CARITAS UNIVERSITY
AMORJI-Nike
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ACADEMIC CURRICULUM FOR THE DEPARTMENT OF BIOCHEMISTRY FACULTY OF NATURAL SCIENCES CARITAS UNIVERSITY ENUGU.

FORWARD

During the deliberations of the Departmental board, the review of the academic brief was considered and consented to. Thereafter, various topics relevant to sections of the academic brief were assigned to different members of academic staff. The affirmative responses from the contributors were collated and organized in line with the current benchmark minimum academic standard (BMAS) from the National Universities Commission (NUC) for the programme.

In terms of curriculum, this revised edition is tailored strictly for the four-year undergraduate programme. However, other sections of the academic brief are of general public interest.

The main objective of this pamphlet is to serve as a brief introduction of our dear Department where "Transparency, Integrity and Academic Excellence" are our guiding principles.

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1.0 INTRODUCTION TO THE DEPARTMENT

Welcome to the Department of Biochemistry, Caritas University Amorji-Nike Enugu.
The Department offers training for careers in biochemistry and is distinguished by its intellectual rigor and collaborative style.

The department covers all the relevant courses for the award of Bachelor of Science degree in Biochemistry.

The Department of Biochemistry was among the first batch of departments to take off in the Faculty of Natural Sciences alongside Department of Microbiology, Industrial Chemistry, Computer Science and Statistics in 2005/2006 academic session. Starting with a modest student enrolment of 10 in 2005/2006, enrolment increased progressively.

The Department is located at the first floor in the Faculty of Natural Sciences Building. This booklet is to help you become familiar with our department and our undergraduate programme. We hope that it will help you get started.

2.0 PHILOSOPHY AND OBJECTIVES

a) To provide students with a broad and balanced foundation of biochemical knowledge and practical skills.
b) To develop in students the ability to apply knowledge and skills to solving theoretical and practical problems in biochemistry.
c) To develop in students a range of transferable skills that are of value in biochemical and non-biochemical employment.
d) To provide students with knowledge and skills base from which they can proceed to further studies in specialized areas of biochemistry or multi-disciplinary areas involving biochemistry.
e) To provide, through training and orientation, an appreciation of the solutary rewards of inter- and multi-disciplanary approach to the solution complex life problems.
f) To generate in students an appreciation of the importance of biochemistry in industrial, economic, environmental, technological and social development.
g) To instill in students a sense enthusiasm for biochemistry, an appreciation of its application in different contexts and to involve them in an intellectually stimulating and satisfying experience of learning and studying.

3.0 BIOCHEMISTRYJOB OPPORTUNITIES

This area provides information on biochemistry jobs including types of jobs available and other potential opportunities.

3.1 WHAT DOES A BIOCHEMIST DO?

Biochemistry is the chemistry of living organisms and their -vital processes. Biochemistry involves studying the chemistry of living things. This would include substances, compounds and processes. A biochemist is the person that gets into the most, minute characteristics of organisms, and their biological processes. Although Biochemists have many different areas of specialization from which to choose, almost all of them are required to have good research techniques as well as the ability to synthesize and analyze information.

Biochemists have many potential roles within the scientific community, including working in agricultural sector, pharmaceutical industry and food industries. An example is that they find new ways to diagnose and treat disease in plants and animals (humans) including potentially creating anti-cancer agents and others of possible treatment for diseases.

With a degree in Biochemistry, an individual would find he/she has a vast list or careers available in both private and public sectors. These include:

Private Sector
Biotechnology

Food and Drink (includes brewing)
I health and Beauty Care
Medical Instrument Companies
Chemical manufacturing companies
Research Companies and Laboratories

Pharmaceutical companies Public Sector
Scientific laboratories
Agriculture and fisheries
Hospitals

Universities

Public Health Entities

Blood Service

Forensic Science

Public Health Laboratories

National Blood Services

Cancer research institutes

Environmental pollution Control

3.2 FURTHER STUDYOPPORTUNITIES

Biochemists also find opportunities once they earn a higher qualification, either through attaining masters or Ph.D level qualification. As in many other science related fields, higher education qualification such as a Ph.D is considered advantageous over students with a single degree as it is considered specialized practical experience. Particularly with research this is considered specialized as postgraduate students receive longer term promotion and career opportunities.

Some areas of specializations for postgraduate biochemistry include:

Bioinformatics

Biotechnology

Enzymology/ Protein Chemistry

Forensic Science

Industrial Biochemistry

Medical Biochemistry

Nutritional Biochemistry

Pharmacological Biochemistry

4.0 ADMISSION REQUIREMENTS

(a) FOUR-YEAR INTEGRATED PROGRAMME

To register as a student of the Department the candidate must have been admitted through Joint Admission and Matriculation Board (JAMB) for a four-year programme. Candidates admitted for a four-year programme must have obtained five credit level passes at the ordinary level (GCE/SSCE/WASCE/NECO) in not more than two sittings which must include English, Mathematics, Biology, Chemistry and Physics.

(b) DIRECT ENTRY CANDIDATES

Candidates seeking admission through direct entry (three-year programme) will normally enroll in the second year of the programme. To qualify for admission, the candidate must satisfy the requirements as specified in 3.0 (a) above. In addition, the candidate must have obtained at least two . advanced level passes in Chemistry and Biology. The advanced level passes can be substituted by qualifications at NCE, OND, HND (upper credit), B.Sc. or others acceptable to Senate.

(c) STUDENTS ON TRANSFER

Transfer students from recognized Universities, shall be admitted in accordance with the conditions stipulated in the undergraduate Academic Regulation of Caritas University.

5.0 ACADEMIC REGULATION

To acquire the skills of the discipline for which students are admitted, important guidelines and rules are followed. In the Department of Biochemistry, students are expected to;

a. Attend 75% lectures in all registered courses to qualify for examination.

b. Attend all practical classes to pass the practical examination. Inability to attend practical classes must be reported to the Technologist.

c. Pass all registered courses before graduation

d. Pass all registered courses before the end of the sixth year to graduate.

e. Studentship expires after six sessions for four-year programme and four and half session for the three-year (direct entry) programme.

f. Sit and pass examinations without cheating. Please read General and Academic Regulation and the University Student Handbook for details of examination misconduct and appropriate punishment.

g. Obtain written permission before voluntary withdrawal from the University.

h. Withdraw from the University on academic grounds if cumulative grade point average is below 1.0 on a 4-point scale.

i. Consider changing choice of course if CGPA falls below I .0.

6.0 CODE OF CONDUCT FOR STUDENTS

The Department of Biochemist1Y has been founded on a philosophy of true quest for knowledge and excellence through hard work and discipline. Anything short of this is not acceptable. The standard has been maintained over the years and has enabled our students to stand out others in the faculty. Each student is therefore urged to read this section very carefully.

GENERAL

All students of the Department should inculcate within themselves a sense of pride for the Department, Commitment, Personal integrity, discipline and courage as a Bonafide student of this noble and eminent discipline.

- A student must not dress indecently, roughly or provocatively. Preferably, male students should wear well-ironed clothes; tuck in shirts, knot ties very neatly (where applicable) while female students must not wear skimpy cloths that would expose their bodies indecently. However, appropriate dressing where applicable, is emphasized such as corporate dressing for seminars and wearing of lab. Coats during all practical sessions.
- A student must not destroy any Department property.

ATTITUDE TO LECTURERS AND STAFF

A student should not show any sign of disrespect of any sort towards a lecturer or any member of staff of the Department. A student should not try to influence marks by offering "incentives" or "bribe" to any lecturer or other members of staff. This will be taken very seriously.

ATTENDANCE TO LECTURES

Attendance to lectures should be taken seriously. A 75% attendance is required by university regulations to qualify for sitting any examination. Students should not disrespect lecturers during lectures either by distracting, noise making, conversing or doing anything unrelated to the lecture or fail to do assignments or take other instructions given by the lecturer.

EXAMINATIONS

The general and academic regulations of the University concerning exams are emphasized. Please note that to qualify to sit for an exanimation the student must have

- Duly registered for the course
- Attended a minimum of 75% at lecturers and laboratory practical
- Must arrive at the designated examination venue 30 minutes before the schedule time
- A student who arrives 30 minutes after the start of the examination will not be admitted into the hall
- Must not enter the hall unless asked to do so by the invigilator
- Shall possess the following;
    a. Current identity card
    b. Pens, Pencil, Ruler
    c. Calculator (not the programmable type or Hand set)
    d. Any other material relevant to the examination that may be permitted by the invigilator (such as graph sheets, statistical tables, drawing paper).

MISCONDUCT

A student of this department must not

1. Impersonate or encourage impersonation during any examination, either within the University or outside the University. Such a student shall be expelled from the University.
2. Engage in collaborative copying (coping or allow copying)
3. Exchange answer scripts or any written material in the examination hall
4. Refuse to hand over suspected offending material(s)
5. Destroy such offending material(s)
6. Smuggle question papers out of the examination hall
7. Possess or tender any unauthentic material(s) or documents relating to examination such as false identity card, payment slip, and medical facility

Offence in any of the above will lead to expulsion from the University. Failure to return an answer script may lead to a repeat of the academic year. A student will instantly be awarded an "E" for the following offences:

1. Talking to another student during an examination
2. Looking into another student's answer script
3. Borrowing or lending of any materials in the examination hall
4. Tearing out paper from the examination booklet or be in possession of any rough papers.

5. Refuse a sitting arrangement assigned to him/her by an invigilator or leaving his/her seat or walking around.
6. Alter registration number already written on script and question paper.
7. Refuse to sign the attendance register.
8. Refuse to sign the examination malpractice form
9. Showing any unruly behavior to an invigilator or any other examination officer.

Any student wishing to draw the attention of the invigilator shall do so by raising of hands. Serious warning will be issued to any student who

a. Starts writing before the start ofthe examination
b. Continues to write after the call to stop the examination.
c. Writes anything other than the registration number on the question paper.

Offence in any two or more of these misconducts will incur greater stringent measures than stipulated. However, any aggrieved student may follow the proper University Channel for petitions.

Adherence to this code of conduct will ensure a fruitful and stressfree tenure in the Department. The Department offers a friendly and open relationship to all compliant students.

PERFORMANCE & EVALUATION CRITERIA

A Methodology Students to be examined by a combination of the following methods:

1. Continuous assessments
2. Formal semester examinations
3. Laboratory and industrial training reports
4. Seminar and Project presentations
5. External examiner is invited in the final year to assess final year courses and Projects and to certify the overall performance of the graduating students as well as the quality of teaching facilities

REGISTRATION OF COURSES

Students required at the beginning of every session to register the courses approved for their level. The University has designated period for normal and late registration of courses every session. Students are advised to go to the staff assigned to their level for proper guidance on registration. Students are not allowed to sit for examination in courses for which they had not earlier registered. If the student succeeds in sitting for the

examination without notice, the result obtained will not be used in the computation of grade point average. Failed courses must be registered before adding the current ones.

COURSES LOAD

The normal course load for a full-time student, ranges from 16 (minimum) to 24 (maximum) credit units per semester. This means that no student is permitted to register for less than 16 or more than 24 credit units in a semester.

Grading System

The following grading system) is adopted

Marks(%)	Grade	Point	Remarks
70-100	A	5	PASS
60-69	B	4	PASS
50-59	C	3	PASS
45-49	D	2	PASS
40-44	E	1	PASS
0-39	F	0	FAIL

The total score for a course is obtained by adding the score made by the student in continuous assessment (maximum of 30 marks) Examination(Maximum of 70 marks)

COMPUTATION OF GPAAND CGPA

Grade point (GP): The mark scored in each course (continuous assessment score plus the end of semester examination score) has an equivalent letter grade of A to E, each grade has a corresponding numerical value of 4.00 to 0.00, called grade point. For example, a student who scores 21 in continuous assessment and 37 in the semester examination in a particular course has a total of 58%. His/her grade is C and his/her grade point is 2.

Quality Point (QP): The quality point (QP) made by a student in particular course is the product of the credit unit assigned to that course and the grade point. For example, a student who made a C in a 3-credit unit course has a quality point of2* 3 = 6.00.

Grade Point Average (GPA): The GPA is obtained by dividing the total quality points earned by a student in a semester by the total credit units registered in that semester. For example, a student who in a semester has a total of 80 QPs from a total of 22 credit units has GPA of 80/22 3.6363636.

Cumulative Grade Point Average (CGPA): This is obtained by dividing the sums of all quality points to date by the sum of all credit units for all courses registered repeated to date. The final cumulative grade point average calculated at the end of a student's academic programme determines the class of degree he she shall be awarded. For example, a student who has a total quality point of395/ 120 = 3.29, the student shall therefore be awarded 2nd Class Upper Division (Honours).

Degree Classification

The degree award is classified according to the following system.

Cumulative grade oint average CGPA	Class of Degree
3.50 to 4.00	First Class
3.0 to 3.49	Second Class (Upper division)
2.0 to 2.99	Second Class (Lower division)
1.0 to 1.99	Third Class
< 1.0	Fail

7.0 UNDERGRADUATE SEMINAR

INTRODUCTION

This 2-credit course is designed to be a formal interactive forum for both students and lecturers. Seminar topics on contemporary issues in biochemistry, molecular biology, biotechnology and bioinformatics are distributed to students by their supervisors. The student then gathers latest available information/data on the subject matter. The literature search includes latest relevant scientific journals, modern books and the internet. The main objectives of this course are;

l. To train our students in using information Technology (IT) for accurate literature search from the internet

2. To inculcate in our students the art of precise and accurate scientific writing and presentation.

PRESENTATION

The presenters (students) are expected to dress formally and presentation is by power point projection. Thereafter a vigorous question and answer session ensues after which the student is scorcd on the spot by the lecturers present at the seminar. Later the student submits a dissertation on the topic presented.

8.0 STUDENTS INDUSTRIAL WORK EXPERIENCE SCHEME

The Department of Biochemistry of Caritas University Amorji-Nike Enugu, participates in the Student's Industrial Work Experience Scheme. It is a well-organized and exciting programme which is aimed at equipping the students with more practical skills to support what they learn during the regular university lectures.

The programme is a full course on its own called Student's Industrial Work Experience Scheme (SIWES) and the code is BCH 321. It is 6 credit courses and the programme lasts for six months. It is graded and the students' scores are used in the computation of their final degree results.

Students always look forward to the programme. This is because it offers them a great deal of practical knowledge. It is also the first time some of the students are having the opportunity to work. It also offers some students the opportunity to live in a new environment for the first time. Some students are also lucky to be paid some remuneration as they participate in the programme. To qualify for the programme the student must have finished the first semester of year three. The second semester of year three and the vacation period are used for the programme. A student who has carry-over in courses amounting to over ten (10) credit units is not qualified to embark on the SIWES programme. Such students automatically stay back in school to re-sit the examinations to cancel or reduce the excess credit. This is because students on Industrial training (IT) are not allowed to write examinations and any examination written by a student on IT is

automatically canceled. Before the students embark on IT thc University SIWES unit coordinator organizes an orientation programme for all the students who will participate in SIWES. Resource persons from Industrial Training Fund Office, the University and all the Departmental SIWES coordinators are invited. It is usually a very busy event and so many questions from the students will be answered. Students on this very occasion are taught to be punctual, regular and to develop a keen sense of responsibility during the Industrial Training. They are encouraged to be friendly with the staff and create a conducive atmosphere in their places of IT. They are also encouraged to be good ambassadors of the University to keep the door open for more students of the university; to be accepted for IT and also for employment to be given when necessary. Students are told that two copies of technical reports will be submitted when they return from the training. The Departmental coordinators

normally send comprehensive list of students of their various departments who will be embarking on IT to the coordinator of the SIWES unit.

SECURING A PLACE FOR SIWES

The student usually secures a place for IT. The appropriate staff of the company will sign the acceptance letter for the student and send it to the SIWES Office. Relevant sections of the IT form will also be filled by the company under which the student served. In some instances, employers have also written some commendation letters for students. Sometimes it is not easy for students to secure a place for the SIWES programme. The efforts of the students in this regard are complemented by the scouting undertaken by the lecturers. The lecturers travel to different parts of the country especially the industrialized parts to look for spaces for students IT. This exercise has always been successful.

Students are expected to do their training in institutions or organizations that are relevant to their disciplines. For the students of Biochemistry, opportunities are always sought for in chemical,
biochemical, agro and allied Industries, oil companies, pharmaceutical industries, medical diagnostic laboratories, hospitals, research institutes, and other organizations. Within the period of training, lecturers and Industrial Training Funds staff visit the students in their various locations and assess them. This makes the students more committed as well as redirects erring ones. The organizations training these students also take the SIWES programmcs more seriously when they see the assessors.

GRADING SIWES

When students return from IT at the first semester of year four, they submit their logbooks and two copies of technical report to the University SIWES Office. They make the necessary entries and send the logbook and a copy of the technical report to the department while they keep a copy. Student's performances in the IT are assessed in the form of a defense and grades arc awarded based on the report, logbooks, appearance and comportment. The Department of Biochemistry of this University now prepares a list of all the students who participated in SIWES with information on industries sections of the industries where they trained and the location of these industries. This will make room for easy reference to relevant information.

9.0 CODE SYSTEM AND NUMBERING

The Department uses three (3) letters and three (3) numerals. Courses are numbered I to 9 for each level. Abbreviations are clarified as shown below:

BCH=Biochemistry

CSC=Computer Science

BIO=Biology

ICH=Industrial Chemistry

PHY=Physics

GST=General Studies

MTH=Mathematics

STA = Statistics

CHE= Chemical Engineering
MCB=Microbiology

YEAR ONE FIRST SEMESTER COURSES

S/N	COURSE CODE	COURSE TITLE	COURSE UNIT
1	GST 111	COMMUNICATION IN ENGLISH	2
2	MTH 111	ELEMENTARY MATHEMATICS	2
3	COS 111	INTRODUCTION TO COMPUTER SCIENCE	3
4	BIO 111	GENERAL BIOLOGY	2
5	BIO 107	GENERAL BIOLOGY PRACTICAL	1
6	CHM 101	GENERAL CHEMISTRY	2
7	CHM 107	GENERAL CHEMISTRY PRACTICAL	1
8	PHY 101	GENERAL PHYSICS 1	2
9	PHY 107	GENERAL PRACTICAL PHYSICS 1	1
10	CUA-GES 111	MORAL EDUCATION	1
11	CUA-GES 101	BASIC COMMUNICATION FRENCH	1
12	CUA-GES 115	NEGERAL LEGAL SYSTEM 1	1
	TOTAL		19

S/N	COURSE CODE	COURSE TITLE	COURSE UNIT
1	MTH 102	ELEMENTARY MATHEMATICS	2
2	BIO 102	GENERAL BIOLOGY II	2
3	BIO 108	GENERAL BIOLOGY PRACTICAL II	1
4	CHM 108	GENERAL CHEMISTRY PRACTICAL II	1
5	PHY 102	GENERAL PHYSICS	2
6	PHY 108	GENERAL PHYSICS PRACTICAL II	1
7	GST 111	NIGERIAN PEOPLES CULTURE	2
8	CUA-GES 126	BASIC COMMUNICATION IN IGBO	1
9	CUA-GES 114	COMMUNICATION IN ENGLISH 111	2
10	CUA-GES 122	EPTASIM AND IGBO METAPHYICS	1
11	CUA-GES 124	NIGERIA LEGAL SYSTEM II	1
12	CHM 102	GENERAL CHEMISTRY	2
	TOTAL		18

YEAR TWO SECOND SEMESTER COURSES

SECOND YEAR FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE CODE
1	GST 212	ENTERPRENEURSHIP STUDIES 1	2
2	BIO 211	INTRODUCTION TO GENETICS	2
3	ICH 211	GENERAL INORGANIC CHEMISTRY	2
4	ICH 213	GENERAL ORGANIC CHEMISTRY	2
5	MCB 211	GENERAL MICRO BIOLOGY I	2
6	STA 211	STATISTICS FOR NATURAL SCIENCES I	2
7	ICH 217	PRACTICAL PHYSICAL CHEMISTRY	1
8	ICH 212	GENERAL PHYSICAL CHEMISTRY -1	2
9	BCH 211	GENERAL BIOCHEMISTRY 1	2
10	BCH 212	PRACTICAL BIOCHEMISTRY 1	1
	TOTAL		18

SECOND YEAR SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE CODE
1	GST 222	PEACE & CONFLICT RESOLUTION	2
2	ICH 220	ANALYTICAL CHEMISTRY	2
3	ICH 223	GENERAL ORGANIC CHEMISTRY II	2
4	MCB 221	GENERAL MICROBIOLOGY II	2
5	STA 221	STATISTICS FOR NATURAL SCIENCES	2
6	MTH 222	ELEMENTARY DIFFRENTIAL EQUATION	2
7	BCH 221	GENERAL BIOCHEMISTRY II	2
8	BCH 222	PRACTICAL BIOCHEMISTRY	1
9	BCH 223	PHYSIOLOGY	2
	TOTAL		18

THIRD YEAR FIRST SEMESTER COURSE

S/N	COURSE CODE	COURSE TITLE	COURSE CODE
1	BCH 311	BIOENEGENTICS AND CHEMICAL KINETICS	1
2	BCH 312	METABOLISM OF CARBOHYDRATE	2
3	BCH 313	MEMBRANE CHEMISTRY	1
4	BCH 314	METABOLISM OF AMINO ACID & PROTEINS	2
5	BCH 316	METABOLISM OF NUCLEIC ACIDS	2
6	BCH 315	METABOLISM OF LIPIDS	2
7	BCH 318	RESEARCH TECHNIQUES IN BIOCHEMISTRY (METHODS IN BIOCHEMISTRY-PRACTICAL)	1
8	BCH 319	ENEZYMOLOGY	2
9	ICH 313	ORGANIC CHEMISTRY	2
10	MCB 312	MICROBIAL PHYSIOLOGY AND METABOLISM	3
11	ICH 313	ORGANIC CHEMISTRY	2
12	BCH 317	FOOD & NUTRIONAL BIOCHEMISTRY	2
13	STA 318	STATISTICAL COMPUTING	2
	TOTAL		20

THIRD YEAR SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE CODE
1	BCH 321	STUDENTs INDUSTRIAL WORK EXPERIENCE SCHEME	6
		TOTAL CREDITS	6

YEAR FOUR FIRST SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE CODE
1	BCH 411	<u>MAJOR COURSES</u> ADVANCED ENZYMOLOGY	3
2	BCH 412	BIOCHEMICAL REASONING AND METHODS	2
3	BCH 414	TISSUE BIOCHEMISTRY	2
4	BCH 415	SEMINAR/SPECIAL TOPICS	2
5	BCH 418	IMMUNOLOOGY	1
6	BCH 413	<u>ELECTIVES</u> BIOINORGANIC CHEMISTRY	1
7	BCH 416	INDUSTRIAL BIOCHEM/BIOTECHNOLOGY -1	3
8	BCH 417	PHARMACOLOGICAL BIOCHEMISTRY	2
9	CHE 411	SEPERATION PROCESS 1	2
	TOTAL		16

YEAR FOUR SECOND SEMESTER

S/N	COURSE CODE	COURSE TITLE	COURSE CODE
1	BCH 421	GENETIC ENGINEERING/BIOTECHNOL -11	3
2	BCH 422	BIOSYNTHESIS OF MICROMOLECULES	1
3	BCH 423	METABOLIC REGULATIONS	2
4	BCH 426	ADVANCED METHODS IN BIOCHEMISTRY	2
5	BCH 427	RESEARCH PROJECT	6
6	BCH 424	PLANT BIOCHEMISTRY	2
7	BCH 425	MEDICAL BIOCHEMISTRY	1
8	STA 444	SAMPLING THEORY AND SUVEY METHODS II	2
	TOTAL		17

10.0 COURSE DESCRIPTION

FIRST SEMESTER

BCH 211: General Biochemistry I (2 Units)

Chemistry of amino acids, proteins and their derivatives; methods of isolation and identification acidity and alkalinity, PH and PKa values and their effects on cellular activities; Buffers. Chemistry/Structures of carbohydrates, lipids and nucleic, acids. Primary, Secondary, tertiary and quaternary structures of proteins; determination and biochemical applications of the structures. Nomenclature of nucleosides, and nucleotides; effects of acid and alkali on hydrolysis of nucleic acids. Structures and functions of major cell components; procaryotic versus eukaryotic organisms.

BCH 212: PRACTICALBIOCHEMISTRY-I (1 UNIT) QUALITATIVE ANALYSIS OF CARBOHYDRATES

Qualitative test for identification of carbohydrates, Molisch's Test, Reactions of reducing sugars, Barfoed's test Benedict's test Osazone test, Furfural tests, Bial's test for Pentoses,

Seliwanoffs test for ketoses, quantitative test for polysaccharides, iodine test for polysaccharides, the hydrolysis of polysaccharides, qualitative test for monosaccharides, mucic acid test.

QUALITATIVE ANALYSIS OF AMINO ACIDS

Specific reactions of amino acids and proteins

Biuret reaction, ninhydrin reaction, xanthoprotein reaction, millon's reaction, diazo reaction, fohl's reaction, sakaguchi reaction, pauly's test, aldehyde test, ehrlisch's test, sulphur tes,t molisch's test, sodium nitroprusside test, qualitative analysis of arginine, qualitative analysis of cysteine, qualitative analysis of . histidine, qualitative analysis of tryptophan, qualitative analysis of methionine, qualitative analysis of tyrosine.

GENERAL REACTIONS OF PROTEIN

Solubility, precipitation by neutral salt, solution, precipitation by heavy metals, precipitation by alcohol heat coagulation.

QUALITATIVE EXAMINATION OF LIPIDS

Solubility, oil spot test, emulsification, unsturation test, salkowski's test liberman-burchard test.

BIO 212: INTRODUCTION TO PARASITOLOGY (2 Units)

Introduction to the concept of parasitism, classification of parasites, sources of infection. Modes of infection, effects of parasites. Plant and animal hosts, morphology and life cycles of parasites. Basic concepts in parasite immunology. Basic aspects of environmental parasitology.

BCH 311 Bioenergetics (1 Unit)

High-energy compounds; Chemical potentials. Electrochemical potentials, Electron transport system and oxidative phosphorylation: Regulation of ATP production. Chemical thermodynamics; Oxidations and reductions.

BCH 312 Metabolism of Carbohydrates (2 Units)

Degradation and digestion of carbohydrates sugars. storaze polysaccharides and cell walls. Reactions of sugars. Glycolysis. the Tricarboxylic acid cycle, the phosphogluconate pathway the glyoxylate pathway; the pentose phosphate pathway and the cori cycle: the

calvin pathway. Gluconeogenesis and glyconeozenesis. Disorders of carbohydrate metabolism.

BCH 313 Membrane Biochemistry: (1 Unit)

Structure, composition and functions of biological membranes. Isolation, characterization and classification of membranes: chemistry and biosynthesis of membranes. Molecular organization of membrane components. Natural and artificial membrane bilayers the unit membrane hypothesis membrane transport system -active versus passive transport systems. Transport of sugars and amino acids; ionophores

BCH 314 Metabolism of Amino Acids and Proteins: (2 Units)

Amino acids as building block-proteins; covalent backbone of proteins; Amino acid sequence of proteins. Protein isolation. fractionation, purification and characterization of proteins. Biological functions of proteins. Oxidative degradation of amino acids and metabolism of one carbon units. Biosynthesis of amino acids and. some derivatives; the urea cycle; metabolism of inorganic nitrogen. Disorders of amino acid metabolism.

BCH 315 Metabolism of Lipids: (2 Units)

Classification of lipids - fatty acids, triglycerides, gycosylglyceroles, phospholipids, waxes, prostaglandins. Lipid inicceles, monolagers
bilayers Lipoprptein systelns. Oxidation and synthesis of fatty acids; cholesterol synthesis. Formation of ketone bodies. Integration of lipid meti&'vHsrn. Acetic acid as a central precursor for biosynthesis of lipids

BCII 316 Metabolism of Nucleic Acids (2 Units)

Genome organisation and biosynthesis of proteins. Metabolism of purines and pyrimidines, nucleosides and nucleotides; abnormalities in nucleic acid metabolism-xeroderma pigmentation and skin cancer.

BCH 317 Food and Nutrition Biochemistry: (2 Units)

An introduction to the theory and application of physical and chemical methods for determining the constituents of food. Food processing, preservation and storage of traditional foods - root and stem tubers, fruits and fruit drinks, seeds and grains, green and vegetables. Food poisoning and intoxication; prevention and cure. Food nutrients; Energy values of foods and energy expenditure by mammalians. Nutritive value of foods - carbohydrates, fats, proteins, vitamins, mineral elements and water. Nutritional disorders, prevention and therapy. Nutritional status and nutritional requirements. Recommended dietary allowances. Assessment of nutritional status. Nutrient requirements in relation to Physical, activity and ageing, diet and disease, obesity and under nutrition.

BCH 318 Methods In Biochemistry: (2 Units)

Principles of instrumentation. Principles, methodologies and applications of electrophoresis, Chromatography, thin layer chromatography, spectroscopy and spectrophotometry centrifugation, (and isotopic techniques).

STA 318: STATISTICAL COMPUTING (2 UNITS)

Uses of computers in statistical computing. Introduction to package, word star, word perfect, spread sheets, SYSTAT, D-base, c-stat, MNFTAB, spss, Use of Basic and FORTRAN. Programmes in solving problems.

BCH 319: Enzymology: (3 Units)

Vitamins and co-enzymes. Fat- and water-soluble vitamins. Structures and functions of vitamins and co-enzymes. Classification and nomenclature of enzymes. Genetics of enzymes and inhibition. Mechanisms of enzyme-catalysed reactions. Effects of temperature, pH, ions and inhibitors on enzyme catalysed reactions. MichaelisMenten Equation. Allosteric/Regulatory enzymes. Active sites of enzymes. Estimation of kinetic parameters - enzyme activities, Km, Vmax, Ki etc. Zymogen activation, digestive enzymes etc. Production, isolation, purification and characterization of enzymes. Recent advances in enzymology.

BCH 411: Advanced Enzymology: (2 Units)

Steady state enzyme kinetics, Transcient kinetic methods. Chemistry of enzyme catalysis. Regulatory enzymes. Molecular models for allosterism. Multienzyme complexes. Enzyme assays. Criteria for determining purity of enzymes. Enzyme reconstitution; Regulation of enzyme activity and synthesis.

BCH 412 Biochemical Reasoning: (2 Units)

Evaluation and design of experimental biochemistry from available information and data. Analysis, interpretation and inference drawing from biochemical research data.

BCH 413 Bioinorganic Chemistry: (1 Unit)

Relationship between the physicochemical properties and biological functions of inorganic ions, Ligand complexes and their biochemical significance. Electrolyte metabolism. Nitrogen fixation and sulphur cycle.

BCH 414 Tissue Biochemistry:

Biochemistry of muscles, kidney, liver, and adipose tissues. General metabolism of the brain and neuronal biochemistry. Biochemistry of . reproductive tissues. Detoxification and excretion in tissues.

BCH 415 special Topics/Seminar biochemistry: (2 Units)

Hormones. inununocherriistry, oncology, brain biochemistry, tnonoclonal antibodies. These may be taught or seminars may be given by academic staff and Students.

BCII 416 Biotechnology Genetic Engineering: (2 Units)

Replication, transcription and translation - a brief review. The genetic code and its relationship to cellular functions. DNA replication in a cell-free system. Genetic transformation, transfunction and conjugation. Gene mutation, mutagenic agents and thin applications to gene-jransfer. Gene mapping. Structure of eucaryotic genome. Recombinant DNA and its application. Hybridomas.

BCH 417 Pharmacological Biochemistry: (2 Units)

Cellular metabolism in infected cells. Biochemical aspects of hostparasite relationships. Metabolic factors affecting chemotherapeutic agents. Theories of the mechanism of drug action. Drug resistances and other factors affecting drug efficacy. The physiological and biochemical action of some selected drugs. Nigerian traditional medicinal plants in the management and therapy ofcommon ailments in Nigerian - malaria, sickle cell anaemia, common cold, hepatitis

BCH 418: IMMUNOLOGYAND IMMUNOCHEMISTRY (2 UNITS)

Introduction of immunochemistry: basic definitions cell and organs involved in immunity, immunoglobulin structure and diversity, immunogenicity and antigenic specificity, innate and acquired immunity-features, mechanism and determinants. haptens, artificial and synthetic antigens, immunoglobulin production (mono-clonal and polyclonal). immunoglobulin biosynthesis, the complement systems, immunopathology-hypersensitivity autoimmunity and tissue transplantation, transplantation antigens, mechanism of graft rejection, immunochemical methods- quantization of immune complexes, radio immune assay, elisa, immunoblotting, immunocytochenistry, immunoflourescence.

SECOND SEMESTER

BCII 221: GENERAL BIOCHEMISTRY 11 (2 UNITS)

ENZYMES Introduction to Biological catalysis, nature, functions and classification of enzymes, factors affecting enzymes action, energy metabolism, introductory, bioenergetics/energy- rich compounds, carbohydrate metabolism glycolysis and pentose phosphate pathway, the kreb's cycle and glyoxylate cycle, electron transport and oxidative phosphorylation.

SEPARATION OF MACROMOLECULES

Chromatographic methods: thin layer chromatograph, Gel Filtration,

Ion Exchange, Chromatography, A Hinity chromatography, Electrophoretic methods: Nucleic acid gel electrophoresis, Electrophoretic Sizing of proteins, Isoelectric Focusing.

BCH 222: PRACTICAL BIOCHEMISTRY 11 (2 UNITS)

EXPT 1: Estimation of Amino Acid by Sorenson's Formol Titration

EXPT2: Estimation of glucose by Benedict's quantitative reagent

EXPT3: Estimation of Ascorbic Acid by Titrimetric method

EXPT4: Determination of Acid number of edible oil

EXPT5: Determination of Saponification number of edible oil

EXPT 6: Estimation of chloride by Mohr's method

EXPT7: Determination of Iodine Number of Edible Oils

EXPT8: The solubility of lipids

EXPT9: Test for the Glycerol

EXPT 10: Test for the presence of unsaturated fatty acids

QUANTITATIVE ANALYSIS OF LIPIDS

Experiment 11: The Determination of Acid Value of Fat

Experiment 12: The Saponification Value of a fat

Experiment 13: The Liebermann-Burchard Reaction

Experiment 14: The Formaldehyde Test

PRECIPITATION OF PROTEINS

Precipitation by heating, Precipitation by mineral acids, Precipitation by ethanol, Precipitation by salts of heavy metals, Chromatography of amino acids, Separation of proteins: gel-filtration, Determination of lsoeletric point of proteins.

ENZYMES

Effects of pH on enzyme activity, Specific reactions for the recognition of some enzymes.

VITAMINS

Reactions for the recognition of vitamins B1 B2 B6 C, PP, 25. Determination of the amount of ascorbic acid in urine.

BCH 223: PHYSIOLOGY (2 UNITS)

Body fluid and electrolyte balance, Body fluid compartments, Buffer mechanism and pH regulation, Blood formation, functions, Cell structure and function, Physio-chemical properties of cell membrane, transfer process and bio-electric activity, Oxygen and Carbon (iv) oxide, Introduction to central Nervous system.

BCH 321: STUDENTS INDUSTRIAL WORK EXPERIENCE SCHEME (SIWES) (6 UNITS) Students will be attached to industrial organizations for 6 months

BCH 421 Industrial Biochemistry: (3 Units)

A short review of microbial physiology and genetics. A review off general metabolic pathways and application in industrial processes. Continuous culture methods, principles and applications. The chemostat and its application in industrial fermentations. Fermentations alcoholic, amino acid antibiotics and other secondary metabolites. Primary and secondary metabolism. Process evaluation and development. Over production of metabolites - amino acids. taste enhancers. vitatlltns. toxin etc. tethods for screenine and selectine tnicro-oreatustus of industrial itnportance. Induction of nmtation in micro-opaanistll and plants for the pumose ot- over production; Strain selection development and enhancetnent. Gene dosage and its application in industrial processes.

BCH 422 Biosynthesis of Macrotuolecules: (1 Unit)

Structure and functions of macromolecules. Storage and structural polysaccharides; mucopolysaceharides. elyeoproteins. bacterial cell wall synthesis ofcomplex lipids. lippoproteins and nucleic acids.

BCH 424 Metabolic Regulations: (2 Units)

The relationship of Krebs[1] Cycle to protein, carbohydrate. lipid and nucleic acids metabolism. Integration of nwtabolie pathways. Turnover rates and metabolic pools. Regulation of.enzymes of metabolic pathways-feedback inhibition versus enzyme synthesis. Catabolite repression, end product repression, the lactose opero and arabinose operon Identification of different rugulatory mechanism in metabolic

BCH 425 Plant Biochemistry: (2Units)

Organization of plant cells, photosynthesis, alkaloids and flavonoids, Plant hormones. Biosynthesis of carotenoid Pigments, Biochemistry of Plant Development. The plant cell wall structure, formation and growth. Lignin formation. Free amino acids, pyrimidines, purines and nucleosides in plants. Metabolism of auxins, gibberelins and cytokinins. Synthetic growth regulators and herbicides. Structupe function relationship ofplant hormones.

BCH 426: MEDICAL BIOCHEMISTRY (I UNIT)

Biochemical mechanisms ofdrug actions, Blood- brain barrier, Type of parasitic protozoa, Methods of control of parasitic diseases, techniques for the isolation of parasitic protozoa. Action potentials, Sodium channel blockers, Neurotransmitters and chemoreceptors,

Biochemistry/Neurological diseases and chemotherapy, Hormones: Biochemistry and molecular mechanism of action, cyclic AMP.

Hormone receptors: isolation and properties, Diabetes mellitus and hypoglycaelnia, insulin, glucagons and other hormones controlling carbohydrate metabolism, Hormones of the hypophysis, biochelnistry and functions of Adrenalin and Noradrenaline, Thyroid hormones, steroid hormones glucocorticoids.

BCH 427 Advanced Biochemical Methods (2 Units)

The purpose of this course is to familiarise students with operations of latest biochemical equipment and with methods of research, assimilation and dissemination of information. Students will go therefore round lecturers and laboratories housing specialized equipment with the aim of exposing them to such equipment under the supervision of lecturer. Part of the course will also cover the effective use of the library, preparation of dissertations or theses, papers for journal publications) Mass Spectrometry, Flame Photometer, Ultra Centrifugation, Electro Analytical Methods, Potentiometer, Voltametry, Polarimetry, Polarometry, Circular Dichromism, Optical Rotation, Isoelectric Focusing, Radioactivity, Infra-red Spectroscopy, Visicometers

STA 444: SAMPLING - THE THEORY AND SURVEY METHODS 11(2 UNITS)
Ratio, Regression and Difference estimation procedures. Double Sampling. Interpreting Scheme. Multiphase and Multistage Sampling, Cluster Sampling with unequal sizes, problems of optimal allocation with more than one item. Further stratified sampling.

BCH 429: UNDERGRADUATE RESEARCH PROJECT (6 UNITS)
Research problems involving laboratory work in an area of interest. Supervisors are assigned to students. Research is to be carried out in the first and second semesters of the final year.

11.0 Research Project Report
Research project topics and proposals
The supervisor will circulate a list of research topics to the students at the beginning of the Ist semester of the academic session. The supervises will then choose their topics from the pool based on their areas of interest. The students will then be encouraged and guided to develop brief research proposals on the topic chosen. The supervisor must ensure that the research proposals state clearly the aims/objectives of the research, the rationale for it and the projected benefits to the society or our environment. Undergraduate research projects must be simple to execute in our laboratories. Projects that require sophisticated equipment located in outside institutions or organizations should be discouraged by supervisors.

In the few isolated cases where research projects must be executed outside the department, the express approval of the HOD must be obtained. Again, undergraduates should avoid projects involving highly hazardous materials such as radioisotopes, carcinogens, teratogens, pathogenic bacteria, and viruses. The actual bench-work on the research projects must span the 1st and 2nd semesters of each academic session.

b. Word processing of report

The research project report should be word processed using A-4 sized paper double spacing, and font size of 12. Scientific reports should be in the passive voice. The sample format for the project report shall be

TITLE PAGE

THE INFLUENCE OF LONG CHAIN POLYUNSA'I'URA'I'EI) FATTY ACIDS ON IMMUNE SYSTEM IN INFANCY

BY

MARY ZULIKE BROWN
BC/2005/053

SUBMITTED

To

THE DEPARTMENT OF BIOCHEMISTRY
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
AWARD OF A BACHELOR OF SCIENCE (B.sc) DEGREE IN BIOCHEMISTRY
CARITAS UNIVERSITY, AMORJI-NIKE ENUGU

JULY, 2005

APPROVAL PAGE

This is to certify that this research project titled "THE INFLUENCE OF LONG CHAIN POLYUNSATURATED FATTY ACIDS ON THE IMMUNE SYSTEM IN INFANCY" submitted by Mary Zulike Brown for the award of a Bachelor of Science (B.Sc) degree in Biochemistry of Caritas University, Amorji-Nike, Enugu is a bonafide record of research work carried out by her under my

supervision.

Dr. Ikpe Vitalis (Supervisor)	Date
Associate Prof. J.K. Emch (Head of Department)	Date
External Examiner	Date

Iii **DEDICATION**

This project is dedicated to all the uncelebrated researchers who toil tirelessly to coin bat global protein jnalntltrition,

ACKNOWLEDGMENI'

Here the researcher should thank his supervisor and other staff of the Department, all collaborators on the project and others who rendered Immaterial and supports.

LIST OF TABLES AND FIGURES

Page

'I'ABLE OF CON'I'EN'I'S

vii.

ABSTRACT

This should be a concise report of the methods used in the project and the total findings and conclusions. Statistical inferences must be clearly stated. Abstract should not be more than 1 words

vii. CHAPTER ONE: INTRODUCTION

This introduction shall include a clear statement of the probJcm, the rationale for the project and its objectives.

viii. CHAPTER TWO: LITERATURE REVIEW

In this chapter, relevant information concerning the subject matter/title is obtained from literature- previous studies, journals, books in the internet.

ix. CHAPTERTHREEMATERIALSAND METHODS

All the reagents, chemicals, equipment and materials used in the project are succinctly reported. The details of the methods and techniques used in the experiments are fully described. The, Ph of buffers, reaction times, temperatures etc. are clearly indicated in the protocols.

x. RESULTS

The major findings from the research project are reported. Graphs, tables, histograms, plates, chromatograms, electrphoregrams, etc. are used to present the results where applicable, Legends are used to explain the illustrations.

xi. DISCUSSION/CONCLUSION

Every effort should be made to avoid repeating the results in the discussion. Rather the implications of the result and conclusions from them are clearly described. The results obtained may also be compared with data from Literature.

xii. REFERENCES

All the references cited in the text should appear in the list of references. The collolary is that all references in the list of references must be cited in the text. References should appear in alphabetical order.