	Rhetoric II: Writing for Special Purposes
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##### LEVEL II

COMP2105	Discrete Mathematics
COMP2115	Information Structures
COMP2125	Computer Architecture
COMP2145	Software Engineering I
ACCT2014	Financial Accounting I
ACCT2015	Financial Accounting II
MGMT2023	Financial Management
FOUN1101	Caribbean Civilization

**LEVEL II ACCOUNTING ELECTIVES**

AND Six (6) Credits From:

ACCT2018	Government Accounting
MKTG2001	Principles of Marketing
MGMT2005	Microcomputer Applications for Business
MGMT2008	Organisational Behaviour
MGMT2020	Managerial Economics
MGMT2006	Management Information Systems I
MGMT2021	Business Law I

**LEVEL III**

COMP3100	Operating Systems
COMP3180	Algorithm Design and Analysis
ACCT2017	Intermediate Cost Accounting
ACCT3043	Auditing
FOUN1301	Law, Governance and Society

*And One Level III COMP course*

*And One Level II/III COMP course*

**AND Either**

ACCT3040	Accounting Theory
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**OR**

ACCT3041	Advanced Financial Accounting
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**AND Six (6) Credits From Accounting Electives:**

ACCT3015	Accounting Information Systems
ACCT3039	Cost & Management Accounting II
ACCT3040	Advanced Accounting Theory
ACCT3041	Advanced Financial Accounting
ACCT3044	Advanced Auditing
MGMT3023	Independent Study
MGMT3024	Managerial Communications
MGMT3048	Financial Management II
MGMT3049	Financial Institutions and Markets
MGMT3052	Taxation and Tax Management
MGMT3072	Services Sector Accounting

**COMPUTER SCIENCE WITH ACCOUNTING**

**LEVEL 1**

COMP1105	Computer Programming I
COMP1115	Computer Programming II
MATH1101	Basic Mathematics I
MATH1110	Applied Statistics
ACCT1002	Introduction to Financial Accounting
ACCT1003	Cost & Management Accounting I
ECON1001	Introduction to Microeconomics
ECON1002	Introduction to Macroeconomics
MGMT1001	Principles of Management

**AND**

ELET1110	Digital Electronics
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**OR**

FOUR (4) Level 1 Credits from any Faculty

**LEVEL II**

COMP2105	Discrete Mathematics
COMP2115	Information Structures
COMP2125	Computer Architecture
COMP2145	Software Engineering I
ACCT2014	Financial Accounting I
ACCT2015	Financial Accounting II
ACCT2017	Management Accounting

**LEVEL III**

COMP3100	Operating Systems
COMP 3180	Algorithm Design and Analysis
ACCT3043	Auditing

**AND**

ACCT3040	Accounting Theory
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**OR**

ACCT3041	Advanced Financial Accounting
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*And One Level III COMP Course*

***And One Level II/III COMP Course  
AND Fourteen (14) Level II/III Credits***

**FOUN**

FOUN 1008 Rhetoric II: Special Purposes

**OR**

FOUN 1001 English for Academic Purposes

**AND**

FOUN1101 Caribbean Civilization

FOUN1301 Law, Governance and Society

**COMPUTER SCIENCE AND ECONOMICS**

**LEVEL I**

COMP1105 Computer Programming I

COMP1115 Computer Programming II

MATH1101 Basic Mathematics I

MATH1110 Applied Statistics

ECON1001 Introduction to Microeconomics

ECON1002 Introduction to Macroeconomics

**AND Eight (8) Level I Credits**

**LEVEL II**

COMP2105 Discrete Mathematics

COMP2115 Information Structures

COMP2125 Computer Architecture

COMP2145 Software Engineering I

ECON2000 Intermed. Microeconomics I

ECON2001 Intermed. Microeconomics II

ECON2002 Intermed. Macroeconomics I

ECON2003 Intermed. Macroeconomics II

ECON2008 Statistical Methods I

**LEVEL III**

COMP3100 Operating Systems

COMP3180 Algorithm Design and Analysis

ECON3049 Econometrics I

***One Level III COMP course***

***One Level II/III COMP course***

***Four Level II/III ECON courses***

**FOUN**

FOUN 1008 Rhetoric II: Special Purposes

**OR**

FOUN 1001 English for Acad. Purposes

**AND**

FOUN 1101 Caribbean Civilisation

FOUN1301 Law, Governance and Society

**COMPUTER SCIENCE WITH ECONOMICS**

**LEVEL I**

COMP1105	Computer Programming I
COMP1115	Computer Programming II
MATH1101	Basic Mathematics I
MATH1110	Applied Statistics
ECON1001	Introd. to Microeconomics
ECON1002	Introd. to Macroeconomics

**AND Eight (8) Level I Credits**

**LEVEL II**

COMP2105	Discrete Mathematics
COMP2115	Information Structures
COMP2125	Computer Architecture
COMP2145	Software Engineering I
ECON2000	Intermed. Microeconomics I
ECON2001	Intermed. Microeconomics II
ECON2002	Intermed. Macroeconomics I
ECON2003	Intermed. Macroeconomics II

**AND One Level II/III ECON course**

**LEVEL III**

COMP3100	Operating Systems
COMP3180	Algorithm Design and Analysis

**One Level III COMP course**

**One Level II/III COMP course**

**And Fifteen Level II/III credits**

**FOUN**

FOUN 1008	Rhetoric II: Special Purposes
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**OR**

FOUN 1001	English for Acad. Purposes
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**AND**

FOUN 1101	Caribbean Civilisation
FOUN1301	Law, Governance and Society

**COMPUTER SCIENCE AND MANAGEMENT**

**LEVEL I**

COMP1105	Computer Programming I
COMP1115	Computer Programming II
MATH1101	Basic Mathematics I
MATH1110	Applied Statistics
ACCT1002	Introduction to Financial Accounting
ACCT1003	Cost and Management Accounting I
ECON1001	Introduction to Microeconomics
ECON1002	Introduction to Macroeconomics
MGMT1001	Principles of Management

**AND**

ELET1110	Digital Electronics
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**OR**

FOUR (4) Level I Credits from any Faculty

**AND**

FOUN1001	English for Academic Purposes
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**OR**

FOUN1008	Rhetoric II: Writing for Special Purposes
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**LEVEL II**

COMP2105	Discrete Mathematics
COMP2115	Information Structures
COMP2125	Computer Architecture
COMP2145	Software Engineering I
MKTG2001	Principles of Marketing
MGMT2006	Information Systems I
MGMT2008	Organisational Behaviour
MGMT2020	Managerial Economics
MGMT2023	Financial Management
MGMT2026	Production & Operations Management

**AND**

FOUN1101	Caribbean Civilization
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**LEVEL III**

COMP3100 Operating Systems  
COMP3180 Algorithm Design and Analysis  
MGMT3017 Human Resources Management

**AND**

FOUN1301 Law, Governance and Society

**AND**

*One Level III COMP course*

*One Level II/III COMP course*

**AND Nine (9) Credits from LEVEL III Electives:**

ACCT3015 Accounting Information Systems  
ACCT3039 Advanced Management &  
Cost Accounting  
MGMT3011 Management Information Systems II  
MGMT3018 Industrial Relations  
MGMT3022 Organisational Development  
MGMT3033 Business, Government and Society  
MGMT3037 International Business  
MGMT3038 Cross-National Management  
MGMT3045 Business Law II  
MGMT3048 Financial Management II  
MGMT3049 Financial Institutions and Markets  
MGMT3052 Taxation and Tax Management  
MGMT3053 International Financial Management  
MGMT3056 Project Management  
MGMT3058 New Venture Management  
MGMT3075 Public Enterprise Management  
MGMT3076 Managing Financial Institutions  
MKTG3000 Marketing Management  
MKTG3001 International Marketing Management  
MKTG3002 Marketing Research  
MKTG3009 Services Marketing

**COMPUTER SCIENCE WITH MANAGEMENT**

**LEVEL I**

COMP1105 Computer Programming I  
COMP1115 Computer Programming II  
MATH1101 Basic Mathematics I  
MATH1110 Applied Statistics  
ACCT1002 Introduction to Financial Accounting  
ACCT1003 Cost & Management Accounting I  
ECON1001 Introduction to Microeconomics  
ECON1002 Introduction to Macroeconomics  
MGMT1001 Principles of Management

**AND**

ELET1110 Digital Electronics

**OR**

FOUR (4) Level I Credits from any Faculty

**AND**

FOUN1001 English for Academic Purposes

**OR**

FOUN1008 Rhetoric II: Writing for Special Purposes

**LEVEL II**

COMP2105 Discrete Mathematics  
COMP2115 Information Structures  
COMP2125 Computer Architecture  
COMP2145 Software Engineering I  
MKTG2001 Principles of Marketing  
MGMT2006 Management Information Systems I  
MGMT2008 Organizational Behaviour  
MGMT2023 Financial Management  
FOUN1101 Caribbean Civilization

**LEVEL III**

COMP3100	Operating Systems
COMP3180	Algorithm Design and Analysis
MGMT3017	Human Resources Management
FOUN1301	Law, Governance and Society

**AND**

*One Level III COMP course*

*One Level II/III COMP course*

**AND**

Fourteen (14) Level II/III credits

**INFORMATION TECHNOLOGY AND ACCOUNTING**

**LEVEL I**

COMP1105	Computer Programming I
COMP1115	Computer Programming II
MATH1101	Basic Mathematics I
MATH1110	Applied Statistics
ACCT1002	Introduction to Financial Accounting
ACCT1003	Cost and Management Accounting I
ECON1001	Introduction to Microeconomics
ECON1002	Introduction to Macroeconomics
MGMT1001	Principles of Management

**AND**

ELET1110 Digital Electronics

**OR**

FOUR (4) Level I Credits from any Faculty

**AND**

FOUN1001 English for Academic Purposes

**OR**

FOUN1008 Rhetoric II: Writing for Special Purposes

**LEVEL II**

COMP2105	Discrete Mathematics
COMP2115	Information Structures
COMP2145	Software Engineering I
COMP2160	Object-Oriented Programming
ACCT2014	Financial Accounting I
ACCT2015	Financial Accounting II
MGMT2023	Financial Management
FOUN1101	Caribbean Civilization

**AND Six (6) Credits From Accounting Electives:**

ACCT2018	Government Accounting
MKTG2001	Principles of Marketing



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MGMT2005	Microcomputer Applications for Business
MGMT2008	Organisational Behaviour
MGMT2020	Managerial Economics
MGMT2006	Management Information Systems I
MGMT2021	Business Law I

**LEVEL III**

FOUN1301	Law, Governance and Society
COMP3160	Database Management Studies
COMP3170	Web-Based Applications
ACCT2017	Intermediate Cost Accounting
ACCT3043	Auditing

**AND**

ACCT3040 Accounting Theory

**OR**

ACCT3041 Advanced Financial Accounting

**AND**

*One Level III COMP course*

*One Level II/III COMP course*

**AND Six (6) Credits From Accounting Electives:**

ACCT3015	Accounting Information Systems
ACCT3039	Cost & Management Accounting II
ACCT3040	Advanced Accounting Theory
ACCT3041	Advanced Financial Accounting
ACCT3044	Advanced Auditing
MGMT3023	Independent Study
MGMT3024	Managerial Communications
MGMT3048	Financial Management II
MGMT3049	Financial Institutions and Markets
MGMT3052	Taxation and Tax Management
MGMT3072	Services Sector Accounting

**INFORMATION TECHNOLOGY WITH ACCOUNTING**

**LEVEL I**

COMP1105	Computer Programming I
COMP1115	Computer Programming II
MATH1101	Basic Mathematics I
MATH1110	Applied Statistics
ACCT1002	Introduction to Financial Accounting
ACCT1003	Cost & Management Accounting I
ECON1001	Introduction to Microeconomics
ECON1002	Introduction to Macroeconomics
MGMT1001	Principles of Management

**AND**

ELET1110 Digital Electronics

**OR**

FOUR (4) Level I Credits from any Faculty

**AND**

FOUN1001 English for Academic Purposes

**OR**

FOUN1008 Rhetoric II: Writing for Special Purposes

**LEVEL II**

COMP2105	Discrete Mathematics
COMP2115	Information Structures
COMP2145	Software Engineering I
COMP2160	Object-Oriented Programming
ACCT2014	Financial Accounting I
ACCT2015	Financial Accounting II
ACCT2017	Management Accounting
FOUN1101	Caribbean Civilization

**LEVEL III**

COMP3160	Database Management Studies
COMP3170	Web-Based Applications
ACCT3043	Auditing
FOUN1301	Law, Governance and Society

**AND**

*One Level III COMP course*

*One Level II/III COMP course*

**AND**

ACCT3040 Accounting Theory

**OR**

ACCT3041 Advanced Financial Accounting

**AND**

Fourteen (14) Level II/III Credits

## INFORMATION TECHNOLOGY AND ECONOMICS

### LEVEL I

COMP1105 Computer Programming I

COMP1115 Computer Programming II

MATH1101 Basic Mathematics I

MATH1110 Applied Statistics

ECON1001 Introd. to Microeconomics

ECON1002 Introd. to Macroeconomics

### **AND Eight (8) Level I Credits**

### LEVEL II

COMP2105 Discrete Mathematics

COMP2115 Information Structures

COMP2145 Software Engineering I

COMP2160 Object-Oriented Programming

ECON2000 Intermed. Microeconomics I

ECON2001 Intermed. Microeconomics II

ECON2002 Intermed. Macroeconomics I

ECON2003 Intermed. Macroeconomics II

ECON2008 Statistical Methods I

### LEVEL III

COMP3160 Database Management Studies

COMP3170 Web-Based Applications

ECON3049 Econometrics I

*One Level III COMP course*

*One Level II/III COMP course*

*Four Level II/III ECON courses*

### FOUN

FOUN 1008 Rhetoric II: Special Purposes

**OR**

FOUN 1001 English for Acad. Purposes

**AND**

FOUN 1101 Caribbean Civilisation

FOUN1301 Law, Governance and Society

## INFORMATION TECHNOLOGY WITH ECONOMICS

### LEVEL I

COMP1105	Computer Programming I
COMP1115	Computer Programming II
MATH1101	Basic Mathematics I
MATH1110	Applied Statistics
ECON1001	Introd. to Microeconomics
ECON1002	Introd. to Macroeconomics

**AND Eight (8) Level I Credits**

### LEVEL II

COMP2105	Discrete Mathematics
COMP2115	Information Structures
COMP2145	Software Engineering I
COMP2160	Object-Oriented Programming
ECON2000	Intermed. Microeconomics I
ECON2001	Intermed. Microeconomics II
ECON2002	Intermed. Macroeconomics I
ECON2003	Intermed. Macroeconomics II

**AND One Level II/III ECON course**

### LEVEL III

COMP3160	Database Management Studies
COMP3170	Web-Based Applications

**One Level III COMP course**

**One Level II/III COMP course**

**And Fifteen (15) Level II/III credits**

### FOUN

FOUN 1008	Rhetoric II: Special Purposes
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### OR

FOUN 1001	English for Acad. Purposes
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### AND

FOUN 1101	Caribbean Civilisation
FOUN1301	Law, Governance and Society

## INFORMATION TECHNOLOGY AND MANAGEMENT

### LEVEL I

COMP1105	Computer Programming I
COMP1115	Computer Programming II
MATH1101	Basic Mathematics I
MATH1110	Applied Statistics
ACCT1002	Introduction to Financial Accounting
ACCT1003	Cost and Management Accounting I
ECON1001	Introduction to Microeconomics
ECON1002	Introduction to Macroeconomics
MGMT1001	Principles of Management

### AND

ELET1110	Digital Electronics
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### OR

FOUR (4) Level I Credits from any Faculty

### AND

FOUN1001	English for Academic Purposes
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### OR

FOUN1008	Rhetoric II: Writing for Special Purposes
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### LEVEL II

COMP2105	Discrete Mathematics
COMP2115	Information Structures
COMP2145	Software Engineering I
COMP2160	Object-Oriented Programming
MKTG2001	Principles of Marketing
MGMT2006	Management Information Systems I
MGMT2008	Organisational Behaviour
MGMT2020	Managerial Economics
MGMT2023	Financial Management
MGMT2026	Production & Operations Management

### AND

FOUN1101	Caribbean Civilization
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**LEVEL III**

COMP3160	Database Management Systems
COMP3170	Web-Based Applications
MGMT3017	Human Resources Management

**AND**

FOUN1301	Law, Governance and Society
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**AND**

***One Level III COMP course***

***One Level II/III COMP course***

**AND Nine (9) Credits from Level III Electives:**

ACCT3015	Accounting Information Systems
ACCT3039	Advanced Management & Cost Accounting
MGMT3011	Management Information Systems II
MGMT3018	Industrial Relations
MGMT3022	Organisational Development
MGMT3033	Business, Government and Society
MGMT3037	International Business
MGMT3038	Cross-National Management
MGMT3045	Business Law II
MGMT3048	Financial Management II
MGMT3049	Financial Institutions and Markets
MGMT3052	Taxation and Tax Management
MGMT3053	International Financial Management
MGMT3056	Project Management
MGMT3058	New Venture Management
MGMT3075	Public Enterprise Management
MGMT3076	Managing Financial Institutions
MKTG3000	Marketing Management
MKTG3001	International Marketing Management
MKTG3002	Marketing Research
MKTG3009	Services Marketing

**INFORMATION TECHNOLOGY WITH MANAGEMENT**

**LEVEL I**

COMP1105	Computer Programming I
COMP1115	Computer Programming II
MATH1101	Basic Mathematics I
MATH1110	Applied Statistics
ACCT1002	Introduction to Financial Accounting
ACCT1003	Cost & Management Accounting I
ECON1001	Introduction to Microeconomics
ECON1002	Introduction to Macroeconomics
MGMT1001	Principles of Management

**AND**

ELET1110	Digital Electronics
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**OR**

FOUR (4) Level I Credits

**LEVEL II**

COMP2105	Discrete Mathematics
COMP2115	Information Structures
COMP2145	Software Engineering I
COMP2160	Object-Oriented Programming
MKTG2001	Principles of Marketing
MGMT2006	Management Inform. Systems I
MGMT2008	Organizational Behaviour
MGMT2023	Financial Management

**LEVEL III**

COMP3160	Database Management Systems
COMP3170	Web-Based Applications
MGMT3017	Human Resources Management

**AND**

***One Level III COMP course***

***One Level II/III COMP course***

**AND**

**Fourteen (14) Level II/III credits**

**FOUN**

FOUN 1008 Rhetoric II: Special Purposes

**OR**

FOUN 1001 English for Academic Purposes

**AND**

FOUN 1101 Caribbean Civilization

FOUN1301 Law, Governance and Society

**MATHEMATICS AND ACCOUNTING**

**LEVEL I**

ACCT1002 Introduction to Financial Accounting

ACCT1003 Cost & Mangt. Accounting I

ECON1001 Introduction to Microeconomics

ECON1002 Introduction to Macroeconomics

MGMT1001 Principles of Management

MATH1100 Basic Mathematics

MATH1110 Applied Statistics

MATH1120 Calculus I

MATH1130 Calculus II

COMP1105 Computer Programming I

**LEVEL II**

MATH2100 Abstract Algebra

MATH2110 Linear Algebra

MATH2120 Analysis & Methods I

MATH2130 Ord. Differential Equations

ACCT2014 Financial Accounting I

ACCT2015 Financial Accounting II

MGMT2023 Financial Management

**AND Six (6) Credits From:**

ACCT2018 Government Accounting

MKTG2001 Principles of Marketing

MGMT2005 Microcomputer Appl. for Business

MGMT2006 Management Inform. Systems I

MGMT2008 Organisational Behaviour

MGMT2020 Managerial Economics

MGMT2021 Business Law I

**LEVEL III**

**Two Level III MATH courses**

**Two Level II/III MATH courses**

ACCT2017 Intermediate Cost Accounting

ACCT3043 Auditing

**AND**

ACCT3040 Accounting Theory

**OR**

ACCT3041 Advanced Financial Accounting

**AND Six (6) Credits From:**

ACCT3015 Accounting Info. Systems

ACCT3039 Cost & Managt. Accounting II

ACCT3040 Advanced Accounting Theory

ACCT3041 Adv. Financial Accounting

ACCT3044 Advanced Auditing

MGMT3023 Independent Study

MGMT3024 Managerial Communications

MGMT3048 Financial Management II

MGMT3049 Fin. Institutions and Markets

MGMT3052 Taxation and Tax Mangt.

MGMT3072 Services Sector Accounting

**FOUN**

FOUN 1008 Rhetoric II: Special Purposes

**OR**

FOUN 1001 English for Academic Purposes

**AND**

FOUN 1101 Caribbean Civilization

FOUN1301 Law, Governance and Society

**MATHEMATICS WITH ACCOUNTING**

**LEVEL I**

ACCT1002 Introduction to Financial Accounting

ACCT1003 Cost & Mangt. Accounting I

ECON1001 Introduction to Microeconomics

ECON1002 Introduction to Macroeconomics

MGMT1001 Principles of Management

MATH1100 Basic Mathematics

MATH1110 Applied Statistics

MATH1120 Calculus I

MATH1130 Calculus II

COMP1105 Computer Programming I

**LEVEL II**

MATH2100 Abstract Algebra

MATH2110 Linear Algebra

MATH2120 Analysis & Methods I

MATH2130 Ord. Differential Equations

ACCT2014 Financial Accounting I

ACCT2015 Financial Accounting II

ACCT2017 Intermediate Cost Accounting

**LEVEL III**

**Two Level III MATH courses**

**Two Level II/III MATH courses**

ACCT3043 Auditing

**AND**

ACCT3040 Accounting Theory

**OR**

ACCT3041 Adv. Financial Accounting

**AND Fourteen (14) Level II/III credits**

**FOUN**

FOUN 1008 Rhetoric II: Special Purposes

**OR**

FOUN 1001 English for Academic Purposes

**AND**

FOUN 1101 Caribbean Civilization

FOUN1301 Law, Governance and Society

**MATHEMATICS AND ECONOMICS**

**LEVEL I**

MATH1100 Basic Mathematics

MATH1120 Calculus I

MATH1130 Calculus II

MATH1110 Applied Statistics

COMP1105 Computer Programming I

ECON1001 Introd. to Microeconomics

ECON1002 Introd. to Macroeconomics

**AND Four (4) Level I Credits**

**LEVEL II**

MATH2100 Abstract Algebra

MATH2110 Linear Algebra

MATH2120 Analysis & Methods I

MATH2130 Ord. Differential Equations

ECON2000 Intermed. Microeconomics I

ECON2001 Intermed. Microeconomics II

ECON2002 Intermed. Macroeconomics I

ECON2003 Intermed. Macroeconomics II

ECON2008 Statistical Methods I

**LEVEL III**

ECON3049 Econometrics I

***Four Level II/III ECON courses***

***Two Level III MATH courses***

***Two Level II/III MATH courses***

**FOUN**

FOUN 1008 Rhetoric II: Special Purposes

**OR**

FOUN 1001 English for Acad. Purposes

**AND**

FOUN 1101 Caribbean Civilisation

FOUN1301 Law, Governance and Society

**MATHEMATICS WITH ECONOMICS**

**LEVEL I**

MATH1100	Basic Mathematics
MATH1120	Calculus I
MATH1130	Calculus II
MATH1110	Applied Statistics
COMP1105	Computer Programming I
ECON1001	Intro. to Microeconomics
ECON1002	Intro. to Macroeconomics

**AND Four (4) Level I Credits**

**LEVEL II**

MATH2100	Abstract Algebra
MATH2110	Linear Algebra
MATH2120	Analysis & Methods I
MATH2130	Ord. Differential Equations
ECON2000	Intermed. Microeconomics I
ECON2001	Intermed. Microeconomics II
ECON2002	Intermed. Macroeconomics I
ECON2003	Intermed. Macroeconomics II

**AND One Level II/III ECON course**

**LEVEL III**

*Two Level III MATH courses*

*Two Level II/III MATH courses*

*AND Fifteen Level II/III credits*

**FOUN**

FOUN 1008 Rhetoric II: Special Purposes

**OR**

FOUN 1001 English for Acad. Purposes

**AND**

FOUN 1101 Caribbean Civilisation

FOUN1301 Law, Governance and Society

**SCIENCE AND MANAGEMENT**

**LEVEL I**

**Required Level 1 Courses for Science Major plus**

MATH1101	Basic Mathematics I
MATH1110	Applied Statistics
ACCT1002	Intro. to Financial Accounting
ACCT1003	Cost & Mangt. Accounting I
ECON1001	Intro. to Microeconomics
ECON1002	Intro. to Macroeconomics
MGMT1001	Principles of Management

**LEVELS II & III**

**Thirty-two (32) credits of required Level II/III Courses for Science Major plus**

MKTG2001	Principles of Marketing
MGMT2006	Mangt. Info. Systems I
MGMT2008	Organisational Behaviour
MGMT2020	Managerial Economics
MGMT2023	Financial Management
MGMT2026	Prodn. & Operations Mangt.
MGMT3017	Human Resources Mangt.

**AND Nine (9) Credits from LEVEL III ELECTIVES**

ACCT3015	Accounting Info. Systems
ACCT3039	Adv. Mangt. & Cost Account.
MGMT3011	Mangt. Info. Systems II
MGMT3018	Industrial Relations
MGMT3022	Organisational Development
MGMT3033	Business, Govt. and Society
MGMT3037	International Business
MGMT3038	Cross-National Management
MGMT3045	Business Law II
MGMT3048	Financial Management II
MGMT3049	Financial Instit. and Markets



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MGMT3052	Taxation and Tax Mangt.
MGMT3053	Intl. Financial Management
MGMT3056	Project Management
MGMT3058	New Venture Management
MGMT3075	Public Enterprise Mangt.
MGMT3076	Managing Fin. Institutions
MKTG3000	Marketing Management
MKTG3001	Intl. Marketing Management
MKTG3002	Marketing Research
MKTG3009	Services Marketing

**FOUN**

FOUN1008	Rhetoric II: Special Purposes
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**OR**

FOUN1001	English for Acad. Purposes
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**AND**

FOUN1101	Caribbean Civilization
FOUN1301	Law, Governance and Society

**SCIENCE WITH MANAGEMENT**

**LEVEL I**

**Required Level 1 Courses for Science Major plus**

MATH1101	Basic Mathematics I
MATH1110	Applied Statistics
ACCT1002	Intro. to Financial Accounting
ACCT1003	Cost & Mangt. Accounting I
ECON1001	Intro. to Microeconomics
ECON1002	Intro. to Macroeconomics
MGMT1001	Principles of Management

**LEVELS II & III**

**Thirty-two (32) credits of required Level II/III Courses  
for Science Major plus**

MKTG2001	Principles of Marketing
MGMT2006	Mangt. Info. Systems I
MGMT2008	Organisational Behaviour
MGMT2023	Financial Management
MGMT3017	Human Resources Management

**And Fourteen (14) Level II/III Credits**

**FOUN**

FOUN1008	Rhetoric II: Special Purposes
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**OR**

FOUN1001	English for Acad. Purposes
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**AND**

FOUN1101	Caribbean Civilization
FOUN1301	Law, Governance and Society

## B. Programmes with the Faculty of Humanities & Education

Under an agreement with the Faculty of Humanities & Education, a limited number of students will be allowed to pursue the following programmes, subject to timetable restrictions:-

- Science Major & Psychology Major
- Science Major with Psychology Minor
- Science Major with Spanish Minor
- Science Major with Education Minor

The Psychology Major comprises 30 credits of specified advanced courses while the Psychology and Spanish Minor each comprise 15 credits of specified advanced courses. In addition, students must satisfy the requirements of their Science Major and complete a minimum total of 101 credits.

### SCIENCE AND PSYCHOLOGY

#### LEVEL 1

**Sixteen (16) credits from Level 1 Science Courses plus**

PSYC1003	Introduction to Psychology
PSYC1004	Introduction to Social Psychology
PSYC1012	Introduction to Developmental Psychology
PSYC1013	Introduction to Research Methods
PSYC1015	Historical Issues in Psychology

#### LEVELS II & III

**Thirty-two (32) credits of required Level II/III Courses for Science Major plus**

PSYC2002	Abnormal Psychology
PSYC2003	Physiological Psychology

PSYC2004	Personality Theory I
PSYC2014	Statistics And Research Design II
PSYC2008	Introduction to Cognitive Psychology
PSYC2022	Developmental Psychology II: From Conception to Adolescence
PSYC3017	Personality Theory II
PSYC3030	Introduction to Clinical Psychology
PSYC3011	Research Paper In Psychology* (6 credits)

#### FOUN

FOUN1008	Rhetoric II: Special Purposes
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#### OR

FOUN1001	English for Acad. Purposes
FOUN1101	Caribbean Civilization
FOUN1301	Law, Governance and Society

\*Students registered for a Science Research Project course (eg: BIOC3950, BIOL3950, CHEM3500, CHEM3505, COMP 3910) must replace PSYC3011 by 6 credits from the electives listed above.

### SCIENCE WITH PSYCHOLOGY

#### LEVEL I

**Sixteen (16) credits from Level I Science Courses plus**

PSYC1003	Introduction to Psychology
PSYC1004	Introduction to Social Psychology
PSYC1013	Introduction to Research Methods

#### LEVELS II & III

**Thirty-two (32) credits of required Level II/III Courses for Science Major plus**

PSYC2003	Physiological Psychology
PSYC2004	Personality Theory I
PSYC2012	Developmental Psychology
PSYC2014	Statistics And Research Design II
PSYC3016	Research Project in Psychology (Minor)

**AND Fifteen (15) Level II/III credits**

**FOUN**

FOUN1008 Rhetoric II: Special Purposes

**OR**

FOUN1001 English for Acad. Purposes

FOUN1101 Caribbean Civilization

FOUN1301 Law, Governance and Society

**SCIENCE WITH SPANISH**

**LEVEL I**

**Twenty-Four (24) credits from Level I Science Courses plus**

SPAN1001 Spanish Language IA

SPAN1002 Spanish Language IB

**LEVELS II & III**

**Thirty-two (32) credits of required Level II/III Courses for Science Major plus**

SPAN2001 Spanish Language IIA

SPAN2002 Spanish Language IIB

SPAN2214 Hispanic Culture

SPAN3502 Business Spanish

SPAN3503 Spanish for Tourism

**AND Fifteen (15) Level II/III credits**

**FOUN**

FOUN1008 Rhetoric II: Special Purposes

**OR**

FOUN1001 English for Acad. Purposes

**AND**

FOUN1101 Caribbean Civilization

FOUN1301 Law, Governance and Society

**SCIENCE WITH EDUCATION**

**LEVEL I**

**Twenty-Four (24) credits from Level I Science Courses plus**

EDPS1001 Introduction to Human Development

**LEVELS II & III**

**Thirty-two (32) credits of required Level II/III Courses for the Science Major plus**

EDCU2101 Introduction to Curriculum, Theory, Planning & Practice

EDRS2201 Introduction to Research Methods

EDSO3102 Social Context of Education

**And ONE of the following:-**

EDPH2016 Philosophy of Education

EDME2211 Testing, Measurement & Evaluation I

EDMA2111 The Structure and Nature of Mathematics

EDSC2110 The Structure and Nature of Science

EDEA2304 Introduction to Educational Administration

EDSE2924 Introduction to Special Education

**And ONE of the following:-**

EDTK3304 Media & Technology in Education

EDTE3001 Issues in Teacher Education

**AND Eighteen (18) Level II/III credits**

**FOUN**

FOUN1008 Rhetoric II: Special Purposes

**OR**

FOUN1001 English for Acad. Purposes

**AND**

FOUN1101 Caribbean Civilization

FOUN1301 Law, Governance and Society

# DEPARTMENT OF BIOLOGICAL AND CHEMICAL SCIENCES

## SEMESTER I

### PRELIMINARY

CHEM0615	Preliminary Chemistry I
BIOL0051	Biology I

### YEAR I

BIOL1051	Biodiversity I
BIOL1052	Biodiversity II
CHEM1010	Fundamentals of Chemistry

### YEAR II

BIOC2351	Biochemistry I
BIOL2053	Physiology of Plants and Animals
BIOL2151	Genetics I
ECOL2451	Population Ecology
ECOL2453	Caribbean Island Biogeography
MICR2251	General Microbiology
CHEM2011	Practical Chemistry I
CHEM2100	Inorganic Chemistry I
CHEM2200	Organic Chemistry I
ERSC2001	Earth & Life
ERSC2002	Climatology

### YEAR III

BIOC3251	Microbial Biochemistry
BIOC3354	Biochemistry of Human Disease
BIOL3152	Bioinformatics
ECOL3452	Behavioural Ecology
ECOL3454	Fisheries Biology
MICR3253	Biology of Viruses
CHEM3100	Inorganic Chemistry II

CHEM3300	Physical Chemistry II
CHEM3415	Analytical Chemistry III
CHEM3500	Chemistry Project
CHEM3515	Environmental Chemistry
ERSC3001	Natural Hazards

## SEMESTER II

### PRELIMINARY

CHEM0625	Preliminary Chemistry II
BIOL0052	Biology II

### YEAR I

BIOL1151	Introductory Genetics
BIOC1351	Introductory Biochemistry
CHEM1020	Introductory Chemistry
ERSC1001	Dynamic Earth

### YEAR II

BIOC2352	Biochemistry II
BIOL2058	Tropical Ornamental Plants
BIOL2152	General Molecular Biology
ECOL2454	Marine Biology
ECOL2452	Community Ecology
MICR2252	Eukaryotic micro-organisms
CHEM2020	Practical Chemistry II
CHEM2300	Physical Chemistry I
CHEM2400	Analytical Chemistry I
ERSC2003	Oceanography

### YEAR III

BIOC3053	Cell Signalling
BIOC3254	Biochemical Plant Pathology
BIOL3053	Developmental Physiology
ECOL3423	Coral Reef Ecology
ECOL3451	Human Ecology and Conservation
ECOL3453	Crop Ecology
MICR3251	Food Microbiology

MICR3252	Microbial Ecology
MICR3258	Pathogenic micro-organisms
CHEM3135	Bioinorganic Chemistry
CHEM3145	Bonding in Inorganic Chemistry
CHEM3200	Organic Chemistry II
CHEM3210	Bioorganic & Medicinal Chemistry
CHEM3500	Chemistry Project
ERSC3002	Climate Variability & Predictability

#### YEAR-LONG COURSES

CHEM3505	Chemistry Research Project
BIOC3950	Biochemistry Research Project
BIOL3950	Biology Research Project
ECOL3950	Ecology Research Project
MICR3950	Microbiology Research Project

## DEPARTMENT OF COMPUTER SCIENCE, MATHEMATICS AND PHYSICS

### SEMESTER I

#### PRELIMINARY

MATH0101	Preliminary Mathematics I
PHYS0070	Preliminary Physics I

#### YEAR I

COMP1105	Computer Programming I
COMP1115	Computer Programming II
COMP1125	Introduction to UNIX
ELET1110	Digital Electronics
ELET1120	Basic Electronics
MATH1101	Basic Mathematics I
MATH1110	Applied Statistics
MATH1120	Calculus I
PHYS1100	Mechanics

#### YEAR II

COMP2105	Discrete Mathematics
COMP2115	Information Structures
COMP2125	Computer Architecture
COMP2135	Systems Software
COMP2145	Software Engineering I
COMP2150	Computer Networks I
COMP2160	Object-Oriented Programming
ELET2100	Microprocessors I
ELET2130	Digital Communications I
MATH2100	Abstract Algebra
MATH2120	Analysis and Methods
MATH2140	Probability Theory

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PHYS2100	Mathematical Methods in Physics
PHYS2101	Quantum Mechanics and Special Relativity
PHYS2102	Solid State Physics
PHYS2106	Advanced Physics/Technology Lab. I
ERSC2004	Renewable Energy Sources

**YEAR III**

COMP3100	Operating Systems
COMP3135	Programming Languages
COMP3140	Software Engineering II
COMP3180	Algorithm Design and Analysis
COMP3210	Electronic Commerce
COMP3220	Human-Computer Interaction
COMP3260	Computer Graphics I
COMP3910	Computer Science Research Project
COMP3920	Computer Science Major Research Project
COMP3930	Computer Science Group Research Project
ELET3110	Control and Instrumentation
ELET3130	Introduction to DSP
ELET3160	Electronics Research Project
MATH3130	Optimization Theory
MATH3140	Fourier Analysis & PDE
MATH3160	Number Theory
MATH3450	Statistical Theory I
PHYS3100	Quantum Mechanics
PHYS3102	Optics and Lasers
PHYS3106	Physics Research Project

**SEMESTER II**

**PRELIMINARY**

MATH0102	Preliminary Mathematics II
PHYS0071	Preliminary Physics II

**YEAR I**

COMP1105	Computer Programming I
COMP1115	Computer Programming II
COMP1130	Web Technology Fundamentals
ELET1100	Circuit Analysis
ELET1110	Digital Electronics
MATH1100	Basic Mathematics
MATH1102	Basic Mathematics II
MATH1110	Applied Statistics
MATH1130	Calculus II
PHYS1101	Electricity and Magnetism
PHYS1102	Optics, Thermodynamics & Modern Physics

**YEAR II**

COMP2105	Discrete Mathematics
COMP2115	Information Structures
COMP2125	Computer Architecture
COMP2145	Software Engineering I
COMP2150	Computer Networks I
COMP2160	Object-Oriented Programming
ELET2110	Circuit Simulation
ELET2120	Discrete Device Electronics
ELET2140	Medical Instrumentation
MATH2110	Linear Algebra
MATH2130	Ordinary Differential Equations
MATH2150	Mathematical Statistics
PHYS2103	Classical Mechanics
PHYS2105	Computational Physics I
PHYS2107	Advanced Physics / Technology Laboratory II

### YEAR III

COMP3115	Information Systems
COMP3125	Artificial Intelligence
COMP3155	Computer Networks II
COMP3160	Database Management Systems
COMP3170	Web-based Applications
COMP3240	Introduction to Distributed Systems
COMP3230	Network & Computer Security
COMP3910	Computer Science Research Project
COMP3930	Computer Science Group Research Project
ELET3041	Microcontrollers & Applications
ELET3120	Communication Circuits
ELET3151	Digital Communications II
ELET3210	Sensors & Actuator Technology
MATH3100	Multivariate Analysis
MATH3120	Numerical Analysis
MATH3150	Complex Variables I
MATH3170	Advanced Algebra
MATH3460	Statistical Theory II
PHYS3101	Electrodynamics
PHYS3105	Statistical Mechanics
PHYS3106	Physics Research Project

## METEOROLOGY

### SEMESTER I

METE1000	Introduction to Physical Meteorology & Weather Observations
METE1200	Oceans & Climate
METE2000	Physical Meteorology I
METE2100	Dynamic Meteorology I
METE2300	Hydrometeorology
METE3100	Dynamic Meteorology II
METE3200	Synoptic Meteorology II

### SEMESTER II

METE1100	Introduction to Dynamic Meteorology and Weather Systems
METE1300	Climate Change, Education and Awareness
METE2001	Physical Meteorology II
METE2200	Synoptic Meteorology I
METE3300	Tropical Meteorology
METE3400	Weather Radars and Satellites
METE3500	Bioclimatology

## BIOLOGICAL SCIENCES

The Department of Biological & Chemical Sciences offers Single Majors in Biochemistry, Biology, Ecology and Microbiology as well as a Double Major in Biology. The Level II/III courses used for a Biology, Biochemistry, Ecology and/or Microbiology major cannot be used to simultaneously satisfy the requirements for a second biological major or a Biochemistry, Biology, Ecology or Microbiology minor.

### MAJOR IN BIOCHEMISTRY:

#### LEVEL I

BIOC1351	Introductory Biochemistry
BIOL1051	Biodiversity I
BIOL1151	Introductory Genetics
CHEM1010	Fundamentals of Chemistry
CHEM1020	Introductory Chemistry

#### LEVEL II

BIOC2351	Biochemistry I
BIOC2352	Biochemistry II
BIOL2151	Genetics I
BIOL2152	General Molecular Biology

#### LEVEL III

BIOC3251	Microbial Biochemistry
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### AND Twelve (12) Credits from:

BIOC3053	Cell Signalling
BIOC3254	Biochemical Plant Pathology
BIOC3352	Biochemistry III
BIOC3354	Biochemistry of Human Disease
BIOC3950	Biochemistry Research Project
BIOL3152	Bioinformatics
CHEM3135	Bioinorganic Chemistry
CHEM3210	Bioorganic & Medicinal Chemistry

A Student Majoring in Biochemistry cannot also Major in Microbiology.

### MINOR IN BIOCHEMISTRY [Sixteen (16) Credits]:

BIOC2352	Biochemistry II
<b>AND Twelve (12) Credits from:</b>	
BIOC2351	Biochemistry I*
BIOC3053	Cell Signalling
BIOC3251	Microbial Biochemistry*
BIOC3254	Biochemical Plant Pathology
BIOC3352	Biochemistry III
BIOC3354	Biochemistry of Human Disease
BIOC3950	Biochemistry Research Project
BIOL3152	Bioinformatics
CHEM3135	Bioinorganic Chemistry

\*A student taking a major in Microbiology cannot use BIOC2351 or BIOC3251 to satisfy the requirements for a Biochemistry minor.

### MAJOR IN BIOLOGY:

#### LEVEL I

BIOC1351	Introductory Biochemistry
BIOL1051	Biodiversity I
BIOL1052	Biodiversity II
BIOL1151	Introductory Genetics

#### LEVELS II & III

BIOL2053	Physiology of Plants & Animals
BIOL3053	Developmental Physiology

#### AND

BIOL2151	Genetics I
MICR2251	General Microbiology

#### OR

BIOC2351	Biochemistry I
BIOC2352	Biochemistry II

#### OR

ECOL2451	Population Ecology
ECOL2452	Community Ecology



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**OR**

BIOL2152 General Molecular Biology  
BIOC2351 Biochemistry I

**OR**

MICR2251 General Microbiology  
MICR2252 Eukaryotic Micro-organisms

**AND Twelve (12) Credits from:**

BIOC3053 Cell Signaling  
BIOC3251 Microbial Biochemistry  
BIOC3254 Biochemical Plant Pathology  
BIOC3352 Biochemistry III  
BIOC3354 Biochemistry of Human Disease  
BIOC3950 Biochemistry Research Project  
BIOL3023 Coral Reef Biology  
BIOL3152 Bioinformatics  
BIOL3950 Biology Research Project  
ECOL3423 Coral Reef Ecology  
ECOL3451 Human Ecology and Conservation  
ECOL3452 Behavioural Ecology  
ECOL3453 Crop Ecology  
ECOL3454 Fisheries Biology  
ECOL3950 Ecology Research Project  
MICR3059 Immunobiology  
MICR3251 Food Microbiology  
MICR3252 Microbial Ecology  
MICR3253 Biology of Viruses  
MICR3258 Pathogenic Micro-organisms  
MICR3950 Microbiology Research Project

**AND Four (4) Credits from:**

BIOC2351 Biochemistry I  
BIOC2352 Biochemistry II  
BIOL2058 Tropical Ornamental Plants

BIOL2151 Genetics I  
BIOL2152 General Molecular Biology  
BIOC3251 Microbial Biochemistry  
BIOC3254 Biochemical Plant Pathology  
BIOC3352 Biochemistry III  
BIOC3354 Biochemistry of Human Disease  
BIOL3023 Coral Reef Biology  
BIOL3053 Developmental Physiology  
BIOL3152 Bioinformatics  
ECOL3423 Coral Reef Ecology  
ECOL3451 Human Ecology and Conservation  
ECOL3452 Behavioural Ecology  
ECOL3453 Crop Ecology  
ECOL3454 Fisheries Biology  
MICR3059 Immunobiology  
MICR3251 Food Microbiology  
MICR3252 Microbial Ecology  
MICR3253 Biology of Viruses  
MICR3258 Pathogenic Micro-organisms

**DOUBLE MAJOR IN BIOLOGY**

**LEVEL I**

BIOC1351 Introductory Biochemistry  
BIOL1051 Biodiversity I  
BIOL1052 Biodiversity II  
BIOL1151 Introductory Genetics

**LEVELS II & III**

BIOL2053 Physiology of Plants & Animals  
BIOL3053 Developmental Physiology

**AND**

BIOL2151 Genetics I  
MICR2251 General Microbiology

**OR**

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BIOC2351 Biochemistry I

BIOC2352 Biochemistry II

**OR**

ECOL2451 Population Ecology

ECOL2452 Community Ecology

**OR**

BIOC2351 Biochemistry I

BIOL2152 General Molecular Biology

**OR**

MICR2251 General Microbiology

MICR2252 Eukaryotic Micro-organisms

**AND Eight (8) Credits from:**

BIOC3950 Biochemistry Research Project

BIOL3950 Biology Research Project

ECOL3950 Ecology Research Project

MICR3950 Microbiology Research Project

**AND Forty (40) Credits from:**

BIOC2351 Biochemistry I

BIOC2352 Biochemistry II

BIOL2058 Tropical Ornamental Plants

BIOL2151 Genetics I

BIOL2152 General Molecular Biology

BIOL2950 Biology Elective

ECOL2055 Horticulture

ECOL2451 Population Ecology

ECOL2452 Community Ecology

ECOL2453 Caribbean Island Biogeography

ECOL2454 Marine Biology

MICR2251 General Microbiology

MICR2252 Eukaryotic Micro-organisms

BIOC3053 Cell Signalling

BIOC3251 Microbial Biochemistry

BIOC3254 Biochemical Plant Pathology

BIOC3352 Biochemistry III

BIOC3354 Biochemistry of Human Disease

BIOL3152 Bioinformatics

ECOL3423 Coral Reef Ecology

ECOL3451 Human Ecology and Conservation

ECOL3452 Behavioural Ecology

ECOL3453 Crop Ecology

ECOL3454 Fisheries Biology

MICR3059 Immunobiology

MICR3251 Food Microbiology

MICR3252 Microbial Ecology

MICR3253 Biology of Viruses

MICR3258 Pathogenic Micro-organisms

**MINOR IN BIOLOGY [Sixteen (16) Credits]:**

BIOL2053 Physiology of Plants & Animals

BIOL3053 Developmental Physiology

**AND Eight (8) Credits from:**

BIOC2351 Biochemistry I

BIOC2352 Biochemistry II

BIOL2058 Tropical Ornamental Plants

BIOL2151 Genetics I

BIOL2152 General Molecular Biology

BIOL2950 Biology Elective

ECOL2055 Horticulture

ECOL2451 Population Ecology

**MAJOR IN ECOLOGY**

**LEVEL I**

BIOC1351 Introductory Biochemistry

BIOL1051 Biodiversity I

BIOL1052 Biodiversity II

BIOL1151 Introductory Genetics

**LEVEL II**

ECOL2451	Population Ecology
ECOL2452	Community Ecology
ECOL2453	Caribbean Island Biogeography

**AND**

ECOL2055	Horticulture
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**OR**

ECOL2454	Marine Biology
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**LEVEL III**

ECOL3451	Human Ecology and Conservation
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**AND Twelve (12) Credits from:**

ECOL3423	Coral Reef Ecology
ECOL3452	Behavioural Ecology
ECOL3453	Crop Ecology
ECOL3454	Fisheries Biology
ECOL3950	Ecology Research Project
MICR3252	Microbial Ecology

**MINOR IN ECOLOGY [Sixteen (16) Credits]:**

ECOL2451	Population Ecology
ECOL2452	Community Ecology
ECOL2453	Caribbean Island Biogeography

**AND**

ECOL2055	Horticulture
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**OR**

ECOL2454	Marine Biology
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**MAJOR IN MICROBIOLOGY:**

**LEVEL I**

BIOC1351	Introductory Biochemistry
BIOL1051	Biodiversity I
BIOL1052	Biodiversity II
BIOL1151	Introductory Genetics

**LEVEL II**

BIOC2351	Biochemistry I
BIOL2151	Genetics I
MICR2251	General Microbiology
MICR2252	Eukaryotic Micro-organisms

**LEVEL III**

BIOC3251	Microbial Biochemistry
MICR3252	Microbial Ecology

**AND Eight (8) Credits from:**

BIOC3254	Biochemical Plant Pathology
MICR3059	Immunobiology
MICR3251	Food Microbiology
MICR3253	Biology of Viruses
MICR3258	Pathogenic Micro-organisms
MICR3950	Microbiology Research Project

A student taking a Major in Microbiology cannot also Major in Biochemistry.

**MINOR IN MICROBIOLOGY [Sixteen (16) Credits]:**

MICR2251	General Microbiology
MICR2252	Eukaryotic Micro-organisms

**AND Eight (8) Credits from:**

BIOC3251	Microbial Biochemistry
BIOC3254	Biochemical Plant Pathology

MICR3059	Immunobiology	Teaching:	Three lectures, one tutorial and three hours of practicals per week.	
MICR3251	Food Microbiology			
MICR3252	Microbial Ecology	Method of Final Examination:	Theory Examination (3 hours)	60%
MICR3253	Biology of Viruses		Two in-course Tests	20%
MICR3258	Pathogenic Micro-organisms		Laboratory reports	20%
MICR3950	Microbiology Research Project			

**All incoming students registered to take courses in the Department of Biological and Chemical Sciences must attend a safety seminar usually held during registration week. Students taking laboratory courses in this Department will only be allowed to perform experiments if dressed in an appropriate lab coat, lab goggles and enclosed shoes. Some exceptions may be made in the wearing of safety goggles for lab procedures where there is no risk of eye injury (eg. microscope use).**

## PRELIMINARY BIOLOGICAL COURSES

### BIOL0051 - BIOLOGY I (6-P Credits)

Pre-requisite: None

Syllabus **Cellular Activities:** Subcellular organisation. Cell membrane structure and function. Biological chemistry – water and living systems, carbohydrates, lipids, proteins and amino acids, enzymes as catalysts, nucleic acids.

**Genetics:** The genetic material.. Nuclear division. Patterns of inheritance. Mutation. Genetic engineering.

**Reproduction Systems:** Examples of bacterial and fungal reproduction and viral replication. Angiosperm sexual and asexual reproduction. Human reproduction.

### BIOL0052 - BIOLOGY II (6-P Credits)

Pre-requisite: None

Syllabus: The organism and the environment: Acquisition of energy - autotrophic, holozoic, saprophytic and parasitic nutrition. Cellular respiration - glycolysis, the Krebs cycle, anaerobic respiration. Ecosystems - structure, function, population interactions. Environmental change & evolution - variation in populations, evolution and natural selection. Human ecology - biodiversity and its value, anthropogenic pollution. Systems and their maintenance: Exchanges with the environment - respiratory gas exchange and excretion. Plant and animal transport systems. Chemical coordination in plants and animals. Nervous coordination in mammals – nervous tissue, conduction and transmission of nerve impulses, the CNS. Support and movement - supporting tissue in plants and tropisms, skeletal diversity and movement in animals.

Teaching: Three lectures, one tutorial and three hours of practicals per week.

Method of Examination:	Final Theory Examination (3 hours)	60%
	Two in-course tests	20%
	Laboratory reports	20%

## LEVEL I BIOLOGICAL COURSES

### BIOC1351 - INTRODUCTORY BIOCHEMISTRY (4 credits)

Prerequisite:	Either CAPE Chemistry Unit 1 or CHEM0615 or an approved equivalent.	
Syllabus:	Cell fractionation and basic analytical techniques. Elementary thermodynamics. ATP synthesis by substrate level, oxidative and photophosphorylation. Properties of H <sub>2</sub> O and aqueous solutions; pH; buffers. Structure and properties of nucleotides and nucleic acids. Structure and properties of amino acids. Protein structure and function. Enzymes. Elementary enzyme kinetics; reversible enzyme inhibition.	
Teaching:	Two lectures, one tutorial and (the equivalent of) three hours of practical per week.	
Method of Examination:	Final Theory Examination (3 hours)	50%
	Mid-semester test	10%
	Tutorial Assignments	15%
	Practical reports	25%

### BIOL1051 - BIODIVERSITY I (4 credits)

Pre-requisite:	CAPE Biology Unit 1 or CAPE Biology Unit 2 or BIOL0051 Biology 1 or BIOL0052 Biology 2 or (CAPE Environmental Science Units 1 & 2 & CSEC Biology).
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Syllabus: **Evolution:** "Theories" of Evolution: Genesis; Linnaeus; Lamarck; Darwin-Wallace; Neo-Darwinism. **Mechanisms:** selection, mutation, migration, genetic drift, isolation

mechanisms, hybridisation. Fossilisation and the fossil record, speciation and the time continuum.

**Ecology:** Populations and communities. Habitat and niche. The Ecosystem Concept: energy flow; nutrient cycles; food chains and webs. Relationships: competition; predator-prey; types of symbioses.

**Diversity and Classification:** Fundamental principles of Taxonomy; Units of Classification; The species as the basic unit of classification; Scientific names of species; The Species Concept. Classical, numerical and molecular taxonomy; Biosystematics and Cladistics.

**Microorganisms:** Introduction to structure and classification of viruses, bacteria and fungi.

**Plants:** A systematic review of the plant kingdom.

Teaching: Two lectures, one tutorial and three hours of practical per week.

Method of Final Examination:	Final Theory Examination (2 hours)	50%
	In-course test(s)	15%
	Tutorial Assignments	10%
	Practical reports	25%

### BIOL1052 - BIODIVERSITY II (4 credits)

Pre-requisite: CAPE Biology Unit 1 or CAPE Biology Unit 2 or BIOL0051 Biology 1 or BIOL0052 Biology 2 or (CAPE Environmental Science Units 1 & 2 & CSEC Biology).

Syllabus:	A systematic review of the animal kingdom, with emphasis on the major groups. Animal body plans: germ layers, levels of organisation, symmetry, metamerism, cephalisation. Characteristics of major groups; adaptive radiation; vertebrate evolution.	Transmission of genes between generations; Hardy-Weinberg (2 and 3 alleles); Selection pressures; selection against a recessive allele; mutation and migration.
Teaching:	Two lectures, one tutorial and three hours of practical per week.	Teaching: Two lectures, one tutorial and three hours of practical per week.
Method of Examination:	Final Theory Examination (3 hours) 50% Tutorial essays 10% Practical Test(s) 15% Practical reports 25%	Method of Examination: Final Theory Examination (2 hours) 50% Mid-semester test 15% Tutorial Assignments 10% Practical reports 25%

## LEVEL II BIOLOGICAL COURSES

### BIOC2351 - BIOCHEMISTRY I (4 credits)

Pre-Requisites: BIOC1351 Introductory Biochemistry & CHEM0625 Preliminary Chemistry II

Syllabus: **Enzymes:** Enzyme kinetics. Catalytic mechanisms. Use of kinetics to elucidate catalytic mechanisms. Models of allosteric enzymes. Regulation of enzyme activity.

**Vitamins:** Structure and activity of water-soluble and lipid-soluble vitamins.

**Carbohydrate Metabolism:** Metabolic pathways and their regulation including glycolysis, tricarboxylic acid cycle, gluconeogenesis, biosynthesis of polysaccharides, glyoxylate pathway and pentose phosphate pathway. Dark reactions of photosynthesis.

**Lipid Metabolism:** Metabolic pathways and their regulation -  $\beta$ -oxidation, fatty acid biosynthesis. Biological membranes and transport.

### BIOL1151 - INTRODUCTORY GENETICS (4 credits)

Prerequisite: CAPE Biology Unit I or BIOL0051 or CAPE Environmental Science & CSEC Biology.

Syllabus: The Nature of the Genetic Material: Experimental evidence implicating the nucleic acids. DNA structure – experimental evidence & theory. DNA conformation. DNA Replication and Assortment: Semi-conservative. Modes of replication. The replication fork in *Escherichia coli*. DNA polymerases. The cell cycle. Organisation of eukaryotic chromatin. Mitosis and meiosis. Mendelism. Linkage and Recombination. The Genetic Material as an Information Carrier: The Central Dogma. Colinearity. Transcription and translation in prokaryotes & eukaryotes. Gene expression/regulation -lac and/or trp operons in *E. coli*. Population Genetics: Gene pools;

**Nitrogen Metabolism:** Overview of amino acid catabolism and biosynthesis. Urea cycle. Nitrogen fixation. Amino acids as biosynthetic precursors.

**Nucleic Acids:** DNA replication. Protein synthesis. Regulation of prokaryotic gene expression.

Teaching: Two one-hour lectures and one three-hour practical class per week.

Method of Examination: Final Theory Examination (3 hours) 60%  
 In-Course Test(s)/Assignment(s) 20%  
 Practical Reports 20%

#### **BIOC2352 - BIOCHEMISTRY II (4 credits)**

Pre-requisite: BIOC2351 Biochemistry I

Syllabus: **Metabolic regulation:** Regulatory enzymes, control of enzyme activity. Hormonal regulation of mammalian metabolism. Chemical classes of hormones. Molecular aspects of hormonal signal transduction. Integration of metabolic regulation. Regulation of fuel metabolism.

**Biochemical Methods:** Molecular spectroscopic methods. Infrared, Raman, NMR, fluorescence UV-vis, circular dichroism. Mass Spectroscopic methods. Review of electrophoresis. Chromatographic methods. Radiotracer methods. Electrochemistry and sensors. Enzymatic methods.

**Toxicology:** Overview of toxicology. Environmental toxicology. Biological fate of pesticides and other potential environmental

pollutants. Regulatory concerns. Metabolism and toxicology of xenobiotics, including pharmacologicals and food additives.

Teaching: Two one-hour lectures and one five hour practical every other week.

Method of Examination: Final Theory Examination (3 hours) 60%  
 In-course test(s) / Assignment(s) 20%  
 Practical reports 20%

#### **BIOC2950 BIOCHEMISTRY ELECTIVE (4 credits)**

Pre-requisites: None

Syllabus: An advanced course in Biochemistry taken as an exchange student at an approved institution and pre-approved by the Dean.

#### **BIOL2053 - PHYSIOLOGY OF PLANTS & ANIMALS (4 credits)**

Prerequisites: BIOL1052 Biodiversity II and BIOC1351 Introductory Biochemistry

Syllabus: **Plants:** Functional anatomy of flowering plants. Water relations, mineral nutrition, transpiration, gas exchange. Photosynthesis and translocation.

**Animals:** Physiological processes in animals. Circulation, gas exchange, osmotic regulation, acquisition of energy, thermoregulation.

Teaching: Two one-hour lectures, one tutorial and three hours of practicals per week

Method of Examination: Final Theory Examination (3hours) 70%  
 In-course Tests/Assignments 10%  
 Practical Reports 20%

**BIOL2057 - BIOLOGY FIELD COURSE (2 credits)**

Pre-requisites: BIOL1051 Biodiversity I & BIOL1052 Biodiversity II

Syllabus: A practical introduction to Caribbean flora and fauna, including the use of ecological methods.

Teaching: A five day residential course on a Caribbean island.

Method of Examination: An assessment of the student's field note book. 100%

**BIOL2058 - TROPICAL ORNAMENTAL PLANTS (4 credits)**

Pre-requisites: BIOL 1051 Biodiversity I and BL 1052 Biodiversity II

Syllabus: This course is a survey of tropical ornamental plants and their families. Students will learn the identification, horticultural classification, cultural requirements and best horticultural use of the cultivated garden flora. Cultivated, domesticated and wild plants will be compared. Morphological features necessary for plant identification will be taught.

Note: **Field sessions will occur at Andromeda Botanic Gardens and other sites of horticultural interest around Barbados.**

Teaching: Two lectures, one tutorial and three hours of practical per week.

Method of Examination: Theory Examination (2 hours) 33%  
 One Practical Examination 34%  
 Learning Log 33%

**BIOL2151 - GENETICS I (4 credits)**

Pre-requisites: BIOC1351 Introductory Biochemistry & BIOL1151 Introductory Genetics

Syllabus: **Gene structure and expression:** The modern concept of the gene in prokaryotes and eukaryotes. Transcription and processing of RNA.

**Genome organisation:** In prokaryotes and eukaryotes. Extranuclear genomes.

**Genetic mutation:** Isolation and analysis of mutants. Mutagens. DNA repair.

**Transmission genetics:** Mendelian principles. Linkage and recombination. Lysis, lysogeny and crossing in bacteriophages. Conjugation. transduction and transformation in bacteria. Sexual and parasexual analyses in fungi. Genetic analysis in higher eukaryotes. Maternal effects and extranuclear genetics.

**Genetic recombination:** Breakage and reunion. Models for generalised recombination and gene conversion. Site-specific recombination. Transposons.

Teaching: Two lectures, one-three hour practical and one tutorial per week.

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



**BIOL2152 - GENERAL MOLECULAR BIOLOGY**

**(4 credits)**

Pre-requisite: BIOL1151 Introductory Genetics I

Syllabus: **Isolation and analysis of nucleic acids and proteins:** Isolation methods. Detection and quantification of DNA, RNA and proteins. Electrophoretic techniques. Restriction and modification systems. Restriction endonucleases. Physical mapping. Hybridisation techniques. Sequencing.

**Genetic manipulation:** Plasmid and bacteriophage cloning vectors. Cloning strategies. Gene libraries. Gene transfer systems. In vitro mutagenesis.

**Gene Expression:** Promoter-probe plasmids. Expression vectors. In situ Hybridization and Immunofluorescent detection methods. In vitro translation.

Teaching: Two lectures, three hours of practicals and one tutorial per week.

Method of Examination:	Final Theory Examination (3 hours)	60%
	Practical reports	20%
	In-course Test(s)/Assignment(s)	20%

**BIOL2950 BIOLOGY ELECTIVE (4 credits)**

Pre-requisites: None

Syllabus: An advanced course in the Biological Sciences taken as an exchange student at an approved institution and pre-approved by the Dean.

**ECOL2055 - HORTICULTURE (4 credits)**

Pre-requisites: BIOL1051 Biodiversity I & BIOL1052 Biodiversity II

Syllabus: Horticulture is reviewed from a scientific base, exploring the environmental, genetic and cultural manipulation of plants for food (fruits and vegetables), pleasure (ornamentals) and recreation (turf). Sessions begin with a brief survey of horticulture and its significance locally and worldwide. These progress to study representative plant groups through stages in plant production, from propagation to growth through development both of the whole plant and of the population. In lectures, tutorials and practicals, plant responses to variations in soil / substrate type, water, minerals, light temperature, genotype and the presence of other organisms (pest, diseases and weeds) as well as spacing, pruning and imposed stress will be considered. Methods for analysing plant productivity in terms of quality and quantity are introduced and discussed.

Teaching: Two lectures, one tutorial and three hours of practical per week.

Method of Examination:	Final Theory Examination (2 hours)	50%
	Practical reports	20%
	Tutorial essays, case studies, presentations	30%

**ECOL2451 - POPULATION ECOLOGY (4 credits)**

Pre-requisites: BIOL1051 Biodiversity I & BIOL1052 Biodiversity II

Syllabus: Life tables. Exponential and logistic population growth. Population regulation. Deterministic and stochastic theories of life history evolution. Evolution and consequences of dispersal. Habitat selection. Quantitative ecological methods. Population dynamics and resource exploitation.

Teaching: Two lectures, one tutorial and three hours of practical per week.

Method of Examination: Final Theory Examination (3 hours) 70%  
 Project Report/Essay 30%

**ECOL2452 - COMMUNITY ECOLOGY (4 credits)**

Pre-requisite: ECOL2451 Population Ecology

Syllabus: Neutralism, commensalism, protocooperation, mutualism. Interference and exploitation competition. Competition equations. Niche characteristics. Competitive exclusion. Character displacement. Predator/prey interactions. Optimal foraging. Food web structure. Community stability. Plant-animal interactions – frugivory and pollination. Population models and parasitoid-host systems. Community changes. Quantitative ecological methods. Palaeoecology.

Teaching: Two lectures, one tutorial and three hours of practical per week.

Method of Examination: Final Theory Examination (3 hours) 70%  
 Project report/Essay 30%

**ECOL2453 - CARIBBEAN ISLAND BIOGEOGRAPHY (4 Credits)**

Pre-requisites: BIOL1051 Biodiversity I & BIOL1052 Biodiversity II

Syllabus: Plate tectonics, island formation and Caribbean geology. Climate patterns (past and present). Equilibrium theory of island biogeography. Species turnover. Taxon cycle. The major habitat types found in the Caribbean - location, structure, anthropogenic influences and typical species. Reviews of distribution, evolution and ecology of selected

Teaching: Two lectures, one tutorial and one practical per week.

Method of Examination: Final Theory Examination (3 hours) 50%  
 Mid-term Test 10%  
 Field Notebook 40%

**ECOL2454 - MARINE BIOLOGY (4 credits)**

Pre-requisite: ECOL2451 Population Ecology.

Syllabus: Basic oceanography - tidal cycles, waves, ocean circulation and seawater chemistry. Global distributions, zonation and adaptations of sublittoral, intertidal planktonic, nektonic and deep sea organisms. Sampling techniques.

Teaching: Two lectures, one tutorial and three hours of practical per week.

Method of Examination:	Final Theory Examination (3 hours)	70%
	Practical Reports	20%
	In-course Test(s)/Assignment(s)	10%

#### **ECOL2950 - ECOLOGY ELECTIVE (4 credits)**

Pre-requisites:	None
Syllabus:	An advanced course in the Ecological Sciences taken as an exchange student at an approved institution and pre-approved by the Dean.

#### **MICR2251 - GENERAL MICROBIOLOGY (4 credits)**

Pre-requisites:	BIOL1051 Biodiversity I & BIOC1351 Introductory Biochemistry	
Syllabus:	This course is an introduction to microorganisms: Bacteria, Archaea, Algae, Fungi, Protozoa and Viruses. Topics presented include: the structure and function of microorganisms, microbial reproduction, physiology, taxonomy, behaviour and ecology. Techniques for the isolation, cultivation, enumeration and control of microorganisms are introduced. Some aspects of applied microbiology are covered.	
Teaching:	Two lectures, one tutorial and three hours of practical per week.	
Method of Examination:	Final Theory Examination (3 hours)	50%
	Practical Report(s)	35%
	In-course Test(s)/Assignment(s)	15%

#### **MICR2252 – EUKARYOTIC MICROORGANISMS (4 credits)**

Pre-requisite:	MICR2251 General Microbiology	
Syllabus:	An introduction to the biology of the eukaryotic microorganisms: algae, fungi, and protists. Structure and function, reproduction, physiology, behaviour, and ecology.	
Teaching:	Two lectures, one tutorial and three hours of practical per week.	
Method of Examination:	Final Theory Examination (3 hours)	50%
	Practical Report(s)	35%
	In-course Test(s)/Assignment(s)	15%

#### **MICR2950 MICROBIOLOGY ELECTIVE (4 credits)**

Pre-requisites:	None
Syllabus:	An advanced course in Microbiology taken as an exchange student at an approved institution and pre-approved by the Dean.

### **LEVEL III BIOLOGICAL COURSES**

#### **BIOC3053 - CELL SIGNALLING (4 credits)**

Pre-requisite:	BIOL2152 General Molecular Biology.
Syllabus:	<b>Intracellular signalling:</b> ion fluxes and electrical fields, establishment of cell polarity.  <b>Intercellular signalling:</b> Chemical messengers in "lower" organisms. The evolution of hormones. General aspects of hormone action.  <b>Animal systems:</b> signal transduction by G proteins. Steroid hormone action.

**Plant systems:** the molecular basis of plant hormone action.

Teaching: Two lectures and three hours of practicals per week.

Method of Examination: Final Theory Examination (3 hours) 70%  
 Practical reports 20%  
 In-course test(s)/Assignment(s) 10%

**BIOC3251 - MICROBIAL BIOCHEMISTRY (4 credits)**

Pre-requisite: BIOC2351 Biochemistry I.

Syllabus: Alternatives to the glycolytic pathway for sugar metabolism in micro-organisms. Fermentation; diversity of products in bacteria. Bacterial phosphoenolpyruvate: sugar phosphotransferase system. Glyoxylate cycle. Anaplerotic pathways unique to micro-organisms. Anoxygenic photosynthesis. Lithotrophy. Anaerobic respiration. Nitrogen fixation. Regulation of activities and cellular levels of microbial enzymes.

Teaching: Two lectures, one tutorial and three hours of practical per week.

Method of Examination: Final Theory Examination (3 hours) 60%  
 Practical report(s) 30%  
 In-course test(s)/Assignment(s) 10%

**BIOC3254 - BIOCHEMICAL PLANT PATHOLOGY (4 Credits)**

Pre-requisites: MICR2251 General Microbiology and BIOL2151 Genetics I.

Syllabus: Penetration of plants by pathogens. Role of pathogen-produced cell-wall degrading Enzymes and toxins in pathogenesis. Disease-induced changes in host metabolism and Physiology. Growth regulator imbalance in plant diseases. Crown gall tumor formation. Mechanisms of disease resistance. Specificity of plant-pathogen interactions.

Teaching: Two lectures, one tutorial and three hours of practicals per week.

Method of Examination: Final Theory Examination (3 hours) 60%  
 In-course Test(s)/Assignment(s) 20%  
 Practical reports 20%

**BIOC3352 - BIOCHEMISTRY III (4 Credits)**

Pre-requisites: BIOC2351 Biochemistry I & BIOC2352 Biochemistry II

Syllabus: The areas of study may vary from year to year but will usually include;-Clinical biochemistry and techniques, biological membranes and transport, food biochemistry, protein structure and function, molecular chaperones.

Teaching: Two one-hour lectures and one three hour practical every week.

Method of Examination: Final Theory Examination (3 hours) 60%  
 In-course test(s) /Assignment(s) 20%  
 Practical reports 20%

**BIOC3354 - BIOCHEMISTRY OF HUMAN DISEASE  
 (4 credits)**

**Prerequisite:** BIOC2351 Biochemistry I

**Syllabus:** The areas of study will focus on a variety of human diseases such as: HIV/AIDS, cardiovascular disease, diabetes, obesity, various cancers, liver disease, kidney disease, various syndromes and deficiencies including in-born errors of metabolism. Various aspects of the biochemistry will be studied for the diseases, with a highlight of the latest ground-breaking research in the area. The areas studied will include specific biochemical pathways, key proteins and enzymes that play a role in the disease, and linkage of these pathways with the presentation of the symptoms of the disease.

**Teaching:** Two lectures, one tutorial and three hours of practicals per week.

**Method of Examination:**

Final Theory Examination (3 hours)	60%
In-course test(s)/assignment(s)	20%
Practical reports	20%

**BIOC3950 - BIOCHEMISTRY RESEARCH PROJECT  
 (8 credits)**

**Pre-requisites:** BIOL2151 Genetics I, BIOL2152 General Molecular Biology, BIOC2351 Biochemistry I & BIOC2352 Biochemistry II

**Restrictions:** Restrictions: Not to be taken with BIOL3950 Biology Research Project, MICR3950 Microbiology Research Project, ECOL3950 Ecology or CHEM3505 Research Project

**Syllabus:** A practical project in Biochemistry carried out under the supervision of a staff member. Students will be allocated one of the available research topics and are expected to spend not less than 144 hours in field/ laboratory studies. The project will be presented both orally in the form of a short seminar and in a written report. Three typed and bound copies of the written report must be presented.

**Method of Examination:**

Supervisor's Assessment	15%
Seminar	15%
Project Report	70%

**BIOL3053 - DEVELOPMENTAL PHYSIOLOGY (4 credits)**

**Prerequisite:** BIOL 2053 Physiology of Plants & Animals

**Syllabus:** Plants: Internal and external regulation of flowering plant growth and development including phytohormones.  
 Animals: Human growth and development. Reproduction. Overview of prenatal and postnatal development. Integrative systems. In depth analysis of selected processes in plant and animal development.

**Teaching:** Two one-hour lectures, one tutorial and three hours of practicals per week

**Method of Examination:**

Final Theory Examination (3 hours)	70%
In-course tests/assignments	10%
Project reports	20%

**BIOL 3152 - BIOINFORMATICS (4 Credits)**

**Pre-requisite:** BIOL2152 General Molecular Biology

**Syllabus:** Common types of genomic and proteomic data including DNA and protein sequences, motifs, domains, patterns, secondary structure and folding classes, tertiary structure. DNA and protein sequence analysis including analysis of homology, identification of motifs and domains, pair-wise and multiple alignments including global and local alignments. Dynamic programming algorithms for sequence alignment, prediction of secondary structure, prediction of gene structure. Methods of phylogenetic analysis. The distribution of data through public databases, data formats, and end-user applications for manipulation and analysis including use of PAM250 scoring matrix, BLOSUM 62, scoring matrix, FASTA, BLAST, PSI-BLAST, PHI-BLAST, PSSM, Smith-Waterman dynamic Programming.

**Teaching:** Two lectures, one tutorial, and three hours of practical per week

**Method of Examination:** Final Theory Examination (3 hours) 60%  
 In-course test(s)/Assignment(s) 40%

**BIOL3950 - BIOLOGY RESEARCH PROJECT (8 credits)**

**Pre-requisites:** 16 credits from Level II Biological courses. Only available to final year students majoring in Biology.

**Restrictions:** Not to be taken with BIOC3950 Biochemistry Research Project, MICR3950 Microbiology Research Project, ECOL3950 Ecology or CHEM 3505 Research Project

**Syllabus:** A practical project in Biology carried out under the supervision of a staff member. Students will be allocated one of the available research topics and are expected to spend not less than 144 hours in field/laboratory studies. The project will be presented both orally in the form of a short seminar and in a written report. Three typed and bound copies of the written report must be presented.

**Method of Examination:**

	Supervisor's Assessment	15%
	Seminar	15%
	Project Report	70%

**ECOL3423 - CORAL REEF ECOLOGY (4 credits)**

**Pre-requisites:** ECOL2452 Community Ecology & ECOL2454 Marine Biology

**Syllabus:** Environmental conditions required for coral reef formation, geological history of Caribbean reef formation and types of reefs. Dynamics of reef structure formation & erosion; Scleractinian coral biology, including

taxonomy, anatomy, endosymbiosis with zooxanthellae, growth (calcification & skeletal morphology), nutrition, reproduction and recruitment; Ecology of coral communities, including reef community structure, zonation and dynamics, diversity/stability relationships, keystone species, algal-herbivore and predator-prey interactions, inter-specific competition, succession, disturbance, and linked systems from mangroves to deep sea; overview of the major taxonomic groups of reef-associated organisms, including other coelenterates, poriferans, echinoderms, fishes, and algae with attention to their ecological function; value and uses of Caribbean coral reef ecosystems, including coral reef fisheries, tourism and recreation, biodiversity and marine products, and ecosystem services; The threats and future challenges to Caribbean coral reefs, including natural disturbances and anthropogenic activities. Current trends in coral reef research.

Teaching: Two lectures, one tutorial and three hours of practical per week.

Method of Examination: Final Theory Examination (3 hours) 60%  
 Project Report/Essay 40%

**ECOL3451- HUMAN ECOLOGY AND CONSERVATION (4 credits)**

Pre-requisites: ECOL2451 Population Ecology and ECOL2452 Community Ecology.

Syllabus: Human population growth – Historical trends, the momentum of population growth, population projections, carrying capacity. Conservation - Conservation as sustainable exploitation of natural resources. Conservation as avoidance of environmental deterioration. Caribbean case studies of pollutants and land use and coastal zone practices as sources of environmental deterioration. Global trends in environmental deterioration. Conservation as maintenance of biological diversity - endangered habitats, endangered species.

Teaching: Two lectures and three hours of practical per week.

Method of Examination: Final Theory Examination (3 hours) 70%  
 Project Report/Essay 30%

**ECOL3452 - BEHAVIOURAL ECOLOGY (4 credits)**

Pre-requisites: ECOL2451 Population Ecology & ECOL2452 Community Ecology

Syllabus: Environmental and genetic effects on behaviour. Individual and group selection. Group living and social systems. Territoriality and dominance hierarchies. Kin and reciprocal altruism. Contest behaviour and evolutionary stable strategies. Mate choice

and sexual selection. Parent-offspring conflict.  
 Interspecific comparisons of parental investment.

Teaching: Two lectures and three hours of practical per week.

Method of Final Theory Examination (3 hours) 70%  
 Examination: Project Report/Essay 30%

**ECOL3453 - CROP ECOLOGY (4 credits)**

Pre-requisites: ECOL2452 Community Ecology & BIOL1151 Introductory Genetics

Syllabus: Autecology of selected crop species and their evolution, propagation and breeding. Interactions of crop species with weed, pest, disease and beneficial organisms in the agroecosystem. Control of weeds, diseases and pests by cultural, chemical and biological means. Integrated pest management.

Teaching: Two lectures, one tutorial and three hours of practical per week.

Method of Final Theory Examination (3 hours) 60%  
 Examination: Project Report 20%  
 Essay 20%

**ECOL3454 - FISHERIES BIOLOGY (4 credits)**

Pre-requisites: ECOL2451 Population Ecology, ECOL2452 Community Ecology & ECOL2454 Marine Biology

Syllabus: Global trends in fisheries yields and consumption patterns. Caribbean fisheries and current legislation. Methods for

determining stock structure, migration and stock abundance. Indices of abundance. Stock dynamics, Stock-recruitment relationships. Surplus production and yield per recruit models for predicting fishery yields.

Teaching: Two lectures and three hours of practicals per week.

Method of Final Theory Examination (3 hours) 70%  
 Examination: Practical Reports 20%  
 In-course test(s)/Assignment(s) 10%

**ECOL3950 - ECOLOGY RESEARCH PROJECT (8 credits)**

Pre-requisites: ECOL2451 Population Ecology, ECOL2452 Community Ecology & ECOL2453 Caribbean Island Biogeography

Restrictions: Not to be taken with BIOL3950 Biology Research Project, MICR3950 Microbiology Research Project, BIOC3950 Biochemistry or CHEM3505 Research Project

Syllabus: A practical project in Ecology carried out under the supervision of a staff member(s). Students will be allocated one of the available research topics and are expected to spend not less than 144 hours in field/ laboratory studies. The project will be presented both orally in the form of a short seminar and in a written report. Three typed, and bound copies of the written report must be presented.



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Method of	Supervisor's assessment	15%
Examination:	Seminar	15%
	Project Report	70%

**MICR3059 - IMMUNOBIOLOGY (4 credits)**

Pre-requisites:	BIOC1351 Introductory Biochemistry & BIOL2151 Genetics I	
Syllabus:	The mammalian immune system. Cells and organs involved in the immune response. Cell biology of phagocytosis. Structure and functions of the immunoglobulins. Phylogeny of the immune system. Immunoprophylaxis.	
Teaching:	Two lectures and three hours of practical and one tutorial per week.	
Method of	Final Theory Examination (3 hours)	80%
Examination:	In-course Test(s)/Assignments	20%

**MICR3251 - FOOD MICROBIOLOGY (4 credits)**

Pre-requisites:	MICR2251 General Microbiology & MICR2252 Eukaryotic Microorganisms	
Syllabus:	Factors regulating the development of food microorganisms and methods to control these factors. Food pathogens and microorganisms deteriorating the major food types. Good practices in alimentary transformations. Food contamination and intoxications.	
Teaching:	Two lectures, one tutorial and three hours of practical per week.	
Method of	Final Theory Examination (3 hours)	60%
Examination:	Practical report(s)	30%
	In-course test(s)/Assignment(s)	10%

**MICR3252 - MICROBIAL ECOLOGY (4 credits)**

Pre-requisites:	Either MICR2251 General Microbiology & MICR2252 Eukaryotic Microorganisms or ECOL2451 Population Ecology, ECOL2452 Community Ecology & ECOL2453 Caribbean Island Biogeography	
Syllabus:	Ecology and evolution. Ecology of individuals. Microbial population and community ecology. Biofilms. Biogeochemical cycles. Species interactions.	
Teaching:	Two lectures, one tutorial and three hours of practical per week.	
Method of	Final Theory Examination (3 hours)	50%
Examination:	Practical Report(s)	35%
	In-course test(s)/Assignment(s)	15%

**MICR3253 BIOLOGY OF VIRUSES (4 credits)**

Pre-requisites:	MICR2251 General Microbiology & BIOL1151 Introductory Genetics	
Syllabus:	The nature of viruses. Structure of viruses. Viroids. Prions. Medical virology – viral diseases of humans, mode of transmission, symptoms, pathogenesis, control measures, vaccination, antiviral drugs, interferon, Plant viruses – disease symptoms, control measures. Molecular virology: entry and exit of viruses from host cells; RNA virus replication; DNA virus replication, viral oncogenesis. Medical virology; viral diseases of humans; modes of transmission, symptoms: pathogenesis, control measures. Laboratory techniques used in the study, detection and identification of viruses.	

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Teaching:	Two lectures , one tutorial and three hours of practicals per week.		<b>MICR3950 - MICROBIOLOGY RESEARCH PROJECT (8 credits)</b>
Method of Examination:	Final Theory Examination (3 hours) Practical Report(s) In-course test(s)/Assignment(s)	50% 30% 20%	Pre-requisites: MICR2251 General Microbiology, BIOL2151 Genetics I, BIOC2351 Biochemistry I & MICR2252 Eukaryotic Micro-organisms
<b>MICR3258 - PATHOGENIC MICRO-ORGANISMS (4 credits)</b>			Restrictions: Not to be taken with BIOC3950 Biochemistry Research Project, BIOL3950 Biology Research Project, ECOL3950 Ecology or CHEM3505 Research Project
Pre-requisites:	MICR2251 General Microbiology & BIOL1151 Introductory Genetics		Syllabus: A practical project in Microbiology carried out under the supervision of a staff member. Students will be allocated one of the available research topics and are expected to spend not less than 144 hours in field/ laboratory studies. The project will be presented both orally in the form of a short seminar and in a written report. Three typed and bound copies of the written report must be presented.
Syllabus:	The normal microbial flora of the human body. Opportunistic infections. The pathogenesis of infectious diseases. Special properties of pathogenic micro-organisms. Virulence determinants - aggressins, impedins. Identification of pathogenic microbes and laboratory diagnosis of infectious diseases. Epidemiology and control of infections. Principles of anti-microbial chemotherapy.		
Teaching:	Two lectures and one tutorial per week and three hour practicals including attachment to a Medical Laboratory.		Method of Examination: Supervisor's assessment Seminar Project Report
Method of Examination:	Final Theory Examination (3 hours) Practical Report(s) In-course Test(s)/Assignment(s)	50% 15% 35%	15% 15% 70%

# CHEMISTRY

The Department of Biological & Chemical Sciences offers a Single Major, Double Major and Minor in Chemistry.

## MAJOR IN CHEMISTRY

### LEVEL I

CHEM1010	Fundamentals of Chemistry
CHEM1020	Introductory Chemistry

### LEVEL II

CHEM2010	Practical Chemistry I (2 credits)
CHEM2020	Practical Chemistry II (2 credits)
CHEM2100	Inorganic Chemistry I
CHEM2200	Organic Chemistry I
CHEM2300	Physical Chemistry I
CHEM2400	Analytical Chemistry I

### LEVEL III

CHEM3500	Chemistry Project (4 credits)
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or

CHEM3505	Chemistry Research Project (8 credits)
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(with special permission)

### And Eight (8) credits from:

CHEM3100	Inorganic Chemistry II
CHEM3200	Organic Chemistry II
CHEM3300	Physical Chemistry II

### MINOR IN CHEMISTRY (Sixteen (16) Credits):

CHEM2010	Practical Chemistry I (2 credits)
CHEM2020	Practical Chemistry II (2 credits)
CHEM2100	Inorganic Chemistry I
CHEM2200	Organic Chemistry I
CHEM2300	Physical Chemistry I

## DOUBLE MAJOR IN CHEMISTRY

### LEVEL I

CHEM1010	Fundamentals of Chemistry
CHEM1020	Introductory Chemistry

### LEVEL II

CHEM2010	Practical Chemistry I (2 credits)
CHEM2020	Practical Chemistry II (2 credits)
CHEM2100	Inorganic Chemistry I
CHEM2200	Organic Chemistry I
CHEM2300	Physical Chemistry I
CHEM2400	Analytical Chemistry I

### LEVEL III

CHEM3505	Chemistry Research Project (8 credits)
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### AND Thirty-two (32) credits from:

CHEM2950	Chemistry Elective
CHEM3100	Inorganic Chemistry II
CHEM3135	Bioinorganic Chemistry
CHEM3145	Bonding in Inorganic Chemistry
CHEM3200	Organic Chemistry II
CHEM3210	Bioorganic & Medicinal Chemistry
CHEM3300	Physical Chemistry II
CHEM3415	Analytical Chemistry III
CHEM3515	Environmental Chemistry

### AND Four (4) Credits From:

BIOC2351	Biochemistry I
ERSC2004	Renewable Energy Sources

**All incoming students registered to take courses in the Department of Biological and Chemical Sciences must attend a safety seminar usually held during registration week. Students taking laboratory courses in this Department will only be allowed to perform experiments if dressed in an appropriate lab coat, lab goggles and enclosed shoes. Some exceptions may be made in the wearing of safety goggles for lab procedures where there is no risk of eye injury (eg. microscope use).**

## PRELIMINARY CHEMISTRY COURSES

### CHEM0615 - PRELIMINARY CHEMISTRY I (6 Credits)

Prerequisite: None

Corequisite: CHEM0625 Preliminary Chemistry II or equivalent.

Syllabus: A course of about 39 lectures, associated tutorials and a maximum of 39 hours of laboratory work on the Fundamentals of Chemistry and Physical Chemistry.

**Fundamentals of Chemistry:** Review of basic concepts and definitions. The mole concept and its applications. Chemical equations and stoichiometry. Atomic theory of matter. Electron configuration of the elements: The periodic Table. Properties of isolated atoms. Energetics of bond formation. Bonding in covalent molecule: hybridization, valence bond theory and Valence Shell Electron Pair Repulsion (VSEPR) Theory. Classification of bonds. Interactions between molecules.

**Physical Chemistry:** Properties of gases and solutions. Energy changes and chemical

bonds. Hess's law and its applications. Bond dissociation energies. Bomb calorimetry. Dynamic and Ionic Equilibria. Buffers. Solubility Product. Kinetics. Principles of electrochemistry.

Teaching: Three lectures, one tutorial and three hours of practical work per week.

Method of	Final examination (three hours)	60%
Examination:	In-course test(s) / assignment(s)	20%
	Practicals	20%

### CHEM0625 - PRELIMINARY CHEMISTRY II (6 Credits)

Prerequisite: None

Corequisite: CHEM0615 (Preliminary Chemistry I) or its equivalent.

Syllabus: A course of about 39 lectures, associated tutorials and a maximum of 39 hours of laboratory work on elementary Organic Chemistry and Inorganic Chemistry.

**Organic Chemistry:** Structures, formulae and nomenclature of organic compounds. Introduction to reaction mechanisms. Functional groups and their reactions: hydrocarbons, halides, alcohols, amines, carbonyl compounds, carboxylic acids and their derivatives, including aliphatic and aromatic systems. Polymers.

**Inorganic Chemistry:** Periodicity. Properties and reaction of main group elements and their compounds: hydrogen, Group 1 and 2, Al, C and Si, N and P, O and S and the halogens. First row transition metals and coordination

complexes. Rusting. Industrial processes and environmental considerations.

Teaching: Three lectures, one tutorial and three hours of practical work per week.

Method of	Final examination (three hours)	60%
Examination:	In-course test(s) / assignment(s)	20%
	Practicals	20%

### LEVEL I CHEMISTRY COURSES

#### CHEM1010 - FUNDAMENTALS OF CHEMISTRY (6 Credits)

Prerequisite: CHEM0615 Preliminary Chemistry I & CHEM0625 Preliminary Chemistry II, or CAPE Chemistry Units 1 & 2, or equivalent.

Syllabus: This course seeks to provide the student with knowledge of the fundamental principles of chemistry with an emphasis on atomic and molecular structures and properties. Introduction to the chemical kinetics, electrochemistry, fundamentals of spectroscopy and organic chemistry will also be explored. The student will also be introduced to fundamental laboratory techniques required in the Organic, Inorganic and Analytical sub-disciplines.

Teaching: Three lectures, one tutorial and four hours of practical work per week.

Method of	Final examination (three hours)	60%
Examination:	In-course test(s) / assignment(s)	20%
	Practicals	20%

#### CHEM1020 - INTRODUCTORY CHEMISTRY (6 Credits)

Prerequisite: CHEM0615 Preliminary Chemistry I and CHEM0625 Preliminary Chemistry II, or CAPE Chemistry Units 1 & 2, or equivalent.

Syllabus: The second half of this course covers three disciplines of chemistry - Inorganic, Organic and Physical and presents introductory information on structures, nomenclature, properties, and reactions of monofunctional and poly functional carbon bases compounds; the chemistry of the main group and transition elements; thermodynamics, energetics and the packing arrangements of ionic structures. Additionally, students will become acquainted with the industrial and commercial applicability of certain elements and their compounds.

Teaching: Three lectures, one tutorial and four hours of practical work per week.

Method of	Final examination (three hours)	60%
Examination:	In-course test(s) / assignment(s)	20%
	Practicals	20%

### LEVEL II CHEMISTRY COURSES

#### CHEM2010 - PRACTICAL CHEMISTRY I (2 Credits)

Prerequisite: CHEM1010 Fundamentals of Chemistry & CHEM1020 Introductory Chemistry

Syllabus: A course of sixty (60) hours of practical work selected from the disciplines of Analytical

Chemistry, Inorganic Chemistry, Organic Chemistry and Physical Chemistry.

including hydrides, oxides, halides, polymers and technologically important materials.

Teaching: Five hours of practical classes per week.  
 Method of Practical work 60%  
 Examination: In-course tests and assignments 40%

Transition Metals: A survey of the properties and reactions of the first row transition metals and their compounds, with emphasis on the effects of the non-degeneracy of the d-orbitals in complexes and on technologically important materials.

### CHEM2020 - PRACTICAL CHEMISTRY II (2 Credits)

Prerequisite: CHEM1010 Fundamentals of Chemistry & CHEM1020 Introductory Chemistry

Syllabus: A course of sixty (60) hours of practical work selected from the disciplines of Analytical Chemistry, Inorganic Chemistry, Organic Chemistry and Physical Chemistry.

Teaching: Three lectures and one tutorial per week.

Method of Final examination (3 hours) 60%  
 Examination: In-course tests and assignments 40%

Teaching: Five hours of practical classes per week.

Method of Practical work 60%  
 Examination: In-course tests and assignments 40%

### CHEM2200 - ORGANIC CHEMISTRY I (4 Credits)

Prerequisite: CHEM1010 Fundamentals of Chemistry & CHEM1020 Introductory Chemistry

Syllabus: A course of 36 lectures and associated tutorials on the essential areas of Organic Chemistry.

### CHEM2100 - INORGANIC CHEMISTRY I (4 Credits)

Prerequisite: CHEM1010 Fundamentals of Chemistry & CHEM1020 Introductory Chemistry

Syllabus: A course of 36 lectures and associated tutorials, surveying the chemistry of the main group and d-block transition elements.

Main Group Chemistry: A survey of the structures, properties and reactions of the s- and p-block elements, and their compounds,

**Reaction mechanisms:** Energetics, kinetics and the investigation of mechanisms. Substitution, elimination and addition reactions. Linear free energy relationships.

**Stereochemistry:** Stereoisomerism and chirality. Fischer convention. Conformation and stereochemistry of ring compounds. Dynamic stereochemistry.

**Spectroscopy:** The application of spectroscopic techniques in elucidating the structures of organic molecules.

**Aromatics:** Aromatic and heteroaromatic chemistry. Electrophilic and nucleophilic substitution. Polynuclear aromatic hydrocarbons (PAH's). Radical halogenation and oxidation of alkyl benzenes.

**Synthesis:** Principles of organic synthesis: carbanions and their use in carbon-carbon bond formation. Organometallic reagents in organic synthesis.

Teaching: Three lectures and one tutorial per week.

Method of Examination:	Final examination (3 hours)	60%
	In-course tests and assignments	40%

#### CHEM2300 - PHYSICAL CHEMISTRY I (4 Credits)

Prerequisite: CHEM1010 Fundamentals of Chemistry & CHEM1020 Introductory Chemistry

Syllabus: A course of 36 lectures and associated tutorials, surveying thermodynamics, properties of matter, molecular spectroscopy and electrochemistry

Teaching: Three lectures and one tutorial per week

Method of Examination:	Final examination (2 hours)	60%
	In-course tests and assignments	40%

#### CHEM2400 - ANALYTICAL CHEMISTRY I (4 Credits)

Prerequisite: CHEM1010 Fundamentals of Chemistry & CHEM1020 Introductory Chemistry

Syllabus: A course of 36 lectures and associated tutorials, surveying the essential areas of analytical chemistry: methodology and sampling; statistical methods; the use of spectroscopic, electrochemical, and chromatographic techniques.

Teaching: Three lectures and one tutorial per week

Method of Examination:	Final examination (2 hours)	60%
	In-course tests and assignments	40%

#### CHEM2950 - CHEMISTRY ELECTIVE (4 Credits)

Pre-requisites: None

Syllabus: An advanced course in Chemistry taken as an exchange student at an approved institution and pre-approved by the Dean.

### LEVEL III CHEMISTRY COURSES

#### CHEM3100 - INORGANIC CHEMISTRY II(4 credits)

Prerequisites: CHEM2100 Inorganic Chemistry I

Syllabus: This final year inorganic chemistry course covers topics in the applications of group theory to problems in bonding and spectroscopy, the use of spectroscopic

techniques in Inorganic Chemistry, organometallic chemistry of main group and transition elements and rates and mechanisms of inorganic reactions. The course requires a sound grounding in descriptive inorganic chemistry.

Teaching: Two lectures, one tutorial and four hours of practicals per week.

Method of Examination:	Final Theory Examination (2 hours)	60%
	In-course test(s)/Assignment(s)	20%
	Practicals	20%

Teaching: Three lectures and one tutorial per week.  
 Method of Final examination (3 hours) 60%  
 Examination: In-course tests and assignments 40%

**CHEM3145 - BONDING IN INORGANIC CHEMISTRY (4 credits)**

**CHEM3135 - BIOINORGANIC CHEMISTRY (4 credits)**

Prerequisites: CHEM2100 Inorganic Chemistry I or CHEM2115 Main Group Chemistry & CHEM3115 Transition Metal Chemistry I

Prerequisites: CHEM3100 Inorganic Chemistry II  
 Syllabus: Laws of groups and their application to symmetry elements and symmetry operations, character tables, irreducible and reducible representations, LGO/MO approach to bonding in small molecules including examples with pi bonding and with bridging atoms and transition metal complexes. Applications of group theory to spectroscopy. Bonding dissociation energies. Electronegativity and its effects, Van Arkel-Ketelaar bond triangle. Use of d-orbitals in bonding by main group elements. Charge distribution in molecules and complex ions: methods of calculation. Group electronegativities.

Syllabus: Importance of metal ions in the environment. Basic concepts of ions in aqueous solutions. Determination of hydration numbers by NMR spectroscopy. Redox potentials of cations. Acidity and polymerization of aquocations. The chemical and physical factors controlling the elements of life energy in biological systems and hydrogen biochemistry, the role of biological macromolecules and polymers. The roles of some individual elements in biology and medicine sodium, potassium and chlorine. The chemistry of thallium, lead and chromium, molybdenum enzymes, cofactors and model systems. The chemistry of cobalt and iron complexes and their role in biological systems with respect to electron transfer reactions in aqueous media.

Teaching: Three lectures and one two-hour tutorial per week.

Method of Examination:	Final Theory Examination (3 hours)	60%
	In-course test(s)/Assignment(s)	40%



**CHEM3200 - ORGANIC CHEMISTRY II (4 credits)**

Pre-requisites: CHEM2200 Organic Chemistry I or  
 CHEM2215 Basic Organic Chemistry

Syllabus: This course aims to develop an understanding of the basic synthesis reactions used in organic Synthesis. Students will be taught to identify advantages and limitations associated with generally applied methodologies of compound classes and to propose mechanisms for the general reactions covered in the course. General principles of retrosynthetic analysis will be used to design simple synthetic schemes for synthesis of target molecules, including important natural products and drug targets. The teaching approaches used will include lectures, tutorials and student presentations.

Teaching: Three lectures and one tutorial per week.

Method of Examination:	Final Theory Examination (3 hours)	60%
	In-course test(s)/Assignment(s)	20%
	Weekly assignments	10%
	Presentations	10%

**CHEM3210 - BIOORGANIC & MEDICINAL CHEMISTRY (4 credits)**

Pre-requisites: CHEM2200 Organic Chemistry I or  
 CHEM2215 Basic Organic Chemistry

Restrictions: Not available to persons who have passed  
 CHEM3225 Natural Products Chemistry  
 or CHEM3235 Bio-organic Chemistry

Syllabus: The aim of this course is to give students an understanding of the basic principles used in the synthesis of compounds of biological importance, an overview of the major classes of secondary metabolites found in nature, and an introduction to medicinal chemistry. The advantages and disadvantages of different approaches to the synthesis of the biologically important compounds will be discussed, while modern methods for the study of natural products and medicinal chemistry will be emphasized.

Teaching: Three lectures and one tutorial per week.

Method of Examination:	Final Examination (2 hours)	60%
	In-Course Tests/Quizzes	20%
	In-Course Assignments	20%

**CHEM3300 - PHYSICAL CHEMISTRY II (4 credits)**

Pre-requisites: CHEM2300 Physical Chemistry I or  
 CHEM2315 Physical Chemistry II

Syllabus: This final year physical chemistry course covers topics in advanced spectroscopy and fundamental theoretical aspects of chemical kinetics, quantum mechanics and statistical Thermodynamics. This course also requires a sound grounding in basic mathematics as well as calculus.

Teaching: Three lectures and one tutorial per week.

Method of Examination:	Final Theory Examination (2 hours)	60%
	In-course test(s)/Assignment(s)	40%

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<b>CHEM3415 - ANALYTICAL CHEMISTRY III (4 Credits)</b>	Method of	Final Theory Examination (2 hours)	60%
	Examination:	In-course test(s)/Assignment(s)	10%
Prerequisites: CHEM2400 Analytical Chemistry I		Practicals	15%
		Project	15%

Syllabus: A survey of advanced instrumental techniques, applications, and data analysis, selected from the following: chromatographic methods, including gas chromatography; mass spectrometry, high performance liquid chromatography (HPLC); Atomic absorption spectroscopy (AAS) and atomic emission spectroscopy (AES); use of the diode array spectroscopy, including Fourier transform infrared (FTIR) and Raman spectroscopy; electrochemical methods, including potentiometric, conductometric, biochemical methods, including enzymatic protein sequencing, and fluorescence; thermogravimetric methods and differential scanning calorimetry; fundamentals of crystallography, including origin of systematic absences, intensity of diffraction, and comparison of monochromatic and Laue methods, fluorescence, including energy transfer, quenching and fluorescence anisotropy statistics; multiplexing; experimental design; use of computers to analyse data. Students will complete an instrumentation related project worth 15% of the course grade. The project will include approximately 20 hours of lab work.

Teaching: Two lectures, one tutorial and three hour practicals per week.

**CHEM3500 - CHEMISTRY PROJECT (4 credits)**

Pre-requisites: CHEM2100 Inorganic Chemistry I, CHEM2200 Organic Chemistry I, CHEM2300 Physical Chemistry I, CHEM2400 Analytical Chemistry I, CHEM2010 Practical Chemistry I and CHEM2020 Practical Chemistry II

Restriction: Not to be taken with CHEM3505 Chemistry Research Project

Syllabus: The course consists of a research project carried out under the supervision of a member of staff. Students will be directed to an initial survey of relevant literature and will present brief outlines of their planned research. Duration of the project is one semester, and students are expected to spend at least 72 hours on laboratory and/or computational work. Each student will be required to give a seminar on completion of the project and submit two copies of a typed report.

Method of	Practical Assessment	30%
Examination:	Seminar	15%
	Project Report	55%

**CHEM3505 - CHEMISTRY RESEARCH PROJECT  
(8 credits)**

**Pre-requisites:** CHEM2100 Inorganic Chemistry I,  
 CHEM2200 Organic Chemistry I,  
 CHEM2300 Physical Chemistry I,  
 CHEM2400 Analytical Chemistry I,  
 CHEM2010 Practical Chemistry I and  
 CHEM2020 Practical Chemistry II

**Restrictions:** Not to be taken with CHEM3500 Chemistry Project, BIOC3950 Biochemistry Research Project, BIOL3950 Biology Research Project, ECOL3950 Ecology Research Project or MICR3950 Microbiology Research Project.

**Description:** A practical project carried out under the supervision of a member of staff. The project will run throughout the academic year and students are expected to spend at least 144 hours on laboratory work. Each student will be required to give a seminar on completion of the project as well as submit two typed and bound copies of a written report. Enrolment will be limited to those students who have demonstrated good practical skills and an aptitude for research.

**Method of Examination:**

Supervisor's Assessment		15%
Seminar		15%
Project Report		70%

**CHEM3515 - ENVIRONMENTAL CHEMISTRY(4 credits)**

**Prerequisites:** CHEM2010 Practical Chemistry I,  
 CHEM2020 Practical Chemistry II and  
 CHEM2400 Analytical Chemistry I

**Syllabus:** **The atmosphere:** Regions of the atmosphere, reactions and properties. Stratospheric chemistry - ozone formation and turnover. Tropospheric chemistry - smog, photochemical smog, exhaust gases, precipitation, composition of rain, acid rain. Atmospheric aerosols. Urban pollution, indoor air pollution. The chemistry of global climate – greenhouse gases, climate change.

**The hydrosphere:** Physical and chemical properties of water. Distribution of species in aquatic systems. Acid base chemistry. CO<sub>2</sub> carbonate equilibrium. Organic matter and metals. Environmental chemistry of colloids and surfaces. Microbiological processes. Water pollution and waste-water treatment chemistry. The terrestrial environment: Soil properties – soil formation and properties, chemical and physical. Soil pollution and soil quality.

**The biosphere and xenobiotics:** Global biogeochemical cycles. Persistent organic pollutants, toxic metals, pesticides. Toxicological Chemistry. Emerging Issues – e.g. personal care products, nanoparticles. Other environmental concerns e.g. energy issues, waste, recycling, Caribbean issues.

Sampling and analysis – an overview of the fundamentals of environmental sampling design, sampling techniques and quality assurance/quality control (QA/QC) essential to acquire quality environmental data.

Teaching:	Two lectures, one tutorial and three hour practicals per week.	
Method of Examination:	Final Theory Examination (3 hours)	60%
	In-course test(s)/Assignment(s)	20%
	Practicals	20%

## COMPUTER SCIENCE & INFORMATION TECHNOLOGY

The Department of Computer Science, Mathematics & Physics offers a Major, Double Major and Minor in Computer Science and a Major and Minor in Information Technology. In association with the Faculty of Social Sciences, the Options of a Double Major combining Computer Science or Information Technology with Accounting or Management are also offered to select students (See Appendix VI, Options in conjunction with other Faculties)

**It is a requirement of the discipline that, to pass any Computer Science course, students must pass both Coursework and Final exam.**

### MAJOR IN COMPUTER SCIENCE:

#### LEVEL I

COMP1105	Computer Programming I
COMP1115	Computer Programming II
MATH1101	Basic Mathematics I

#### AND

ELET1110	Digital Electronics (Not required but strongly recommended)
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#### OR

**Four (4) Level I credits from this Faculty**

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**LEVEL II**

COMP2105	Discrete Mathematics
COMP2115	Information Structures
COMP2125	Computer Architecture
COMP2145	Software Engineering I

**LEVEL III**

COMP3100	Operating Systems
COMP3180	Algorithm Design and Analysis

**AND Eight (8) Credits (including at least one Level III course) from:**

COMP2135	Systems Software
COMP2150	Computer Networks I
COMP2160	Object-Oriented Programming
COMP2950	Computer Science Elective
COMP3115	Information Systems
COMP3125	Artificial Intelligence
COMP3135	Programming Languages
COMP3140	Software Engineering II
COMP3155	Computer Networks II
COMP3160	Data Base Management Systems
COMP3170	Web-Based Applications
COMP3190	Special Topics in Computer Science
COMP3210	Electronic Commerce
COMP3220	Human-Computer Interaction
COMP3230	Network and Computer Security
COMP3240	Introduction to Distributed Computing
COMP3260	Computer Graphics I
COMP3270	Computer Graphics II
COMP3910	Computer Science Research Project
COMP3920	Computer Science Major Research Project
COMP3930	Computer Science Group Research Project

**MINOR IN COMPUTER SCIENCE [Sixteen (16) Credits]:**

**At Least Eight (8) Credits From:**

COMP2105	Discrete Mathematics
COMP2115	Information Structures
COMP2125	Computer Architecture
COMP2145	Software Engineering I
COMP3100	Operating Systems
COMP3180	Algorithm Design and Analysis

**AND At Most Eight (8) Credits from:**

COMP2135	Systems Software
COMP2150	Computer Networks I
COMP2160	Object-Oriented Programming
COMP2950	Computer Science Elective
COMP3115	Information Systems
COMP3125	Artificial Intelligence
COMP3135	Programming Languages
COMP3140	Software Engineering II
COMP3155	Computer Networks II
COMP3160	Data Base Management Systems
COMP3170	Web-Based Applications
COMP3190	Special Topics in Computer Science
COMP3210	Electronic Commerce
COMP3220	Human-Computer Interaction
COMP3230	Network and Computer Security
COMP3240	Introduction to Distributed Computing
COMP3260	Computer Graphics I
COMP3270	Computer Graphics II
COMP3910	Research Project
COMP3920	Computer Science Major Research Project
COMP3930	Computer Science Group Research Project

N.B: Students are not allowed to take both COMP3115 Information Systems and MGMT3011 Management Information Systems II for credit.

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**MAJOR IN INFORMATION TECHNOLOGY:**

**LEVEL I**

COMP1105 Computer Programming I  
 COMP1115 Computer Programming II  
 MATH1101 Basic Mathematics I

**AND**

ELET1110 Digital Electronics (Not required but strongly recommended)

**OR**

Four (4) Level I credits from this Faculty

**LEVEL II**

COMP2105 Discrete Mathematics  
 COMP2115 Information Structures  
 COMP2145 Software Engineering I  
 COMP2160 Object-Oriented Programming

**LEVEL III**

COMP3160 Database Management Systems  
 COMP3170 Web-Based Applications

**AND Eight (8) Credits (including at least one Level III course) from:**

COMP2125 Computer Architecture  
 COMP2135 Systems Software  
 COMP2150 Computer Networks I  
 COMP2950 Computer Science Elective  
 COMP3100 Operating Systems  
 COMP3115 Information Systems  
 COMP3125 Artificial Intelligence  
 COMP3135 Programming Languages  
 COMP3140 Software Engineering II  
 COMP3155 Computer Networks II

COMP3180 Algorithm Design and Analysis  
 COMP3190 Special Topics in Computer Science  
 COMP3210 Electronic Commerce  
 COMP3220 Human-Computer Interaction  
 COMP3230 Network and Computer Security  
 COMP3240 Introduction to Distributed Computing  
 COMP3260 Computer Graphics I  
 COMP3270 Computer Graphics II  
 COMP3910 Computer Science Research Project  
 COMP3920 Computer Science Major Research Project  
 COMP3930 Computer Science Group Research Project

**MINOR IN INFORMATION TECHNOLOGY**

**[Sixteen (16) Credits]**

**At Least Eight (8) Credits From:**

COMP2105 Discrete Mathematics  
 COMP2115 Information Structures  
 COMP2145 Software Engineering I  
 COMP2160 Object-Oriented Programming  
 COMP3160 Database Management Systems  
 COMP3170 Web-Based Applications

**AND At Most Eight (8) Credits From:**

COMP2125 Computer Architecture  
 COMP2135 Systems Software  
 COMP2150 Computer Networks I  
 COMP2950 Computer Science Elective  
 COMP3100 Operating Systems  
 COMP3115 Information Systems  
 COMP3125 Artificial Intelligence  
 COMP3135 Programming Languages  
 COMP3140 Software Engineering II

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COMP3155	Computer Networks II
COMP3180	Algorithm Design and Analysis
COMP3190	Special Topics in Computer Science
COMP3210	Electronic Commerce
COMP3220	Human-Computer Interaction
COMP3230	Network and Computer Security
COMP3240	Introduction to Distributed Computing
COMP3260	Computer Graphics I
COMP3270	Computer Graphics II
COMP3910	Research Project
COMP3920	Computer Science Major Research Project
COMP3930	Computer Science Group Research Project

N.B: Students are not allowed to take both  
COMP3115 Information Systems and  
MGMT3011 Management Information  
Systems II for credit.

### DOUBLE MAJOR IN COMPUTER SCIENCE

#### LEVEL I

COMP1105	Computer Programming I
COMP1115	Computer Programming II
MATH1101	Basic Mathematics I

#### AND

ELET1110	Digital Electronics (Not required but strongly recommended)
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#### OR

Four (4) Level I credits from this Faculty

#### LEVEL II

COMP2105	Discrete Mathematics
COMP2115	Information Structures
COMP2125	Computer Architecture
COMP2145	Software Engineering I

COMP2150	Computer Networks I
COMP2160	Object-Oriented Programming

#### AND at most Eight (8) Credits From:

COMP2135	Systems Software
COMP2950	Computer Science Elective
ELET2100	Microprocessors I
ELET2130	Digital Communications I

#### LEVEL III

COMP3100	Operating Systems
COMP3155	Computer Networks II
COMP3160	Database Management Systems
COMP3180	Algorithm Design and Analysis
COMP3910	Computer Science Research Project

#### AND at least Twelve (12) Credits From:

COMP3115	Information Systems
COMP3125	Artificial Intelligence
COMP3135	Programming Languages
COMP3140	Software Engineering II
COMP3170	Web-Based Applications
COMP3190	Special Topics in Computer Science
COMP3210	Electronic Commerce
COMP3220	Human-Computer Interaction
COMP3230	Network and Computer Security
COMP3240	Introduction to Distributed Computing
COMP3260	Computer Graphics I
COMP3270	Computer Graphics II
ELET3151	Digital Communications II

**LEVEL I COMPUTER SCIENCE COURSES**

**COMP1105 - COMPUTER PROGRAMMING I (4 Credits)**

Pre-requisite: None

Syllabus: Basic Computer Architecture (Central processor, main and secondary memory, Input/output devices), Integrated Development Environments (Editors, Compilers, debuggers, libraries), Problem Solving (top-down design, stepwise refinement, sorting and searching), Files (Standard input/output, sequential text files) Data Types (integers, reals, characters, strings), Operators (Assignment, arithmetic, relational, Boolean, precedence rules), control Structures (Sequencing, iteration, selection), Data Structures (Linear arrays) Modules (Functions, Values and reference parameters, scope rules)

Teaching: Three (3) lectures, one tutorial and two (2) hours of labs per week.

Method of Final Theory Examination (3 hours) 60%

Examination: In-course Tests/Assignments 40%

**COMP1115 - COMPUTER PROGRAMMING II (4 Credits)**

Pre-requisite: COMP1105 Computer Programming I

Syllabus: Problem Solving (Recursion, randomness), Files (Direct and indexed files), Data Types (Enumerated types, type definitions), Data Structures (Structures, multidimensional arrays, systems, pointers), Basic Abstract Data Types (Lists, stacks, queues), Pointers (Dynamic memory allocation), Classes and Data Abstraction

Teaching: Three (3) lectures, one tutorial and two (2) hours of labs per week

Method of Final Theory Examination (3 hours) 60%

Examination: In-course Tests/Assignments 40%

**COMP1125 - INTRODUCTION TO UNIX (4 Credits)**

Pre-requisite: None

Syllabus: The role of UNIX, its current uses and applications and the UNIX family of operating systems. Interacting with UNIX – graphical and command line interfaces. File creation and their management. Navigating Directories - UNIX directory hierarchy, maintaining directories and locating files. Working with the C shell – wildcards, command history facility. Developing and executing shell scripts. Accessing servers remotely and transferring data. Data



manipulation – selecting, searching, sorting, counting and trimming. Customizing and monitoring of the system.

Teaching: Three lectures and two hours of lab per week.

Method of Final Theory Exam 60%  
 Examination: In course Test/Assignments 40%

**COMP1130 - WEB TECHNOLOGY FUNDAMENTALS  
 (4 Credits)**

Pre-requisite: None

Syllabus: The Internet, Overview of Web Application Architectures, Hypertext Markup Language (HTML), Web Server Applications, Java in the Enterprise, E-Business, Security.

Teaching: Three (3) lectures, one tutorial and two (2) hours of labs per week

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**LEVEL II COMPUTER SCIENCE COURSES**

**COMP2105 - DISCRETE MATHEMATICS (4 Credits)**

Pre-requisite: MATH1100 Basic Mathematics

Syllabus: Predicate Calculus (Universal and existential quantifiers, proofs, logical equivalences and inferences), Asymptotic Analysis and

Notation ( $O$ ,  $\theta$  and  $\Omega$ ), Recurrence Relations (Homogeneous, non-homogeneous, change of variable), Mathematical induction, Elementary Combinatorics (permutations and combinations, Binomial Theorem, Pigeonhole principle), Elementary Graph Theory (Paths, cycles and connectivity, classes of graphs, trees, minimum spanning trees, depth-first and breath-first traversals, adjacency and incident matrices), Finite State Machines, (State graphs/tables, regular sets, recognizers, Kleene's theorem, machine minimization)

Teaching: Three (3) lectures and one tutorial per week.  
 Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**COMP2115 INFORMATION STRUCTURES (4 Credits)**

Pre-requisite: COMP1115 Computer Programming II

Syllabus: Abstract Data Types (Lists, queues, stacks, trees), Indices (Open /closed hash tables, hash functions, collision resolution schemes), Dictionaries (Binary search trees, AVL-trees, splay trees, B-trees), Graphs (Adjacency matrices/lists, mapping functions), Sets (Forest, path compression, weighted unions)

Teaching: Three (3) lectures, one tutorial and two (2) hours of labs per week.

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**COMP2125 - COMPUTER ARCHITECTURE (4 Credits)**

Pre-requisites: [COMP1115 Computer Programming II & MATH1100 Basic Mathematics] or ELET1110 Digital Electronics

Syllabus: Instruction Sets and Execution, Pipelining, Addressing Modes, Memory Hierarchies, Caching, RISC vs CISC Architecture, Interrupt Processing, I/O Processing.

Teaching; Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**COMP2135 - SYSTEMS SOFTWARE (4 Credits)**

Pre-requisite: COMP1115 Computer Programming II

Syllabus: Programming Tools (Structure and use of: Compilers, linkers, Debuggers, profilers and preprocessors), Process Management (Overview of processes and threads, creating and using child processes, creating and using pipes), File Management (Overview of file management, manipulating file attributes, binary I/O, streamed I/O, redirection of standard I/O, use of shell redirection operators, filters, atomic operations, directory manipulation), Memory Management (Memory layout of a program, advanced memory, Array and pointer manipulations, command line arguments and Environment variables), Device Management (Accessing and managing I/O devices),

Teaching; Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**COMP2145 - SOFTWARE ENGINEERING I (4 Credits)**

Pre-requisite: COMP1115 Computer Programming II

Syllabus: Software Development (Requirements analysis, specifications, Design, implementation, validation and verification, maintenance), Product and Project Documentation (user manuals, internal documentation), Software Development Approaches (e.g. prototyping, agile development), Testing Strategies (black box, white box, usability).

Teaching; Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**COMP2150 - COMPUTER NETWORKS I (4 Credits)**

Pre-requisite: COMP1115 Computer Programming II

Syllabus: Data Communication Fundamentals, The ISO References Model, Transmission Media, Interface Standards, Asynchronous and Synchronous Transmission, Communications Control Devices, Data Compression, Error Detection Methods, Framing Methods,

Flow Control, Network Topology, LAN Technologies – including Wireless LANs.

Teaching; Three (3) lectures and one tutorial per week.

Method of Examination: Final Theory Examination (2 hours) 60%  
 In-course Tests/Assignments 40%

**COMP2160 - OBJECT-ORIENTED PROGRAMMING (4 Credits)**

Pre-requisite: COMP1115 Computer Programming II

Syllabus: Fundamental Concepts (Encapsulation, information hiding, classes and objects, inheritance, polymorphism, dynamic binding), Fundamentals of Class Design (Inheritance vs composition relationships, constructors and destructors, copy constructors, selectors, modifiers) Design by Contract (Exception handling, assertions), Advanced Concepts (Abstract and concrete classes, frame-works and design patterns), Applications using Class Libraries.

Teaching; Three (3) lectures, one tutorial and two (2) hours of labs per week.

Method of Examination: Final Theory Examination (2 hours) 60%  
 In-course Tests/Assignments 40%

**COMP2950 - COMPUTER SCIENCE ELECTIVE (4 Credits)**

Pre-requisites: None

Syllabus: An advanced course in Computer Science taken as an exchange student at an approved institution and pre-approved by the Dean.

**LEVEL III COMPUTER SCIENCE COURSES**

**COMP3100 - OPERATING SYSTEMS (4 Credits)**

Pre-requisites: COMP2115 Information Structures & COMP2125 Computer Architecture

Syllabus: Evolution of Operating Systems  
 Characteristics of Modern Operating systems  
 Process Management (Processes and threads, process synchronization, Scheduling, deadlock), Memory Management (Memory partitioning, paging, virtual memory segmentation), File Management (File organization, file system implementation, example file systems), Device Management (I/O devices, device drivers, I/O design issues, disk-scheduling), Security (Security threats, protection mechanisms, trusted systems).

Teaching; Three (3) lectures and one tutorial per week.

Method of Examination: Final Theory Examination (2 hours) 60%  
 In-course Tests/Assignments 40%

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**COMP3115 - INFORMATION SYSTEMS (4 Credits)**

Teaching; Three (3) lectures and one tutorial per week.

Pre-requisite: COMP2145 Software Engineering I

Restriction: Not available to students who have passed MGMT3011 – Management Information Systems II

Syllabus: Evolution of Information Technology, Impact of Information Technology on Business, Information and Information Systems, Systems Planning, Development and Implementation, Delivery of Information Services.

Teaching; Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

Teaching; Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**COMP3135 - PROGRAMMING LANGUAGES (4 Credits)**

Pre-requisite: COMP2115 Information Structures

Syllabus: Imperative Programming (Basic Semantics, data types control structures), Object-Oriented Programming (Objects, classes and methods, Inheritance, polymorphism), Functional Programming (Referential transparency, recursion, types and Polymorphism, lambda calculus) Logic Programming (Predicate calculus and logical deduction, unification and resolution, non-determinism and back-tracking), Scripting Languages (Regular expressions) Concurrent Programming (Communication and synchronization).

**COMP3125 - ARTIFICIAL INTELLIGENCE (4 Credits)**

Pre-requisites: COMP2105 Discrete Mathematics & COMP2115 Information Structures

Syllabus: Problems and Search (Problem spaces, heuristic search), Knowledge Representation (Predicate logic, rule-based systems, Reasoning, slot-and-filler), Advanced Topics (Game playing, natural language, planning, learning), Applications (Expert systems, software agents, programming-by-example) Software Development Approaches (e.g. prototyping, agile development), Testing Strategies (black box, white box, usability).

Teaching; Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**COMP3140 - SOFTWARE ENGINEERING II (4 Credits)**

Pre-requisite: COMP2145 Software Engineering I

Syllabus: Application of Project Management to Software Projects, Approaches to Project Management, Project Selection and

Feasibility Analysis, Project Cost Estimation, Planning and Resource Scheduling, Control Techniques, Quality Assurance, Team Management.

Teaching; Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**COMP3155 - COMPUTER NETWORKS II (4 Credits)**

Pre-requisite: COMP2150 Computer Networks I

Syllabus: The ISO Reference Model – layer 3 and above, Internetworking with TCP/IP, WAN Technologies e.g. ATM, Frame Relay Quality of Service in Communications Networks, Network Security, Network Design, Network Performance, Network Management.

Teaching; Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**COMP3160 - DATABASE MANAGEMENT SYSTEMS (4 Credits)**

Pre-requisite: COMP2115 Information Structures

Syllabus: Principles of Database Design (Logical and Physical schemas, Data independence,

entity-relationship model), Relational Database Systems (Data normalization, data Description Languages, query languages), Advanced Database Concepts(Distributed databases, object-oriented Databases, data warehousing).

Teaching; Three (3) lectures, one tutorial and two (2) hours of labs per week.

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**COMP3170 - WEB-BASED APPLICATIONS (4 Credits)**

Pre-requisite: COMP2160 Object-Oriented Programming

Syllabus: Overall Client-Server Model, Client Side Programming (Development of browser software, Client side scripting), Networking (TCP/IP, HTTP, sockets, datagrams, routing issues), Server Side Programming (GGI, server side scripting, web services), Database Connectivity (Server to database connectivity issues), Security (Policy development, physical security, securing web applications), Design Issues (User interface factors, hardware issues).

Teaching; Three (3) lectures, one tutorial and two (2) hours of labs per week.

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**COMP3180 - ALGORITHM DESIGN AND ANALYSIS  
 (4 Credits)**

algorithms, program verification, discrete mathematics and any other area of current interest.

Pre-requisites: COMP2105 Discrete Mathematics &  
 COMP2115 Information Structures

Teaching; Three (3) lectures and one tutorial per week.

Syllabus: Analysis of Algorithms: computational models, time and space; Complexities, worst-case and expected complexities, lower and Upper bounds; Techniques for designing efficient algorithms: recursion, divide-and-conquer, balancing, dynamic programming, and branch-and-bound; Problems on sets and sequences including sorting and selection; string matching; Matrix and Boolean matrix multiplication; Graph algorithms; The classes of P, NP and NP-Complete problems.

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**COMP3210 - ELECTRONIC COMMERCE (4 Credits)**

Pre-requisite: COMP2160 Object-Oriented Programming

Syllabus: Internet concepts and technology, Economic foundation of electronic commerce, Storefronts, shopping carts and Landing pages, Order processing, Pricing and payment processing, Security issues, Shipping and handling, Products, Internet marketing and legal issues.

Teaching; Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

Teaching; Three (3) lectures and one tutorial per week.

**COMP3190 - SPECIAL TOPICS IN COMPUTER SCIENCE (4 Credits)**

Pre-requisite: Restricted to Finalists majoring in Computer Science.

Syllabus: Topics will be drawn from the principles of programming languages, operating systems, information systems, graphics, artificial intelligence, software engineering, networks, logic, computability and complexity theory,

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**COMP3220 - HUMAN-COMPUTER INTERACTION (4 Credits)**

Pre-requisites: COMP2115 Information Structures &  
 COMP2145 Software Engineering I

Syllabus: Historical overview of human-computer interaction. Current and future developments in the area of human-computer interaction.

Relationship to computer science and software engineering. Influences on interface design. General models and guidelines. Methods of designing interfaces. Software and hardware interface implementation. Mechanisms of evaluation.

Teaching: Three (3) hours of lectures and two (2) hours of labs per week.

Method of Examination: Final Theory Examination (2 hours): 60%  
 In-course Tests/Assignments: 40%

**COMP3230 - NETWORK AND COMPUTER SECURITY (4 Credits)**

Pre-requisites: COMP2105 Discrete Mathematics & COMP2150 Computer Networks I

Syllabus: Introduction to cryptography. Symmetric-key encryption and authentication. Public-key encryption and authentication. Cryptographic hash functions. Message authentication codes and digital signatures. Key distribution and certification. Authorization and access control. Security protocols. Storage security. Web security. Payment systems. Email security. Digital rights management. Social issues such as usability, privacy and risk assessment.

Teaching: Three (3) hours of lectures and two (2) hours of labs per week.

Method of Examination: Final Theory Examination (2 hours): 60%  
 In-course Tests/Assignments: 40%

**COMP3240 - INTRODUCTION TO DISTRIBUTED COMPUTING (4 Credits)**

Pre-requisites: COMP2115 Information Structures & COMP2125 Computer Architecture

Syllabus: Introduction to Distributed Systems. Communication Mechanism. Distributed Algorithms. Naming. Synchronization. Fault Tolerance. Security. Distributed Files Systems. Distributed File System design and implementation. NFS, Coda. Cluster Computing.

Teaching: Three (3) hours of lectures and two (2) hours of labs per week.

Method of Examination: Final Theory Examination (2 hours): 60%  
 In-course Tests/Assignments: 40%

**COMP3260 - COMPUTER GRAPHICS I (4 Credits)**

Pre-requisites: COMP2115 - Information Structures & COMP2105 - Discrete Mathematics

Syllabus: Output primitives. 2-dimensional transformations and clipping. 3-dimensional display techniques. Representations and transformations. Projection algorithms. 2D Raster Graphics Algorithms. Illumination and color models. Hidden-surface elimination. Bézier and B-Spline curves.

Teaching: Three (3) hours of lectures and two (2) hours of labs per week.

Method of Examination: Final Theory Examination (2 hours): 60%  
 In-course Tests/Assignments: 40%

**COMP3270 - COMPUTER GRAPHICS II (4 Credits)**

Pre-requisite: COMP3250 - Computer Graphics I

Syllabus: Rendering. Graphics Rendering Pipeline.  
 Geometric modeling. Curves and Surface Design. Texture Mapping. Terrain Mapping. Detail optimizations. Ray-Tracing. Animation.

N.B.

material and evidence of extensive reading and comprehension of the subject area. A proposal and literature review must be submitted no later than the fourth week of Semester II and a final written report must be submitted and presented orally to a panel of at least three Faculty members no later than the last week of classes in Semester II.

Enrolment will be limited to those students who have demonstrated a sound academic background and an aptitude for research.

Teaching: Three (3) hours of lectures and two (2) hours of labs per week.

Teaching: Three (3) lectures and one tutorial per week.

Method of Examination: Final Theory Examination (2 hours): 60%  
 In-course Tests/Assignments: 40%

Method of Examination: Written Report 60%  
 Oral Presentation 20%  
 Proposal and Literature Review 20%

**COMP3910 - COMPUTER SCIENCE RESEARCH PROJECT (4 Credits)**

Pre-requisite: Restricted to Finalists majoring in Computer Science.

Syllabus: In consultation with and under the supervision of a Faculty member, students are expected to define, investigate and report on an applied or theoretical research topic in Computer Science. The project itself is equivalent to a single Faculty course and must therefore reach that standard in terms of content and research effort. The project should contain some originality in

**COMP3920 - COMPUTER SCIENCE MAJOR RESEARCH PROJECT (8 Credits)**

Pre-requisite: Restricted to finalists majoring in Computer Science or Information Technology and by permission of the Computer Science discipline

Syllabus: This course provides students with the opportunity to complete a major project utilizing classroom knowledge to solve a realworld or research- based problem. Students are required to realize a significant software application from inception through to implementation or proof of concept.



The project runs throughout the academic year (semesters I and II) giving students the needed time to thoroughly research and solve a problem that can produce usable outcomes with either commercial or research applications.

Teaching: Students are required to meet with their supervisors at least once a week.

Method of	Mid-term presentation	10%
Examination:	Final project presentation	15%
	Product Demonstration	15%
	Web Page	10%
	Report	50%

Teaching: Students are required to meet with their supervisors at least once a week.

Method of	Proposal Presentation	10%
Examination:	Proposal Report	10%
	Final Presentation	15%
	Demonstration	15%
	Final Report	50%

**COMP3930 - COMPUTER SCIENCE GROUP RESEARCH PROJECT (4 Credits)**

Pre-requisite: COMP2115, COMP2145 and restricted to finalists majoring in Computer Science or Information Technology and by permission of the Computer Science discipline

Syllabus: This course provides groups comprised of 2-4 students with the opportunity to implement a substantive software system under the supervision of a staff member. The software may address a problem in any domain, but must meet the minimum standards of design and functionality, appropriate for a Computer Science or Information Technology major.

## EARTH SCIENCES

Earth Sciences is an interdisciplinary programme of the Faculty comprising individual courses as well as a Minor in Earth Sciences. The Minor is restricted to students in the Faculty of Pure & Applied Sciences.

### MINOR IN EARTH SCIENCES

ERSC1001 Dynamic Earth

METE1200 (ERSC1002) Oceans & Climate

#### AND Sixteen (16) credits from:

ERSC2001 Earth & Life

ERSC2002 Climatology

ERSC2003 Oceanography

ERSC2004 Renewable Energy Sources

ERSC3001 Natural Hazards

ERSC3002 Climate Variability & Predictability

ERSC3900 Earth Science Research Project

### ERSC1001 - DYNAMIC EARTH (4 credits)

Pre-requisites: None

Syllabus: An introduction to geology with specific reference to the Caribbean. Earthquakes, magnetism and the structure of the Earth. The geological processes that shape the Earth's surface – volcanism, weathering, erosion, transport and deposition; large-scale dynamic processes – plate tectonics. The Earth through geological time. Introduction to rocks, minerals and geological maps.

Teaching: Two lectures, one tutorial and three hours of labs per week.

Method of Examination:	Theory Examination (2 hours)	60%
	Laboratory	20%
	In-course assignments/tests	20%

### ERSC2001 - EARTH & LIFE (4 credits)

Pre-requisites: ERSC1001 Dynamic Earth

Syllabus: What is life? Atoms & molecules. The formation of the solar system. Hypotheses on the origins of life. Factors that make the earth hospitable to life. Temperature regulation of the earth. The carbon cycle. The impact of volcanism on the Earth system. The role of plate tectonics as an influence on climate. Climate modelling of atmospheric oxygen during the Phanerozoic. Development of the Earth's atmosphere during the Cryptozoic. Regulation of atmospheric oxygen during the Phanerozoic. The importance of ozone in shielding life from harmful radiation. Climate modelling of atmospheric carbon dioxide during the Phanerozoic. Life in the Phanerozoic. The links between the evolution of land plants and global atmospheric conditions. Case studies for environmental conditions during two scenarios.

Teaching: Two lectures, one tutorial and three hours of labs per week.

Method of Examination:	Theory Examination (3 hours)	60%
	Laboratory	20%
	In-course assignments/tests	20%

**ERSC2002 - CLIMATOLOGY (4 credits)**

Pre-requisites: ERSC1002 Oceans & Climate or METE1200

Oceans & Climate

Syllabus: Climate system. Annual and seasonal temperature distribution. Annual and seasonal precipitation distribution.

Atmospheric circulation. Global climate.

Regional climate. Climate oscillations. Ocean/atmosphere interactions. Climate change.

Teaching: Two lectures, one tutorial and three hours of labs per week.

Method of Theory Examination (3 hours) 60%

Examination: Laboratory 20%

In-course assignments/tests 20%

Teaching: Two lectures, one tutorial and three hours of labs per week.

Method of Theory Examination (3 hours) 60%

Examination: Laboratory 20%

In-course assignments/tests 20%

**ERSC2004 - RENEWABLE ENERGY SOURCES (4 credits)**

Pre-requisite: 16 Level 1 FPAS credits

Restriction : Available only to FPAS students

Syllabus: Current and future energy generation systems. Resources, extraction, conversion, and end-use, with emphasis on meeting regional and global energy needs in the 21st century in a sustainable manner. Aspects of energy production and consumption. Patterns of national, regional and global energy patterns of supply and utilization. Environmental effects of energy and the energy-prosperity-environmental dilemma. Mathematical representations of sustainability. Allowability, efficiency, and production rates of different renewable energy sources - solar energy, wind energy, tidal power, wave energy, geothermal energy, hydroelectricity, and bio-energy. Energy systems and sustainability systems in the renewable energy context. Major economic issues of production, storage, transportation, and distribution of energy.

**ERSC2003 - OCEANOGRAPHY (4 credits)**

Pre-requisites: CSEC Chemistry and ERSC1002 Oceans & Climate or METE1200 Oceans & Climate.

Syllabus: Introduction to oceanography. Distribution and formation of the Oceans. Marine sediments. Descriptive chemical oceanography. Physical chemistry of seawater. Dissolved gases in seawater. The carbonate cycle. Nutrients. Minor and trace elements. Biological productivity in the marine environment. The organic carbon cycle. Metal geochemistry. Tracers of processes. Ocean and atmospheric circulation. Waves and tides. Coasts and coastal processes. Anthropogenic impacts & coastal pollution. Marine data interpretation.

Teaching: Two hours of lecture, one hour of tutorial, and three hours of project work per week.

Method of Final Examination (3 hrs) 50%  
 Assessment: Project: 25%  
 In-course Test(s): 25%

12. Climate and Climate Change
13. The economic and human cost of disaster
14. The assessment and management of natural hazard risks
15. Reducing the impact of disaster
16. The human response to hazard

### ERSC3001 - NATURAL HAZARDS (4 Credits)

Pre-requisites: ERSC1001: The Dynamic Earth and  
 ERSC2003: Oceanography or ERSC2002:  
 Climatology

Teaching: Two lectures, one tutorial, three hours of research/practical work each week

Method of Final exam (3 hrs) 60%  
 Assessment: In-Course & Practical work 40%

Syllabus: The following topics, concepts and issues will be discussed in this course:

1. Hazard, risk and disaster
2. The role of plate tectonics in natural hazards
3. Earthquakes distribution, magnitude, intensity, hazard assessment and mitigation
4. Tsunami causes, speed, amplitude, hazards and mitigation
5. Volcanoes distribution, eruptive styles, hazards monitoring and mitigation
6. Flooding and drought
7. Mass wasting
8. Subsidence
9. Severe weather events
10. Hurricanes distribution, structure, hazards intensity and mitigation
11. Coastal processes waves, vulnerable regions, coastal erosion, mitigation

### ERSC3002 - CLIMATE VARIABILITY & PREDICTABILITY (4 credits)

Pre-requisite: ERSC2002 Climatology

Syllabus: Climate system and variability, mean state, cycle, trend; Concepts of variability, solar radiation and the role of aerosols on climate processes. Data used in climate analysis: observation, reconstruction, modeling. Model simulation and limitations of the climate models. Skill, robustness and reliability of the climate models. Climate response to external and internal forcings. North Atlantic Oscillation and sea surface temperature forcing. ENSO and climate predictability in the north Atlantic region. Oscillations in the climate system. Monthly and seasonal predictability. Past climate variability. Short term and Long term climate prediction.

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Teaching:	Two lectures, one tutorial and three hours of labs per week.	Method of Examination:	Supervisor's Assessment Seminar Project Report	15% 15% 70%
Method of Examination:	Theory Examination (3 hours) Laboratory In-course assignments/tests			60% 20% 20%

**ERSC3900 - EARTH SCIENCE RESEARCH PROJECT**

Pre-requisites: ERSC1001: The Dynamic Earth, METE1200: Oceans and Climate, 12 credits from the following second level 4 credit courses:  
 ERSC2001: Earth and Life, ERSC2002: Climatology, ERSC2003: Oceanography  
 ERSC2004: Renewable Energy Resources

Syllabus: This course consists of a research project in Earth Science carried out under the supervision of a member (or members) of staff. Students will be allocated one of the available research projects and are expected to spend not less than 144 hours in field/laboratory/theoretical studies. The project will be presented in the form of a short seminar and a written report.

Teaching: Students will be involved in regular meeting/discussions with their supervisor(s) who will provide training in relevant laboratory/field methods/skills and guide the student in experimental design, data collection and the analysis and interpretation of the data collected.

## ELECTRONICS

The Department of Computer Science, Mathematics & Physics offers a Major and Minor in Electronics.

### MAJOR IN ELECTRONICS

#### LEVEL I

ELET1100	Circuit Analysis
ELET1110	Digital Electronics
ELET1120	Basic Electronics
MATH1120	Calculus I

**And 32 Credits from Level II & III Electronics courses as indicated below.**

#### LEVEL II

At Least Twelve (12) Credits From:

ELET2100	Microprocessors I
ELET2110	Circuit Simulation
ELET2120	Discrete Device Electronics
ELET2130	Digital Communications I
ELET2140	Medical Instrumentation

#### LEVEL III

At Most Twenty (20) Credits (Five Courses) From:

ELET3041	Microcontrollers & Applications
ELET3110	Control and Instrumentation
ELET3120	Communication Circuits
ELET3130	Intro. to Digital Signal Processing (DSP)
ELET3151	Digital Communications II
ELET3152	Mobile Communications and Applications
ELET3160	Electronics Research Project
ELET3210	Sensor and Actuator Technology

### MINOR IN ELECTRONICS [Sixteen (16) Credits]

**Sixteen (16) Credits (Four Courses) From:**

ELET2100	Microprocessors I
ELET2110	Circuit Simulation
ELET2120	Discrete Device Electronics
ELET2130	Digital Communications I
ELET2140	Medical Instrumentation
ELET3041	Microcontrollers & Applications
ELET3110	Control and Instrumentation
ELET3120	Communication Circuits
ELET3130	Intro. to Digital Signal Processing (DSP)
ELET3151	Digital Communications II
ELET3152	Mobile Communications and Applications
ELET3160	Electronics Research Project
ELET3210	Sensor and Actuator Technology

### MINOR IN MEDICAL ELECTRONICS

**[Sixteen (16) Credits]**

ELET2120	Discrete Device Electronics
ELET2140	Medical Instrumentation
ELET3041	Microcontrollers & Applications
ELET3210	Sensor and Actuator Technology

**A student with a Minor in Medical Electronics cannot count any of these courses as part of their Major or Minor in Electronics**

**LEVEL I ELECTRONICS COURSES**

**ELET1110 - DIGITAL ELECTRONICS (4 Credits)**

**ELET1100 - CIRCUIT ANALYSIS (4 Credits)**

Pre-requisite: None

Pre-requisite: CAPE Physics Units I & II or CAPE Pure Mathematics Units I & II

Syllabus: Binary systems. Logic gates, truth-tables. Combinational logic. Boolean algebra. Karnaugh mapping, minimization, NAND/NOR logic. Binary arithmetic, binary codes, encoders, decoders, code conversion, multiplexer, data selector, de-multiplexer, clocks, one-shot Asynchronous & synchronous circuits (latches, flip-flops, asynchronous counters, synchronous counters, applications of counters, shift registers). Design and analysis of asynchronous & synchronous circuits. IC families. Bipolar, MOS, TTL, CMOS, Tri-state, Schmitt trigger. Recent advances of ICs, Analog-to-Digital and Digital-to-Analog conversion, sample & hold, D/A & A/D ICs, introduction to the microprocessor, number systems, floating point representation.

Syllabus: Kirchhoff's laws, DC circuits, alternating voltages. Phasor and complex representation of sinusoids. Impedance and power in AC circuits. Series and parallel circuits. Admittance, impedance and resonance. Mesh current and node voltage analysis. Thevenin's and Norton's theorems, superposition and maximum power transfer theorem. Mutual inductance, circuit transients, bode plots. Operational amplifier circuits - amplifiers, integrators, differentiators, adders, subtractors, multi-vibrators, waveform generators, power op-amps.

Teaching: Two (2) lectures, one tutorial per week and 26 hours of practical work.

Teaching: Two (2) lectures, one tutorial per week and 26 hours of practical work.

Method of Examination: Final Theory Examination (2 hours) 70%  
 In-course Tests/Assignments 20%  
 Laboratory 10%

Method of Examination: Final Theory Examination (2 hours) 70%  
 In-course Tests/Assignments 20%  
 Laboratory 10%

**ELET1120      BASIC ELECTRONICS (4 Credits)**

Pre-requisite:    None

Syllabus:        Resistors, capacitors, inductors & their applications in circuits. Characteristics and applications of diodes including photo-devices. Other semiconductor devices and their applications (SCR, TRIACS, etc...). Transistors (BJT & FETS), how they work and their application in circuits. Simple amplifiers, their design and properties. Basic filters, power supplies and regulators. Analysis of some standard electronic circuits.

Teaching:        Two (2) lectures, one tutorial per week and 26 hours of practical work.

Method of Examination:	Final Theory Examination (2 hours)	70%
	In-course Tests/Assignments	20%
	Laboratory	10%

**LEVEL II ELECTRONICS COURSES**

**ELET2100 - MICROPROCESSORS I (4 Credits)**

Pre-requisite:    ELET1110 Digital Electronics

Syllabus:        Architecture of 8-bit CPU's e.g. INTEL 8085, Instruction set, Registers and their uses, Operation, Busses, Addressing, Data flow, Control section, Interrupts, Stack, Branching, Subroutines, Loops, Serial I/O, Interfacing, Port and memory mapping, Polling, Handshaking, Parallel ports, Serial communications (RS-232), A/D and basic D/A interfacing, device control with simple examples, comparison with other 8-bit CPU's, Introduction to advanced microprocessors.

Teaching:        Two (2) lectures four (4) hours of laboratory per week.

Method of Examination:	Final Theory Examination (2 hours)	60%
	In-course Tests/Assignments	20%
	Laboratory	20%

**ELET2110 - CIRCUIT SIMULATION (4 Credits)**

Pre-requisite:    ELET1100 Circuit Analysis

Syllabus:        Introduction to SPICE, Language syntax, netlists, Source specification and passive element models, Active device modeling, macro models, AC, DC, transient, frequency and Monte Carlo analysis, Issues of convergence and stability.



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Teaching: Two (2) contact hours and four (4) laboratory hours per week

conversion, Information Theory, Baseband Transmission, Error Control Coding (Block).

Method of Examination: Final Theory Examination (2 hour) 60%  
 In-course Tests/Assignments 20%  
 Laboratory 20%

Teaching: Two (2) 1-hour lectures and four (4) hours of laboratory per week.

**ELET2120 - DISCRETE DEVICE ELECTRONICS  
 (4 Credits)**

Examination: Final Theory Examination (2 hours) 60%  
 In-course Tests/Assignments 20%  
 Laboratory 20%

Pre-requisite: ELET1120 Basic Electronics

**ELET2140 - MEDICAL INSTRUMENTATION (4 credits)**

Syllabus: Hybrid & hybrid-pi equivalent circuits. Difference & Cascode amplifiers. Darlington configuration, complementary symmetry amplifiers. Types of feedback & their effects. High & low frequency response of RC coupled amplifiers. Tuned amplifiers, oscillators.

Pre-requisite: ELET1110 Digital Electronics

Teaching: Two (2) lectures and four (4) hours of laboratory per week.

Syllabus: The following topics and concepts will be discussed during the course:  
 Introduction to Anatomy and Physiology  
 Overview of Medical Electronics Equipments  
 Preparation of Biosensor  
 Types of Biosensors and their Applications  
 Electrodes Bio-Medical Recorders  
 Patient Monitoring Systems  
 Safety Aspects of Medical Instruments

Method of Examination: Final Theory Examination (2 hours) 60%  
 In-course Tests/Assignments 20%  
 Laboratory 20%

Teaching: Two (2) lectures and four (4) hours of laboratory per week.

**ELET2130 - DIGITAL COMMUNICATIONS I (4 credits)**

Pre-requisite: MATH1120 Calculus I and ELET1110 Digital Electronics

Method of Examination: Final Theory Examination (2 hours) 40%  
 In-course Tests/Assignments 20%  
 Laboratory/Mini-Project 40%

Syllabus: Fundamentals of digital communications, Fourier analysis, Energy and power spectral density, frequency response, Analog to Digital

**ELET2950 - ELECTRONICS ELECTIVE (4 credits)**

Pre-requisites: None

Syllabus: An advanced course in Electronics taken as an exchange student at an approved institution and pre-approved by the Dean.

Teaching: Two hours of lectures, one hour of tutorial and three hours of laboratory each week.

Method of	In course test(s) / Assignment(s)	20%
Assessment:	Laboratory/ Mini-Project	30%
	Final Theory Examination (2 hours)	50%

**LEVEL III ELECTRONICS COURSES**

**ELET3041 - MICROCONTROLLERS AND APPLICATIONS (4 credits)**

Pre-requisite: ELET2100 Microprocessors I

Syllabus: A Microcontroller Framework - hardware architecture, instruction set, addressing modes, program memory, register file structure and uses, simple program operations. The Assembler and Its Use – application code source file, list, hex, and object file generation, table use, macros, subroutines, directives. Input and Output Peripherals - ports, displays, buttons, keypads, sensors, actuators, relays, interrupts, timers, counters, pre-scalars, A/D, D/A, motors, PWM, serial communication Protocols. Memory – RAM, ROM, PROM, EPROM, EEPROM, Flash, and Error Correction. Applications – a variety of applications from consumer electronics to research instruments

**ELET3110 - CONTROL & INSTRUMENTATION (4 Credits)**

Pre-requisite: ELET2120 Discrete Device Electronics

Syllabus: Block diagrams, signal flow graphs, frequency response, stability, steady state and transient response. Transducers, controllers and control systems for level, temperature, speed and position control. Sampled systems. Introduction to computer control and robotics.

Teaching: Two (2) lectures and four (4) hours of laboratory per week.

Method of	Final Theory Examination (2 hour)	60%
Examination:	In-course Tests/Assignments	20%
	Laboratory	20%

**ELET3120 - COMMUNICATION CIRCUITS (4 Credits)**

Pre-requisite: ELET2120 Discrete Device Electronics

Syllabus: High frequency transistors, transformers and filters. HF construction techniques. RF amplifiers, oscillators and frequency

synthesisers. Mixers, IF amplifiers. Circuits for modulation and demodulation. Simulating communication circuits.

**ELET3151 - DIGITAL COMMUNICATIONS II (4 credits)**

Pre-requisite: ELET2130 Digital Communications I

Teaching: Two (2) lectures and four (4) hours of laboratory per week.

Syllabus: Signals and Spectra, Bandpass Transmission, Error Control Coding (Convolutional), Satellite Communications, Wireless Communications.

Method of Final Theory Examination (2 hour) 60%  
 Examination: In-course Tests/Assignments 20%  
 Laboratory 20%

Teaching: Two (2) 1-hour lectures and four (4) hours of laboratory per week.

**ELET3130 - INTRODUCTION TO DIGITAL SIGNAL PROCESSING (DSP) (4 Credits)**

Pre-requisite: ELET2130 Digital Communications I

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 20%  
 Laboratory 20%

Syllabus: Sampling, Z-Transforms, discrete convolution, DFT, FFT, DCT and related transforms. IIR and FIR digital filters. Approximations to analog filters. Practical implementation of digital filters.

**ELET3152 - MOBILE COMMUNICATION & APPLICATIONS (4 credits)**

Pre-requisite: ELET2130 Digital Communications I or COMP2150 Computer Networks I

Teaching: Two (2) lectures and four (4) hours of laboratory per week.

Syllabus: Radio basics, Electromagnetic energy, frequency and wavelength, Spectrum management, Information theory, Coding theory, Core wireless communications, technologies and standards, FSK, PSK, QAM, TDMA, FDMA, OFDM, CDMA, SDMA, GSM, UMTS, HSPA, LTE, Wi-Fi, WiMAX, Bluetooth, Wireless Networking, Network design, Cellular infrastructure, WAN, MAN, LAN, PAN, HRAN, Mobile Internet and the protocol Stack, Circuit and packet switching TCP/IP, mobile IPv4,

Method of Final Theory Examination (2 hour) 60%  
 Examination: In-course Tests/Assignments 20%  
 Laboratory 20%

mobile IPv6, Technological convergence and multi-purpose mobile computing, SMS, MMS, VoIP, Video conferencing, Geolocation, Mobile operating systems, Symbian, Microsoft, iPhone, Android, Mobile application development, Mobile application environment, Context-aware mobile applications

Teaching: Two lectures & Four hours of Lab work per week

Method of Examination:	Final Theory Examination (2 hours)	60%
	Course & Lab work	40%

**ELET3160 - ELECTRONICS RESEARCH PROJECT  
(4 Credits)**

Pre-requisite: Restricted to Finalists Majoring in Electronics

Syllabus: Students will be given a problem for which they must develop a workable electronics solution which should preferably be of commercial interest. The developed solution should be of sufficient breadth and depth to make it equivalent to a 4-credit advanced course in electronics. Solution may include Mathematics and Computer Software but an electronic circuit component is required.

Method of Examination:	Proposal and Literature Review	20%
	Oral Presentation	20%
	Final Written Project Report	60%

**ELET3210 - SENSORS & ACTUATOR TECHNOLOGY  
(4 credits)**

Pre-requisite: ELET1110 Digital Electronics

Syllabus: Measurement Systems, Measurements of Displacement and Strain, Force and Torque Measurement, Pressure Measurement, Flow Measurement, Measurement of Temperature, Measurement of other non electrical quantities, Transducer Theory, construction and use of various transducers, Temperature, Magnetic, Electrical, Mechanical, Acoustic, Optical, Chemical, Image, and Bio sensors. Electrical, Mechanical, Pneumatic, Hydraulic, Piezoelectric, and Polymer Actuators.

Teaching: Two lectures, one tutorial, 3 hours of Practical per week

Method of Examination:	In course test(s) / Assignment(s)	20%
	Laboratory/ Mini-Project	40%
	Final Theory Examination (2 hrs)	40%

# MATHEMATICS

The Department of Computer Science, Mathematics & Physics offers a Double Major, Major and Minor in Mathematics as well as a Minor in Statistics.

**It is a requirement of the discipline that, to pass any Mathematics course, students must pass both Coursework and Final exam.**

## MAJOR IN MATHEMATICS:

### LEVEL I

MATH1101	Basic Mathematics I
MATH1102	Basic Mathematics II
MATH1120	Calculus I
MATH1130	Calculus II

### LEVEL II

MATH2100	Abstract Algebra
MATH2110	Linear Algebra
MATH2120	Analysis & Methods I
MATH2130	Ordinary Differential Equations

### LEVEL III

**Sixteen (16) Credits from Levels II and III courses (including AT LEAST two Level III courses) from:**

MATH2140	Probability Theory
MATH2150	Mathematical Statistics
MATH3100	Multivariate Analysis
MATH3110	Design of Experiments
MATH3120	Numerical Analysis
MATH3130	Optimization Theory
MATH3140	Fourier Analysis and PDE
MATH3150	Complex Variables I

MATH3160	Number Theory
MATH3170	Advanced Algebra
MATH3180	Introduction to Topology
MATH3300	Mathematics Research Project
MATH3450	Statistical Theory I
MATH3460	Statistical Theory II

## MINOR IN MATHEMATICS [Sixteen (16) Credits]

MATH2100	Abstract Algebra
MATH2120	Analysis & Methods I

## AND Eight (8) Credits From:

MATH2110	Linear Algebra
MATH2130	Ordinary Differential Equations
MATH2140	Probability Theory
MATH2150	Mathematical Statistics
MATH3100	Multivariate Analysis
MATH3110	Design of Experiments
MATH3120	Numerical Analysis
MATH3130	Optimization Theory
MATH3140	Fourier Analysis and PDE
MATH3150	Complex Variables I
MATH3160	Number Theory
MATH3170	Advanced Algebra
MATH3180	Introduction to Topology
MATH3450	Statistical Theory I
MATH3460	Statistical Theory II

## MINOR IN STATISTICS [Sixteen (16) Credits]

MATH 2140	Probability Theory
MATH 2150	Mathematical Statistics
MATH 3100	Multivariate analysis
MATH 3460	Statistical Theory II

### DOUBLE MAJOR IN MATHEMATICS

#### LEVEL I

MATH1101	Basic Mathematics I
MATH1102	Basic Mathematics II
MATH1120	Calculus I
MATH1130	Calculus II

#### LEVEL II

MATH2100	Abstract Algebra
MATH2110	Linear Algebra
MATH2120	Analysis & Methods I
MATH2130	Ordinary Differential Equations

#### LEVEL III

#### Forty-eight (48) Credits from Levels II and III courses:

MATH2140	Probability Theory
MATH2150	Mathematical Statistics
MATH3100	Multivariate Analysis
MATH3120	Numerical Analysis
MATH3130	Optimization Theory
MATH3140	Fourier Analysis and PDE
MATH3150	Complex Variables I
MATH3160	Number Theory
MATH3170	Advanced Algebra
MATH3180	Introduction to Topology
MATH3190	Matrix Analysis
MATH3300	Mathematics Research Project
MATH3450	Statistical Theory I
MATH3460	Statistical Theory II

### PRELIMINARY MATHEMATICS COURSES

#### MATH0101 - PRELIMINARY MATHEMATICS I (6 P-Credits)

Pre-requisite: CXC Mathematics or equivalent.

Syllabus: Algebra: Sets. Cartesian Product, functions, operations, the integers, mathematical induction, algebraic operations on polynomials and rational quadratics, step functions, modulus function. Geometry: Coordinate geometry, trigonometrical functions and identities, complex numbers, Argand diagram; vectors.

Calculus: Limits, continuity, intermediate-value theorem, gradient of a tangent, differentiation, Mean value theorem and its consequences (motivation, but no proof), curve sketching, integration as inverses of differentiation, fundamental theorem of calculus, techniques of integration, numerical techniques.

Teaching: Five (5) lectures and one tutorial per week.

Method of Examination:	Final Theory Examination (3 hours)	80%
	In-course Tests/Assignments	20%

**MATH0102 PRELIMINARY MATHEMATICS II**

**(6P-Credits)**

Pre-requisite: CXC Mathematics or equivalent

Syllabus: Sequences and Series: Use of  $\sum$  notation, arithmetic and geometric progressions, binomial theorem.

Special functions: Exponential and logarithmic functions as solutions of initial value problems, definition of arbitrary exponential, coordinate transformations, differential and integral calculus applied to transcendental functions.

Elementary first and second order differential equations: Classification, techniques of solution, linear ordinary differential equations with constant coefficients.

Combinatorics and Matrices: Elementary combinatorics, matrices of arbitrary size, determinants. Mathematical modeling; Ordinary differential equations of Physics, Biology, Economics, applications of Mathematics.

Teaching: Five (5) lectures and one tutorial per week.

Method of Examination:	Final Theory Examination (3 hours)	80%
	In-class Tests/Assignments	20%

**LEVEL I MATHEMATICS COURSES**

**MATH1100 BASIC MATHEMATICS (4 Credits)**

Pre-requisites: CAPE Pure Mathematics Units 1 & 2 or MATH0101 & MATH0102 or equivalent.

Syllabus: Logic, summation conventions, mathematical induction; sets, relations and functions; equivalence relations, graphs, trees, partial orders; binary operations; number systems, real numbers, complex numbers; counting principles; systems of linear equations, Gaussian elimination; matrices, adjoint and inverse; linear independence.

Teaching: Three (3) lectures and one tutorial per week.

Method of Examination:	Final Theory Examination (3 hours)	75%
	In-class Test(s)/Assignment(s)	25%

**MATH1101 - BASIC MATHEMATICS I (4 Credits)**

Pre-requisites: CAPE Pure Mathematics Units 1 & 2 or MATH0101 & MATH0102 or equivalent.

Syllabus: The following topics, concepts or issues will be discussed in this course:  
 Logic, Sets, Relations, Functions, Number and Mathematical Systems

Teaching: Three (3) lectures and one tutorial per week.

Method of Examination:	Final Theory Examination (3 hours)	75%
	In-class Test(s)/Assignment(s)	25%

**MATH1102 - BASIC MATHEMATICS II (4 Credits)**

Pre-requisites: MATH1101 Basic Mathematics I

Syllabus: The following topics, concepts or issues will be discussed in this course:  
 Vector Spaces, Matrices & Determinants,  
 Equations, Euclidean spaces, Conic sections  
 and quadratic surfaces

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (3 hours) 75%  
 Examination: In-class Test(s)/Assignment(s) 25%

**MATH1110 - APPLIED STATISTICS (4 Credits)**

Pre-requisites: CAPE Pure Mathematics Units 1 & 2 or  
 MATH0101 & MATH0102 or equivalent.

Syllabus: Data presentation types of dates, tables and  
 graphs. Numerical summary measures,  
 measure of central tendency, measure  
 of dispersion and Chebychev's inequality.  
 Probability, operations on events, conditional  
 probability and Bayes' theorem. Probability  
 distributions, binomial, Poisson and  
 normal distributions. Point estimation and  
 confidence interval. Hypotheses testing  
 general concepts, types of errors, power,  
 sample size, one-sided and two-sided tests.  
 Comparisons of means, paired samples  
 and independent samples. Analysis of

variance, one-way analysis of variance  
 and multiple comparisons procedures.  
 Contingency tables, chi-square test and  
 odds ratio. Correlation, two-way scatter  
 plot and Pearson's correlation coefficient.  
 Linear regression, concepts, the model and  
 its evaluation. Nonparametric methods,  
 sign tests, Wilcoxon rank sum test and  
 applications. Sampling methods and  
 sources of bias.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 75%  
 Examination: In-course Tests/Assignments 25%

**MATH1120 - CALCULUS I (4 Credits)**

Pre-requisite: CAPE Pure Mathematics Units 1 & 2 or  
 MATH0101 & MATH0102 or equivalent.

Syllabus: Functions and graphs, limits, continuity,  
 differentiability, the concept of an extremum,  
 curve sketching, antiderivatives, the definite  
 integral, fundamental theorem of calculus,  
 improper integrals, sequences and series.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 75%  
 Examination: In-class Tests/Assignments 25%



**MATH1130 - CALCULUS II (4 Credits)**

Pre-requisite: MATH1120 Calculus I  
 Syllabus: Function of several variables, vector functions, limits, continuity, and sketching, differentiation, partial derivatives, extrema for functions of 2 and 3 variables, Lagrange multipliers, change of variable and Jacobian, polar, spherical and cylindrical coordinates, double and triple integrals, line and surface integrals.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 75%  
 Examination: In-class Tests/Assignments 25%

**LEVEL II MATHEMATICS COURSES**

**MATH2100 - ABSTRACT ALGEBRA (4 Credits)**

Pre-requisite: MATH1100 Basic Mathematics

Syllabus: Elements of logic. Elements of set theory. Relations and functions. Finite permutations. Isomorphisms. Elementary theory of groups, rings and fields.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 70%  
 Examination: In-class Tests/Assignments 30%

**MATH2110 - LINEAR ALGEBRA (4 Credits)**

Pre-requisite: MATH1100 Basic Mathematics, MATH1120 Calculus I & MATH1130 Calculus II

Syllabus: Elements of sets and functions. Vector spaces, Linear forms. Linear transformations Matrices and determinants. Systems of linear equations. Quadratic forms.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 70%  
 Examination: In-class Tests/Assignments 30%

**MATH2120 - ANALYSIS & METHODS I (4 Credits)**

Pre-requisite: MATH1100 Basic Mathematics, MATH1120 Calculus I & MATH1130 Calculus II

Syllabus: The real number system. Countability and topology of the real line; Continuity and differentiability. The Rieman integral. Infinite series and power series.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 70%  
 Examination: In-class Tests/Assignments 30%

**MATH2130 - ORDINARY DIFFERENTIAL EQUATIONS**

**(4 Credits)**

Pre-requisite: MATH1100 Basic Mathematics, MATH1120 Calculus I & MATH1130 Calculus II

Syllabus: Techniques of solution, applications, and theory of first-order differential equations. Theory and methods of solution for higher-order linear equations. Applications of second-order linear equations from the sciences and engineering. Power series methods for solutions to linear equations. Laplace transform theory, techniques and applications.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 70%  
 Examination: In-class Tests/Assignments 30%

**MATH2140 - PROBABILITY THEORY (4 Credits)**

Pre-requisite: MATH1120 Calculus I & MATH1130 Calculus II

Syllabus: Basic probability theory: Combinational Methods, Laws of probability, conditional probability, independence. Bayes formula; random variables, discrete and continuous distributions, expectations, moments, moment generating functions, functions of random variables, jointly distributed random variable. Special distributions: binomial,

geometric, negative binomial, Poisson, hypergeometric, uniform, exponential, gamma, normal, bivariate normal. Law of large numbers, the central limit theorem.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 70%  
 Examination: In-class Tests/Assignments 30%

**MATH2150 - MATHEMATICAL STATISTICS (4 Credits)**

Pre-requisite: MATH2140 Probability Theory

Syllabus: Sampling distributions including chi-square, t, order statistics. Estimation of parameters, likelihood, Sufficiency, significance tests. Simple linear regression and correlation. Analysis of Variance. Non- Parametric procedures, elementary principles of experimental design.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory examination (2 hours) 70%  
 Examinations: In-class Tests/Assignments 30%

**MATH2950 - MATHEMATICS ELECTIVE (4 Credits)**

Pre-requisites: NONE

Syllabus: An advanced course in Mathematics taken as an exchange student at an approved institution and pre-approved by the Dean.

**LEVEL III MATHEMATICS COURSES**

**MATH3100 - MULTIVARIATE ANALYSIS (4 credits)**

Prerequisites: MATH2110 Linear Algebra and MATH2140 Probability Theory.

Syllabus: Notions of multivariate distributions, Bivariate normal distributions, conditional distribution and multiple correlation coefficients, moments. Estimation of the mean vector and covariance matrix of the multivariate normal distributions; Inferences concerning the mean vector. Introduction to the T2 statistics and its uses. Discriminant analysis and its applications. Principal components analysis. Cluster analysis.

Teaching: Three lectures and one tutorial per week.

Examination: One 2-hour written paper 60%  
Coursework 40%

**MATH3120 - NUMERICAL ANALYSIS (4 Credits)**

Pre-requisite MATH2110 Linear Algebra, MATH2120 Analysis & Methods I, MATH2130 Ordinary Differential Equations

Syllabus: Types of error, Finite Differences and Interpolation; Numerical Evaluation and Integrals; Numerical solution of Differential equations; Roots of Equations: Linear Systems and Matrices.; Construction of Algorithms for Computation using MATLAB.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 60%  
Examination: In-class Tests/Assignments 40%

**MATH3130 - OPTIMIZATION THEORY (4 Credits)**

Pre-requisite: MATH2110 Linear Algebra & MATH2120 Analysis & Methods

Syllabus: Optimization problems in  $R^n$ : examples & objectives.  
Existence: Weierstrass Theorem and applications. Unconstrained Optima: first and second-order conditions.  
Equality Constraints: theorem of Lagrange & Lagrangean multipliers, applications.  
Inequality Constraints: theorem of Kuhn and Tucker, applications, mixed constraints.  
Convex Optimization: convex sets and functions, convexity and optimization.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 60%  
Examination: In-class Tests/Assignments 40%

**MATH3140 - FOURIER ANALYSIS AND PDE (4 Credits)**

Pre-requisite: MATH2130 Ordinary Differential Equations

Syllabus: Orthogonal systems (Fourier, Haar, Bessel, Sturm-Liouville etc.). Periodic functions, Fourier expansion, Fourier coefficients, periodic extension. Fourier series for odd and even functions. Problem of convergence.

Dirichlet theorem. Minimal property of partial sums. Bessel's inequality. Parseval's identity. Integration and differentiation of Fourier series. Fourier series in complex form. Multiple Fourier series. Fourier transform its properties. Convolution. Partial differential equations, their classification. Basic differential equations of mathematical physics: wave equation; Laplace equation, heat equation. Application of the Fourier method to the solution of the PDE. The Discrete Fourier transform. The Fast Fourier transform.

Teaching: Three (3) lectures and one tutorial per week.

Method of Examination: Final Theory Examination (2 hours) 60%  
 In-class Tests/Assignments 40%

**MATH3150 - COMPLEX VARIABLES 1 (4 credits)**

Pre-requisite: MATH2120 Analysis & Methods I

Description: This is a first course in the theory and methods of complex variables. Many concepts in complex variable are generalizations of topics in calculus and real analysis, while other results and methods are specific to the subject itself. The material in this course is a blend of mathematical theorems and computational techniques. This course will be of interest to students majoring in mathematics or physics.

Syllabus: Complex numbers, their analysis and geometry. Functions of a complex variable, limits, continuity. Analytic functions and harmonic functions. Complex integration, contour integrals, Cauchy theorems and consequences. Power series, Taylor series and Laurent series. Residue theory and applications.

Teaching: Three (3) lectures and one tutorial per week.

Method of Examination: Final Theory Examination (2 hours) 60%  
 In-class Tests/Assignments 40%

**MATH3160 - NUMBER THEORY (4 Credits)**

Pre-requisite: MATH2100 Abstract Algebra

Syllabus: Number systems. Peano's axioms for  $\mathbb{N}$  and extensions. Mathematical Induction. Equivalence relations. Quotient systems. Euclidean Algorithm. Linear Diophantine Equations. Congruences. Wilson's theorem. Chinese remainder theorem. Euler totient function. Elements of Cryptography.

Teaching: Three (3) lectures and one tutorial per week.

Method of Examination: Final Theory Examination (2 hours) 60%  
 In-class Tests/Assignments 40%

**MATH3170 - ADVANCED ALGEBRA (4 Credits)**

Pre-requisite: MATH2100 Abstract Algebra

Syllabus: Normal subgroups. Factor groups. Isomorphism theorems. Cayley's theorem. Sylow's theorems. Rings and ideals. Fields.

Teaching: Three (3) lectures and one tutorial per week.

Method of Examination: Final Theory Examination (2 hours) 60%  
 In-class Tests/Assignments 40%

**MATH3180 - INTRODUCTION TO TOPOLOGY (4 Credits)**

Pre-requisites: MATH2100 Abstract Algebra & MATH2120 Analysis & Methods I

Syllabus: Definition of a topological space, examples, continuous functions. Connected spaces and compact spaces. Topology of the real line and Euclidean space. Countability of topological spaces and separation axioms.

Teaching: Three (3) lectures and one tutorial per week.

Method of Examination: Final Theory Examination (2 hours) 60%  
 In-class Tests/Assignments 40%

**MATH3300 - MATHEMATICS RESEARCH PROJECT (4 Credits)**

Pre-requisite: Restricted to Finalists Majoring in Mathematics

Syllabus: In consultation with and under the supervision of a Faculty member, students are expected to define, investigate and report on an applied or theoretical research topic in Mathematics. The project itself is equivalent to a single Faculty course and must therefore reach that standard in terms of content and research effort. The project should contain some originality in material and evidence of extensive reading and comprehension of the subject area. A proposal and literature review must be submitted no later than the fourth week of the Semester and a final written report must be submitted and presented orally to a panel of at least three Faculty members no later than the last week of classes in the same Semester. N.B. Enrolment will be limited to those students who have demonstrated a sound academic background and an aptitude for research.

Method of Examination: Written Report 60%  
 Oral Presentation 20%  
 Proposal and Literature Review 20%

**MATH3450 - STATISTICAL THEORY I (4 Credits)**

Pre-requisite: MATH2120 Analysis & Methods and  
 MATH2140 Probability Theory and  
 MATH2150 Mathematical Statistics

Syllabus: Measure Theory & Law of Large Numbers,  
 Conditional Expectation, Bounding  
 Probability & Expectations, Introduction to  
 Queuing Theory, Renewal Theory

Teaching: Three (3) lectures and one tutorial per week.

Method of Examination: Final Theory Examination (2 hour) 60%  
 Class tests/computer assignments 40%

**MATH3460 - STATISTICAL THEORY II (4 Credits)**

Pre-requisite: MATH2140 Probability Theory and  
 MATH2150 Mathematical Statistics

Syllabus: Methods of finding estimators and their  
 properties; Bayesian Inference; Regression  
 Analysis; Time Series Analysis; Testing of  
 Hypothesis; Design of Experiments; Sampling  
 Theory.

Teaching: Three (3) lectures and one tutorial per week.

Method of Examination: Final Theory Examination (2 hour) 60%  
 Class tests/computer assignments 40%

# METEOROLOGY

Through our affiliate institution, the Caribbean Institute for Meteorology & Hydrology, a Major and Minor in Meteorology are offered.

## MAJOR IN METEOROLOGY

### LEVEL I

METE1000	Introduction to Physical Meteorology & Weather Observations
METE1100	Introduction to Dynamic Meteorology & Weather Systems
METE1200	Oceans & Climate
MATH1120	Calculus I
MATH1130	Calculus II

### LEVEL II

METE2000	Physical Meteorology I
METE2001	Physical Meteorology II
METE2100	Dynamic Meteorology I
METE2200	Synoptic Meteorology I

### LEVEL III

METE3100	Dynamic Meteorology II
METE3200	Synoptic Meteorology II
METE3300	Tropical Meteorology

### AND Four (4) Credits from:

METE2300	Hydrometeorology
METE3400	Weather Radar and Satellites
METE3500	Bioclimatology

## MINOR IN METEOROLOGY [Sixteen (16) Credits]

METE2100	Dynamic Meteorology I
METE2200	Synoptic Meteorology I

### AND Four (4) Credits from:

METE2000	Physical Meteorology I
METE2001	Physical Meteorology II

### AND Four (4) Credits from:

METE3100	Dynamic Meteorology II
METE3200	Synoptic Meteorology II
METE3300	Tropical Meteorology

## LEVEL I METEOROLOGY COURSES

### METE1000 - Introduction to PHYSICAL Meteorology & WEATHER OBSERVATIONS (4 Credits)

Pre-requisites: CAPE Pure Mathematics Units 1 & 2 (or equivalent) & CAPE Physics Unit 1 (or equivalent).

Syllabus: The Atmosphere: composition and structure. Weather elements and instruments. Energy and heat transfer. Radiation and the Earth's atmosphere. Seasonal and daily temperatures. Energy budget. Clouds and precipitation. Thermodynamics. Simple thermodynamics chart analysis; Weather observations. Scalar analysis.

Teaching: Two (2) lectures, one (1) tutorial and two (2) hours of practical per week.

Method of Examination: Final Theory Examination (2 hours) 70%  
 In-course Tests/Assignments 30%

**METE1100 - Introduction to DYNAMIC Meteorology & WEATHER SYSTEMS (4 Credits)**

Pre-requisites: CAPE Pure Mathematics Units 1 & 2 (or equivalent) & CAPE Physics Unit 1 (or equivalent).

Syllabus: Air pressure and winds. Wind: small-scale and local systems. Wind: global systems. Air masses and fronts. Middle-latitude cyclones. Thunderstorms and tornadoes. Tropical weather systems. Laboratory classes will include basic scalar analysis, computation exercises of geostrophic gradients and thermal winds, frontal analysis utilizing surface and upper air charts.

Teaching: Two (2) lectures, one (1) tutorial and three (3) hours of practical per week.

Method of Examination: Final Theory Examination (2 hours) 60%  
 In-course Tests/Assignments 40%

**METE1200 - OCEANS AND CLIMATE (4 Credits)**

Pre-requisites: None.

Restriction: Not to be taken with ERSC1002 Oceans & Climate.

Syllabus: The climate system components and interactions. Timescales and responses of the climate system. The basic global radiation budget. The atmosphere: evolution

and composition. The greenhouse effect. The biosphere – atmosphere interaction. The biosphere – hydrosphere interaction. Classification of oceans and seas. Topography of ocean floor. Chemistry of the ocean: temperature, salinity and density. The circulations of the oceans: wind driven and thermohaline circulation. Ocean and atmospheric interactions: tropical cyclones, monsoon circulation, upwelling, ENSO. Waves and tides. Drivers of natural climate variability and anthropogenic climate change. Laboratory classes will involve basic analysis of earth science datasets by hand, and using the Grid Analysis and Display System (GrADS), a computer based application for manipulation and visualization of earth science datasets.

Teaching: Two (2) lectures, one (1) tutorial and two (2) hours of practical per week.

Method of Examination: Final Theory Examination (2 hours) 60%  
 In-course Tests/Assignments 40%

**METE1300 - CLIMATE CHANGE EDUCATION AND AWARENESS (4 Credits)**

Pre-requisites: None

Restriction: Cannot be taken by majors and minors in Meteorology. Students are not allowed to take BOTH METE1200 and METE1300 for credit.



Syllabus: The biosphere: definition, evolution and contributions to climate and climate change. The greenhouse effect. Climate change scenarios: definition and uses. Changing climate scenarios and challenges to man's health. Climate change and energy consumption and sustainability. Climate change and water availability, distribution and usage. The cost of changing climate. Climate change and Caribbean industries: sustainability, adaptation and mitigation. Preparing for climate change: global and regional mitigation and adaptation strategies.

Teaching: Three (3) lectures, one (1) tutorial hour per week.

Method of Final Theory Examination (2 hours) 60%

Examination: In-course Tests/Assignments 40%

## LEVEL II METEOROLOGY COURSES

### **METE2000 - PHYSICAL METEOROLOGY I (4 Credits)**

Pre-requisites: METE1000 Introduction to Physical Meteorology and Weather Observations, METE1100 Introduction to Dynamic Meteorology and Weather Systems and METE1200 Oceans and Climate and MATH1120 Calculus I & MATH1130 Calculus II.

Syllabus: Thermodynamics of dry air and moist air. Thermodynamic diagrams. Hydrostatics, instability and convection. Mixing of air masses. Formation and growth of cloud droplets by diffusion and condensation. Droplet growth by collision and coalescence. The growth and structure of ice crystals. The size and distribution of droplets and crystals. Widespread and convective precipitation, thunderstorms.

Teaching: Two (2) lectures, one (1) tutorial and two (2) hours of practical per week.

Method of Final Theory Examination (2 hours) 70%

Examination: In-course Tests/Assignments 30%

### **METE2001 - PHYSICAL METEOROLOGY II (4 Credits)**

Pre-requisites: METE1000 Introduction to Physical Meteorology and Weather Observations, METE1100 Introduction to Dynamic Meteorology and Weather Systems and METE1200 Oceans and Climate and MATH1120 Calculus I & MATH1130 Calculus II.

Syllabus: Fundamental physics, quantification and laws of radiation. Solar and terrestrial radiation. The heat balance of the earth and atmosphere. The atmospheric greenhouse effect. Fundamentals of atmospheric electricity. Elementary atmospheric optics. Ozone in the atmosphere.

Teaching: Two (2) lectures, one (1) tutorial and two (2) hours of practical per week.

Method of Examination: Final Theory Examination (2 hours) 70%  
 In-course Tests/Assignments 30%

**METE2100 - DYNAMIC METEOROLOGY I (4 Credits)**

Pre-requisites: METE1000 Introduction to Physical Meteorology and Weather Observations, METE1100 Introduction to Dynamic Meteorology and Weather Systems and METE1200 Oceans and Climate and MATH1120 Calculus I & MATH1130 Calculus II.

Syllabus: Elementary vector methods in meteorology. Derivation of the equation of motion from Newton's law. The equation of motion in various co-ordinate systems. Simplification of the equation of motion. The conservation of mass and the conservation of total energy. The basic equations with pressure as the vertical coordinate. Horizontal balanced motions; the geostrophic thermal wind. Concepts of circulation and vorticity; the circulation theorems and the vorticity equation and their applications. Structure and dynamics of the planetary boundary layer.

Teaching: Three (3) lectures and one (1) tutorial per week.

Method of Examination: Final Theory Examination (2 hours) 70%  
 In-course Tests/Assignments 30%

**METE2200 - SYNOPTIC METEOROLOGY I (4 Credits)**

Pre-requisites: METE1000 Introduction to Physical Meteorology and Weather Observations, METE1100 Introduction to Dynamic Meteorology and Weather Systems and METE1200 Oceans and Climate and MATH1120 Calculus I & MATH1130 Calculus II.

Syllabus: The characteristics, structure and evolution of mid- latitude frontal systems and cyclones. Kinematics of horizontal motion and the computation of kinematic parameters of divergence, vorticity and deformation. Analysis of scalar and vector fields. Analysis of mid-latitude synoptic systems. Methods of estimating vertical motion. Evaluation of advection.

Teaching: Two (2) lectures and four (4) hours of practical per week.

Method of Examination: Final Theory Examination (2 hours) 60%  
 In-course Tests/Assignments 40%

**METE2300 - HYDRO-METEOROLOGY (4 Credits)**

Pre-requisites: MATH1120 Calculus I & MATH1130 Calculus II.

Syllabus: The hydrological cycle. Water balance concepts. Precipitation measurement and analysis. Interception and interception loss. Evaporation and evapo-transpiration.

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Infiltration measurement and estimation.  
 Rainfall-runoff processes. Hydrologic simulation.

Teaching: Three (3) lectures and one (1) tutorial per week.

Teaching: Two (2) lectures, one (1) tutorial and two (2) hours of practical per week.

Method of Final Theory Examination (2 hours) 70%  
 Examination: In-course Tests/Assignments 30%

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**METE3200 - SYNOPTIC METEOROLOGY II (4 Credits)**

**METE2950 METEOROLOGY ELECTIVE (4 credits)**

Pre-requisites: METE2100 Dynamic Meteorology I and METE2200 Synoptic Meteorology I

Pre-requisites: None

Syllabus: An advanced course in Meteorology taken as an exchange student at an approved institution and pre-approved by the Dean.

Syllabus: The Polar front jet stream - structure and characteristics and its role in mid-latitude development. The pressure tendency equation and its applications. Four-dimensional analysis of mid-latitude synoptic systems; use of thickness maps, sounding and cross-sections. Theories of mid-latitude cyclone development; Characteristic and formation of cut-off cyclones, upper level anticyclones, and blocking systems; Development theories associated with polar lows and dry lines; Familiarization with and use of numerical products and satellite and radar data in analysis and forecasting.

**LEVEL III METEOROLOGY COURSES**

**METE3100 - DYNAMIC METEOROLOGY II (4 Credits)**

Pre-requisites: METE2100 Dynamic Meteorology I & METE2200 Synoptic Meteorology I

Syllabus: The dynamics of developing synoptic scale systems in mid-latitudes. The theory and behaviour of pure wave motions in the atmosphere. Introduction to numerical weather prediction; barotropic and filtered baroclinic models; primitive equation models. The physical basis of baroclinic instability and cyclogenesis. The energy cycle and momentum budget of the atmosphere.

Teaching: Two (2) lectures and four (4) hours of practical per week.

Method of Final Theory Examination (2 hours) 60%  
 Examination: In-course Tests/Assignments 40%

**METE3300 - TROPICAL METEOROLOGY (4 Credits)**

**Pre-requisites:** METE2100 Dynamic Meteorology I and METE2200 Synoptic Meteorology I

**Syllabus:** General circulation of the tropics. The role of the tropics in the heat, energy and momentum budgets of the earth-atmosphere system. Tropical jet streams. Structure and characteristics of the tropical boundary layer and the trade wind inversion. Cumulus convection and scale interaction in the tropics. Structure and characteristics of synoptic scale systems in the tropics. Structure, behaviour and dynamics of tropical cyclones. Analysis of the evolution of tropical weather systems.

**Teaching:** Two (2) lectures and four (4) hours of practical per week.

**Method of Examination:** Final Theory Examination (2 hours) 60%  
 In-course Tests/Assignments 40%

**METE3400 - WEATHER RADARS AND SATELLITES (4 Credits)**

**Pre-requisites:** METE2000 Physical Meteorology I, METE2001 Physical Meteorology II and METE2200 Synoptic Meteorology I

**Syllabus:** **Radar Meteorology:** Brief historical review. Radar components and related features. Electromagnetic waves. Radar beam

characteristics. Propagation of radar waves. Formulation of the radar equation. Precipitation measurements. Principles of Doppler radar. Interpretation of radar echoes. Applications and use of radar data.

**Satellite Meteorology:** Brief History and basic concepts. Instrumentation and receiving systems. Identification of cloud and weather systems. Atmospheric temperature and water vapor profiles. Satellite wind estimation. Precipitation estimation. Analysis of tropical cyclones. Satellite detection of aerosols. Applications and use of satellite information. Use of satellite data in combination with radar data.

**Teaching:** Two (2) lectures, one (1) tutorial and two (2) hours of practical per week.

**Method of Examination:** Final Theory Examination (2 hours) 60%  
 In-course Tests/Assignments 40%

**METE3500 - BIOCLIMATOLOGY (4 Credits)**

**Pre-requisites:** METE1200 Oceans & Climate or BIOL1051 Biodiversity 1 and 28 FPAS Level II/III credits.

**Syllabus:** Characteristics of Caribbean climate; inter-seasonal, inter-annual and inter-decadal climate variability. Role of climate in vegetation distribution. Influence of weather parameters on vegetation and terrestrial

ecosystems. Bioclimatic indices and natural ecosystems. Weather, climate and coastal and marine ecosystems. Climate change and terrestrial, coastal and marine ecosystems. Role of vegetation in determining climate (biogeochemical cycles, albedo, roughness and fluxes). Carbon trading, cleandevlopment mechanism (CDM).

Teaching: Two (2) lectures, one (1) tutorial and two (2) hours of practical per week.

Method of Examination:	Final Theory Examination (2hours)	60%
	In-course Tests	10%
	Essay Assignments & Computer Exercises	30%

## PHYSICS

The Department of Computer Science , Mathematics & Physics offers a Major and Minor in Physics.

### MAJOR IN PHYSICS

#### LEVEL I

PHYS1100	Mechanics
PHYS1101	Electricity and Magnetism
PHYS1102	Optics, Thermodynamics & Modern Physics
MATH1120	Calculus I

#### LEVEL II

PHYS2100	Mathematical Methods in Physics
PHYS2101	Quantum Mechanics & Special Relativity
PHYS2103	Classical Mechanics
PHYS2106	Advanced Physics/Technology Laboratory I
PHYS2107	Advanced Physics/Technology Laboratory II

#### LEVEL III

PHYS3100	Quantum Mechanics
PHYS3101	Electrodynamics
PHYS3105	Statistical Mechanics

#### AND Four (4) Credits From:

ELET2100	Microprocessors I
ELET2110	Circuit Simulation
ELET2120	Discrete Device Electronics
ELET2130	Digital Communications I
ELET2140	Medical Instrumentation
PHYS2102	Solid State Physics
PHYS2105	Computational Physics I
PHYS2950	Physics Elective
ELET3041	Microcontrollers and Applications

ELET3110	Control and Instrumentation
ELET3120	Communication Circuits
ELET3130	Introd. to Digital Signal Processing (DSP)
ELET3151	Digital Communications II
ELET3152	Mobile Communication & Applications
ELET3160	Electronics Research Project
ELET3210	Sensors & Actuator Technology
PHYS3102	Optics and Lasers
PHYS3106	Physics Research Project
PHYS3107	Fundamentals of Photovoltaic Physics

PHYS3102	Optics and Lasers
PHYS3105	Statistical Mechanics
PHYS3106	Physics Research Project
PHYS3107	Fundamentals of Photovoltaic Physics

\* Students should note that PHYS2106 and PHYS2107 are Practical Courses that are worth Two (2) Credits each.

### PRELIMINARY PHYSICS COURSES

#### PHYS0070 - PRELIMINARY PHYSICS I (6 P-Credits)

Pre-requisite: None

Syllabus: SI system and standard units, dimensional analysis, vectors (graphical and analytical) Equilibrium, Newton's first law, third law, friction, motion in a straight line, average and instantaneous velocity & acceleration, accelerated motion, free fall, relative velocity Motion in a plane, projectiles, circular motion, centripetal force, Newton's second law & applications. Gravitation, mass and weight, satellite motion. Work & kinetic energy, gravitational & elastic potential energy, dissipative and conservative forces, power, simple machines moments & torque, couples. Stress, strain, elastic moduli, force constant, Hooke's law, simple harmonic motion (basic concepts), SHM & circular motion, mass-spring system, simple pendulum, pressure in a fluid, pressure gauges, Archimedes principle, surface tension, pressure difference across surface

#### MINOR IN PHYSICS (Sixteen (16) Credits)

##### At Least Eight (8) Credits From:

PHYS2100	Mathematical Methods in Physics
PHYS2101	Quantum Mechanics & Special Relativity
PHYS2103	Classical Mechanics
PHYS2106*	Advanced Physics/Technology Laboratory I
PHYS2107*	Advanced Physics/Technology Laboratory II
PHYS3100	Quantum Mechanics
PHYS3101	Electrodynamics
PHYS3105	Statistical Mechanics

##### AND at Most Eight (8) Credits From:

PHYS2100	Mathematical Methods in Physics
PHYS2101	Quantum Mechanics & Special Relativity
PHYS2102	Solid State Physics
PHYS2103	Classical Mechanics
PHYS2105	Computational Physics I
PHYS2106	Advanced Physics/Technology Laboratory I
PHYS2107	Advanced Physics/Technology Laboratory II
PHYS2950	Physics Elective
PHYS3100	Quantum Mechanics
PHYS3101	Electrodynamics

film, contact angle and capillaries, Bernoulli's equation (applications), viscosity, Stoke's law, Reynold's number. The temperature concept, thermometers, scales, thermal expansion and stress. Heat capacity, phase changes, conduction, convection, radiation, Stefan-Boltzman law, ideal radiator, solar energy, ideal gas, equation of state, phase diagrams, triple and critical points, vapour pressure, effect of dissolved substances on freezing and boiling point, first law of thermodynamics, energy and work, work and heat, adiabatic, isochoric, isothermal and isobaric processes, internal energy, molecular theory of motion, kinetic theory of ideal gas. Mechanical waves, waves, mathematical representation, waves at boundaries, standing waves, interference of sound waves, beats, sound intensity, the decibel, the ear & hearing, quality and pitch, Doppler effect, ultrasonics and applications.

Teaching: Three (3) lectures, one tutorial per week and 52 hours of practical work.

Method of	Final Theory Examination (3 hours)	70%
Examination:	In-course Tests/Assignments	20%
	Practical Reports	10%

**PHYS0071 - PRELIMINARY PHYSICS II (6 P-Credits)**

Pre-requisite: None

Syllabus: Charge, Coulomb's law, insulators and conductors. Electric field, lines of force, electric potential, potential differences, electron volt (Millikan's experiment, CRO). Capacitance, series and parallel combination, energy in a charge capacitor. Dielectrics, current Resistivity, resistance, EMF, work and power, resistors in series and parallel. Kirchoff's laws, Wheatstone bridge and potentiometer. The magnetic field, lines of force, magnetic flux, motion in a magnetic field. Thomson's measurement of  $e/m$ , isotopes and spectrography. Force on conductor. Torque on a current loop. The d.c. motor, pivoted-coil galvanometer. Magnetic field of a long straight wire. Force between parallel conductors, the ampere, induced EMF. Faraday's law, Lenz's law. Eddy currents. The nature of light, speed of light (experimental). Waves and rays. Refraction and reflection. Snell's law. Total internal reflection. Dispersion. Single surface images Reflection from plane and spherical surfaces, refraction at plane and spherical surfaces. Focal point and length. Graphical and analytical methods. Images as objects. Thin lens, diverging lens, lensmaker equation. Aberrations, the eye, defects of vision. Magnifier, camera, projector, compound microscope, telescope, etc. Atomic nucleus,

nuclear radiation. Isotopes and isobars, binding energy and stability. Alpha, beta and gamma rays. Decay law, decay constant. Half life, activity, radioactivity series, radioactive shielding, radiation and the life sciences.

simple harmonic motion. Transverse and longitudinal waves (1-D), intensity, standing waves, sound waves, vibrational resonance, beats. Doppler effect.

Teaching:	Three (3) lectures, one tutorial per week and 52 hours of practical work.	Teaching:	Three (3) lectures, one tutorial per week and 26 hours of practical work.
Method of Examination:	Final Theory Examination (3 hours) 70% In-course Tests/Assignments 20% Practical Reports 10%	Method of Examination:	Final Theory Examination (2 hours) 70% In-class Tests/Assignments 20% Practical Reports 10%

**PHYS1101 - ELECTRICITY & MAGNETISM (4 Credits)**

**LEVEL I PHYSICS COURSES**

**PHYS1100 - MECHANICS (4 Credits)**

Pre-requisite: CAPE Physics Unit 1 or CAPE Pure Mathematics Units 1 & 2.

Pre-requisite: CAPE Physics Unit 1 or CAPE Pure Mathematics Units 1 & 2.

Syllabus: Kinematics in 1-, 2- and 3-dimensions, full vector analysis. Projectiles, Circular motion, dynamics of circular motion. Polar co-ordinates. Newton's laws. Friction. Conical pendulum. Inertial frames of reference. Centripetal forces, velocity-dependent forces (terminal velocity). Gravitation. Kepler's laws. Kinetic and potential energy, work-energy theorem, conservation of energy, power. Linear momentum, elastic and inelastic collision in 1-, 2- and 3-dimensions. Impulse, variable-mass systems. Rotational kinematics, rotational kinetic energy. Torque, angular momentum, rigid bodies. Equilibrium conditions, physical systems as examples of

Syllabus: Electric charge, Coulomb's law, electric field. Charge and dipole in an electric field. Motion of charged particles in uniform and non-uniform electric fields. Calculation of E for point charges and charge distributions. Electric flux, Gauss' law. Calculation of E for symmetrical charge distributions using Gauss's law. Electric potential, potential difference, work, potential energy, calculation of potential for point charges and charge distributions. Capacitance, RC circuits. Magnetic fields, force on charges and currents in a magnetic field, Hall effect, motion of charged particles in uniform and non-uniform magnetic fields, Ampere's law, Calculation of magnetic field B for simple field configurations, Biot and Savart law, induced



EMF, Lenz's law, time varying magnetic field and relative motion, inductance, LR circuits. Displacement current and Maxwell's equations. EM waves, E & B fields, energy density and energy flow in EM radiation.

Teaching: Three (3) lectures, one tutorial per week and 26 hours of practical work.

Method of Examination:	Final Theory Examination (2 hours)	70%
	In-class Tests/Assignments	20%
	Practical Reports	10%

**PHYS1102 - OPTICS, THERMODYNAMICS & MODERN PHYSICS (4 Credits)**

Pre-requisite: CAPE Physics Unit 1 or CAPE Pure Mathematics Units 1 & 2.

Syllabus: **Physical Optics:** Fermat's principle and the derivation of laws of reflection and refraction. Interference of light: Path and phase difference, Young's double-slit experiment and interference in thin films. Diffraction of light: Single and double slit diffraction, Raleigh's criteria and the resolution of single-slit and circular aperture. Resolving power of optical instruments. Diffraction grating and missing orders. Polarization of light: Methods of generating polarized light. Double refraction and optical activity.

**Thermodynamics:** Zeroth law of thermodynamics. Heat, work and the first law of thermodynamics. Applications of the

first law to ideal gases. Heat engines and the second law of thermodynamics. Entropy calculations for reversible and irreversible processes.

**Modern Physics:** Early quantum theory: Blackbody radiation and Planck's hypothesis. Experimental evidence to support the photon theory of light. Wave-particle duality of light. Wave nature of matter and de Broglie's hypothesis. Experimental evidence to support de Broglie's hypothesis. Uncertainty Principle. Early models of the atom and their limitations.

Teaching: Three (3) lectures, one tutorial per week and 26 hours of practical work.

Method of Examination:	Final Theory Examination (2 hours)	70%
	In-class Tests/Assignments	20%
	Practical Reports	10%

**LEVEL II PHYSICS COURSES**

**PHYS2100 - MATHEMATICAL METHODS IN PHYSICS (4 credits)**

Prerequisites: MATH 1120 Calculus I

Syllabus: Taylor's Expansion, Partial Differentiation of Multivariate Functions, diagonalization of Matrices, Eigenvectors, Eigenvalues, Elementary functions of Complex Variables, Divergence Theorem, Stokes' Theorem,

line Integrals, Surface and Volume Integrals, Fourier Series, Ordinary differential Equations, Laplace Transforms, Introduction to Special functions, Wave Equation, Diffusion Equation.

Method of Final Theory Examination (2 hours) 80%  
 Examination: In-class Tests/Assignments 20%

**PHYS2102 – SOLID STATE PHYSICS (4 Credits)**

Pre-requisite: PHYS1101 Electricity & Magnetism

Syllabus: Miller indices, Brillouin zones X-ray diffraction: Solid-state bonding: electrons in periodic potential Kronig-Penney model. Fermi Level: Thermal properties of solids. Electrical conductivity, Intrinsic and extrinsic semiconductors, Insulators, Thermoelectric and galvomagnetic effects, Factors affecting the properties of semiconductors, Basic semiconductor devices, Types of magnetism and magnetic materials.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 80%  
 Examination: In-course tests / assignments 20%

**PHYS2101 - QUANTUM MECHANICS & SPECIAL RELATIVITY (4 Credits)**

Pre-requisite: PHYS1100 Mechanics, PHYS1102 Optics, Thermodynamics & Modern Physics, and MATH1120 Calculus I

Syllabus: Superposition of states, Wave mechanics, Matrix mechanics, Uncertainty relations, Complementarity, Wave-particle duality, Wave equation, Wave packets. Group velocity, Momentum and position operators, operators. Measurement, expectation values, TISE, Free particle, 1-D potentials – square well, Finite square well, Step potential, barrier penetration, Numerical solution of the S.E, Ether hypothesis, Einstein's relativity, Lorentz transformation, Time dilation, Fitzgerald contraction, combination of velocities, Relativistic energy and momentum.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 80%  
 Examination: In-class Tests/Assignments 20%

**PHYS2103 - CLASSICAL MECHANICS (4 Credits)**

Pre-requisite: PHYS1100 Mechanics & MATH1120 Calculus I

Syllabus: Full treatment of classical harmonic oscillator: damped and forced oscillations, jerk, coupled oscillators - normal modes (secular equation, normal frequencies, normal coordinates), simulation of 1-D crystal as linear array of coupled oscillators. General wave equation,

Teaching: Three (3) lectures and one tutorial per week.

phase and group velocity. Mechanics of continuous media: waves on a string, surface waves, sound waves, boundary effects. Fluids: statics, kinematics and dynamics of steady flow. Lagrange and Hamiltonian equations of motion. Non inertial frames of reference: accelerated and rotating, Coriolis effect. Rotation of a rigid body, Euler equations of motion. Dynamics of a particle in a central field of force, scattering.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 80%  
 Examination: In-class Tests/Assignments 20%

**PHYS2105 - COMPUTATIONAL PHYSICS I (4 Credits)**

Pre-requisite: PHYS1100 Mechanics, PHYS1101 Electricity & Magnetism and MATH1120 Calculus I

Syllabus: Algorithms, flowcharts and pseudocode, organisation, control structures and standards for scientific programming, FORTRAN, C/C++, MATLAB and MAPLE, Introduction to UNIX, error, accuracy and stability, Introduction to numerical methods, practical implementation, Roots of equations, interpolation and extrapolation, numerical differentiation and integration, numerical solution of differential equations, Fourier methods, Introduction to computer modelling in Science.

Teaching: Two (2) lectures and four (4) hours of laboratory per week.

Method of Final Theory Examination (2 hours) 40%  
 Examination: In-class Tests/Assignments 60%

**PHYS2106 - ADVANCED PHYSICS / TECHNOLOGY LABORATORY I (2 credits)**

Pre-requisite: PHYS1100 Mechanics, PHYS1101 Electricity & Magnetism and PHYS1102 Optics, Thermodynamics & Modern Physics

Syllabus: A minimum of five (5) experiments will be performed, researched and written up in a report format specified by the lecturer. Students will not be allowed to repeat experiments carried out in PHYS2107.

At least two (2) experiments will be chosen from each of the following two (2) categories:  
 (i) Classical Physics Experiments  
 (ii) Experiments in New Technology.

Teaching: Four hours of laboratory per week.  
 Method of Written Laboratory Reports (5) 80%  
 Examination: Oral Examination 20%

**PHYS2107 - ADVANCED PHYSICS / TECHNOLOGY LABORATORY II (2 credits)**

Pre-requisite: PHYS1100 Mechanics, PHYS1101 Electricity & Magnetism and PHYS1102 Optics, Thermodynamics & Modern Physics

Syllabus:	A minimum of five (5) experiments will be performed, researched and written up in a report format specified by the lecturer. Students will not be allowed to repeat experiments carried out in PHYS2106. At least two (2) experiments will be chosen from each of the following two (2) categories: (i) Classical Physics Experiments (ii) Experiments in New Technology.	relations. Evolution of states in time. Hamiltonian operator, Ehrenfest's equations, representations and transformations of state vectors. Factorisation method. Harmonic oscillator, general Hamiltonian, normalisation. Free particle in 3-D, angular momentum, parity. Central potentials, isotropic harmonic oscillator, hydrogen atom. Fermions and bosons, the Exclusion Principle. Electron spin, magnetic moment, Perturbation theory. Time-dependent perturbations, transitions to the continuum, density of states. Elastic scattering in 1-D, scattering by a square well, resonances. Interpretation of Q. M. Copenhagen interpretation, alternative interpretations of wave-function collapse, EPR paradox, Bell's theorem.
Teaching:	Four hours of laboratory per week.	
Method of Examination:	Written Laboratory Reports (5) Oral Examination	80% 20%

**PHYS2950 - PHYSICS ELECTIVE (4 credits)**

Pre-requisites: None

Syllabus:	An advanced course in Physics taken as an exchange student at an approved institution and pre-approved by the Dean.	Teaching:	Three (3) lectures and one tutorial per week
		Method of Examination:	Final Theory Examination (2 hours) In-class Tests/Assignments
			80% 20%

**LEVEL III PHYSICS COURSES**

**PHYS3100 - QUANTUM MECHANICS (4 Credits)**

Pre-requisite: PHYS2101 Quantum Mechanics & Special Relativity

Syllabus: Operators and eigenvectors, eigenvalue equations, vector spaces, Dirac bra-ket formulation, axioms of quantum mechanics, compatible observables, uncertainty

**PHYS3101 - ELECTRODYNAMICS (4 Credits)**

Pre-requisite: PHYS1102 Optics, Thermodynamics & Modern Physics and PHYS2101 Quantum Mechanics & Special Relativity

Syllabus: Development of Maxwell's equations. Potentials. E-m waves in free space, conducting medium, plasmas. Reflection of e-m waves from dielectric and metallic

boundaries, waveguides, special relativity and electrodynamics. Transformation of electric and magnetic fields.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 80%

Examination: In-class Tests/Assignments 20%

**PHYS3102 - OPTICS & LASERS (4 Credits)**

Pre-requisite: PHYS2101 Quantum Mechanics & Special Relativity

Syllabus: Spatial and temporal coherence. Fraunhofer and Fresnel diffraction. Image formation and processing. Basic principles of lasers, population inversion, stimulated emission, A & B coefficients, etc. Gas, solid-state, liquid & dye lasers. Production of tunable, high-power, high-stability and short-pulse lasers. Applications.

Teaching: Three (3) lectures and one tutorial per week.

Method of Final Theory Examination (2 hours) 80%

Examination: In-class Tests/Assignments 20%

**PHYS3105 - STATISTICAL MECHANICS (4 Credits)**

Pre-requisite: PHYS2101 Quantum Mechanics & Special Relativity

Syllabus: Models of thermal systems. Probability. Entropy. Internal energy. Temperature Contact with thermodynamics. Chemical potential. Free energy. Heat capacities. Microcanonical Canonical and grand canonical distributions (Boltzmann and Gibbs sums). Quantum statistics. F-D, B-E and Planck distributions. Blackbody radiation. Ideal gas. Fermi gas Density of states. Superfluidity. Bose-Einstein condensation. Phase transitions. Thermodynamics of the superconducting transition.

Teaching: Three (3) lectures and one tutorial per week

Method of Final Theory Examination (2 hours) 80%

Examination: In-class Tests/Assignments 20%

**PHYS3106 - PHYSICS RESEARCH PROJECT (4 Credits)**

Pre-requisite: Restricted to Final Year students, Majoring in Physics.

Syllabus: In consultation with and under the supervision of a Faculty member, students are expected to define, investigate and report on an applied or theoretical research topic in Physics. The project itself is equivalent to a single Faculty course and must therefore

reach that standard in terms of content and research effort. The project should contain some originality in material and evidence of extensive reading and comprehension of the subject area. A proposal and literature review must be submitted no later than the fourth week of Semester II and a final written report must be submitted and presented orally to a panel of at least three Faculty members no later than the last week of classes in Semester II.

N.B. Limited to those students who have demonstrated a sound academic background and an aptitude for research.

Method of Examination:	Final Written Project Report	80%
	Oral Presentation	20%

photocurrent, fill factor, photoconversion efficiency, charge recombination, and charge trapping and detrapping are discussed. Photovoltaic cells manufacturing, systems, reliability, life-cycle analysis, and risk analysis. The economics of photovoltaic technology evolution in the context of markets, policies, society, and environment.

Teaching: Two lectures, one hour of tutorial, and 26 hours of practical work.

Method of Assessment:	Final Examination (2 hours)	50%
	Laboratory Work	25%
	Assignments	25%

### **PHYS3107 - FUNDAMENTALS OF PHOTOVOLTAIC PHYSICS (4 credits)**

Pre-requisites: PHYS1101 Electricity & Magnetism & MATH1120 Calculus I

Syllabus: Group III-V semiconductors, p-n junctions, and wide-band-gap metal-oxide semiconductors with good optical properties. Fundamentals of photoelectric conversion, i.e. charge photoexcitation and separation, charge conduction and transport (diffusion and drift), and charge collection. First, second, and third generation photovoltaic technologies. Characterization of photovoltaic cells: open-circuit photovoltage, short-circuit





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