

UNIVERSITY OF NIGERIA, NSUKKA
FACULTY OF BIOLOGICAL SCIENCES
DEPARTMENT OF BIOCHEMISTRY POSTGRADUATE PROGRAMME
Academic Masters (M.Sc.) and Doctor of Philosophy (Ph.D.)

Brief history of the Department

The University of Nigeria Senate's approval of a degree programme in Biochemistry was given on March 26th, 1971. The commencement of the degree was authorized with effect from the 1971/72 academic year. At inception, the Department was located in one room at the second floor of Carver Building. The Department had as its first academic staff, Dr. A. U. Ogan (later Professor Ogan) as pioneer Head of Department, Dr. E. N. Ugochukwu (later Professor Ugochukwu), Mr. E. O. Anosike (later Professor Anosike), Mr. S. I. O. Agogbua (now late), Mr. E. I. Mbadiwe (later Dr. Mbadiwe), Mr. M. O. Eze (later Professor Eze), Mr. I. C. Ononogbu (later Professor Ononogbu of blessed memory), Mr. G. O. Osuji (later Professor Osuji), and Miss G. Amadi (later Professor Mrs. G. Njemanze of blessed memory).

The honours degree programme in Biochemistry started with the above members of academic staff and presently there are thirty two members of academic staff and twenty members of administrative/technical staff.

Postgraduate programme in the Department

Postgraduate programme in Biochemistry was approved in the year 1977. The approved programmes of the Department are Master of Science (M.Sc) and Doctor of philosophy (Ph.D) in Biochemistry.

Philosophy and objectives of the Departmental Postgraduate programme

The Department of Biochemistry aims at producing M.Sc and Ph.D graduate biochemists who are not only equipped with knowledge in all the modern aspects of the discipline, but are also poised to meet needs of Nigeria in particular and Africa in general in their area of specialty. Thus, the programme lays much stress on such locally important topics as Nutritional and Food Biochemistry; Pharmacological and biochemical basis of diseases and chemotherapy, including biochemical studies on African traditional medicine; Medical Biochemistry and human biochemical genetics, particularly with respect to the West African sub-region; Lipids and lipoproteins; Industrial Biochemistry and Biotechnology; Bioremediation and Environmental Biochemistry; Enzymology and Protein Chemistry, Molecular Biology and Bioinformatics.

Scope of the Programme

The Department offers postgraduate programmes leading to the awards of Master of Science and Doctor of Philosophy degrees in Biochemistry. The areas of specialization include Enzymology

and Protein Chemistry, Industrial Biochemistry and Biotechnology, Environmental Biochemistry, Medical Biochemistry, Pharmacological Biochemistry, Nutritional and Food Biochemistry, Molecular Biology and Bioinformatics.

Entry requirements for degree of Masters

To qualify for a Master's degree in the Department, the candidate must be a graduate of the University of Nigeria or of other recognized Universities who have obtained the approved degree of bachelor with a least a second class honours (lower division) with GPA not less than 2.50 on a 5-point scale or its equivalent.

Master's/Ph.D programme

A candidate with first class honours bachelor's degree from a recognized University may be admitted into a Master's/PhD programme

Entry requirements for Ph.D programme

Candidates for Ph.D programme must have academic Master's degree in relevant areas with a minimum CGPA of 3.0 on a 4- point scale or 3.5 on a 5- point scale or 60% and Project score not lower than 60% B

Mode of Study

The mode of the M.Sc programme is two-thirds coursework and one-third research project. The PhD is undertaken through coursework presented as seminars on contemporary and topical issues in the course of study and an original research embodied in thesis. The first 2 semesters of the Doctoral programme is for course work and written examination and the remaining sessions for thesis, seminars and orals.

Duration of Programme:

- (i) Full time M.Sc Programme is a minimum of 3 semesters (18 months) and a maximum of 5 semesters (30 months) while Part-time programme is a minimum of 5 semesters or a maximum of 8 semesters.
- (ii) Full-time M.Sc/Ph.D Programme is a minimum of 8 semesters or a maximum of 12 semesters (72 months) while Part-time PhD is a minimum of 10 semesters (60 months) and a maximum of 14 semesters.
- (iii) Full-time Ph.D Programme is a minimum of 6 semesters (36 months) or a maximum of 10 semesters (60 months) while Part-time PhD is a minimum of 8 semesters (48 months) and a maximum of 12 semesters (72 months).

Employment opportunities

The Department produces world class postgraduate Biochemists in various areas/fields as Enzymologists, Industrial and Environmental Biochemists, Medical Biochemist, Pharmacological Biochemist, Molecular Biologist, Nutritional and Food Biochemist, who can compete favourably and globally with other M.Sc and PhD graduates of other Universities across the world. The postgraduates of Biochemistry can take up positions in food and drug Industries, food and drug regulatory agencies, pharmaceutical companies, environmental and pollution control agencies; research and teaching positions in research Institutes and Universities.

List of Approved Supervisors

O.U. Njoku, B.Sc., M.Sc., Ph.D (Nig).	Professor
I. N. E. Onwurah, B.Sc. (Lagos), M.Sc., Ph.D (Nig).	Professor
F. C. Chilaka, B.Sc., M.Sc., Ph.D (Nig).	Professor
L. U. S. Ezeanyika, B.Sc., M.Sc., Ph.D (Nig,)	Professor
H. A. Onwubiko, B.Sc. (Indiana), M.Sc. (Colorado) Ph.D (Nig).	Professor
B. C. Nwanguma, B.Sc., M.Sc., Ph.D (Nig), M.Sc. (Wmin).	Professor
S. O. O. Eze, B.Sc., M.Sc., Ph.D (Nig)	Professor
O. C. Enechi, B.Sc., M.Sc., Ph.D (Nig)	Senior Lecturer
V. N. Ogugua, B.Sc., M.Sc., Ph.D (Nig)	Senior Lecturer
C. S. Ubani, B.Sc., M.Sc., Ph.D (Nig).	Senior Lecturer
C. A, Anosike, B.Sc., M.Sc., Ph.D (Nig),	Senior Lecturer
V. E. O. Ozougwu, B.Sc., M.Sc., Ph.D (Nig).	Senior Lecturer
U. O. Njoku, B.Sc., M.Sc. Ph.D (Nig).	Senior Lecturer
P. E. Joshua, B.Sc. (PH), M.Sc., Ph.D (Nig).	Senior Lecturer
E.C. Ossai, B.Sc., M.Sc. (Nig), M.Sc., (Hokkaido), Ph.D (Tsukuba)	Lecturer I
C. C. Nkwocha, B.sc (ABSU), M.Sc, Ph.D (Nig)	Lecturer II
F. N. Nworah, B.Sc., M.Sc., Ph.D (Nig)	Lecturer II
A. L. Ezugwu B.Sc., M.Sc. Ph.D (Nig). M.Sc. (Nottingham)	Lecturer II
E. G. Anaduaka, B.Sc., M.Sc. Ph.D (Nig).	Lecturer II

Areas of Specialization

Masters Degrees

- M. Sc. (Environmental Biochemistry)
- M.Sc. (Enzymology)
- M. Sc. (Industrial Biochemistry & Biotechnology)
- M. Sc. (Medical Biochemistry)
- M. Sc. (Nutritional Biochemistry)
- M. Sc. (Molecular Biology)
- M. Sc. (Pharmacological Biochemistry)

M. Sc. (Protein Chemistry)
 M. Sc. (Lipid Biochemistry)
 M. Sc. (Plant Biochemistry)

Doctor of Philosophy (Ph.D)

Ph.D. (Enzymology)
 Ph.D. (Industrial Biochemistry & Biotechnology)
 Ph.D. (Medical Biochemistry)
 Ph.D. (Nutritional Biochemistry)
 Ph.D. (Pharmacological Biochemistry)
 Ph.D. (Environmental Biochemistry)
 Ph.D. (Molecular Biology and Biotechnology)

Stress Areas

General/Fundamental courses	0
Enzymology	0
Molecular Biology	1
Medical	2
Pharmacological	2
Nutritional	4
Metabolism	5
Industrial/Biotechnology	7
Environmental	7
Techniques	8
Seminar	9
Project	9

M.Sc Taught Courses

Course Code	Title	Units
PGC 601	Research methodology and application of ICT in research	3
PGC 603	Management And Entrepreneurship	3
BCH 601	Current Concepts In Enzymology	3
BCH 602	Protein Biochemistry	3
BCH 610	Molecular Biology And Biotechnology	3
BCH 621	Membrane Biochemistry	3
BCH 622	Medical Biochemistry	3
BCH 623	Advanced Pharmacological Biochemistry	3

BCH 641	Special Topics In Nutritional Biochemistry	3
BCH 651	Advanced Metabolism And Regulation	3
BCH 671	Advanced Industrial Biochemistry	3
BCH 672	Special Topics In Environmental Biochemistry	3
BCH 680	Research Techniques In Biochemistry	3
BCH 681	Biostatistics	3
BCH 682	Biochemical Reasoning	3
BCH 691	Seminar	3
BCH 690	Research Project	6

M.Sc (Environmental Biochemistry)

General Courses

PGC 601: Research methodology and application of ICT in research	3 Units
PGC 603: Management and Entrepreneurship	3 Units
Sub-Total	6 Units

Core courses

First Semester

BCH 601: Current Concepts in Enzymology	3 Units
BCH 651: Advanced Metabolism and Regulation	3 Units
BCH671: Advanced Industrial Biochemistry	3 Units
BCH 681: Biostatistics	3 Units
BCH 691: Seminar	3 Units

Second Semester

BCH 610: Molecular Biology and Biotechnology	3 Units
BCH 672: Special Topics in Environmental Biochemistry	3 Units
BCH 680: Research Techniques in Biochemistry	3 Units
BCH 682: Biochemical Reasoning	3 Units
BCH 690: Research Project	6 Units

Sub-Total **33 Units**

Grand-Total **39 Units**

M.Sc. (Enzymology)

General Courses

PGC 601: Research methodology and application of ICT in research	3 Units
PGC 603: Management and Entrepreneurship	3 Units

Sub-Total	6 Units
Core courses	
First Semester	
BCH 601: Current Concepts in Enzymology	3 Units
BCH 651: Advanced Metabolism and Regulation	3 Units
BCH671: Advanced Industrial Biochemistry	3 Units
BCH 681: Biostatistics	3 Units
BCH 691: Seminar	3 Units
Second Semester	
BCH 602: Protein Biochemistry	3 Units
BCH 610: Molecular Biology and Biotechnology	3 Units
BCH 680: Research Techniques in Biochemistry	3 Units
BCH 682: Biochemical Reasoning	3 Units
BCH 690: Research Project	6 Units
Sub-Total	33 Units
Grand-Total	39 Units

M.Sc (Industrial Biochemistry)

General Courses

PGC 601: Research methodology and application of ICT in research	3 Units
PGC 603: Management and Entrepreneurship	3 Units

Sub-Total **6 Units**

Core courses

First Semester

BCH 601: Current Concepts in Enzymology	3 Units
BCH623: Advanced Pharmacological Biochemistry	3 Units
BCH 651: Advanced Metabolism and Regulation	3 Units
BCH671: Advanced Industrial Biochemistry	3 Units
BCH 681: Biostatistics	3 Units
BCH 691: Seminar	3 Units

Second Semester

BCH 610: Molecular Biology and Biotechnology	3 Units
BCH 680: Research Techniques in Biochemistry	3 Units
BCH 682: Biochemical Reasoning	3 Units
BCH 690: Research Project	6 Units

Sub-Total **33 Units**

Grand-Total **39 Units**

M.Sc. (Medical Biochemistry)**General Courses**

PGC 601: Research methodology and application of ICT in research 3 Units

PGC 603: Management and Entrepreneurship 3 Units

Sub-Total 6 Units**Core courses****First Semester**

BCH 601: Current Concepts in Enzymology 3 Units

BCH623: Advanced Pharmacological Biochemistry 3 Units

BCH 651: Advanced Metabolism and Regulation 3 Units

BCH 681: Biostatistics 3 Units

BCH 691: Seminar 3 Units

Second Semester

BCH 610: Molecular Biology and Biotechnology 3 Units

BCH 622: Medical Biochemistry 3 Units

BCH 680: Research Techniques in Biochemistry 3 Units

BCH 682: Biochemical Reasoning 3 Units

BCH 690: Research Project 6 Units

Sub-Total 33 Units**Grand-Total 39 Units****M.Sc. (Molecular Biology)****General Courses**

PGC 601: Research methodology and application of ICT in research 3 Units

PGC 603: Management and Entrepreneurship 3 Units

Sub-Total 6 Units**Core courses****First Semester**

BCH 601: Current Concepts in Enzymology 3 Units

BCH 651: Advanced Metabolism and Regulation 3 Units

BCH 681: Biostatistics 3 Units

BCH 691: Seminar 3 Units

Second Semester

BCH 602: Protein Biochemistry 3 Units

BCH 610: Molecular Biology and Biotechnology 3 Units

BCH 622: Medical Biochemistry	3 Units
BCH 680: Research Techniques in Biochemistry	3 Units
BCH 682: Biochemical Reasoning	3 Units
BCH 690: Research Project	6 Units
Sub-Total	33 Units
Grand-Total	39 Units

M.Sc. (Nutritional Biochemistry)

General Courses

PGC 601: Research methodology and application of ICT in research	3 Units
PGC 603: Management and Entrepreneurship	3 Units
Sub-Total	6 Units

Core courses

First Semester

BCH 601: Current Concepts in Enzymology	3 Units
BCH 641: Special Topics in Nutritional Biochemistry	3 Units
BCH 651: Advanced Metabolism and Regulation	3 Units
BCH671: Advanced Industrial Biochemistry	3 Units
BCH 681: Biostatistics	3 Units
BCH 691: Seminar	3 Units

Second Semester

BCH 610: Molecular Biology and Biotechnology	3 Units
BCH 680: Research Techniques in Biochemistry	3 Units
BCH 682: Biochemical Reasoning	3 Units
BCH 690: Research Project	6 Units
Sub-Total	33 Units
Grand-Total	39 Units

M.Sc. (Pharmacological Biochemistry)

General Courses

PGC 601: Research methodology and application of ICT in research	3 Units
PGC 603: Management and Entrepreneurship	3 Units
Sub-Total	6 Units

Core courses

First Semester

BCH 601: Current Concepts in Enzymology	3 Units
BCH 623: Advanced Pharmacological Biochemistry	3 Units
BCH 651: Advanced Metabolism and Regulation	3 Units

BCH 681: Biostatistics	3 Units
BCH 691: Seminar	3 Units
Second Semester	
BCH 610: Molecular Biology and Biotechnology	3 Units
BCH 672: Special Topics in Environmental Biochemistry	3 Units
BCH 680: Research Techniques in Biochemistry	3 Units
BCH 682: Biochemical Reasoning	3 Units
BCH 690: Research Project	6 Units
Sub-Total	33 Units
Grand-Total	39 Units

M. Sc. (Protein Chemistry)

General Courses

PGC 601: Research methodology and application of ICT in research	3 Units
PGC 603: Management and Entrepreneurship	3 Units
Sub-Total	6 Units

Core courses

First Semester

BCH 601: Current Concepts in Enzymology	3 Units
BCH 651: Advanced Metabolism and Regulation	3 Units
BCH671: Advanced Industrial Biochemistry	3 Units
BCH 681: Biostatistics	3 Units
BCH 691: Seminar	3 Units

Second Semester

BCH 602: Protein Biochemistry	3 Units
BCH 610: Molecular Biology and Biotechnology	3 Units
BCH 680: Research Techniques in Biochemistry	3 Units
BCH 682: Biochemical Reasoning	3 Units
BCH 690: Research Project	6 Units
Sub-Total	33 Units
Grand-Total	39 Units

M. Sc. (Lipid Biochemistry)

General Courses

PGC 601: Research methodology and application of ICT in research	3 Units
PGC 603: Management and Entrepreneurship	3 Units
Sub-Total	6 Units

Core courses**First Semester**

BCH 601: Current Concepts in Enzymology	3 Units
BCH623: Advanced Pharmacological Biochemistry	3 Units
BCH 651: Advanced Metabolism and Regulation	3 Units
BCH 681: Biostatistics	3 Units
BCH 691: Seminar	3 Units

Second Semester

BCH 610: Molecular Biology and Biotechnology	3 Units
BCH 622: Medical Biochemistry	3 Units
BCH 680: Research Techniques in Biochemistry	3 Units
BCH 682: Biochemical Reasoning	3 Units
BCH 690: Research Project	6 Units

Sub-Total **33 Units**

Grand-Total **39 Units**

M. Sc. (Plant Biochemistry)**General Courses**

PGC 601: Research methodology and application of ICT in research	3 Units
PGC 603: Management and Entrepreneurship	3 Units

Sub-Total **6 Units**

Core courses**First Semester**

BCH 601: Current Concepts in Enzymology	3 Units
BCH 623: Advanced Pharmacological Biochemistry	3 Units
BCH 651: Advanced Metabolism and Regulation	3 Units
BCH 681: Biostatistics	3 Units
BCH 691: Seminar	3 Units

Second Semester

BCH 610: Molecular Biology and Biotechnology	3 Units
BCH 672: Special Topics in Environmental Biochemistry	3 Units
BCH 680: Research Techniques in Biochemistry	3 Units
BCH 682: Biochemical Reasoning	3 Units
BCH 690: Research Project	6 Units

Sub-Total **33 Units**

Grand-Total **39 Units**

Ph.D Programmes

Course Code	Title	Units
PGC 701	Research grant writing	3
PGC 703	Synopsis and Scientific paper writing techniques	3
BCH 701	Special Topics in Enzymology	3
BCH 702	Special Topics in Protein Biochemistry	3
BCH 710	Special Topics in Molecular Biology and Biotechnology	3
BCH 722	Special topics in Medical Biochemistry	3
BCH 723	Special Topics in Pharmacological Biochemistry	3
BCH 741	Special Topics in Nutritional Biochemistry	3
BCH 751	Special Topics in Advanced Metabolism and Regulation	3
BCH 771	Special Topics in Industrial Biochemistry	3
BCH 772	Special Topics in Environmental Biochemistry	3
BCH 791	Special Seminar I	3
BCH 792	Special Seminar II	3
BCH 790	Doctorate degree (Ph.D). Thesis	12

Ph.D (Environmental Biochemistry)

Credit Units

General courses

PGC 701: Research grant writing 3 units

PGC 703: Synopsis and Scientific paper writing techniques 3 units

Sub- total 6 units

Core courses

First Semester

BCH 701: Special Topics in Enzymology 3 units

BCH 751: Special Topics in Advanced Metabolism and Regulation 3 units

BCH 791: Special Seminar I 3 units

Second Semester

BCH 710: Special Topics in Molecular Biology and Biotechnology 3 units

BCH 772: Special Topics in Environmental Biochemistry 3 units

BCH 792: Special Seminar II 3 units

BCH 790: Doctorate degree (Ph.D). Thesis 12 units

Sub- total 30 units

Grand Total

36 units

Ph.D (Enzymology)

General courses

PGC 701: Research grant writing 3 units

PGC 703: Synopsis and Scientific paper writing techniques	3 units
Sub- total	6 units

Core courses

First Semester

BCH 701: Special Topics in Enzymology	3 units
BCH 751: Special Topics in Advanced Metabolism and Regulation	3 units
BCH 791: Special Seminar I	3 units

Second Semester

BCH 702: Special Topics in Protein Biochemistry	3 units
BCH 710: Special Topics in Molecular Biology and Biotechnology	3 units
BCH 792: Special Seminar II	3 units
BCH 790: Doctorate degree (Ph.D). Thesis	12 units

Sub- total	30 units
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Grand Total	36 units
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Ph.D (Industrial Biochemistry)

General courses

PGC 701: Research grant writing	3 units
PGC 703: Synopsis and Scientific paper writing techniques	3 units

Sub- total	6 units
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Core courses

First Semester

BCH 701: Special Topics in Enzymology	3 units
BCH 751: Special Topics in Advanced Metabolism and Regulation	3 units
BCH 771: Special Topics in Industrial Biochemistry	3 units
BCH 791: Special Seminar I	3 units

Second Semester

BCH 710: Special Topics in Molecular Biology and Biotechnology	3 units
BCH 792: Special Seminar II	3 units
BCH 790: Doctorate degree (Ph.D). Thesis	12 units

Sub- total	30 units
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Grand Total	36 units
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Ph.D (Medical Biochemistry)

General courses

PGC 701: Research grant writing	3 units
PGC 703: Synopsis and Scientific paper writing techniques	3 units

Sub- total	6 units
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Core courses**First Semester**

BCH 701: Special Topics in Enzymology	3 units
BCH 751: Special Topics in Advanced Metabolism and Regulation	3 units
BCH 791: Special Seminar I	3 units

Second Semester

BCH 710: Special Topics in Molecular Biology and Biotechnology	3 units
BCH 722: Special Topics in Medical Biochemistry	3 units
BCH 792: Special Seminar II	3 units
BCH 790: Doctorate degree (Ph.D). Thesis	12 units
Sub- total	30 units
Grand Total	36 units

Ph.D (Molecular Biology and Biotechnology)**General courses**

PGC 701: Research grant writing	3 units
PGC 703: Synopsis and Scientific paper writing techniques	3 units
Sub- total	6 units

Core courses**First Semester**

BCH 701: Special Topics in Enzymology	3 units
BCH 751: Special Topics in Advanced Metabolism and Regulation	3 units
BCH 791: Special Seminar I	3 units

Second Semester

BCH 702: Special Topics in Protein Biochemistry	3 units
BCH 710: Special Topics in Molecular Biology and Biotechnology	3 units
BCH 792: Special Seminar II	3 units
BCH 790: Doctorate degree (Ph.D). Thesis	12 units
Sub- total	30 units
Grand Total	36 units

Ph.D (Nutritional Biochemistry)**General courses**

PGC 701: Research grant writing	3 units
PGC 703: Synopsis and Scientific paper writing techniques	3 units

Sub- total	6 units
Core courses	
First Semester	
BCH 701: Special Topics in Enzymology	3 units
BCH 741: Special Topics in Nutritional Biochemistry	3 units
BCH 751: Special Topics in Advanced Metabolism and Regulation	3 units
BCH 791: Special Seminar I	3 units
Second Semester	
BCH 710: Special Topics in Molecular Biology and Biotechnology	3 units
BCH 792: Special Seminar II	3 units
BCH 790: Doctorate degree (Ph.D). Thesis	12 units
Sub- total	30 units
Grand Total	36 units

Ph.D (Pharmacological Biochemistry)

General courses

PGC 701: Research grant writing	3 units
PGC 703: Synopsis and Scientific paper writing techniques	3 units

Sub- total **6 units**

Core courses

First Semester

BCH 701: Special Topics in Enzymology	3 units
BCH 723: Special Topics in Pharmacological Biochemistry	3 units
BCH 751: Special Topics in Advanced Metabolism and Regulation	3 units
BCH 791: Special Seminar I	3 units

Second Semester

BCH 710: Special Topics in Molecular Biology and Biotechnology	3 units
BCH 792: Special Seminar II	3 units
BCH 790: Doctorate degree (Ph.D). Thesis	12 units

Sub- total **30 units**

Grand Total **36 units**

Course Outline

PGC 601: Research methodology and application of ICT in research [3 Units]

In-depth research work aimed at acquiring full knowledge and presentations in scholarly writing of the concepts, issues, trends in the definition and development of the study area from African and Western perspectives. Major steps in research: selection of problem, literature review, design, data collection, analysis and interpretation, conclusions. Study of various research designs, historical, case studies, survey, descriptive, cross sectional, experimental, etc. Analysis, surveys and synthesis of conceptual and philosophical foundations of different disciplines.

Identification of research problems and development of research questions and or hypotheses. Detailed treatment of methods of collecting relevant research data and the format for presenting research results (from designing the table of contents to referencing, bibliography and appendix). Data analysis and result presentation in different disciplines using appropriate analytical tools. Methods of project/ dissertation writing. Application of appropriate advanced ICT tools relevant in every discipline for data gathering, analysis, and result presentation. Essentials of spreadsheets, internet technology, internet search engines, statistical packages, precision and accuracy of estimates, principles of scientific research, concepts of hypothesis formulation and testing, organization of research and report writing. All registered Masters Degree students must attend a solution-based interactive workshop to be organized by the School of Postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

PGC 603: Management and Entrepreneurship [3 Units]

The course will cover business environment, general management, financial management, entrepreneurship development, feasibility studies, marketing and managerial problem solving.

BCH 601: Current Concepts in Enzymology [3 Units]

General introduction: Kinetics and Catalysis. Assay, isolation and purification of Enzymes. Enzyme production. Single substrate enzyme models: Rapid equilibrium assumption and Steady State Assumption, Transient kinetics: Stopped flow and Relaxation Techniques. Multi-substrate enzyme models: Kinetic mechanisms, product inhibition and isotope exchange reactions. Kinetics of the effect of pH and Temperature on enzyme catalysis. The enzyme active site: Models. Residues/groups. Investigation of active site structure by X-ray crystallography, chemical modification, pH effects and site-directed mutagenesis. Chemical nature of enzyme catalysis Enzyme reaction mechanisms: Ribonuclease, lysozyme, Proteases, etc. Multi-enzyme systems: Keto-acid dehydrogenases, etc Ligand binding to proteins: Independent sites and hyperbolic curves. Sigmodity and cooperativity. Adair equations and Hill plots. Determination of ligand binding sites: equilibrium dialysis, etc . Scatchard plots. Allosteric transitions: Models – MWC, KNF and morpheein.ATCase
Recent advances in Enzymology and Protein Chemistry.

BCH 602: Protein Biochemistry [3 Units]

Overview of protein structure. Protein isolation and characterization. Protein receptors. Transport Proteins. Protein diseases. Binding proteins. Protein folding. Infectious proteins. Post-translational processing of protein. Protein modeling. Role of Reactive Oxygen Species in disease onset and progression. Proteomics.

BCH 622: Medical Biochemistry [3 Units]

Biochemical concept of clinical/disease state.. Biochemical diagnosis. Biochemical basis of some diseases (gout, anaemia, etc). Biochemical complications of selected tropical infectious diseases. Selected metabolic diseases. Disorders of carbohydrates and lipid metabolism. In-borne errors of metabolism. Inflammatory and immunological diseases. Diseases of the liver and heart. Diseases of blood/haemoglobin The biochemistry of cancer. Chemotherapy. Role of reactive oxygen species in disease onset and progression Reactive oxygen species in microbial potencies: Phagocytes, respiratory burst, oxidative killing and relationship to chronic granulomatous diseases (CDG) ROS – scavengers and antioxidants in protection against (therapeutic interrentionsin) inflammation and diseases. Free radicals in drugs and herbal action.

BCH 623: Advanced Pharmacological Biochemistry [3 Units]

Mode of action of drugs, mechanism and kinetics of drug action. Enzyme inhibitors as drugs. Structure activity relationship. Biotransformation. Pharmacogenetics. Chemistry of neural function. Autacoids and cellular control. Toxicology. Toxicity testing. Adverse drug reactions. Immunopharmacology. Plants as sources of drugs. Isolation and characterization of active compounds from plants. Current topics in pharmacology and crude drug research. Traditional medicine.

BCH 641: Special Topics in Nutritional Biochemistry [3 Units]

The Concept of the Balanced Diet, food supplementation and fortification, etc. World Food situation, as determined by production, distribution, consumption, population and poverty. Food Policy and Food security: Concept and definition Nutrition through the life cycle: Childhood nutrition, nutrition through adolescence, nutrition during pregnancy, Nutritional needs of the aged, etc. Diet and Diseases: role of nutrition in aetiology of diabetes, obesity, hypertension, atherosclerosis and cancer Oxidative stress and nutritional antioxidants in human health and diseases: Role of oxidative stress and antioxidants in aetiology and prevention of human diseases Functional foods and Nutritional therapy: Nutraceuticals, probiotics, organic foods, etc. Nutrigenetics and Nutrigenomics Food Quality and Safety: health effects of common toxins, allergens, contaminants and additives found in food. Concerns about expired and fake foods; GM Foods, etc. Food Standardization and Regulation: International food standards (CODEX Alimentarius); National Food Regulatory Agencies, NAFDAC, etc. Research and analytical techniques in nutritional biochemistry: proximate analysis, food tests, etc

BCH 651: Advanced Metabolism and Regulation [3 Units]

Biosynthesis and degradation of storage and structural polysaccharides. Pathways of carbohydrate metabolism and their regulation. The anaplerotic/cataplerotic reactions and central role in energy metabolism and biosynthesis. Integration of carbohydrate metabolism. Electron Transport and Oxidative Phosphorylation; mechanism of oxidative phosphorylation. Photosynthesis, pathways of carbon and energy, Photorespiration and the glycolate pathway,

crassulacean acid metabolism. Lipid metabolism and its regulation. Amino acid metabolism and its regulation. synthesis of epinephrine and melanin. Nucleotide metabolism and its regulation. Porphyrin biosynthesis and its regulation. Inter-relationship of metabolic pathways: integration and compartmentalization in intermediary metabolism, Role of vitamins (co-enzymes) in intermediary metabolism. Diseases of intermediary metabolism.

BCH 671: Advanced Industrial Biochemistry [3 Units]

Overview of basic steps involved in the processing industry – (viz R & D, Raw material processing, production, quality control/assurance, etc.). Biochemistry of fermentation. Types of fermentation. Industrial production of selected foods/drinks (some tropical fermented foods, yoghurt, cheese, beer, wine). Industrial production of amino acids, vitamins and antibiotics. Industrial production of enzymes (amylase, glucose isomerase, etc.). industrial production of food additives (sweeteners). The role of biochemistry in the textile and laundry industries.

BCH 672: Special Topics in Environmental Biochemistry [3 Units]

Sustainable development. Impact of human actions on the environment. Environmental pollution. Climate change. Biological disposal of wastes (Use of bioreactors, trickling filters, suspended processes, etc). Recycling of resource recovery, bioremediation. Production of biofuels and biofertilizers. Life cycle assessment of industrial processes/pollution, mathematical modeling – theoretical consideration and applications.

BCH 680: Research Techniques in Biochemistry [3 Units]

Overview of biochemical calculations. PH metres and electrodes. Gradient centrifugation and ultracentrifugation. Immunochemical Techniques: Radioimmunoassay and enzyme-linked immunoassay, etc. Isotopic techniques, Electrophoresis, Chromatography: Ion exchange chromatography, gel filtration, Gas chromatography, hydrophobic interaction chromatography, affinity chromatography, etc. Absorption spectrophotometry (Principles, techniques, UV, Visible and Fluorescence, applications to macromolecular structures

BCH 681: Biostatistics [3 Units]

Biostatistics: Definition, scope and applications. Presentation of data. Overview of measures of central tendency, Chi square test. Scientific writing 1. (a). Biostatistics; population and sample size, sampling distribution. Research design. Study of some classical papers for experimental design and data presentation. Normal, Binomial and Poisson distributions. Tests of significance, students t –test. Analysis of variance (ANOVA). One-way and two-way ANOVA. Regression analysis. Simple and multiple analysis regression. Overview of non-parametric tests, statistical packages; Graphical Instat, Minitab, SAS, Epi Info and SPSS.

PGC 701: Research Grant Writing [3 Units]

Overview of research funding. Types of research grants. Research grant awarding bodies. Searching the internet for calls for grants, writing of concept notes, detailed project description, budgeting and budget defence, mining of research

PGC 701: Synopsis and research grant writing [3 units]

Overview of research funding. Types of research grants. Research grant awarding bodies. Searching the internet for calls for grants. Identification of types and nature of grant. Determining appropriate strategy for each grant application. Study of various grant applications structures and contents and writing of concept notes, detailed project description, budgeting and budget defense. Project justification, review of critical problems, principles of scientific research, concepts of hypothesis formulation and testing, aims and objectives, essentials of literature review, methodology, experimental design, SWOT analysis, work plan, budgeting, expected outcome, beneficiary, cost benefit analysis, overall contributions to society. Study of sample grants writings in various forms and writing of mock research and other grants. Identification of University of Nigeria synopsis structure and requirements (Introduction, methodology and results). Determining the content of each subunit of the synopsis. Steps in the writing of the synopsis from project report/dissertation/thesis. Structural and language issues. Common errors in synopsis writing and how to avoid them. The role of the student and the supervisor in the production of the synopsis. Writing of mock synopsis. All registered Ph.D students must attend a solution-based interactive workshop to be organized by the School of Postgraduate Studies for a practical demonstration and application of the knowledge acquired from the course, conducted by selected experts.

BCH 703: Synopsis and Scientific paper writing techniques [3 Units]

Writing of synopsis, Data presentation (tables, graphs, scatter plots, pie charts, histograms, etc). Types, components and Organization of scientific papers (conference papers, journal articles, etc.). Referencing styles. Research misconduct and publication ethics.

BCH 701: Special Topics in Enzymology [3 Units]

Students to present seminars on contemporary and topical issues in the field of enzymology. Assessment to be based on depth of literature review, coverage of topic, presentation skills and response to questions

BCH 702: Special topics in Protein Biochemistry [3 Units]

Students to present seminars on topical issues in protein biochemistry, including new and emerging Protein diseases, Binding proteins, Infectious proteins and Post-translational

processing of protein. Assessment to be based on depth of literature review, coverage of topic, presentation skills and response to questions

BCH 710: Molecular Biology and Biotechnology

Students to present seminars on new and emerging topics in Molecular Biology and Biotechnology. Assessment to be based on depth of literature review, coverage of topic, presentation skills and response to questions.

BCH 722 Special topics in Medical Biochemistry [3 Units]

Students to present seminars on topical issues in medical biochemistry, including new and emerging diseases, new methods of disease diagnosis and therapy, including emerging technologies and possible ethical concerns associated with them. Assessment to be based on depth of literature review, coverage of topic, presentation skills and response to questions

BCH 723: Special Topics in Pharmacological Biochemistry [3 Units]

Students to review and present seminars on selected topical and current issues in pharmacological biochemistry. Assessment to be based on depth of literature review, coverage of topic, presentation skills and response to questions.

BCH 741 Special Topics in Nutritional Biochemistry [3 Units]

Students to review and present seminars on contemporary issues in nutritional biochemistry and related fields. Assessment to be based on depth of literature review, coverage of topic, presentation skills and response to questions

BCH 751: Special Topics in Advanced Metabolism and Regulation [3 Units]

Students to review and present seminars on selected topical and current issues in General Biochemistry, advanced metabolism and pathway regulation. Assessment to be based on depth of literature review, coverage of topic, presentation skills and response to questions.

BCH 772: Special Topics in Environmental Biochemistry [3 Units]

Students to present seminars on contemporary and topical issues in environmental biochemistry, such as sustainable development, climate change, carbon footprints, bioremediation, etc.

BCH 791: Special Seminar I [3 Units]

Each candidate is expected to write up and present a seminar on a topic in the candidate's area of specialization. Candidates will be scored based on content, depth of literature review, presentation skills, response to questions and quality of write up, which must be bound and submitted for examination.

BCH 792: Special Seminar II [3 Units]

Candidates are expected to present seminars in which they report on what progress they have made in their approved research projects. In addition to highlighting progress, candidates should also highlight whatever obstacles and challenges they face in their research. Discussions will thereafter focus on finding solutions to these problems.

BCH 790: Doctorate degree (Ph.D). Thesis [12 Units]

A doctorate degree (Ph.D) thesis which embodies an acceptable level of original research shall be approved for the award of doctor of philosophy in Biochemistry. In addition, thesis should contain evidence of candidate's originality of thought and critical judgment. Findings should amount to a significant contribution to knowledge and should suitable for publication in suitable journals in biochemistry or related fields.