COVENANT UNIVERSITY

DEPARTMENT OF BIOLOGICAL SCIENCES

BIOLOGY PROGRAMME

ACADEMIC HANDBOOK

2022 – 2026

COVENANT UNIVERSITY

Km. 10, Idiroko Road,

P.M.B 1023, Ota,

Ogun State, Nigeria

Tel: 01-7900724, 7901081, 7913282, 7913283

Fax: 01-7936529

e-mail: contact@covenantuniversity.edu.ng

Published by

Media & Corporate Affairs Department,

Covenant University

Ota, Ogun State, Nigeria.

In Press

Covenant University Press

2022

Table of Contents

DAVID O. OYEDEPO, ***Ph.D, FNAE***
CHANCELLOR AND CHAIRMAN, BOARD OF REGENTS

PROFESSOR ABIODUN H. ADEBAYO

VICE-CHANCELLOR, COVENANT UNIVERSITY

MRS. REGINA A. TOBI-DAVID, *M.A*
Ag. REGISTRAR, COVENANT UNIVERSITY

PRINCIPAL OFFICERS OF COVENANT UNIVERSITY

Vice-Chancellor
Professor Abiodun H. Adebayo, *B.Sc, M.Sc, Ph.D*

Ag. Registrar
Mrs. Regina A. Tobi-David, *M.A*

Ag Director, Centre for Learning Resources
Dr. Mercy A. Iroaganachi, *B.A, MLS, CLN, Ph.D*

Director, Financial Services
Pastor Kiki Olugbenga, *B.Sc*

Ag. Director, Physical Planning and Development
Engr. Elizabeth Akinyeoluwa

University Chaplain
Pastor Victor Hill *B.Sc*

Dean, Student Affairs
Prof. David Imhonopi *B.Sc, M.Sc; Ph.D*

DEANS OF COLLEGES AND SCHOOL OF POSTGRADUATE STUDIES

Dean, School of Postgraduate Studies

Professor Akan B. Williams, *B.Sc, M.Sc, Ph.D*

Dean, College of Management and Social Sciences
Professor Abiola Babajide, *B.Sc, M.Sc, Ph.D*

Dean, College of Leadership Development Studies
Professor Charles U. Ogbulogo, *B.A, M.A, Ph.D*

Dean, College of Engineering
Professor David O. Olukanni, *B. Engr, M.Engr, Ph.D*

Dean, College of Science and Technology
Professor Timothy A. Anake, *B.Sc, M.Sc, Ph.D*

DIRECTORS

Director, Centre for Research, Innovation and Discovery
Professor Kolawole Ajanaku, *B.Sc, M.Sc, Ph.D*

Director, Open and Distance Learning
Professor Francis E. Idachaba, *B.Engr, M.Engr, Ph.D*

Director, Covenant University Centre for Instrumentation and Research Facilities
Professor Olayinka Ajani, *B.Sc, M.Sc, Ph.D*

Director, Academic Planning Unit
Professor Ahzegbobor P. Aizebeokhai, *B.Sc, M.Sc, Ph.D*

Director, Centre for Systems and Information Services
Engr. Bola Akanle, *B.Engr.*

Director, Vice-Chancellor's Office
Professor Omotayo A. Osibanjo, *B.Sc, M.Sc, Ph.D*

Director, Centre for Entrepreneurial Development Studies
Dr. Olaleke O. Ogunnaike, *B.Sc, M.Sc, Ph.D*

Director, International Office and Linkages
Dr. Isaac Akinwunmi, *B.Engr, M.Enrg, Ph.D*

Director, Strategic Business Unit
Mr. Opeyemi S. Babatunde

Director, Covenant University Medical Centre
Dr. Ademola Adebanjo, MBBS

WELCOME ADDRESS NOTE FROM THE CHANCELLOR

Raising a New Generation of Leaders

"Seest thou a man diligent in his business? He shall stand before kings; he shall not stand before mean men". (Proverbs 22:29 - KJV)

Covenant University is a Royal Academy birthed on the platform of a compelling vision to raise a new generation of leaders, especially for the Continent of Africa. It is indeed the birthplace of "Kings and Queens". I do believe that the greatest need of the 21st Century is that of leadership, whereas leadership is not an endowment, it is a commitment to the future that makes a leader.

Our mission at Covenant University is to develop the man who will, in turn, develop his world. We see the character as the anchor of leadership. The ability makes a manager, but integrity makes a leader.

Our experience over the last twenty years strongly indicates the great potential we have as a University in instituting a world class-learning context that is rich in educational opportunities, research and scholarship. The heart-warming positive feedback from employers on the excellent and exemplary conducts of our graduates is one of the many concrete validations of the University's unique vision. We are, however, looking ahead to the future we envision in driving excellence across all our programmes by ensuring that the stage is well anchored to actualise our set vision of raising a new generation of leaders.

Only a serious approach guarantees a glorious result. There is no short cut to any place worth going. Edmund Hilary, the first man that conquered Mount Everest, said, "It is not the mountain that we conquered but ourselves". Covenant University is indeed a place where you are taught how to conquer yourself as part of the process of becoming outstanding in life. Therefore, if leadership and excellence are your goals, then Covenant University is the right place for you.

Starting from the 2013/2014 Academic Session, every student of the University undertakes at least a Certificate/Diploma Course in Leadership in addition to his/her major discipline.

Therefore, the currency of the curriculum and the inclusion of Leadership Certificate is one of the unique selling points.

You are welcome to Covenant University, a Royal Academy, a Leadership Training Varsity.

Dr. David O. Oyedepo

Chancellor, Covenant University

FROM THE VICE-CHANCELLOR'S DESK

It is my great delight to welcome you to Covenant University where "*Eaglets*" are nurtured into "*Eagles*" as transformational leaders in their respective vocations and the society. Covenant is a vision-birthed University with a compelling vision to raise a new generation of leaders in all fields of human endeavour, noting that leadership is a fundamental challenge to the advancement and development of Africa. We are on a mission to change the educational landscape of Africa through our departure philosophy; to create knowledge and restore the dignity of the black man through our curricula and pedagogy that are designed to be life-applicable. Our programmes are unique and in consonance with the unique products that we produce.

In our pursuit of this vision, our core values are the crucibles of our quality assurance processes in teaching, research, and community service. These core values—Spirituality, Possibility Mentality, Capacity Building, Integrity, Responsibility, Diligence, and Sacrifice are the building blocks of our enterprise.

Further to our drive towards producing employable and industry ready graduates, our students continue to enrich their knowledge-base with respect to industry expectations through interaction with the Industry offered by the Town and Gown seminar series. Our custom built programmes Entrepreneurial Development Studies (EDS), Total Man Concept (TMC) and Towards a Total Graduate (TTG), equip our students with unique skills to navigate life and becoming a total man.

In making the decision to pursue your undergraduate education at Covenant, you have chosen a distinctive institution with a rich spiritual heritage and academic prowess. Within a short period of 20 years, Covenant has demonstrated great potentials in instituting a world-class learning context that is rich in educational opportunities, research and scholarship. As a university acclaimed to be scholarly vibrant; with attestation of eight different rankings of Times Higher Education (THE) in one year, it is our desire to share and disseminate latest knowledge and ideas that are essential in driving the future of society and humanity.

During your time here, I encourage you to take an active role in your own academics, and understand that education at Covenant is as much about character, values, morals, and social responsibility as it is about intellectual development and critical thinking. Take the time to reflect on your total development as you pursue your dreams aspirations and vision. We will assist and support you in the process of becoming what God has destined for you. In doing so, we will also challenge you to stretch your mind, heart and spirit.

This Handbook contains vital information and instructions that will help you to enjoy a most rewarding academic journey through your willing and delightsome obedience.

Professor Abiodun H. Adebayo
Vice-Chancellor, Covenant University

Covenant University Center for Learning Resources

Covenant University Gate

Senate Building

CHAPTER ONE
INTRODUCTION

1.1 THE NAME: COVENANT UNIVERSITY (CU)

All over Africa, and Nigeria in particular, a great significance is attached to names. They portray meanings and convey important messages. Names reflect circumstances of birth or events. The word "Covenant" was chosen as an expression of the University's total commitment and vows to make a Total Man of her students. It reflects the intention of the proprietors of the University to uphold a binding agreement with students to deliver their desires for excellence and career exploits by offering them the best in educational attainment and by offering their parents/guardians the best value for their investment. It is also common knowledge that every covenant is ratified by blood and, as a church-sponsored University, we consider the blood of Jesus Christ, which is the blood of the everlasting covenant, as our stronghold in the fulfilment of this awesome obligation. Covenant University vows to make of her graduates expert thinkers, leader-managers, and hyper-resourceful technocrats in all fields of human endeavour.

1.2 OUR VISION

To be a leading World-Class University, committed to raising a new generation of leaders in all fields of human endeavour.

1.3 OUR MISSION

To create knowledge and restore man's dignity through a Human Development concept of the Total Man, employing innovative, leading-edge, teaching and learning methods. We aim for application of research that promotes integrated, life-transforming values through Science, Technology and Human Capacity Building.

On October 21, 2002, the African educational landscape was radically altered by the formal entry of Covenant University (CU) into the Higher Education context. The University is located at Canaan Land, Ota, Ogun State, Nigeria. The University is a growing, dynamic vision-birthed and vision-driven University, founded on a Christian mission ethos and committed to pioneering excellence at the cutting edge of learning.

The University's specific mandate can be stated as follows:

- "Raising a new generation of leaders through a qualitative and life-applicable training system that focuses on value and skill development".
- "Raising a new generation of leaders through a broad-based qualitative education built on sound biblical principles culminating in the birth of path-finders, pace-setters and trail-blazers".
- "Raising a new generation of leaders who shall redeem the battered image of the black race and restore her lost glory as this trained army of reformers begins to build the old wastes, repair the wasted cities and raise the desolation of many generations".

1.4 OUR FOUNDING PHILOSOPHY

In response to the global demand for a departure from dogmatism to dynamism in the existing educational system, Covenant University is built on the following philosophical platform:

A departure from form to skill
A departure from knowledge to empowerment
A departure from figures to future building
A departure from legalism to realism
A departure from mathe-matics to life-matics.

This is reflected in our motto: "Raising a New Generation of Leaders".

1. OUR OBJECTIVES

The objectives of the University are to:

i. provide facilities for learning and give instructions and training in such areas of knowledge that will produce sound and mentally equipped graduates, who will provide intellectual leadership in academic institutions, industry and the public sector through the Total Man Concept approach;

ii. develop and offer academic and professional programmes leading to the award of diplomas, first degrees and higher degrees, which emphasise planning, adaptive and technological maintenance, developmental and productive skills;

iii. promote by research and other means, the advancement of knowledge and its practical application to social, cultural, economic, scientific and technological problems;

iv. encourage and promote scholarship and conduct research in all fields of learning and human endeavour;

v. disseminate scientific and technological knowledge among scientists, researchers, industries, trade services and other bodies; and

vi. relate its activities to the technological, scientific and socio-economic needs of the people of Nigeria and to undertake other activities appropriate for a University of the highest standard.

1.6 OUR CORE VALUES

Our Core Values as a University are the defining components of the Covenant University Vision and they reflect our beliefs in the encrypted truths that firmly define our purpose and the underlining ethos of our existence as a University.

As a University, we strongly uphold the practices embedded in our Core Values and strive to integrate these Values into all facets of our functions and operations as a University. We expect that students of Covenant University will visibly demonstrate and integrate the virtues embedded in these Core Values in their daily conduct as students who are being raised along the Vision lines of raising a New Generation of Leaders for the Continent of

Africa on the Total Man Concept-driven developmental platform. All students are expected to adhere strictly to the University's Core Values in their day-to-day activities within or outside the University.

The Covenant University Core Values are: Spirituality, Possibility Mentality, Capacity Building, Integrity, Responsibility, Diligence and Sacrifice.

a. Spirituality

This forms the bedrock of our existence as a University and defines every aspect of our operations and context. The Christian ethos underlies our activities and conducts at all times, and every student of Covenant University is expected to exhibit the character traits and dispositions of a Jesus-centred heritage. The Jesus - factor centred approach to all issues is non-negotiable and central in the pursuit of our mandate in raising a New Generation of leaders. To this end, therefore, students are to be committed to maintaining a high level of spirituality and act in such a manner as to facilitate their spiritual growth. Attendance at Chapel Services, which every student is expected to attend with a Bible, notebook and pen, are a compulsory and essential part of students‟ spiritual development. Students are also expected to demonstrate a deep reverence for God at all times.

b. Possibility Mentality

Students of Covenant University are expected to exhibit a royal carriage, attitude, habit and character, exuding self-confidence and dignity at all levels of interaction and in general conduct. They are expected to see themselves as persons of worth and value, taking pride in their uniqueness as individuals with a positive mind-set devoid of any trace of inferiority.

c. Capacity Building

This is related to commitment to a lifestyle of continuous academic and personal development, striving to be continuously relevant to the overall vision requirement of the University as well as her core mission, goals and objectives. Students are encouraged to constantly seek paths for self-improvement. Openness to learning new skills and taking on board new information is a trait expected of Covenant University students in order to have robustness and depth in the quality of their output.

d. Integrity

Students of Covenant University are expected to demonstrate traits of honesty, uprightness and trustworthiness at all times. They must ensure that they are accountable, transparent and open in all their dealings. They shall flag truth as a virtue at all times, particularly in conduct during examinations, obeying the rules and regulations of the University, being spiritually sound, morally upright and having a good conscience.

e. Responsibility

We are committed to inculcating a sense of responsibility in our students. We believe in the place of discipline for effective leadership. We expect our students to respond to issues as demanded, not as convenient. Here at Covenant University, our students are not permitted to do what they like but what is right. Punctuality at lectures, as well as prompt response to assignments as demanded, is a desired trait of responsibility.

f. Diligence

Students of Covenant University are expected to be deeply committed to their assignments. We expect that they will extol the virtues of hard work and constantly strive towards excellent attainment in all they do.

g. Sacrifice

Sacrifice is the ultimate price for outstanding leadership. It is the quality of sacrifice that defines great leadership. We therefore expect students of Covenant University to go the extra-mile and pay the extra- price in the attainment of their set goals. Raising an altar of sacrifice in pursuit of their dreams is what must distinguish and define the Covenant University student.

1.7 THE TOTAL MAN CONCEPT

The Total Man Concept (TMC) is Covenant University's custom-built Programme that constitutes the core concept of her academic programmes. This concept centres on "developing the man that will develop his world." It is designed to make the student become intelligently conscious of his environment and thus be able to maximise his potential.

The programmes of the University are first directed at "the person" before his profession. In this way, the University will raise a generation of experts who possess the capacity to face and manage challenges.

The TMC Programme centres on three components of the human personality: the spirit, the mind, and the body:

a) The Spiritual Man

Spiritual development is to us a major force for the evolvement of the Total Man, as mental excellence and understanding are generated through the vital force in man, which is the Spirit of God and the Spirit of Intelligence. As a University sponsored by a Christian Mission, character formation is considered as a spiritual issue that is instilled by self-discipline and commitment to the principles enunciated by our Lord Jesus Christ.

Covenant University provides opportunities for spiritual development through various avenues, including spiritual formation programmes and counseling, and also by creating leadership opportunities.

b) The Intellectual Man

Covenant University students enjoy the highest standards of excellence through the institution of academic programmes that are innovative, creative and functional. Covenant University also encourages students to be inquisitive, bold and forthright in asking questions and facing the challenges of academic leadership. The Total Man concept is also promoted through the introduction of a system of compulsory, theoretical and practical courses, all of which must be passed before one can be considered for a degree from the University. In addition to normal General Studies courses, we have included our own specially-designed courses in areas such as: biographical studies, entrepreneurship, family life, human development process, leadership development, mental development, success concepts, work ethics and Towards the Total Graduate (TTG) Programme.

c) The Physical Man

The body is a vital component of the Total Man. Covenant University is committed to providing avenues for sound physical development via recreational activities that engage the body and also enhance personality development, stimulating the cultivation of lifestyles that are conducive to healthy living. We thus encourage students to participate in sporting activities.

1.8 THE TOTAL GRADUATE

The Covenant University graduate will be mentally resourceful, intellectually reinforced, enterprisingly self-dependent, futuristically visionary and responsibility-sensitive to the changes demanded for the leadership role or dominion nature he is made for. He shall be a Total Man.

OUR CAMPUS

Sporting Activity at the Sport Complex

Covenant University provides a serene, safe, secure, pleasant and ICT driven teaching and learning environment.

Academic programmes are free of strikes, shut-downs and union face-offs. Well-stocked libraries and laboratories, as well as unrestricted access to the internet for study and research purposes

Covenant University pioneered the introduction of:

i. Entrepreneurial Development Studies (EDS) aimed at preparing the student for self-employment; and
ii. The Total Man Concept (TMC) aimed at developing the Total Man – Spirit, Soul and Body

Our graduates earn an additional certificate in leadership upon completion of their studies.

Covenant University Landscape

CHAPTER TWO

UNIVERSITY ADMINISTRATION AND CONTROL

Covenant University was established by the World Mission Agency (WMA), an arm of the Living Faith Church Worldwide Inc. The Board of Trustees of the Agency appoints the members of Board of Regents, which is the apex ruling body for the University. In his capacity as the *visioner* of the University, Dr. David Oyedepo serves as the lifeChancellor of the University and the Chairman of the Board of Trustees of World Mission Agency. The University's Vision of raising a new generation of leaders has necessitated the development of a unique approach to governance and management of the institution. Its founding philosophy is to specifically and emphatically promote change against the status quo, which had stagnated growth and development in the nation and in the African continent. The University is committed to a visionary resolution of these issues.

The other organs by means of which the University administration is carried out include: the Senate, and Management Board. Other statutory and academic Boards are as explained.

2.1 BOARD OF REGENTS

The Board of Regents is the Governing Council of the University. The Board serves as the apex ruling body of the University and exercises final authority and power in all policy, legal, administrative and financial matters of the University. It has the overall responsibility for the policies and operations of the University.

2.2 THE CHANCELLOR

The unique founding philosophy of change, which was birthed from the visionary base of the University, as well as the adopted strategies for its accomplishments, was considered crucial to the general and specific objectives of the University. The visionary direction and guidance had compelled the executive presence of the Chancellor who conceived the vision of the University. Consequently, the vision, as well as its governance imperatives, is shared with the faculty, staff and students at regular intervals. This vision has permitted and continues to permit stable formation, not only of the organisational structure but also of, the management culture, as well as helping to inculcate the values and ethos of the University into members of the University community. The Chancellor of the University is the Chief Executive Officer of the University. He also serves as the Chairman of the Board of Regents.

2.3 THE PRO-CHANCELLOR

The Pro-Chancellor shall, as may be directed by the Chancellor, undertake spiritual oversight of the University in the light of the Institution's foundation of faith and fear of God which is fundamental to successful living. The Pro-Chancellor shall as may be directed by the Chancellor, undertake the oversight and entrenchment of the University Vision and mission in the faculty, staff, and students from the underlining perspective of the University core values. The Pro-Chancellor shall, as may be directed by the Chancellor, maintain a functional platform for the discharge of the governance responsibilities of the Board. The Pro-Chancellor shall, as may be directed by the Chancellor, entrench a culture of efficient management of the resources and investments of the University, through the prompt discharge of the finance and general-purpose duties of the Board.

2.4 THE VICE-CHANCELLOR

The Vice-Chancellor is the Chief Academic Officer of the University. In this capacity, he/she is the Chief Responsibility Officer for the University's operations. Academic administration is planted firmly in the highest academic authority of the University, which is the Senate. The Vice-Chancellor is the Chairman of the University Senate and exercises all powers granted him/her in the law that established the University in respect of guiding and directing the University's academic activities. He/she holds in trust the Chancellor's executive responsibilities and authority in all areas where the Chancellor so delegates.

2.5 THE REGISTRAR

He is the Chief Administrative Officer of the University and oversees the administrative efficiency of the University, engaging historical records and regulations. The Registrar chairs the University's Administrative Board, which serves as the University's apex administrative organ and clearance house for all operational issues. He monitors rules, regulations and policies as well as make recommendations on policies to Senate and Board of Regents.

2.6 OTHER OFFICERS OF THE UNIVERSITY

(a) THE DEANS OF COLLEGES AND SCHOOL OFPOSTGRADUATE STUDIES

Our Colleges were established to provide teaching, research and community service activities in Departments/Programmes approved for them by the Senate. A College Management Board and College Academic Boards are established for each College to determine direction and supervise the conduct and grading of examinations and other academic responsibilities and they make recommendations to Senate on any academic matter, including curriculum development and examination results through the Deans. The Dean is the Chief Academic Officer of the College/School. He is the Chairman of the College Management Board and he coordinates and regulates the teaching responsibilities and the conduct of examinations within the available facility and specified guidelines. He is also responsible for co-coordinating the day-to-day administration of the College, including the organisation of students' admission, registration, matriculation and examinations.

b) THE DIRECTOR, PHYSICAL PLANNING AND DEVELOPMENT

The overall development of Covenant University involves the provision of buildings, equipment, furniture, roads, water, electricity, healthcare facilities and educational facilities for the children of the staff and accommodation for staff and students. The Director of Physical Planning and Development is responsible to the Vice-Chancellor for the physical development as well as maintenance and care of the University estate. Officers of the unit are divided into three main groups: maintenance and services; rehabilitation; and development of new facilities.

c) THE DIRECTOR, CENTRE FOR LEARNING RESOURCES

The Centre for Learning Resources (CLR) is the academic heart of the University system. Its basic purpose is to provide students and all academic members of the community with materials, assistance and an environment that facilitate teaching, learning and research. Covenant University's Centre for Learning Resources is being continuously equipped, as a fundamental requirement for academic excellence. The Director of CLR is the head of theUniversity Library, and he is responsible to the Vice-Chancellor in growing and developing the University Library system. This includes the main Library, CollegeLibraries and the departmental reading rooms.

d) THE DIRECTOR, FINANCIAL SERVICES

The Director, Financial Services Department, is responsible for ensuring financial prudence in the allocation and utilisation of the financial resources of the institution. This involves coordination, control and periodic evaluation of the financial system of the University, including the internal audit with a proactive audit strategy extending beyond compliance, probability and systems audit, to a value-for-money audit. The Director ensures that financial regulations are made, published in a Manual of Financial Procedures and followed through to ensure the efficient use of funds allocated to, or generated by the University.

e) THE DIRECTOR, CENTRE FOR SYSTEM & INFORMATION SERVICES (CSIS)

The Director manages the information system, provides technical support for portal administration, internet and intranet services, training and deployment of systems. CSIS generates and manages data from various sources, including candidate admission, student registration and examination processes for management decisions at various levels.

g) THE DIRECTOR, ACADEMIC PLANNING UNIT

The Director, Academic Planning Unit (DAPU) has the responsibility of collating, managing and interpreting data to guide the academic development of the University. The Director also ensures compliance with government policies, notably, the National Universities Commission (NUC) Benchmark Minimum Academic Standard (BMAS), the University status as they relate to academic matters and other academic requirements of Senate.

African Leadership Development Centre

(Top & Down) Members of the Board of Regents in academic procession during a Convocation Ceremony

Students Convocation Procession

Students Matriculation Procession

CHAPTER THREE

COLLEGE OF SCIENCE AND TECHNOLOGY

3.1 DEAN'S WELCOME NOTE

It is with great delight and gratitude to God that I welcome you to the College of Science and Technology (CST). The College has the following departments Architecture, Biochemistry, Building Technology, Estate Management, Biological Sciences, Chemistry,Computer and Information Sciences, Mathematics and Physics.

Each of the Departments has articulated its specific mission and objectives as well as the specifics of its academic programmes in line with the vision and mission of the College. A total of eleven academic programmes are offered by the nine Departments in the College. All the programmes were crafted with a view to producing job-ready graduates in science and technology with appropriate IT skills and capacity for independent thinking, creativeness and resourcefulness. The curricula of the programmes are unique, robust, current and comparable to the best in the world. They are designed not only to meet and surpass the basic academic standards prescribed by regulatory authorities in Nigeria but also to make our students spiritually buoyant, intellectually resourceful and physically fit to emerge as leaders in their chosen disciplines and solution providers in areas of their future endeavours.

We have modern ICT-driven and interactive teaching/learning facilities, state-of-the-art laboratories and workshops, and a rare crop of eminent scholars, committed and highly motivated faculty and staff. These, coupled with the unique serene and green environment of Covenant University will certainly make learning in the College a pleasurable experience.

This Academic Handbook contains details of prescribed courses and other specific requirements for all programmes offered in the College at the undergraduate level. It is intended to provide precise information to students, parents and everyone interested in the academic programmes of the College of Science and Technology.

Professor Timothy A. Anake
Dean, College of Science & Technology

OVERVIEW OF THE COLLEGE OF SCIENCE AND TECHNOLOGY

At the inception of Covenant University in 2002 and up till 2009, there were three Colleges: College of Business Studies (CBS), College of Human Development (CHD) and College of Science and Technology (CST). In 2009/2010 academic session, the number of Colleges in the University was reduced to two with the merging of the College of Business Studies and the College of Human Development to form the College of Development Studies (CDS). In the 2014/2015 academic session, the number of Colleges was increased to four. The four Colleges are the College of Business and Social Sciences (CBSS) now College of Management and Social Sciences (CMSS), College of Leadership and Development Studies (CLDS), College of Engineering (CoE) and College of Science and Technology (CST).

College of Science and Technology

3.2 DEPARTMENTS AND PROGRAMMES IN THE COLLEGE OF SCIENCE AND TECHNOLOGY

In the College of Science and Technology there are eight (8) Departments and eleven (11) programmesin the College. The Departments are Architecture, Building Technology, Estate Management, Biological Sciences, Biochemistry, Chemistry, Computer and Information Sciences, Mathematics and Physics. The Department of Architecture runs programme in Architecture while the Department of Building Technology offers programme in Building Technology. The Department of Estate Management runs programme in Estate Management. The Department of Biological Sciences runs programmes in Applied Biology and Biotechnology and Microbiology. The Department of Chemistry runs programme in Chemistry with options in Industrial Chemistry, Analytical/Environmental Chemistry and Materials/Polymer Chemistry.

The Department of Computer and Information Sciences offers programmes in Computer Science and Management Information System. The Department of Mathematics runs programme in Industrial Mathematics while Department of Physics offers programme in Industrial Physics with options in Applied Geophysics, Electronics and IT Applications, and Renewable Energy. All the programmes are accredited by the National Universities Commission (NUC) and relevant professional bodies.

3.3 VISION

To be a leading, world class centre of excellence for teaching, research and innovation in all fields of Science and Technology.

3.4 MISSION

To provide, through innovative teaching and research, science and technology education aimed at producing a new generation of highly motivated, competent, skilful and innovative professionals and scientists with a burning desire to tackle Africa's developmental challenges. Consequently, the College strives to generate and provide high quality and high-tech knowledge in a student-friendly environment for the purpose of producing well-prepared leaders of tomorrow.

3.5 PHILOSOPHY

The philosophy of the College derives from the fact that today's knowledge economy requires a multi-disciplinary, IT-driven approach with scientists and professionals from different disciplines connecting and collaborating in the deployment of a wide range of skills and knowledge to provide solutions to societal problems. Situated in a Christian mission University, the College is committed to the goals of learning and faith – learning as both the means to and the result of dogged scholarship; and faith as the personal appropriation of truth for godly living.

Professor Timothy A. Anake is the current Dean of the College of Science and Technology. Former Deans of the College include the pioneer Dean, Professor S. T. Ibiyemi (October, 2002 - September 2005), Professor E. A. Adeyemi, the renowned architect and former Vice-Chancellor of Federal University of Technology, Akure (October, 2005 – September, 2006) and Professor James Katende (September, 2006 – September 27, 2010). Others are Professor Frederick Hymore (September, 2010 – September, 2012), Professor Cleophas Loto (September, 2012 – August, 2014), Professor Olubukanlain Okusanya (August 8, 2014 – September 5, 2014), Professor Shalom Chinedu (September 6, 2014-August 9, 2015), Professor Nicholas Omoregbe (August 10, 2015- July 2017), Professor Kolawole Ajanaku (August, 2017- July 2019) and Professor Temidayo V. Omotosho (August 2019 – August 2021).

E-Learning facility at the Centre for Learning Resources (Library)

CHAPTER FOUR DEPARTMENT OF BIOLOGICAL SCIENCES

4.1 WELCOME NOTE FROM THE HEAD OF DEPARTMENT

It is with great delight that I welcome you to the Department of Biological sciences domiciled in the College of Science and Technology (CST). The Department has two programmes, namely,

- Biology (Applied Biology and Biotechnology)
- Microbiology

Each of the programmes has articulated its specific mission, vision and objectives in line with the vision and mission of the University. All the programmes were designed with a view to producing job-ready graduates in the life sciences appropriate IT skills and capacity for independent thinking, creativity and resourcefulness. The curricula of the programmes are unique, robust, current and comparable to the best in the world. They are designed not only to meet and surpass the basic academic standards prescribed by regulatory authorities in Nigeria but also to make our students spiritually buoyant, intellectually resourceful and physically fit to emerge as leaders in their chosen disciplines and solution providers in areas of their future endeavors.

We have modern ICT-driven and interactive teaching/learning facilities, state-of-the-art laboratories and workshops, and a rare crop of eminent scholars, committed and highly motivated faculty and staff. These, coupled with the unique serene and green environment of Covenant University, certainly makes learning in the department a pleasurable experience.

This Academic Handbook contains details of prescribed courses and other specific requirements for all programmes offered in the department at the undergraduate level. It is intended to provide precise information to students, parents and everyone interested in the academic programmes of the Department.

Professor Solomon U. Oranusi
Head, Department of Biological Sciences

4.2 OVERVIEW OF THE DEPARTMENT

Welcome to the Department of Biological Sciences, Covenant University. The Department of Biological Sciences was established in September, 2005/2006 academic session; and thus making it one of the oldest departments in this University. The Department of Biological Sciences was established to provide training in knowledge acquisition and skill development in the Art and Science of Biology and Microbiology. We offer a 4 sessions' programme leading to the award of the B.Sc. degree in Biology and Microbiology.

The Department began offering the B.Sc (Hons) Biology and Microbiology Programme (4 Sessions) in 2006 and the M.Sc Biology and Microbiology (2 Sessions) in 2009. Professor E. T. Otunola was the first Head of the Department in 2006/2007 academic session, and Dr. E.O. Fagade became the second Head of Department late in the 2006/2007 academic sessions. In 207/2008 academic sessions, Dr. O. A. Daini succeeded Dr. E.O. Fagade as the third Head of Department. Professor B. O. Elemo was the fourth Head of Department in the 2008/2009 session. Professor Louis O. Egwari became the fifth Head of the Department in 2009/2010 session and was succeeded by Dr. Shalom N. Chinedu as the sixth Head of Department in the 2009/2010 session. Professor Egwari again served as seventh Head of the Department between 2010 to 2012. He was succeeded by Dr. Israel S. Afolabi in 2012-2014 as the eighth Head of Department. Dr. Emeka J. Iweala became the nineth Head of Department at the inception of 2014/2015 academic session. Prof. Adesola Ajayi took over from Dr. Emeka Iweala as the tenth Head of Department during the 2015/2016 and 2016/2017 academic sessions. Dr. Grace I. Olasehinde served as the eleventh Head of Department from 2017-2019. Currently, Professor S.U. Oranusi is serving as the twelfth Head of the Department.

4.2.1 Vision

To be a leading world-class citadel of learning renowned for innovative contributions to Biological Sciences education, endeavours and solutions.

4.2.2 Mission

To produce new breed of graduate Biologists and Microbiologists who are competent, highly creative, innovative, and capable of providing leadership in the food, medical, pharmaceutical, agriculture and petrochemical based industries and the conservation, biotechnology and academic industries. The

Department plans to attain the set goals through "system innovation," quality teaching, leading research,and specialised mentorship within a conducive learning environment.

4.2.3 Philosophy

The Biological Sciences programmes of Covenant University is focussed on raising a new generation of leaders, equipped in their total personality to positively influence their community and restore hope to the citizens of their nation and to mankind in general. The Programmes are also designed to empower the students to recognize, investigate and propose solutions to the several biological problems affecting man and his environment through the designed programmes and to provide the students with a thorough, broad and balanced foundation in order to prepare them for career opportunities or an environment where they can be creative, innovative and self-reliant. Our curriculum is focused on the development of students' creative skills and capabilities in generating biological solutions that are industrially, environmentally, socially, economically and culturally responsive to the desires of our society. This is achieved through our emphasis on problem-based learning approach, deployment of technological and analytical tools required in advancing a biologically sensitive environment in particular, through inter-disciplinary approaches as well as through multi-disciplinary strategies that is the hallmark of microbiology and biology education. The department being situated in Christian Mission University is committed to the goals of learning by means of dogged scholarship, and faith as the personal appropriation of truth for godly living.

Aim of the Programme

The aim of the Biological Sciences Programme is to create knowledge and restore the black man's dignity through a Human Development concept of the Total Man, employing innovative, leading edge, teaching and learning methods that would assist our graduates to be very relevant in aspect of human endeavours.

4.2.4 Objectives

In order to actualise the philosophy and the aim of the programmes in the department, the specific objectives are to:

(i) stimulate appreciation of the science of Biology and its diverse applications;
(ii) provide the students with a broad, sound and balanced knowledge in a range of areas of Biology in a stimulating and supportive environment that is enriched by research;
(iii) prepare the students for teaching in basic Biology and for post-graduate research work in Biology/Applied Biology or other Biology-related discipline; and
(iv) inculcate in the students, the knowledge and skills needed for self -employment.

4.2.5 Goal-Attainment Strategies

The Department of Biological Sciences appreciates the fact that conducive learning environment has to be created. The components of the ideal environment include Curriculum, Right Man Resources, Qualified students & Learning Facilities. With the right environment, the curriculum is structured to produce professionals capable of producing appropriate and imaginative solutions that are not only technically proficient and contemporary but also economically feasible and relevant in all their ramifications. Students are guided by the right human resources, procedures and conducive learning environment. Practical laboratory work and its supervision are structured to enable students acquire the knowledge and skills for the practice of the profession.

Molecular Biology Laboratory, Department of Biological Sciences, Covenant University, Ota

Sections of Biology and Microbiology Laboratories, Covenant University, Ota

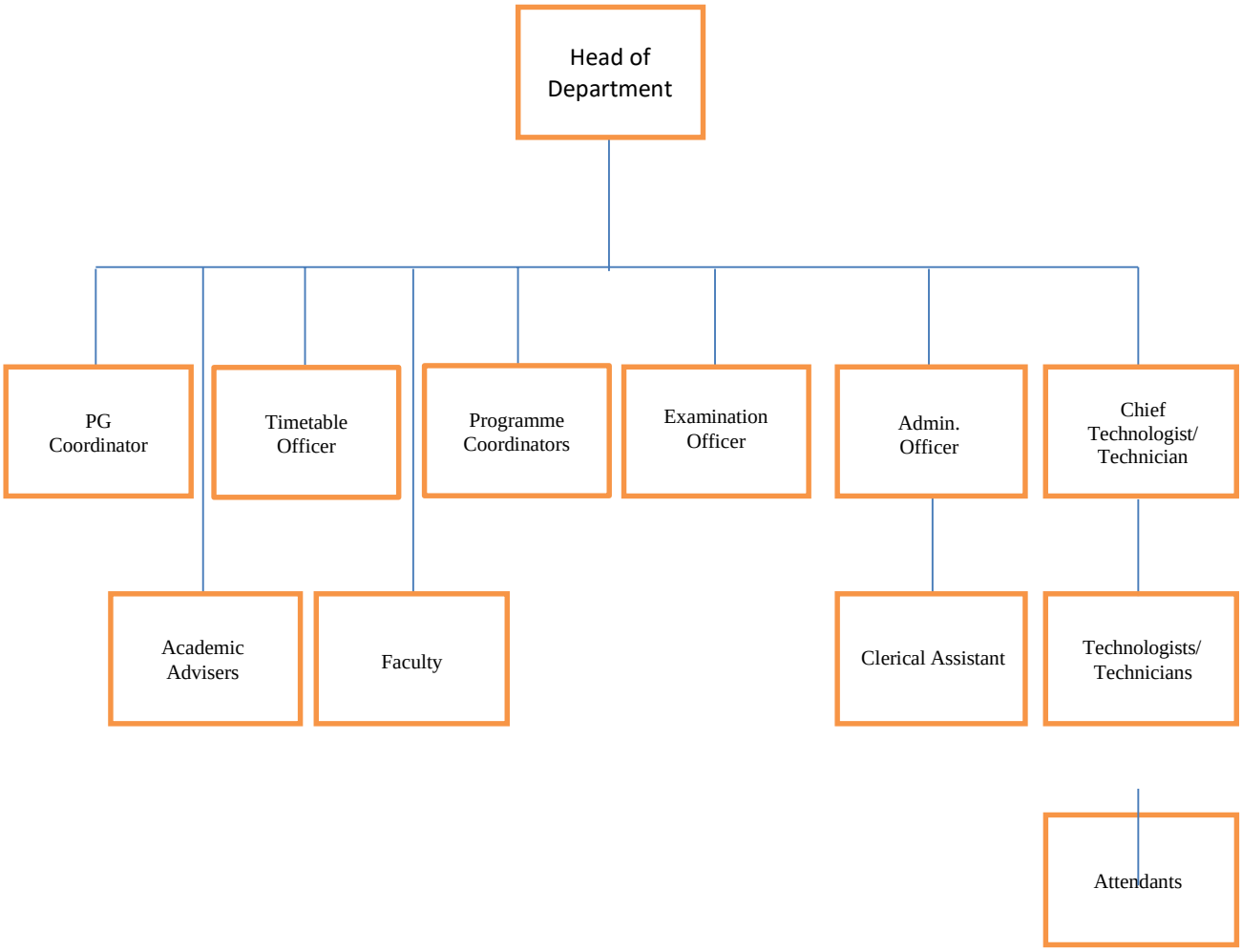
Closing of a Training Session at the Molecular Biology Lab, Covenant University, Ota

Pix after a Town and Gown Seminar Session at the Department of Biological Sciences

Students on excursion to IITA Ibadan

4.2.6 ADMINISTRATION AND CONTROL

Organisational Structure of the Department



List of Staff in the Biology Programme

Table 4.1 Academic staff list

S/N	NAME	QUALIFICATIONS	STATUS	AREAS OF SPECIALISATION
1.	Prof. O. O. Obembe	B.Sc, M.Sc, Ph.D	Professor	Plant Physiology and Biotechnology
2.	Prof. A. C. Omonhinmin	B.Sc, M.Sc, Ph.D	Professor	Molecular systematics, Plant Genetic Diversity and Conservation.
3.	Prof. A. B. Odaibo	B.Sc, M.Sc, Ph.D	Professor (Sabbatical)	Zoology
4.	Prof. S. U. Oranusi	B.Sc, M.Sc, Ph.D, FMLSC, MIPAN	Professor	Parasitology/Food Microbiology
5.	Prof. G. I. Olasehinde	B.Sc, M.Sc, Ph.D	Professor	Parasitology/Medical Microbiology
6.	Dr. O. I. Ayanda	B.Sc, M.Sc, Ph.D	Associate Professor	Environmental Biology and EcotToxicology
7.	Dr. Ogunsola E. Kayode	B.Sc, M.Sc, Ph.D	Senior Lecturer (Part-time)	Environmental Biology & Plant Genetics
8.	Dr. Babatunde Adewale	B.Sc, M.Sc, Ph.D	Senior Lecturer (Part-time)	Parasitology
9.	Dr. Tonjock Rosemary-Kinge	B.Sc, M.Sc, Ph.D	Senior Lecturer (International Visiting Scholar)	Botany
10.	Dr. Abdou Tenkouano	B.Sc, M.Sc, Ph.D	Senior Lecturer (International Visiting Scholar)	Botany
11.	Dr. Sankar Ramachandran	B.Sc, M.Sc, Ph.D	Senior Lecturer (International Visiting Scholar)	Biotechnology/Microbiology
12.	Dr. P. Isibor	B.Sc, M.Sc, Ph.D	Lecturer I	Hydrobiology, AquaticToxicology
13.	Dr. A. S. Ejoh	B.Sc, M.Sc, Ph.D	Lecturer I	Environmental Biology
14.	Dr. O. A. Bello	B.Sc, M.Sc, Ph.D	Lecturer II	Plant Physiology
15.	Dr. P. A. Akinduti	B.Sc, M.Sc, Ph.D	Lecturer I	Medical Microbiology
16.	Mr. O. Aworunse	B.Sc, M.Sc	Assistant Lecturer	Plant Biotechnology
17.	Mrs I.B. Ajiboye	B.Sc, M.Sc	Assistant Lecturer	Plant Genetic Diversity and Conservation
18.	Mr. O. Oyesola	B.Sc, M.Sc	Assistant Lecturer	Plant Pathology

TECHNICAL STAFF
Table 4.2 Technical staff list

S/N	NAME	QUALIFICATION	STATUS
1	Mr. O. S. Taiwo	B.Sc, HND,AISLT	Assistant Lead Technologist
2	Mrs. B. T. Adekeye	M.SC, HND,AISLT	Senior Technologist II
3	Mrs. O. A. Awotoye	HND, AISLT	Technologist I
4	Miss. A. D. Kuye	HND, AISLT	Technologist I
5	Mr. O.M. Ezekiel	GCE O'Level	Lab. Assistant II

ADMINISTRATIVE STAFF
Table 4.4 Administrative staff list

S/N	NAME	QUALIFICATION	STATUS	AREA OF SPECIALISATION
1.	Mr. S. T. Popoola	M.Sc; B.Sc	Administrative Officer	Administration

4.3.1 ADMISSION AND GRADUATION POLICY

4.3.1.1 ADMISSION POLICY

"To admit young, single, disciplined and vision-driven candidates, who will be ready to accept full responsibility for the revolution being entrusted to them."

4.3.1.2 ADMISSION REQUIREMENTS

a) Jamb Pre-Requisite

Candidates applying to Covenant University are required to sit for the University Matriculation Examination (UME) of the Joint Admissions and Matriculation Board (JAMB) and attain the prescribed cut-off marks. In addition to the above, the University conducts aptitude and character-screening exercises for all candidates seeking admission into the University.

b) General Requirements

The minimum entry requirements for admission into Covenant University are credit level passes in 5 subjects at the SSCE/ GCE O' Level/ NECO/ NABTEB or its equivalent obtained at not more than two sittings. The subjects passed must include English Language, Mathematics and one relevant Science subject, selected from the following group: Biology, Physics, Chemistry, Health/General Science, Food and Nutrition Science, and Agricultural Science,. Candidates are also to note that there are other requirements that may be specific to a College and/or a Programme.

4.3.2 GENERAL REGULATIONS FOR AWARD OF FIRST DEGREES

1. To be eligible for admission to a Bachelors Degree programme in one of the Colleges of the University, a candidate must have:
   (a) satisfied the general requirements for admission into the University;
   (b) satisfied the College or Departments‟ requirements for admission;
   (c) followed the approved course of study for the prescribed period;
   (d) passed the required examinations;
   (e) paid all the prescribed fees; and
   (f) complied with such other regulations and requirements as may be prescribed.

2. Before registering for a course, the student must meet the pre-requisites as prescribed for that course. Each student must complete the registration for each semester within the period prescribed for registration.

3. Approved courses of study and syllabuses of courses for the examinations under these regulations and the number of papers in each course are those approved by Senate. Approved courses shall also include such lectures, tutorials, seminars, laboratory classes, fieldwork, as prescribed by departmental regulations, and such written work as the Department concerned shall require.

4. A candidate for a first degree must pass the prescribed examinations in the General Studies Programme. Each student will be required to take and pass courses in Entrepreneurial Development Studies and Total Man Concept. He must, in addition, complete all compulsory courses as prescribed in his/her programme.

5. A student shall be registered as a full-time student and enrol in any one semester for a minimum of 15 and a maximum of 25 units.

6. A candidate shall not be deemed to have followed any approved programme of study unless the Head of Department concerned certifies that his attendance and performance have been satisfactory.

7. Student Workload

   (a) Workload is defined in terms of course units.

   (b) One unit represents one hour of lecture or one hour of tutorial, or 3 hours of practical work per week throughout a Semester of fifteen weeks.

   (c) All courses shall run for one semester.

8. A candidate whose work or progress is considered unsatisfactory may be required by Senate, on the recommendation of the appropriate College to be on probation or withdraw from the University. Failure in an examination is regarded as evidence of unsatisfactory progress.

The duration of courses of study for a first degree shall normally not be less than four academicyears. A student may be permitted to extend the period of study prescribed for a degree on condonable grounds as approved by Senate.

9. Candidate for examinations must register for these examinations at the prescribed times and in accordance with the conditions prescribed by the regulations for examinations.

4.3.3 GRADING SYSTEM

Class Test/Assignments	20 marks	
Mid-Semester Test	10 marks	30%
End of Semester Examination	70 marks	70%
		100%

Table 4.3: Grades and grade points

Interpretation of Grade	Points
A = 70 and above	5
B = 60 – 69	4
C = 50 – 59	3
D = 45 – 49	2
F = Below 45	0

4.3.4 GRADE POINT AND GRADE POINT AVERAGE

A Grade Point (GP) is the product of the Course Credit Unit (CU) and the Point Score (PS) in each course. {i.e. GP = CU x PS}. The sum of all Grade Points for the semester is the Total Grade Point (TGP). {i.e. TGP = ∑GP}. The Grade Point Average (GPA) is the TGP divided by the Total Credit Units (TCU). {i.e. GPA = TGP/TCU}. The following example illustrates how to calculate the GPA.

Example: A student registered for five courses and scored the marks shown in the Examination.

Table 3.2 Calculation of Grade Point Average

Course	Credit Unit (CU)	Score (%)	Grade	Point Score (PS)	Grade Point (GP)
BIO421	3	72	A	5.0	15
BIO424	2	57	C	3.0	6
BIO426	2	64	B	4.0	8
BIO427	2	78	A	5.0	10
GST221	2	60	B	4.0	8
TOTAL	11				47

TGP = 3 x 5 + 2 x 3 + 2 x 4 + 2 x 5 + 2 x 4 = 47

TCU = 3+ 2 + 2 + 2 + 2 = 11

GPA = TGP/TCU = 47/11 = 4.27

The highest GPA that can be earned is 5.0 and the lowest is 0 (zero)

The Cumulative Grade Point Average (CGPA) is the summation of the TGP for all semesters divided by the summation of TCU‟s for the said semesters. Like the GPA, the CGPA obtainable ranges from 0 to 5. The CGPA is calculated for all courses taken from the 1st semester (Alpha Semester) of the first year of entry (i.e. 100 levels) to the current semester.

The final award and class of the degree shall be based on the cumulative grade point average obtained by each candidate in all the prescribed courses and approved electives taken at the University. A candidate who has satisfactorily completed all requirements for the degree with an overall Grade Point Average of not less than 1.50 shall be awarded the Honours Degree.

DEGREE CLASSIFICATION

Classes of degree are to be awarded depending on the cumulative GPA obtained. The classes of degree that may be awarded are First Class Honours, Second Class Honours (Upper Division), Second Class Honours (Lower Division) and Third Class Honours.

Table 3.3 Degree Classification

CGPA	CLASS OF DEGREE
4.50 – 5.00	First Class
3.50 – 4.49	Second Class (Upper Division)
2.40 – 3.49	Second Class (Lower Division)
1.50 – 2.39	Third Class
Less than 1.5	Fail

4.3.5 ADMISSION TO DEGREES

After Senate has approved the report of the examiners, successful candidates shall be admitted to the Bachelors Degree at the Graduation Ceremony for the award of degrees. No Pass Degree is awarded in Covenant University.

4.3 REGULATIONS ON STUDENTS' CONDUCT

4.3.1 PENALTIES FOR STUDENTS MISCONDUCT

All disciplinary issues will be be appropriately addressed by administrative protocols and the Student Disciplinary Committee as may be deamed appropriate based on the laid down rules and regulations in the university handbooks and policies (refere to students' handbook chapter 7 and university policies).

4.3.2 GUIDELINES FOR CHAPEL SERVICE CONDUCTS:

4.4.2.1 Chapel Attendance Regulations

1. Chapel attendance is mandatory for all students. All students are expected to maintain decorum during Chapel services.
2. Students are expected to be on their seats at least fifteen minutes prior to the beginning of the service.
3. Provisions are made for the signing of attendance in the Chapel.
4. Excuses from Chapel Service require permission from the office of the Dean, Student Affairs. In addition, class trips, college/departmental-sponsored activities and emergency cases are excusable absences. Also, students with health challenges who are unable to attend any University general assembly are expected to report to the Hall staff and proceed to the University Health Centre for medical attention.
5. Dress code must be strictly observed.
6. No distraction of any kind shall be tolerated. Movements in and out of the Chapel and along the walkway during services are not allowed.
7. All students must obey and take instructions from Chapel officials.
8. Students must attend Chapel services with their Bibles and writing materials.

4.3.3 RESIDENCY CONDUCTS

The residence life of students is a communal life where a student's moral character and conduct can be moulded. The residency policy is to enhance peaceful coexistence amongst the students and facilitate good administration in the Halls of Residence.

4.4.3.1 **Guidelines for Peaceful Residence**

1. A student who accepts residence in the hall also accepts to abide by all the rules of residence.
2. There shall be a Great Silence (Magna Silencio) in the Halls of Residence from 12midnight to 5.00 am. During that period, students are expected to be in their rooms and not to engage in any activity that may disturb or distract other students.
3. The light in all rooms is expected to be put off from 12.30 am. However, students are allowed to use their reading lamps for their private study.
4. No student shall duplicate, loan, or transfer possession of any room key.
5. Pets and all kinds of animals are prohibited in the University.
6. Quarrelling and fighting are absolutely forbidden in the Hall, and in any other part of the campus.
7. No student should engage in commercial activities/solicitation without clearance from the Dean of Student Affairs.
8. Students are strictly warned from jumping or flying over the reception desk.

No person shall create a safety or health hazard within and around any Residential Hall. Examples of prohibited behaviour include opening outside doors, unlocking lounge windows, using windows or balconies to enter and exit the building, using unauthorized doors for entering or leaving the buildings, accumulating excessive garbage or filth, changing electrical wiring, throwing, pushing objects off windows or balconies, sitting or playing on the railings.

4.4.3 DRESS CODE

The University attaches great importance to modest and decent dressing. Dressing adds value to a person's personality, selfconfidence and self-worth. Indeed, "the way you dress is the way you are addressed." Dress code is one of the unique aspects of Covenant University's culture that students must imbibe to make their academic pursuits pleasurable. The dress code regulations subsist during the academic period, 8.00 am - 6.00 pm.

4.4.4 EXAMINATION MISCONDUCT

Students are admonished not to be involved in any form of examination misconduct as cheating of any kind during examinations is strictly prohibited. Any action by a student, which prejudices the integrity and sanctity of the University examinations, shall be considered to be examination misconduct, punishable by appropriate disciplinary action (refere to students' Handbook Chapter 7).

4.4.5 COUNSELLING SUPPORT

Any student who experiences any emotional or social discomfort should feel free to speak with the Chaplain, the Director of the Counselling Centre, Dean, Student Affairs, Hall Mentors, Hall Officers, or any other officer designated to provide spiritual and emotional counselling to students. Every student is expected to relate well with other students and other members of the University Community. Covenant University shall perform its role as 'in-loco-parentis' to students and shall assist students to develop spiritually, academically, emotionally, socially and physically during their studentship in the University. The Student Support Programme (SSP) also provides a rich anchor in this respect.

4.4 BIOLOGY PROGRAMME AT COVENANT UNIVERSITY

4.4.1 PROGRAMME: Biology
DEGREE AWARDED: B.Sc (Honours) Biology
DURATION: 4 Years (8 Semesters)

4.4.2 COURSE STRUCTURE

4.5.2.1 Admission Requirements

i) Applicants must have successfully completed the Senior Secondary Certificate Exams and passed five (5) subjects in the SSCE/GCE, O'Level / NECO/ NABTEB or its equivalent obtained **at not more than two sittings.** The five (5) credit passes must include Mathematics,

English Language, Biology, Chemistry and Physics. Candidates applying to Covenant University are required to sit for the Unified Matriculation Examination (UME) of the Joint Admissions and Matriculation Board (JAMB) and attain the prescribed cut-off marks. The UME Subjects are English Language, Biology, Chemistry and Physics.

ii) The candidate must also fulfil all other Admission Requirements as prescribed by the Senate of Covenant University. Candidates must meet the requirements of the Covenant University Scholastic Aptitude Screening (CUSAS) to qualify for admission. Candidates so admitted should commence their studies at the 100-level of the programme.

4.5.2.1 Graduation Requirements

To graduate with the Bachelor of Science degree programme in Biology, with two options **(Plant Biology & Biotechnology**) and **(Animal & Environmental Biology)**, students must have successfully completed a minimum of 161 credit units' distribution of which is shown below:

Table 46.1: SUMMARY OF GRADUATION BENCHMARK B.Sc. BIOLOGY

Level	Core Courses	University Courses	NUC General Courses	Elective Courses	SIWES	Total
100	31	4	10	-	-	**45**
200	31	4	6	4	-	**45**
300	14	2	2	4	6	**28**
400	27	4	-	12	-	**43**
Total	**103**	**14**	**18**	**20**	**6**	**161**

(a) Course content specifications/syllabus of all courses in the programme:

COURSE STRUCTURE

The courses to be offered by Biology students in their four years of study, that is 100 to 400 level, are presented in Tables 46.2-46.5, respectively

Table 2: 100 Level Biology Programme Courses by Semesters

100 LEVEL											
	ALPHA SEMESTER					OMEGA SEMESTER					
	Course Code	**Course Title**	**Status**	**Units**	**Pre-Requisite**	**Course Code**	**Course Title**	**Status**	**Units**	**Pre-Requisite**	**Total**
Core Courses	BIO111	General Biology I	C	3	-	BIO121	General Biology II	C	2	-	
	BIO117	General Biology Lab I	C	1	-	BIO122	General Biology III	C	2	-	
	CHM111	General Chemistry 1 (Physical Chemistry)	C	3	-	BIO123	Introductory Ecology	C	2	-	
	CHM119	General Chemistry Practical I	C	1	-	BIO127	General Biology Lab II	C	1	-	
	MAT111	Elementary Mathematics	C	3	-	CHM121	General Chemistry II (Organic	C	2		
	PHY111	General Physics I (Mechanics & Properties of Matter	C	2	-	CHM122	General Inorganic Chemistry	C	2	-	
	PHY119	General Physics Lab I	C	1	-	CHM129	General Chemistry Practical II	C	1	-	
	CSC111	Introduction to Computer Science	C	3	-	PHY121	General Physics III (Electricity &	C	2	-	
						CSC121	Introduction to Problem Solving	C	2	-	
		Sub-Total		**17**			**Sub-Total**		**16**		**3**
University Courses	EDS111	Entrepreneurial Development Studies I	C	1	-	EDS121	Entrepreneurial Development Studies II	C	1	EDS 111	
	TMC111	Total Man Concept I	C	1	-	TMC121	Total Man Concept II	C	1	TMC111	
	TMC112	Total Man Concept– Sports I	C	0	-	TMC122	Total Man Concept – Sports II	C	0	TMC112	
	CIT111	Microsoft office specialist on MS 2013: WORDS	C	0	-	CIT121	Microsoft Office Specialist on MS 2013 in Excel	c	0		
		Sub-Total		**2**			**Sub-Total**		**2**		**4**
NUC Courses	CST111	Computer Application and library Studies I	C	2	-	CST121	Computer Application and Library Studies II	C	2	CST111	
	GST111	Communication in English I	C	2	-	GST121	Communication in English II	C	2	GST111	
						GST122	Communication in French	C	2	-	
		Sub-Total		**4**			**Sub-Total**		**6**		**1**
		TOTAL		**23**			**TOTAL**		**24**		**4**

Table 3: 200 Level Biology Programme Courses by Semesters

	200 LEVEL										
	ALPHA SEMESTER					OMEGA SEMESTER					
	Course Code	Course Title	Status	Units	Pre-Requisite	Course Code	Course Title	Status	Units	Pre-Requisite	Total Units
Core Course	BIO211	Genetics I	C	2	BIO121	BIO221	Lower Invertebrates	C	2	BIO 111	
	BIO213	Biological Techniques	C	2	BIO111	BIO222	General Physiology I	C	2	-	
	BIO215	Introductory Developmental/Cell Biology	C	3		BIO225	Parasitology	C	3		
	BIO217	Introduction to Biotechnology	C	2		BIO226	Seedless Plants	C	2		
	MAT237	Statistics for Life and Physical Sciences	C	3		CHM221	Organic Chemistry II	C	2		
	BCH215	General Biochemistry I	C	3		BCH227	General Biochemistry II	C	3		
	CSC211	Computer Programming, I	C	3	CSC121						
		Sub – Total		**18**					**14**		**32**
Electives	**Note: Choose a minimum of 4 Units Electives**										
	MCB213	General Microbiology	E	3		BIO223	Chordates	E	2		
	CHM213	Analytical chemistry I	E	2		BIO224	Seed Plants	E	2		
						BIO227	Coelomate Invertebrates	E	2		
		Sub-Total		**2**					**2**		**4**
University Courses	EDS211	Entrepreneurial Dev. Studies III	C	1	EDS121	EDS221	Entrepreneurial Dev. Studies IV	C	1	EDS211	
	TMC211	Total Man Concept III	C	1	TMC121	TMC221	Total Man Concept IV	C	1	TMC211	
	TMC212	Total Man Concept– Sports	C	0	TMC122	TMC222	Total Man Concept – Sports	C	0	TMC212	
	CIT 212	Oracle Database Foundations	C	0		CIT221	Oracle Database SQL Fundamentals	C	0		
		Sub-Total		**2**			**Sub-Total**		**2**		**4**
NUC Courses	GST211	Logic, Philosophy and Human Existence	C	2	-	GST221	Nigerian People and Culture	C	2	-	
						GST222	Peace Studies and Conflict Resolution	C	2	-	
		Sub-Total		**2**			**Sub-Total**		**4**		**6**
		TOTAL		**24**			**TOTAL**		**22**		**46**

Table 4: 300 Level Biology Courses by Semesters

300 LEVEL												
	ALPHA SEMESTER					OMEGA SEMESTER					
	Course Code	Course Title	Status	Units	Pre-Requisite	Course Code	Course Title	Status	Units	Pre-Requisite	Total Units
Core Courses	BIO311	General Cytology and Tissue Culture	C	3	BIO111, 213						
	BIO313	General Physiology II	C	3	BIO222						
	BIO315	Genetics II	C	2	BIO211						
	BIO316	General Ecology	C	3							
	BIO317	Recombinant DNA Technology	C	3	BIO217						
	BIO319	Biostatistics	C	2							
		Sub-Total		**16**							**16**
Electives	Note: Choose a minimum of 4 units										
	Plant Biology and Biotechnology Option										
	BIO318	Molecular Genetics and Forensic Science	E	2	BIO211						
	BIO334	Plant Pathology	E	2							
	MCB316	Immunology	E	3							
	Animal and Environmental Biology Option										
	BIO333	Principles of Wildlife & Management	E	2							
	BIO336	Ecotoxicology	E	2							
	MCB316	Immunology	E	3							
		Sub-Total		**4**							**4**
SIWES						BIO329	SIWES (Industrial Training)	R	6		**6**
University Courses	EDS311	Entrepreneurial Development Studies V	C	1	EDS221						
	TMC311	Total Man Concept V	C	1	TMC221						
	TMC312	Total Man Concept–Sports V	C	0	TMC222						
	CIT310	Cyber Security Specialist-Application security	C	0							
		Sub-Total		**2**							**2**
N U rses ( )	GST311	History and Philosophy of Science	C	2							
		Sub-Total		**2**							**2**
0		**TOTAL**		**24**			**TOTAL**		**6**		**30**

Table 5: 400 Level Biology Programme Courses by Semesters

	ALPHA SEMESTER					OMEGA SEMESTER					
	Course Code	**Course Title**	**Status**	**Units**	**Pre-Requisite**	**Course Code**	**Course Title**	**Status**	**Units**	**Pre-Requisite**	**Total Units**
Core Courses	BIO411	Population Genetics	C	3		BIO428	Systematic Biology	C	3		
	BIO412	Seminar Review	C	2		BIO429	Research Project	C	6		
	BIO416	Bioinformatics and Functional Genomics	C	2							
	BIO417	Field Course	C	2							
	BIO418	Soil Ecology	C	3							
	BIO419	Hydrobiology	C	3							
	Plant Biology & Biotechnology Option										
						BIO421	Cytogenetics of Plants	C	3	BIO111, BIO211	
	Animal & Environmental Biology Option										
						BIO423	Applied Entomology	C	3	BIO221	
		Sub-Total		**15**					**15**		**30**
Electives	**NOTE: Choose Minimum of (6) Units Electives in Alpha**					**Choose minimum of six (6) units Electives in Omega Semester**					
	Plant Biology & Biotechnology Option										
	BIO414	Principles of Plant and	E	2		BIO422	Marine Biology	E	2		
	BIO415	Bioresources Management	E	2		BIO424	Economic Botany	E	2		
	BIO431	Developmental Biology	E	2		BIO426	Environmental Biotechnology	E	2		
	MCB414	Virology II	E	3		BIO427	Biotechnology in sustainable Energy	E	2		
						MCB421	Industrial Microbiology	E	3		
	Animal & Environmental Biology										
	BIO414	Principles of Plant and Animal Breeding	E	2		BIO422	Marine Biology	E	2		
	BIO415	Bioresources Management	E	2		BIO426	Environmental Biotechnology	E	2		
	BIO431	Developmental Biology	E	2		BIO440	Environmental Assessment and Monitoring	E	2		
						BIO441	Environmental Pollution and Management	E	2		
	MCB414	Virology II	E	3		MCB421	Industrial Microbiology	E	3		
		Sub-Total		**6**					**6**		**12**
University Courses	EDS411	Entrepreneurial Dev. Studies VII	C	1	EDS311	EDS421	Entrepreneurial Dev. Studies VIII	C	1	EDS411	
	TMC411	Total Man Concept VII	C	1	TMC311	TMC421	Total Man Concept VIII	C	1	TMC411	
	TMC412	Total Man Concept–Sports VII	C	0	TMC312	TMC422	Total Man Concept –Sports VIII	C	0	TMC412	
		Sub-Total		**2**					**2**		**4**
		TOTAL		**23**			**TOTAL**		**22**		**45**

100 LEVEL ALPHA SEMESTER

BIO 111 GENERAL BIOLOGY I: (3 Units) (LH 30: TH 30)

Cell structure and organization, functions of cellular organelles, diversity, characteristics and classification of living things, general reproduction, interrelationship of organisms; heredity and evolution, elements of ecology and types of habitats.

BIO 117 GENERAL BIOLOGY LAB I (1Unit) (PH: 45)

Tools in cell biology studies: Light microscopy, phase contrast Microscopy, Scanning and Transmission Electron Microscopy, Fluorescence Microscopy, Polarization Microscopy, Staining techniques. Tools for Ecological studies/Survey of habitats.

CHM111 - General Physical Chemistry (3 Units) (LH 30: TH 30)

Historical development of the atom: definition of atoms, Dalton's atomic theory, relative atomic masses. Fundamental particles of the atom and atomic structure. Modern electronic theory of atoms; electronic configuration of the elements. Periodicity of the elements. Radioactivity: Stoichiometry: mole concept, chemical formulas, equations and calculations. States of matter: gas – empirical gas laws, Ideal Gas Equation of State, qualitative treatment of kinetic theory of gases, real gases and deviations from ideal gas laws; liquid – macroscopic properties of liquids, evaporation, vapour pressure and its variation with temperature, boiling point, heat of vaporization, Clausius-Clapeyron equation, freezing point, melting point and phase diagrams of simple systems; solids – types of solids and their properties, ionic solids and lattice energy, crystalline solids. Chemical Energetic: definition of some thermodynamic terms, heat, work, internal energy, enthalpy, pressure-volume work. Relationship between internal energy and enthalpy. First law of thermodynamics and its applications. Chemical Kinetics: rate of reaction, factors affecting reaction, order of reaction and how to determine it for zero order and first order reaction, rate of equation and temperature, reaction mechanisms and rate equation for simple reactions. Chemical Equilibrium: reversible reactions and chemical equilibrium, equilibrium constant, factors affecting equilibrium. Le Chatelier's Principle. Effect of temperature on equilibrium constant. Relationship between equilibrium constant and standard Gibbs free energy, ΔG^{o}. Ionic equilibrium. Electrochemistry: types of conductors, classification of compounds, electrolysis, Faraday's laws of electrolysis. Application of electrolysis. Introduction to electrochemical cells.

CHM119: General Chemistry Practical I (1 Unit) PH: 45

Practice in weighing and measurement of volume, preparations of standard solutions. Tritimetry: acid-base, oxidation-reduction, precipitation and complex metric titrations; gravimetric analysis.

PHY111 - Mechanics and Properties of Matter (2 Units) (LH 15: TH 30)

Physical quantities; Units and dimensions. Scalars and vectors. Kinematics. Dynamics; Newton's laws of motion; particles; rigid bodies; simple harmonic motion. Friction. Work, energy and power. Centre of mass. Newton's law of universal gravitation; Kepler's laws. Pressure in fluids. Intermolecular forces. Surface tension. Hook's law, Young's modulus.

PHY119 - Practical Physics I (1 Unit) (PH:45)

Simple experiments illustrating the topics covered in PHY111.

MAT111 - Mathematics I: Algebra (3 Units) (LH 30: TH 30)

Algebra of Sets; special sets; theory of indices, law of logarithms, indical equations, surdic equations. Polynomials, the remainder and factor theorems; polynomial equations and inequalities-especially linear, quadratic and cubic. Solving quadratic equations and cubic equations with an integral root. Domain and zeroes of rational functions. Partial fractions. Permutations and combinations. The binomial theorem for any index and applications. Sequences and series of real numbers (including AP and GP). Algebra of complex numbers. Introduction to m x n matrices; elementary operations on matrices and applications to solution of linear equations. Elementary properties of determinants of at most 3 x 3 matrices; The Rule of Sarrus.

CSC111: Introduction to Computer Science (3 Units) LH:30, TH: 30

Definition of computer science, history of computer science and their generations, computer hardware, functional components, Modern I/O units; Software: Operating Systems, Application Packages Program: Development; Flowchats and algorithms; Program Object

EDS111: Entrepreneurial Development Studies I (1 Unit) LH: 15

Approach: Resource persons will be drawn from the academics and industries as a way of bridging the gap between town and gown. Students are exposed to actual industrial environment.

Objective: This is a foundation course that is aimed at imparting entrepreneurial orientation and skill to the students. Topics covered include the following: some basic concepts and definitions of entrepreneurship; entrepreneurial equation, historical background of entrepreneurship; definition of

entrepreneurship and entrepreneur; characteristics of entrepreneurship. Qualities of successful entrepreneur, entrepreneurship and economic growth, environment of entrepreneur development, what entrepreneurship involves, elements of entrepreneurship, components of entrepreneurial ventures, fundamental changes that stimulate entrepreneurship, entrepreneurial process, benefits of being an entrepreneur, contributions of memorable early entrepreneurs, time management. Students are also expected to submit a term paper on entrepreneurship from some selected areas of Small and Medium Scale Enterprise (SMEs) operations.

TMC111: Total Man Concept I (1 Unit) LH: 15

This course provides explanatory constructs for TMC as a course of study in understanding life and development of a total man. It provides a basic introduction to the fundamental aspects of the Total Man Concept, exploring life from the biblical, philosophical and experiential perspectives. It also sets out to explore the purpose and pursuit of life with a view to identifying the foundational anchors of life, the place of visions, dreams, goals and the foundational principles for making the most of life.

TMC112: Total Man Concept - Sports (0 Unit) PH: 15

Jogging: This help in many ways, our focus here on the benefit of jogging is forphysical fitness that reduced risk of Osteoporosis.

Osteoporosis is the condition when the bones become increasingly porous and brittle. It can result to bone fractures and deformities.

Aerobics exercise: This is said to be any activity that can get the heart rate going and keeps it at a sustained rate over a period of time. Eg twenty minutes. Anaerobic activity helps to increase cardio respiratory fitness which is one of the fine essential components of physical fitness. Being aerobically fit you can feel it as you go about.

Swimming (safety measures): the importance of swimming lessons for water safety cannot be overstated. Everyone and especially young people should be able to swim. Swimming has a lot of benefits which include health benefit, psychological benefit, most importantly safety benefit which involved discipline that is adhering to the rules governing swimming and learning of basic skills

CIT111: Microsoft Office Specialist on Microsoft Office 2013 in WORD LH: 15

Create and manage documents, Format text, paragraphs, and sections, Create tables and lists, Apply references, Insert and format object.

GST111: Communication in English I (2 Units) LH: 15, TH: 30

This course focuses on developing effective study skills, the library and other information sources, communication skills, listening and speaking skills.

CST111: Use of Library, Study Skills and Information Communication Technology I (2 Units) LH: 15, TH: 30

Library and Society: history of the development of libraries, the roles of libraries in various communities, cultural and educational revival, the role of libraries in adult literacy programmes, user studies, planning library services in developing countries; Library Resources and their Role in Education: information bearing media: books, serials, cartographic materials, CD ROMs, sound recordings, motion pictures, graphics, machine readable data, use of library materials by teachers and students; References Sources and Services: introduction to reference and bibliography, definition and concept of reference services, characteristics and uses of different types of reference materials, selection and evaluation of reference works; Conservation of Library Materials: history of paper and printing, cause of damage to paper with emphasis on tropical areas, processes of books repair of restoration, preservation and repair of non-book materials, library crimes and security; Using Covenant University Library: identification of PC parts and peripheral devices, functions, applications, and how to use them, safety precautions, procedure for booting a PC; Filing System: directory, sub-directory, file path, and how to locate them; Word Processing: principle of operation, application, demonstration and practical hand-on exercise in word processing using a popular word processor package; and Internet: services available, principle of operation, application, demonstration and hand-on practical exercise on e-mails and www using popular browsers.

OMEGA SEMESTER

BIO 121 GENERAL BIOLOGY II: (2 Units) LH :15, TH:30)

A generalized survey of the plant kingdom mainly on study of similarities and differences in the external features, the ecological adaptation of these forms. Plant Diversity: forms and functions.

BIO 122 GENERAL BIOLOGY III (2 Units) (LH :15, TH: 30)

A generalized survey of the animal kingdom mainly on the study of similarities and differences in the external features, the ecological adaptation of these forms. Animal Diversity: forms and functions.

BIO 123 INTRODUCTORY ECOLOGY (2 Units) (LH 15: TH 30)

Definitions and types of ecology, Basic units of ecology (population, community, and ecosystems). Biotic and Abiotic factors controlling distributions of animals in the ecosystem, succession, and climax. Ecologicalinteractions. Man, and Environment.

BIO 127 GENERAL BIOLOGY LAB II (1 Unit): PH45

Practical sessions on Plant Diversity: forms and functions – representative organisms of plant divisions. Diagnostic features of the representative groups of each animal phylum.

CHM121 - General Organic Chemistry (2 Units) (LH 30, TH 30)

Introduction to and importance of organic chemistry. Qualitative analysis of organic compounds. Isolation and purification of organic compounds. Quantitative analysis of organic compounds. Determination of structure of organic compounds; empirical, molecular, and structural formulas. Hybridization; formation of sp^3, sp^2, sp orbital in carbon. Homologous series and functional groups. Isomerism-structural and stereoisomerism. Aliphatic hydrocarbon chemistry: alkenes, alkenes, alkynes-nomenclature (IUPAC), physical properties, preparation, and chemical reactions with simple mechanism where applicable.

CHM122 - General Inorganic Chemistry (2 Units) (LH 15: TH 30)

Chemical bonding and structure: ionic, covalent, coordinate covalent (dative), metallic, hydrogen bonding. General properties of compounds formed by the different types of bonding. Influence of bonding on size, shape and structure. Main Group Chemistry (Groups IA – VIIIA): trends in the properties of elements (structure, ionization energies, physical and chemical properties). Properties of selected types of compounds.

CHM129 - General Chemistry Practical II (1 Unit) PH: 45

Qualitative analysis for common captions and anions. Identification of organic functional group: Hydroxyl, carboxyl, carboxylic, amino groups, carbohydrate, protein, etc.

PHY121 - Electricity and Magnetism I (3 Units) LH:30, TH:30

Coulomb's law. Capacitors. Ohm's law; conductivity, Kirchhoff's laws. Electrical energy, DC bridges; Wheatstone; potentiometer. Magnetic effect of current; electromagnetic induction; moving coil galvanometers; multi-meters. DC and AC motors; generators. Power in AC circuits. Rectification.

CSC121 - Introduction to Problem Solving (2 Units) LH: 15 TH:30

Problem solving strategies, Roles of algorithm in problem solving process, implementation strategies, concepts, and properties of algorithm. Using C-language.

EDS121: Entrepreneurial Development Studies I (1 Unit) LH: 15

Prerequisite: EDS111

Topics covered include the following: generating entrepreneurial ideas and translating same with action, the source, and approaches to the study of entrepreneurship, constraints of launching business, youths and money management, investment, introduction to capital market, classification of entrepreneurs, economic importance of entrepreneurship, entrepreneurial windows, factors that influence entrepreneurship. The practice of entrepreneurship productivity, salaried employment Vs entrepreneurship, introduction to marketing management, forms of business organizations, their advantages, and disadvantages. Introduction to International Trade, students are also expected to submit a term paper on entrepreneurship from some selected areas of Small and Medium Scale Enterprises (SMEs) operations.

TMC121: Introduction to the Total Man Concept II (1 Unit) LH: 15

Prerequisite: TMC111

This course focuses on the exploration of self as it relates to self-discovery and the context of the changing life course and stages. It attempts to help students have some understanding of who they are in relation to God and the context of human systems. The spiritual, physical, psychological, cultural, and ecological dimensions of self and the development of positive self-image, self-esteem and self-actualization parameters are also explored.

TMC122: Total Man Concept - Sports (0 Unit) PH: 15

Prerequisite: TMC112

Jogging: This help in many ways, our focus here on the benefit of jogging is for physical fitness that reduced risk of Osteoporosis. Osteoporosis is the condition when the bones become increasingly porous and brittle. It can result to bone fractures and deformities.

Aerobics exercise: This is said to be any activity that can get the heart rate going and keeps it at a sustained rate over a period of time e.g. twenty minutes. An aerobic activity helps to increase cardiorespiratory fitness which is one of the fine essential components of physical fitness.

Being aerobically fit you can feel it as you go about.

Athletic (track & short quarter mile races): Institutional athletics programme represent a multi financial industry and are generally linked to school branding and reputation. Athletic programme drive enrolment and heightens institutional profile, and often resulting in financial windfall for those whom their students engaged in.

CIT121: Microsoft Office Specialist on Microsoft Office 2013 in EXCEL LH: 15,

Create and manage worksheets and workbooks, Create cells and ranges, Create tables, Apply formulas and functions, Create charts and objects.

CST121: Use of Library, Study Skills and Information Communication Technology II (2 Units)

LH: 15, TH: 30

Prerequisite: CST111

Audio-visual Resources: variety and forms, selection organization and uses, operation and care of both hard and software, in-house production of audio visual resources, this demands a lot of cooperation between library staff and lecturers; Documentation: definition, genesis, basic function, theory and techniques of analysing, storing and retrieving information through manual and mechanical applications, abstraction, indexing principles and methods; Serials Librarianship: types of serials, important of serials, selection, organization and uses, storage of serials, print and microform, ISSN, users access through abstract and indexes; Library Automation: computers literacy, different types of computers, programming, designs, values of computers in library, OPAC, online database, internet, search engines, digitization, virtual library, etc; Overcoming Library Abuse: spreadsheet, principle of operation, application, demonstration and practical hand-on exercises in spreadsheet using a popular spreadsheet package; Database Management: principle of operation, application, demonstration and practical hand-on exercise in using a popular rational database management package; and Report Presentation: software package, principle of operation, application, demonstration and practical hand-on exercise in using a popular report presentation package such as power point package, mini-project to test proficiency in the use of software packages,

GST121: Communication in English II (2 Units) LH: 15, TH: 30

Prerequisite: GST111

This course focuses on introducing basic aspects of English grammar, developing effective reading and writing skills across disciplines, style in communication, revision and self-editing strategies, skills for eliciting information from simple literary text, survey of the Nigerian and African literary tradition.

GST122: Communication in French (2 Units) LH: 15, TH: 30

Basic grammatical structure and relevant items of vocabulary (lexical items) of French Language; essentials of French Language, pronunciation and recognition of French sounds, greeting and introducing self; meeting people and introducing them, describing people, professions and nationalities, describing self, family, and school, telling age, days of the week and month of the year, describing places, countries and cities/towns; making request, making travel arrangements, departure and arrival at destination, ordering a meal in restaurant, shopping for clothes and other items, banking transaction of visitor tourists.

200 LEVEL ALPHA SEMESTER

BIO 211 GENETICS I: (2 Units) (LH: 15, TH: 30)

Prerequisite: BIO 111, BIO 121

Basic concepts in genetics. Principles of inheritance, quantitative inheritance, heritable and non-heritable characteristics, probability, and tests of goodness of fit, structure and behavior of chromosomes, variations in genome structure. Current concepts of evolution, genetic variation, and introduction to population genetics. Evolution and speciation. Current concepts in evolution. Geological periods and epochs. Genetic variation and speciation. Evolution of selected organisms.

BIO 213 BIOLOGICAL TECHNIQUES: (2 Units) (LH: 15, TH:30)

Prerequisite: BIO 111

Preparation of microscope slides, biological drawings, microtomy, colorimetry, photometry, cytological techniques, chromatography, collection, and preservation of biological specimens. Herbarium Techniques, experimental design Basic techniques on Cell biology, Genetics, Biotechnology, and Microscopy: Preparation of microscope slides (Fixation, Embedding, Sectioning, Staining, and Preservation); cell types, cell counting. Cell division analysis (mitosis and meiosis); blood smear analysis; blood grouping. Photometry; Colorimetry; Chromatography; Conductometry. Chromosome squash preparation; DNA Isolation and Visualization; Amplification using PCR; Detection of nitrogenous waste; Estimation of Oxygen and Carbon dioxide in water body; Salivary amylase activity in relation to pH, Plant water relation; Photosynthesis, Sterilization techniques, Wet and Dry heating techniques.

BIO 215 INTRODUCTORY DEVELOPMENTAL/CELL BIOLOGY (3 Units) (LH: 30, TH: 30)

History and present trends in cell biology. Reproduction, cell division, cell differentiation and growth of cells. A brief study of the molecular basis of cell structure and development. Organelles. Proteins and nucleic acids.

BIO 217 INTRODUCTION TO BIOTECHNOLOGY (2 Units) LH: 15, TH: 30

Basic concepts of biotechnology; history and evolution of biotechnology (Historical developments, Applications and Implications of molecular biology including ethical and social controversies, the inter- disciplinary nature of biotechnology. Introduction to the Principles and techniques in biotechnology. Applications of biotechnology in medicine, food/agriculture, industries, and environment. Genetic Modification. The Biotechnology of enzymes and biocatalysis. Biotechnology of microbes.

CHM 213 Analytical Chemistry I: (2 Units) (LH: 15, TH: 30)

Pre-requisite -CHM 101 and 102

Theory of Errors; and statistical treatment of data: Theory of sampling. Chemical methods of analysis including volumetric, gravimetric, and physiochemical methods, Optical methods of analysis; separation methods.

CSC 211: COMPUTER PROGRAMMING I (3 Units) (LH: 30, TH: 30) Introduction to problem solving methods and algorithm development, designing, coding, debugging and documenting programmes using techniques of a good programming language style, programming language and programming algorithm development. A widely used programming language should be used in teaching the above. E.g., FORTRAN 92

BCH215 - GENERAL PRACTICAL BIOCHEMISTRY 1 (3 UNIT) PH: 45

Introduction to Biochemistry laboratory, Preparation of solutions and serial dilutions, History, and evolution of Biochemistry; Techniques and advances in the field of Biochemistry; Cells; Origin of building block molecules, hierarchy of molecular organization, structures, and functions of major cell components; Prokaryotic versus eukaryotic cells; Metabolism and Enzyme activity; Energy transformation in living cells;

Transmission and expression of genetic information. Career prospects and relevance of Biochemistry in national development.

Biomolecules - the Molecules of life; Classes of biomolecules; Definition, function, classification; Chemistry and properties of amino acids, peptides, proteins, and their derivatives; methods of isolation and identification. Primary, secondary, tertiary, and quaternary structure of proteins. Determination and biochemical application of structures. Classes of enzymes, vitamins, and Coenzymes. Chemistry, structure, and functions of nucleic acids. Nomenclature of nucleosides and nucleotides. Hydrolysis of nucleic acids. standardization of acids and bases, Preparation of buffers; acetate buffer, pH measurement using pH meter and indicators, Effect of acid, base and water on buffers, General qualitative tests for proteins and amino acids, General qualitative tests for nucleotide bases.

MCB 213- GENERAL MICROBIOLOGY (3 UNITS) LH: 30, TH: 30

General characteristics of major groups of microorganisms (viruses, bacteria, fungi, protozoa). Cell structures, Gross and fine structures of the major groups of microorganisms, Growth, motility, Nutrition, Protein synthesis, Pathogenesis, Antibiotics Nutrition and biochemical activities of microorganisms. Antigens and antibodies. Identification and economic importance of selected microbial groups. Microbial variation and heredity,

MAT 237 STATISTICS FOR LIFE AND PHYSICAL SCIENCES (3 Units) LH: 30, TH: 30

Scope for statistical method in Biology and Agriculture. Measures of location, partition and dispersion. Elements of probability. Probability distributions: binomial, Poison, geometric, Hypergeometric, negative binomial normal. Estimation (point and Interval) and tests of hypotheses concerning population means, proportions and variances. Regression and correlation. Non–parametric tests. Contingency table analysis. Introduction to design of experiments. Analysis of variance.

EDS211: Entrepreneurial Development Studies III (1 Unit) LH: 15

Prerequisite: EDS121

Objective: This course is the continuation of EDS 1. The course is aimed at exposing students to the opportunities in Entrepreneurship and the basic characteristics required for successful performance as entrepreneurs using some related biographical studies of entrepreneurs and management giants as

case studies. Topics covered include the following: Relevance of Entrepreneurial and SMEs to the Nations and Societies and Individuals, More on biographical studies of business thinkers, Entrepreneurs and Management Giants, Introduction to International Entrepreneurship, Entrepreneurship and globalization, accelerated industrialization through active promotion and development of SMEs, SMEs: Definitions, Advantages and Disadvantages, Management Challenges of SMEs. Managing the Business Growth; students are also expected to submit a term paper on Entrepreneurship from some selected areas of SMEs (Small and Medium Scale Enterprise) activities, operations etc.

TMC211: Total Man Concept III (1 Unit) LH: 15

Prerequisite: TMC121

The focus of this course is on the identification of building blocks of self-development in the context of personal visions, mission, and personal capacity building. Major self-motivational blocks, the power and place of focus, the place of the human thought process and how to enhance thinking and reasoning for creativity

TMC212: Total Man Concept - Sports (0 Unit) PH: 15

Prerequisite: TMC122

Jogging: This help in many ways, our focus here on the benefit of jogging is for physical fitness that reduced risk of Osteoporosis. Osteoporosis is the condition when the bones become increasingly porous and brittle. It can result to bone fractures and deformities.

Flexibility Exercise: Flexibility can be said to be the freedom and ease of motion performed within an individual normal anatomical range.

To improve one's flexibility range at a joint or muscles persons should engage in exercises that involves, flexion, adduction, extension and circumduction at the various joints.

Athletics (Field Events): Institutional athletics programme represent a multi financial industry and are generally linked to school branding and reputation. Athletic programme drive enrolment and heightens institutional profile, and often resulting in financial windfall for those whom their students engaged in.

CIT211: Java Foundations Certified Junior Associate LH: 15

What Is Java? Java Basics, Basic Java Elements, Working with Java Data Types, Working with Java Operator, Working with the String Class, Working with the Random and Math Classes, Using Decision Statements. Using Looping Statements, Debugging and Exception Handling, Arrays and Array Lists, Classes and Constructors, Java Methods.

GST211: Introduction to Philosophy and Logic (2 Units)LH: 15, TH: 30

The aim of this course is to expose students to the meaning of philosophy and a brief survey of its branches. While discussing its major branches, emphasis will be on Logic. The topics to be taught in this respect will include Symbolic logic, Quantificational theory and Logical rules. Other sub-topics will include arguments and evidence, fallacies, statements and sentences, laws of thought, rules of inference and deduction and analogical reasoning. The course will also provide valuable insights into the origin and content of traditional logic.

OMEGA SEMESTER

BIO 221 LOWER INVERTEBRATES: 3 Units (LH: 30, TH: 30)

The systematic, inter-relationship and basic organization of the invertebrates.

BIO 222 GENERAL PHYSIOLOGY I: (2 Units) (LH: 15, TH:30)

Physical and chemical processes in basic plant physiology. Basic elements of respiration, photosynthesis, transportation, or circulation. Reproduction, germination, growth hormones and enzymology. Plant water relation, growth, and growth regulation. Physiological aspect of crop Yield

BIO 223 CHORDATES 2 Units (LH: 15, TH:30)

The systematic inter-relations and basic Organization of the vertebrates. The Biology of Balanoglossus, Ciona, Branchiostoma, Petromyzon, Scolidon, Tilapia, Bufo, Agama, Colubia and Rattus to illustrate the classification, organization evolutionary trends and diversity of chordates.

BIO 224 SEED PLANTS 2 Units LH: 15, TH:30

Morphology and reproduction of seed plants. Introduction to Spermatophytes, Origin and Evolution of Seed Plant, Biology of Seed Plants, Gymnosperms I, Gymnosperms II, Angiosperms I, Angiosperms II, Angiosperms III, Morphology and Anatomy of Seed Plants, Vegetative Structure of Seed Plants- Stem, Vegetative Structure of Seed Plants- Leaf, Vegetative Structure of Seed Plants- Root, Vascular Elements of Seed Plants, Vascular Tissues: Xylem, Vascular Tissues: Phloem, Vascular cambium and Cork cambium

BIO 225 PARASITOLOGY (3 Units) LH: 30, TH: 30

Classification, adaptation morphology, anatomy, Life cycle and other features of interest in the protozoans, Platyhelminthes, nematodes, and parasitic arthropods; drawing particular attention to the various adaptations exhibited by selected members of the group. Facultative and obligate parasitism, ecto and endo parasitism. Parasites of medical and veterinary importance. Laboratory methods in parasitology.

BIO 226 SEEDLESS PLANTS (2 Units) **LH: 15, TH: 30**

Morphology and reproduction of algae, bryophytes and Pteridophytes including fossils. Introduction to Seedless plants, Classification of Seedless plants Classification of Algae,Morphology and Biology of Algae, Algae I, Algae II, Algae III, Algae IV, Lichens,Morphology and life cycle of Bryophytes, Bryophytes I, Bryophytes II, Bryophytes III,Morphology and life cycle of Pteridophytes, Pteridophytes I, Pteridophytes II, Pteridophytes III.

BIO 227 COELOMATES INVERTEBRATES (2 Units) LH: 30, TH: 30

The systematic, inter-relationship and basic organization of the coelomate invertebrates

BCH227 - GENERAL BIOCHEMISTRY II (3 UNITS) LH: 30, TH: 30

Definition, functions, classes, Structure, and chemistry of carbohydrates; reactions of monosaccharides and their derivatives, disaccharides and oligosaccharides, storage, and structural polysaccharides; complex carbohydrates. Classification, Functions, Chemistry, and structure of lipids; saturated, unsaturated, and essential fatty acids, storage and membrane lipids, Blood lipids and lipoproteins. Industrial and clinical application of glycolipids, leucotrienes, prostaglandins and thromboxanes. Lipid micelles, monolayers, and bilayers. Structures, functions and 19 compositions of biological membranes; plasma membrane and other major cell components.

CHM221 - Basic Organic Chemistry (2 Units) LH: 15, TH: 30

Factors affecting structure and physical properties of organic compounds; factors affecting availability of electrons. Stereochemistry, energy of activation and free radical substitution reactions in alkanes. Electrophilic and necleophilic substitution reactions. Aromaticity. Basic organic reactions, e.g. addition, free radical, elimination and condensation reactions etc. Some named organic reactions.

EDS221: Entrepreneurial Development Studies IV (1 Unit) LH: 15

Prerequisite: EDS211

Topics covered include the following: More on biographical studies of business thinkers, Entrepreneurs and Management Giants in Nigeria, Africa and Europe. Theoretical Framework of Entrepreneurship, Feasibility studies, Marketing Management in Entrepreneurship, Impact of Modern Technologies on Entrepreneurial Ventures in Developing Countries. The SMEs: Challenges and Prospects, Financing of SMEs in Nigeria. Planning, SMEs and Capital Markets; Term paper on Entrepreneurship from some selected areas of SMEs (Small and Medium Scale Enterprise) operations.

TMC221: Total Man Concept IV – 1 Unit LH: 15

Prerequisite: TMC211

Understanding success, personal profile building, and biographical analysis of some success giants forms the emphasis of this course. The role of wisdom in the context of success is explored along the lines of understanding, building, and communicating wisdom. In addition, the place of self-identity building is explored alongside with a focus on identifying personal measures and inches of self-worth and self-appreciation in the context of success.

TMC222: Total Man Concept - Sports (0 Unit) PH: 15

Prerequisite: TMC212

Jogging: This help in many ways, our focus here on the benefit of jogging is for physical fitness that reduced risk of Osteoporosis. Osteoporosis is the condition when the bones become increasingly porous and brittle. It can result to bone fractures and deformities.

Games (Table – tennis): This centre on the mastery of basic skills, game situation as well as rules and regulation governing the various sports that will be attempted.

Focuses are also being on appreciation of various sports and the spirit of sportsmanship that is ‘win or loss’ taking it in good fate.

Athletic (Field Events): Institutional athletics programme represent a multi financial industry and are generally linked to school branding and reputation. Athletic programme drive enrolment and heightens institutional profile, and often resulting in financial windfall for those whom their students engaged in.

CIT221: Oracle Database: SQL Fundamentals LH: 15

Oracle and Structured Query Language (SQL), Restricting and Sorting Data, Using Single-Row Functions to Customize Output, Using Conversion Functions and Conditional Expressions, Reporting Aggregated Data Using the Group Functions, Displaying Data from Multiple Tables, Using Subqueries to Solve Queries, Using the Set Operators, Manipulating Data, Using DDL Statements to Create and Manage Tables, Managing Objects with Data Dictionary Views, Controlling User Access, Managing Schema Objects, Manipulating Large Data Sets.

GST221: Nigerian People and Culture (2 Units) LH: 15, TH: 30

The concept of culture; study of Nigerian history, culture and arts in pre-colonial times; social beliefs and the Nigerian perception of his world; culture areas of Nigeria and their characteristics; evolution of Nigeria as political unit; indigene/settler phenomenon; concepts of trade, economic self-reliance and social justice; individual and national development, norms and values; negative attitudes and conducts (cultism and related vices); re-orientation of moral and national values as well as moral obligation of citizens; environmental problems.

GST222: Peace Studies and Conflicts Resolution (2 Units) LH: 15, TH: 30

The concept of conflict; definitions, constructive and destructive angles to understand conflict; the cause of conflicts, contradicting value systems, competition for scarce resources, psychological needs of people, perception (self, others, circumstances, interests), manipulations of information; conflict handling styles: avoidance, confrontation, role-playing, third-party decision making, joint-problem solving, compromising; the life angle of conflict; organization transformation; the concept of peace: definition of concept, peace-making, peace-keeping; power and conflict, type of power, expert power, referent power, legitimate power, reward power, and coercive power.

300 LEVEL ALPHA SEMESTER

BIO311 GENERAL CYTOLOGY AND TISSUE CULTURE: (3 Units) (LH30: TH30)

Light, Phase contrast, dark-field and electron microscopy, auto-radiography, florescence; cell cycle; introductory cytogenetics. Modern biological research laboratory on cell culture techniques. Aseptic techniques for animal and plant cell culture; the requirements for cell growth in vitro; mechanisms underlying cellular differentiation; immunohistochemistry and in situ hybridization, and the expression of transfected DNA in cultures animal and plant cells; propagation techniques, commercial laboratory production; indexing for pathogens.

BIO313 GENERAL PHYSIOLOGY II: (3 Units) (LH: 30, TH: 30)

Physical and chemical processes in basic animal physiology. A general study of osmoregulation, excretion, transport, homeostasis, and their coordination in animals. Prerequisite –BIO 111.

BIO315 GENETICS II: (2 Units) (LH: 15, TH:30)

Aspects of human genetics; pedigree analysis. Further consideration of various deviations from basicprinciples. Gene interaction. Pre- requisite – BIO211**.**

BIO316 GENERAL ECOLOGY: (3 Units) (LH:30, TH: 30).

The ecosystem approach to the study of ecology. Energy flow and nutrients cycling. Dynamics of populations and communities in ecosystem; influence of man. Concept and definition of ecosystem, ecology at community level, ecological classification of habitat types, terrestrial and aquatic biomass, specific features of each, biotic components of habitat. Natural destruction, factors of communities, success of community interaction, natural cycle, dynamics of population. Practical: to include among others community and population studies of each species in a habitat. Succession simply treated. Definitions and types of ecology. Basic units of ecology (populations, communities, and ecosystems). Biotic and abiotic components as factors controlling the distribution of plants and animals in the ecosystem. Succession and climax. Ecological interactions. Man, and environment.

Practical sessions. Pre-requisite –BIO111, BIO122.

BIO317 RECOMBINANT DNA TECHNOLOGY: (3 Units) (LH: 30, TH:30)

Biogenesis of microtubules, microfilaments, golgi and mitochondria. Membrane - membrane interactions. Introduction to bioenergetics and thermo-dynamics.

Principles and methods of recombinant DNA technology. Methods in rDNA: Transformation, Phage Introduction, and Non-Bacterial Transformation. Restriction modification enzymes used in recombinant DNA technology: Hybridization, cloning, sequencing, polymerase chain reaction. Gene manipulations: cloning vectors, cloning in E. coli, plasmids, bacteriophages and cosmid vectors. Cloning strategies: genomic and cDNA library. Screening of gene libraries: screening by DNA hybridization, immunological assay, and protein activity. DNA delivery methods and expression: physical methods and biological methods, expression of cloned genes in prokaryotes (*E. coli*), and eukaryotes (yeast); Expression signals promoters and terminators; Translation expression vectors. Case studies: DNA integration into bacterial genome; Increasing secretions; Metabolic load, Directed mutagenesis; transposon mutagenesis, Gene targeting, Site specific recombination. Applications and future of rDNA technology. Pre-requisite – BIO211, BIO217

BIO318 - MOLECULAR GENETICS AND FORENSIC SCIENCE (2 Units) LH: 15, TH: 30

Prerequisite: BIO 211, BIO 217

Principles of physical science and genetics at the molecular level for investigative (crime) studies. Physical Evidence in forensics; Fingerprints, firearms and ammunition, hair, fibres, glass fragments, impression, splash patterns, fire and paint etc; Drug identification and substances of abuse: Cannabis, heroin, cocaine, alcohol etc. Forensic Serology: Blood, semen, vaginal fluid, saliva etc; Elements of Forensic pathology, entomology, and anthropology. Comparative molecular processes; Molecular evidence: DNA Fingerprinting (nuclear, mitochondria); protein profiling of materials.

BIO319 Biostatistics (2 Units) (LH: 15, TH:30)

Basic statistical concepts, Experimental design, Data transformation, Biological data, Accuracy of Measurement, Significant figures. Frequency distribution.Measure of central tendency, Measure of dispersion and variability.Graphical presentation of data.Normal distribution and standard curve.Statistical hypotheses and level of significance, Central limit theorem and confidence interval.t-test: Student t-distribution, One sample hypotheses, Two sample hypotheses: (Paired and Unpaired) Parametric t-distribution, Non- Parametric t- distribution. Multisample hypotheses: ANOVA, Fischer's test. Simple Linear Correlation and Regression. Sequence Analysis, Molecular Phylogenetics, Basic Structure Modeling, Visualization of Alignments, Trees and Structure Models.

BIO333 PRINCIPLES OF WILDLIFE MANAGEMENT (2 Units) LH: 15, TH: 30

Habitat Management, Methods of Estimating Wildlife Population, Wildlife and Water, Some Ecological Influences of Water, Wildlife Diseases, Wildlife Diseases and Human Population, Wildlife Diseases – Agriculture and Urbanization Conflict, Wildlife Diseases Legislation, National Laws, International Convention on Biodiversity, Economic Benefits of Biodiversity

BIO334 PLANT PATHOLOGY (2 units) LH: 15, TH: 30

Importance of plant diseases and plant health; Principles of plant pathology; Diagnosis of plant diseases and identification of plant pathogens; Etiology of representative diseases and pathogens; and Plant health and disease management. Introduction to plant pathology. Historical perspective, social impact of plant diseases and general concepts in plant pathology. Causes of plant diseases: abiotic and biotic causes. Symptoms of plant diseases. Disease cycles and disease development. Infection biology (pathogenesis), phytoalexins and mycotoxins. Plant diseases caused by fungi. Plant diseases caused by bacteria. Plant diseases caused by viruses. Plant diseases caused by nematodes. Molecular and diagnostic plant pathology. Disease management: cultural, biological, chemical, transgenic and IPM. Host resistance and defense. Basic elements of disease epidemics and disease forecasting

BIO336 ECOTOXICOLOGY (2 Units) LH: 15, TH: 30

Human and the environment in various ecosystems: Air, Water and Soil. Impacts on the ecosystems; assessment of risks and abatement techniques. Principles of Ecotoxicology: Quantification of toxicity on biolabel, individual, population, ecosystem level, use of dose response curves to determine the toxicity Global pollution and impacts; Contaminant groups: heavy metals, nanoparticles, microbial contaminants, organic xenobiotics, and natural toxins. Calculation methods for determination of concentration, speciation, sorption, degradation, ecotoxicity and transport of contaminants. Case study: Pesticides– Their use and abuse; Endocrine Disruption in fish- An Introduction; population-level consequences in wildlife and for human health; The application of molecular biology in ecotoxicology

EDS311: Practical Side of Entrepreneurship 1 (1 Unit) LH: 15

Prerequisite: EDS221

Objective: To expose the students to a greater depth in the practical aspects of entrepreneurship, particularly the development of skills. The aim is to distinguish Covenant University graduates from graduates of other institutions of higher learning.

Practicum: All students are sent to the entrepreneurial village in Groups for skills acquisition in different specialization fields. Mini trade fairs will be organized where the students will display all their products. This program includes both theoretical and practical aspects of entrepreneurship. Production and Quality control of entrepreneurship material management will be taught. These specialized fields include: tailoring, carpentry, millinery (hat making), mechanical, catering, shoe making, interior decoration, software development, candle and soap making, fishery, farming, snail rearing, poultry farming, piggery, textile development (tie & dye), cooking, paint manufacturing, photography, ice-cream making, saloon and barbing, etc.

TMC311: Total Man Concept V (1 Unit) LH: 15

Prerequisite: TMC221

This course examines Man in different environmental contexts – the biblical, biological, cultural, and ecological. The emphasis here is the civic and social responsibilities of man in society and the expectations of community living. The place of social relationships, diversity, issues of difference, conflict, family issues are explored looking at God’s mandate and current trends and challenges.

TMC312: Total Man Concept - Sports (0 Unit) PH: 15

Prerequisite: TMC222

Aerobics (Cardiorespiratory) Aerobics exercise: This is said to be any activity that can get the heart rate going and keeps it at a sustained rate over a period of time. Eg twenty minutes. An aerobic activity helps to increase cardiorespiratory fitness which is one of the fine essential components of physical fitness. Being aerobically fit you can feel it as you go about.

Games (modified sports): Modified level of sports prepares student for the real activity itself and beyond. The philosophy of modified is to maximize participation and playing time for students. The level focuses on growth of basic skills and sportsmanship. During these events we make every attempt to include as many students as possible on possible teams.

Athletics (Field Events): Institutional athletics programme represent a multi financial industry and are generally linked to school branding and reputation. Athletic programme drive enrolment and heightens institutional profile, and often resulting in financial windfall for those whom their students engaged in.

CIT310: Cyber Security Specialist - Application Security LH: 15

Understanding treats and security risks in the society and in the enterprise. Security Domains (People, Data, Application, and Infrastructure). Security aspects of mobile, business analytics and data management.

GST311: History and Philosophy of Science (2 Units) LH: 15, TH: 30

The focus of this course shall be the discipline of science, which at present, is held in high esteem as the greatest agent of development in the 21st century. This course is a survey of the philosophical foundation of science; major topical issues in the Philosophy of Science will be treated. It begins with a brief account of the role of metaphysics in scientific explanation, and determinism in the sciences. The students shall therefore be expected to, among other things, examine the main areas of philosophy; the meaning and characteristics of science, explanations in science, its objectives, methods, laws and theories with the view of justifying or debunking the superiority that has been accorded to the discipline of science over other discipline, that is where this becomes necessary. The course shall also treat the philosophical thoughts of thinkers like Karl Popper, Copernicus, Newton and Fereyarband.

OMEGA SEMESTER

BIO329 - Industrial Training (6 Units) Six Months

Prerequisite: Good Academic standing on not less than a CGPA of 1.0. Students will be attached for aperiod of 6 months to relevant organizations for industrial field experience, in relevant areas.

400 LEVEL ALPHA SEMESTER

BIO411 POPULATION GENETICS: (3 Units) (LH: 30, TH: 30)

An introductory consideration of mathematics models for the analysis of gene frequencies and genetic variation in populations. Microevolution, Random genetic drift, Probability review, The Effective population size, Selection, Inbreeding, Sex ratio evolution, Population structure**. Pre-requisite** BIO211, BIO315

BIO412 SEMINAR (2 Units) LH: 15, TH: 30

Literature review of an approved topic in contemporary areas of studies plus oral presentation.

BIO414 PRINCIPLES OF PLANT AND ANIMAL BREEDING (2 Units) LH: 15, TH: 30

Breeding methods: Line breeding: bulk, pedigree, backcross, Population improvement, inbred line development, evaluating hybrids and combining ability. Selection methods: Single trait selection: mass selection, line selection, multiple stage selection, Multiple trait selection: independent culling, tandem selection, selection indices, Indirect selection methods: theory, Linkage disequilibrium Indirect selection methods: conventional breeding, Indirect selection methods: DNA markers. Seed production and quality: Certification agencies, Seed production schemes, maintaining genetic purity: isolation and gene flow, Producing and enhancing seed quality, Seed dormancy and storage. Breeding program overview: Monitoring progress, Global seed Dairy, Poultry and Pork market overview.

BIO415 - BIO-RESOURCES MANAGEMENT (2 Units) LH: 15, TH: 30

Concepts in Biological diversity: biological diversity, genetic diversity, specific diversity, species of local cereals, local legume, fruit tree species. Genetic diversity expression: through large number of associations, combinations of genes in individuals of single species, wild relatives of domesticated species, species resistance to (disease, drought, extreme environments etc), utilization of (plant and animal) for varied needs and local germplasms. Conservation and Preservation: importance of plant and animal genetic resources conservation, effects of destruction of natural environment on local plant and animal resources, development of seed, gene and germplasm banks, germplasm collections of local crop species (Case study), selection and breeding of resistant varieties. Alternate management of bioresources: Biotechnologically based alternatives to live animal experiments; biotechnological protection of forest plantations and economic plants, germplam appropriation and privatization for crop improvement, patents and plant breeders' rights, production of improved plants and animals.

BIO416 - BIOINFORMATICS AND FUNCTIONAL GENOMICS (2 Units) LH: 15, TH: 30

The topic contains an overview of the potential applications of genome analysis and introduces students to the role of bioinformatics in evolutionary analysis, functional genomics, proteomics, and disease management. It covers the principles of protein structure and protein structure prediction (e.g., homology modelling, threading). It also covers nucleotide sequence analysis i.e., computer analysis of nucleotide sequences assembly, restriction analysis, gene location and identification, protein sequence analysis and structure prediction, database searching, sequence alignments and phylogenetic analysis.

BIO417 FIELD COURSE (2 Units)

This is designed to give students an opportunity to carry out a small independent research project dealing with plant material, approved by the Departmental Board and under the supervision of one or more members of the staff.

BIO418 SOIL ECOLOGY (3 Units) (LH: 30, TH: 30)

Physical and chemical nature of soil. Detritus organisms. Cycling of minerals and nutrient pools.

BIO419 HYDROBIOLOGY: (3 Units) LH: 30, TH: 30

General physical (size, length, depth, light, temperature, turbidity, colour, total suspended solids, total dissolved solids, conductivity) and chemical (pH, dissolved oxygen, salinity, nutrients, cations, anions, total hydrocarbons, oil, heavy metals) properties and seasonality of Nigerian water bodies. Variations in water quality parameters according to water types: freshwater, brackish and marine. Ecological studies of Zooplankton, Benthos, Nekton – Productivity, diversity. Bioindicator status and applications in water pollution studies.

BIO431 DEVELOPMENTAL BIOLOGY (2 Units) LH: 15, TH: 30

Molecular and genetic aspects of development. A detailed study of the cellular and multicellular bases of development.

Outlines of origin: Spermatogenesis and oogenesis. Comparative study of vertebrate and invertebrate sperms and eggs: Viability of gamete cells; influence of yolk; polarity; symmetry; Egg membranes; Mechanics and Physiology; Theories of fertilization. Parthenogenesis: Natural and Artificial; Cleavage and Gastrulation: General Principles - Outlines of their physiology - Comparative study in Amphioxus, frog, chick, and mammals; Factors influencing cleavage; Fate map; Development of brain, eye, and ear in frog. Embryonic Adaptations: Embryonic membranes and their functions; Placentation in mammals; Regeneration: regeneration in invertebrates and vertebrates; Puberty - Menstrual cycle - Menopause - Pregnancy and related

problems - Parturition – Lactation; Development and differentiation; Contraception - its merits and family welfare; Reproductive Technology: Monitoring of estrus cycle - Artificial insemination - Cryopreservation - IVF - Embryo transfer - Test tube babies.

BIO432 ENVIRONMENTAL PHYSIOLOGY (2 Units) LH: 15, TH: 30

Physiological adaptations to changes in the environment: temperature, light, hydrogen ion concentration, water, osmotic and ionic concentration, oxygen. Temperature relations of poikilothermic animals. Physiology of migration, hibernation, aestivation and diapause, effects of high attitude and hydrostatic pressure on organisms and adaptations to these factors. Reproductive adaptations.

MCB414 –Virology II (3 Units) LH: 30, TH: 30

Prerequisite-MCB 222, MCB 316

Characterization of common plant viruses and diseases. Control of plant viral diseases. Major group of human viruses; DNA viruses, RNA viruses, Hepatitis viruses, Arboviruses, Tumor viruses, Slow viruses and prions. Human immunodeficiency virus and minor viral pathogens. Current trends in virus control and genetic engineering; interferons, plant derived edible vaccines, gene cloning and the use of transgenic plants. Chemotherapy of viral infections. Functional peculiarities in viruses (Satellites, viroids, defective nucleic acids and prions).

EDS411: Entrepreneurial Development Studies VII (1 Unit) LH: 15

Prerequisite: EDS311

Objective: To expose the students to more issues in entrepreneurship. Topics covered include the following: Various functions of Entrepreneurship – such as financing, production, marketing, and personnel management. Entrepreneurial succession, issues in succession: challenges and prospects; taking Entrepreneur to the stock market; International Entrepreneurship; Funding of Entrepreneurial activities; Term paper on Entrepreneurship from some selected areas of SMEs (Small and Medium Scale Enterprise) operations.

TMC411: Total Man Concept VII (1 Unit) LH: 15

Prerequisite: TMC311

This course examines the building blocks for leadership development in the context of providing an overview of the broad dimensions of leadership. The course also explores the enhancement of leadership traits and how power and influence qualify the dynamics of leadership.

TMC412: Total Man Concept - Sports (0 Unit) PH: 15

Prerequisite: TMC312

Game (Soccer & Volleyball): This centre on the mastery of basic skills, game situation as well as rules and regulation governing the various sports that will be attempted.

Focuses are also being on appreciation of various sports and the spirit of sportsmanship that is 'win or loss' taking it in good fate.

Aerobics exercise: This is said to be any activity that can get the heart rate going and keeps it at a sustained rate over a period. Eg twenty minutes. An aerobic activity helps to increase cardiorespiratory fitness which is one of the fine essential components of physical fitness.

Being aerobically fit you can feel it as you go about. Muscle tone improves as you work on the proper running techniques.

OMEGA SEMESTER

BIO421 CYTOGENETICS OF PLANTS: (3 Units) (LH: 15, TH: 30)

Aspects of cell and nuclear divisions. Morphology and behaviour of chromosomes. Aberrations and polyploidy. Pre-requisite -BIO 211

BIO422 MARINE BIOLOGY: (3 Units) (LH:30, TH: 30)

A study of the Biology of Marine fauna and flora. Economic importance of the marine organisms.

BIO423 – APPLIED ENTOMOLOGY (3 Units) LH: 30, TH: 30

Prerequisite: BLY111, BLY214

Overview of arthropod evolution, distribution. History of medical entomology. Some common tropical parasitic diseases indigenous in Nigeria and Africa. Myiasis: Arthropods as agents of diseases to plants and animals. Arthropods as pseudo-hosts and vectors of disease pathogens. Invertebrate reservoirs of parasitic pathogens. Arthropods and diseases transmission cycles involving some major diseases of plants and animals: mosquitoes, tse-tse fly, muscid flies, lice, mites, bugs, fleas, sandfly aphids, etc). Arthropods success as diseases agents and vectors. Management of arthropod borne and arthropod mediated diseases: Agricultural, Medical, Veterinary. Pest Life History: Case study: construct and identify stages of pest(s) studied, identify the host organism(s), diagnose the pest problem on host, state management options (to include possible bio-antagonist, predator or pesticides).

BIO424 - Economic Botany (2 Units) LH: 15, TH: 30

Human aspects of economic Botany: Ethnobotanical disposition that shaped the uses of plants. Classification of plants based on their uses: Food; Constructions (Shelter, Bridges, Boats, Wagons etc.); Medicine; Poisoning (War, Hunting, fishing, trapping, assassination, etc); Spiritual and Cultural communication (Feud, Peace, Marriage, Naming, Burial). Major emphasis will be placed on the growth in Economic Botany in Nigerian particularly in the areas of food and Medicine.

BIO426 - ENVIRONMENTAL BIOTECHNOLOGY (2 Units) LH: 15, TH: 30

Biotechnology as applied in Pollution control; Renewable energy; Energy conservation; Restoration of degraded lands: Bioremediation and Phytoremediation. Biodiversity and its conservation: Environmental genomics, Gene flow, Monitoring and Analysis of genetic contamination of biodiversity. The fate of genetically engineered microorganisms is considered, together with the topic of extreme environments.

BIO427 - BIOTECHNOLOGY IN SUSTAINABLE ENERGY (3 Units) LH: 30, TH: 30

The objective is to introduce students to one of the most dominating and compelling areas of human existence and endeavor: energy; with focus on the Technology, Ecology, Economics, Sustainability of the energy issue as well as the place of biotechnology in the future of energy technologies. Overview of the global demand for energy, and the resource availability and technology used in its current and future supply; Concepts of Alternative, Renewable and Sustainable Energy; Sustainable energy and C-skeleton cycles; Biotechnology augmentations and creations for the Exploitation of plants for cellulosic-, and of algae for hydrocarbon-based fuels; Chemical feed stocks; plants and plant cells as factories for high value products; animal and human as prospects for future energy systems in power generation for localized, general as well as use in space.

BIO428 SYSTEMATIC BIOLOGY: (3 Units) (LH: 30, TH: 30).

A bio-systematic approach to the classification of organisms and nomenclature.

BIO429 (6 Units)

A short research project involving an investigation on a selected biological probable. The project is to be written up in the form of a scientific report or paper.

BIO440 ENVIRONMENTAL ASSESSMENT AND MONITORING (2 Units) LH: 15, TH: 30

Definition and history of environmental impact assessment, related law necessary for EIA • Process for EIA, TOR, IEE Components of EIA Reports • Tools for assess environmental impact: Checklist, Network, Matrices, Overlays, Mathematical Modeling • Environmental Impact Assessment for air and noise •

Environmental Impact Assessment for soil and land use • Environmental Impact Assessment for water quantity and quality • Environmental Impact Assessment for biological: terrestrial ecology forest and wildlife • Environmental Impact Assessment for biological aquatic ecology: plankton, nekton, benthos and importance coastal habitat • Environmental Impact Assessment for human use • Environmental Impact Assessment for quality of life, socio-economic • Mitigation and Monitoring process for environmental impact assessment.

BIO441 ENVIRONMENTAL POLLUTION AND MANAGEMENT (3 Units) LH: 30, TH:30

Types and Sources of Pollution, Human modification of the environment through pollution: common pollutants. Impact assessment, control, and management of pollutants in air, land and water. Pestcides and control. Aquatic Pollution. Water availability and its benefits. Natural Water Quality, Classification of Pollutants, and its types. Parameters of Pollutants, Water Hardness. Advantages and disadvantages and Problems related to technology and processes in; Source Reduction; Reuse; Recycle; Composting (part of recycling); Incineration with energy recovery and landfilling with methane recovery. Sources, characteristics, and classification of municipal, industrial, agricultural and hazardous waste. Hazards of different types of waste, waste audit process, waste minimization and elimination techniques, and processes for pollution prevention, treatment, and recovery. Pollution impact on land due to non – biodegradable waste matters (glass, polythene bags, P.V.C. & other plastic materials, etc. Biological processes for environmental control; biological basis of wastewater treatment; river systems and wastewater treatment work analogy.

EDS421: Entrepreneurial Development Studies VIII (1 Unit) LH: 15

Prerequisite: EDS411

Issues in Entrepreneurship & Management of SMEs (Part 2): Topics covered include the following: Reviewing/appraising various strategies and skills for: Poverty Alleviation, Employment through SMEs, Entrepreneurial Environments: types, appraisal and contending with the environment in Nigeria, Africa/Third World countries. Incorporating the company: practical steps and issues involved, translating the four phases of business into reality (Micro, Small, Medium and Large); A greater depth of the practical issues in launching, growing and harvesting of entrepreneurial outfits. Issues involved in Partnership and Corporation Formation. Final Project presentation (On the dream business) and feasibility studies on Entrepreneurship etc.

TMC421: Total Man Concept VIII (1 Unit) **LH: 15**

Prerequisite: TMC411

Leadership Development (Part 2): This is a continuation of TMC411. This second part of the course on leadership development examines the biographical details and leadership traits or styles of some biblical andhistorical figures and identifies some specific lessons for developing leadership traits and sensitivity. Specific character studies will examine the leadership style of Jesus, Moses, Joshua, Gideon, Alexander the Great, Nelson Mandela, Nnamdi Azikwe etc.

TMC422: Total Man Concept - Sports (0 Unit) **PH: 15**

Prerequisite: TMC412

Jogging: This help in many ways, our focus here on the benefit of jogging is for physical fitness that reduced risk of Osteoporosis. Osteoporosis is the condition when the bones become increasingly porous and brittle. It can result to bone fractures and deformities.

Game (Basketball & Handball): This centre on the mastery of basic skills, game situation as well as rules and regulation governing the various sports that will be attempted. Focuses are also being on appreciation ofvarious sports and the spirit of sportsmanship that is 'win or loss' taking it in good fate.