UNIVERSITY OF PORT HARCOURT FACULTY OF SCIENCE DEPARTMENT OF MICROBIOLOGY



POSTGRADUATE STUDENTS' HANDBOOK

2016 - 2017

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PREFACE

Information and facts are vital to all those who seek knowledge. Critical thinking is crucial in a problem-solving approach to life, and this is knowledge-driven. Therefore, the need to have current information is of paramount importance and this could make the difference between failure and success of a student. More importantly, where authentic information is lacking, rumour or misleading information becomes cherished and inevitable.

No system is static. Therefore, the rules and regulations of this University (i.e. including those of the academic departments) are evolving continually and students need to be adequately informed of such developments. This brochure is an invaluable handbook for the guidance and success of each student in the Department of Microbiology. In this regard, the graduate students are encouraged to have a copy of this brochure. It is advisable to consult the brochure regularly, and wherever in doubt; students should seek clarification from appropriate authority or unit.

Welcome to Microbiology at Uniport and Best wishes for a fulfilling student career!

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1.0 BACKGROUND INFORMATION

The University of Port Harcourt was initially established in 1975 as the University College of Port Harcourt. But in 1977, the University was granted a full university status.

Microbiology as a discipline was at a time designated "Microbiology Unit" (like the other disciplines) in the then School of Biological Sciences. The unit metamorphosed into a full-fledged Department of Microbiology on October 1, 1983.

However, the Department turned out her first set of graduates (B.Sc. in Microbiology) in 1981. Since then, the number of students in the department has grown tremendously over the years.

The school system was adopted in the early years of the University. But in 1982, the then Schools of Biological, Chemical and Physical Sciences were merged and became the Faculty of Science and have remained same to date; now consisting of nine (9) departments.

The pioneer academic staff of the Department employed in 1977 and 1978 were Dr. M.T. Ogan (Lecturer II), Mr. N.A. Oranusi (Graduate Assistant), Mr. A. Obafemi (Assistant Lecturer), Miss E.C. Bassey [now E.C. Wokoma (Graduate Assistant)], and Mr. P.O. Okerentugba.

The University maintains a policy of offering employment to alumni with excellent academic performance. Based on this policy, the university employed the following alumni of the Department: Late Dr (Mrs) Beatrice N. Uba (nee Ebele), Dr. Lucky O. Odokuma, Dr. Abiye A. Ibiene, Miss Chibuzor I. Nwachukwu, Others are Mrs. O.E. Agbagwa, Miss K. Otokunefor, Miss N. Igwiloh, Mr. O Onianwa, Mr. EN Ogbodo and Mrs. T. I. Cookey.

The first academic staff to retire from the Department was Professor T.J.T. Princewill, who retired in 1993. Professor T.J.T. Princewill, was coronated King of Kalabari Kingdom in 2002. He is the Amanayabo of Kalabari.

Currently, the Department has 41 academic, 25 technical and 7 administrative staff. Below is a chronological headship of the Department since inception:

Dr. T. J. T. Princewill	Jan 1981 – Sept. 1982
(Director of Studies)	
Dr. T. J. T. Princewill	Oct 1982 – Sept. 1984
(Head of Department)	

Dr. M. T. Ogan	Oct 1984 – Sept. 1986
Dr. C.O. Ofuya	Oct 1986 – Sept. 1988
Dr. A.U. Orjih	Oct 1988 – Sept. 1990
Dr. C.O. Ofuya	Oct 1990 – Sept. 1991
Dr. N. A. Oranusi	Nov. 1991 – Nov. 1993
Dr. G. S. C. Okpokwasili	Nov. 1993 – Nov. 1995
Dr. T. V. Otokunefor	Nov. 1995 – Nov. 1997
Dr. H. O. Njoku	Nov. 1997– Nov. 1999
Dr. B. J. O. Efiuvwevwere	Nov. 1999 – Nov. 2001
Dr. L. O. Odokuma	Nov. 2001– Nov. 2003
Dr. G. O. Abu	Nov. 2003 – Jan. 2006
Dr. E. C. Wokoma	Jan. 2006 – Jan. 2008
Dr. E. R. Amakoromo	Jan. 2008 – Mar. 2010
Prof. N. Frank-Peterside	Mar. 2010 – May 2012
Dr. P.O. Okerentugba	May 2012 – May 2014
Prof L. O. Odokuma	May 2014 – May, 2016
Dr. A. A. Ibiene	May 2016 – Date

1.2 ORGANISATIONAL STRUCTURE OF THE DEPARTMENT AND ITS RELATIONSHIP WITH THE FACULTY AND UNIVERSITY.



1.2 ACADEMIC, TECHNICAL AND ADMINISTRATIVE PERSONNEL A. Academic Staff

S/N	Name	Qualification	Areas of	Designation
			Specialisation	
1	Okpokwasili, G.S.C.	B.Sc. Lagos; Ph .D. Maryland.	Biodegradation and Bioremediation in Soil and Aquatic environments. Environmental Toxicology of Pollutants. Biodeterioration of Industrial Materials.	Professor
2	Efiuvwevwere, B.J.O	BS. Detroit; MS. Penn. State U., PhD. London	Food/Industrial Microbiology Food Safety & Public Health. Biodeterioration & Preservation of Foods. Fermentation Processes and Microbial Dynamics	Professor
3	Odokuma, L.O.	B.Sc. M.Sc., Ph.D. UPH.	Environmental Toxicology. Water Management. Bioremediation. Development of Bioindiacators of Aquatic Toxicity.	Professor
4	Abu, G.O.	B.Sc. ABU; Ph.D. Maryland	Environmental Microbiology and Biotechnology. Natural attenuation and Ecophysiology. Bioremediation and Bioenergetics. Biopolymers. Microalgal Biotechnology	Professor
5	Njoku, H.O.	B.Sc. Ife; Ph.D. Strathclyde.	Food Fermentations	Professor
6	Otokunefor, T.V.	B.Sc. ABU; Ph. D. Western Ontario.	Drug Resistance. Bacterial Infections. Public Health/ Environmental Microbiology	Professor
8	Amakoromo, E.R.	B.Sc. UPH M.Sc.; Ph.D. Ibadan	Food Microbiology. Legume Fermentation. Product Development.	Professor
7	Frank-Peterside, N.	B.Sc., M.Sc. Ibadan; Ph.D. Belfast	Antimicrobial activities of Plant Extracts. Uses and Microbiological Assessment of African	Professor

			Yam Bean Products. Virology	
9	Okerentugba, P.O.	B.Sc. Lagos; Ph.D. Strathclyde.	Yeast genetics, Protoplast fusion and cloning techniques. Fermentation technology and industrial strain development. Bioremediation.	Professor
10	Mbakwem- Aniebo, C.	B.Sc. Nigeria; Ph.D. London	Antimicrobial activities of natural Products. Microbial quality of common foods.	Reader
12	Ibiene, A.A.	B.Sc., M.Sc., Ph.D. UPH.	Microbially enhanced oil recovery. Environmental toxicology of pollutants and bioremediation.	Readerr & Head of Department
13	Ogugbue, C.J.	B.Sc,(ABSU): M.Sc, Ph.D UPH	Biotransformation and biodegradation of organic pollutants, Ecotoxicology, biotechnology of biofertilizers and aeromicrobiology	Reader
11	Odu N.N.	B.Sc., M.Sc. London; Ph.D. UPH	Food Microbiology & Public Health Microbiology.	Senior Lecturer
14	Ariole,C.N.(Mrs)	HND,NISLT, PGDM, M.Sc, Ph.D. UPH	Environmental Microbiology and Biotechnology.	Senior Lecturer
16	Stanley, H.O.	B.Sc. UPH PGDE Unical, MEMAAU Ph.D. RSUST	Environmental Mgt/Toxicology, EIA, Pollution/Oil Spillage, Fertility characteristics of Hydromorphic soils, Forest soil Microbiology and Bioremediation in soils	Senior Lecturer
20	Ire, F.S.	B.Sc., M.Sc., Ph.D. UNN	Industrial Microbiology	Senior Lecturer
21	Agwa, O.K.	B.Sc., Awka M.Sc. Awka, Ph.D UPH	Industrial Microbiology	Senior Lecturer
22	Chikere, C.E.	B.Sc., ABSU, M.Sc., FUTO; Ph.D. UPH	Enviromental and Pollution Microbiology, Mirobbial Ecology of Petroleum Hydrocarbon Polluted Matrics	Senior Lecturer
23	Dr. Wariso, K.T.	B.Med.Sc.	Clinical Mycology/	Senior

		MBBS, UPH FMC Path	Infectious Disease	Lecturer
24	Dr.Awopeju, A.T.O	MBBS, Unilorin FMC <i>Path</i>	Medical Microbiology	Senior Lecturer
25	Okonko, IO	B.Sc. UNAAB, M.Sc., FD. Ibadan; Cert. WABT/Florida	Virology. Immunology. Molecular Virology. Molecular Epidemiology. Bioethics. New, Emerging & Re- emerging Infections. Multi-Drug Resistant Pathogens.	Lecturer I
26	Agbagwa, O.E	B.Sc., M.Sc., Ph.D. UPH	Medical Microbiology	Lecturer I
30	Otokunefor, K	B.Sc. UPH; M.Sc. Manchester, Ph.D Nottingham	Medical/Molecular Microbiology	Lecturer I
31	Eruteya, O.C.	B.Sc., Abraka; M.Sc., Ph.D. Ibadan	Food/Industrial Microbiology	Lecturer I
33	Uzoigwe, C.I	B.Sc., M.Sc. UPH	Environmental Microbiology	Lecturer II
34	Ahaotu,,I.	BSc, Umudike; MSc. Benin, Ph.D. UPH	Food/ Industrial Microbiology	Lecturer II
35	Onianwa, O.	B.Sc UPH, M.Sc, Westminster	Medical/Molecular Microbiology	Lecturer II
36	Omorodion, N.J.P.N.	B.Sc., M.Sc. UPH	Food Microbiology	Lecturer II
37	Ogbodo, E.N.	B.Sc UPH; MSc. Nottingham	Medical Microbiology	Lecturer II
38	Ezediokpu MN	B.Sc. Anambra M.Sc. UPH	Food/Industrial Microbiology	Assistant Lecturer
39	Azubuike, C.C.	B.Sc UPH; M.Sc. Newcastle	Environmental Microbiology	Assistant Lecturer
40	Wokem, V.C	B.Sc., M.Sc. UPH	Environmental Microbiology	Assistant Lecturer
41	Osadebe, A.U.	B.Sc., M.Sc. Nottingham	Environmental Microbiology and Biotechnology	Assistant Lecturer
42	Cookey, T.I.	B.Sc., M.Sc. UPH	Medical Microbiology	Assistant Lecturer

B. Technical Staff

S/N	Name	Qualification/Dates Obtained, Membership of Professional Association	Designation
1	Ogbegbe, Ambrose	FSLC 1971, WAEC, 1977, OND, 1992 HND, 1997 PGDM, 2005 NREP, 2006	Chief Technologist
2	Nwogu, Njoku Hyacinth Akagbuo	PGDM 1998 H.N.D NIST 1992 OND NIST 1990Member NISLT Reg. Environ. Manager. 1st movement2006.	Chief Technologist
3	Osakuade, Felicia Oluwatoyin	Final Diploma in Microbiology/Virology 1997. -Ordinary National Diploma, (1992) -West African Examination WAEC (1988) Membership of Professional Associate Nigeria institute of Science Laboratory (1997) Post Graduate Diploma in Microbiology (2003). Associate, Institute of Medical Laboratory Science. (2008).	Chief Medical Laboratory Scientist
4	Horsfall, Seleipiri Jemina	WAEC, Associate, Institute of Medical Laboratory Science	Assistant Chief Medical Laboratory Scientist
5	Onoriode,, Diamreyan	AIML-2012, PGD-2007, M.Sc-2011	Medical Laboratory Scientist I
6	Kalio, Awop Olagha Justice	AIMLS-2010, M.Sc-2009, B.Sc-2003, WASC-1996, FSLC-1991	Medical Laboratory Scientist I
7	Ibekwe, Sixtus .E.	MSc,SSCE, 1992, ND–1995, HND-1998, PGDM-2003. NISLT-AISLT	Technologist I
8	Gbaramogho, Biale Helen	HND (2007), ND- 2005 BASICN CERT- 2003 DIP. LIB. SC. – 1997 NIST – 2011,WASC -1979 GCE – 1990 FSLC -1974	Technologist II
9	Odoemelam, Helen A.	PGDM-2009, HND-2006 WASSCE-1998 NISLT-2012 FSLC	Technologist II
	Chukwu, Abina O.	ANISLT- 2005, HND-1999, N.D- 1997, WASC- 1992, GCE-1993, FSLC-1983	Technologist II

10	Ugo-Chinnah, Stella	PGDE-2006, NIST-2001, HND-2002, OND-1996 WASC-1985	Technologist II
11	Rufus Kate Uchechi	B. Technology, 2012 ANISLT- 2012 WASC-2005 FSLC-1999	Technologist II
12	Aliezi Eberechi I.		Technologist II
13	Anyanwu, Vivian	OND	Senior Assistant Technologist
14	Teke, F. Taria U	WA.S.C (G.C.E) 1973	Lab. Supervisor
15	Ngbara-ue, Augustine	WASS.C.E (G.C.E.) 2002	Senior Lab. Supervisor
16	Nemeke, Tambari G	SSCE – (2009)	Senior Lab. Assistant
17	Kpakol, Lucky	WASC- (2006)	Lab. Assistant
19	Ihua, Cecelia	FSLC	Caretaker
20	Nwidee, Kate	SSCE-1997	Lab. Assistant
21	Simon, Happiness C.	SSCE-2009	Lab. Assistant
22	Nnamdi, Gloria	FSLC	Head Lab. Attendant
23	Lolynielo, Pius B.	SSCE (2005)	Head Lab. Attendant
24	Mbiabu, Samuel	FLSC 1988, WASC 1998	Lab. Attendant
25	Nwibana, Alex	WASC – 1986 (2012)	Lab. Attendant

C. ADMINISTRATIVE STAFF

S/N	Name	Qualification	Designation
1	Ibiene, Acheseomie T.	Dip. RSUST	Personal Secretary III
2	Okoro, Gloria Ubong	FSLC, WAEC, NABTEB, DIP- Computer Science	Senior Secretarial Asst. I
3	Wegu, Joy Cheje.	FSLC, WAEC, B.Sc, Economics	Higher Executive Officer
4	Aadum-Dumbor Mary	SSCE	Chief Clerical Officer
5	Nnamdi, Helen Chimezie	FSLC, WASC, B.Sc. Pol. Admin.	Chief Clerical Officer
6	Salome, Enyi	FSLC	Caretaker
7	Onuigwe, Comfort	FSLC	Caretaker

ACADEMIC STAFF



Professor G. C. Okpokwasili



Professor G. O. Abu



Professor N. Frank-Peterside



Professor B. J. O. Efiuvwevwere



Professor H. O. Njoku



Professor E. R. Amakoromo



Professor L. O. Odokuma



Professor T. V. Otokunefor



Professor. P. O. Okerentugba



Dr. C. Mbakwem-Aniebo



Dr. A. A. Ibiene



Dr. C. J. Ogugbue



Dr. (Mrs.) N. N. Odu





Dr. (Mrs.) C. N. Ariole

Dr. H. O. Stanley

Dr. F. S. Ire



Dr. K.T. Wariso



Dr. A.T.O. Awopeju



Dr. (Mrs.) C. B. Chikere

Dr. (Mrs.) O. K. Agwa



Okonko I. O.



Dr. O. E. Agbagwa



Dr. K. Otokunefor



Dr. O. C. Eruteya



Uzoigwe, C. I.



Dr. I. Ahaotu



Onianwa, O.



Omorodion, N. J. P. N.



Ogbodo, E. N.



Ezediokpu, M. N.



Azubuike, C. C.



Wokem, V. C.



Osadebe, A.



Cookey, T. I.

TECHNICAL STAFF



Ogbegbe Ambrose



Onoriode, Diamreyan



Nwogu, Njoku Hyacinth



Kalio Awop Olagha Justice



Osakuade Felicia O.



Ibekwe Sixtus .E.

Ugo-Chinnah Stella



Horsfall, Seleipiri J.



Gbaramogho Biale Helen



Odoemelam, Helen A.



Aliezi Eberechi I.



Nemeke Tambari G



Chukwu, Abina O.



Anyanwu Vivian C.



Kpakol, Lucky



Tariah Teka

Teke F. Tariah U.

Ihua Cecelia



Rufus Kate Uchechi



Ngbara-ue Augustine



Nwidee Kate







Simon, Happiness C.





Lolynielo Pius B.



Mbiabu Samuel



Nnamdi Gloria

Nwibana Alex

ADMINISTRATIVE STAFF



Ibiene, Acheseomie T.



Okoro, Gloria Ubong



Wegwu, Joy Cheje



Aadum-Dumbor, Mary





Nnamdi, Helen Chimezie



2.0 INTRODUCTION

Microbiology as a discipline is practical-oriented and is one of the most diverse areas of bioscientific and biotechnological studies. Several sub-disciplines including Environmental, Food, Industrial and Medical/Pathogenic Microbiology are of immense benefit to man. Consequently, these areas have generated considerable research and practical interest globally.

In Nigeria, Microbiology has been employed in various establishments. Specifically, the knowledge of Microbiology has benefited the petro-chemical establishments, food manufacturing /processing industries, government regulatory agencies, non-governmental organisations (NGOs) as well as medical services outfits located in the immediate environment and in the country at large.

Numerous local, national and global problems are encountered in life and they are sometimes complex and daunting. Consequently, well-talented and determined individuals should be encouraged to pursue graduate programmes to help provide solutions to these problems. However, it must be emphasized that M.Sc. and Ph.D degrees in Microbiology are not simply an extension of the undergraduate programme. Rather, they are designed to train and establish the individuals as professional leaders and independent scholars capable of providing leadership in academic, government, research industry and other technical positions.

It is therefore hoped that these trained and mature scholars will help resolve many scientific and biotechnology problems in Agro-Food industries, petro-chemical establishments, medical and public health services.

3.0 Philosophy

The department is committed to the philosophy of the University of Port Harcourt which is based on academic freedom, tolerance, probity, equal opportunity and respect for cultural diversity.

4.0 Vision

The department aims to be ranked among the best in Africa, renowned for its teaching, research, creativity and innovation.

5.0 Mission Statement

The Department of Microbiology is dedicated to providing high quality education and research in order to develop internationally competitive professionals with academic excellence, excellent leadership, communication and teamwork skills, who can contribute positively to their community and the world at large.

6.0 THE OBJECTIVES OF THE DEPARTMENT ARE TO:

- a. Advance knowledge in Microbiology in order to enhance the skills and expertise required for self-reliance and gainful employment.
- Educate the students on the importance of critical thinking in Research and Development using microbiological concepts for the development of our immediate community and the nation, and
- c. Enable the students acquire knowledge through broad based training in relation to the Minimum Academic Standard (MACS) as required by the NUC, thereby making our graduates competitive in various challenges or ventures.

7.0 ADMISSION REQUIREMENTS

7.1 Post-graduate Diploma in Microbiology (PGDM) This is designed for different categories of candidates.

- (a) Non-Microbiology graduates. B.Sc. in related disciplines (PSB, AEB, etc).
- (b) B.Sc. in Microbiology graduates with third class.
- (c) HND graduates (in Bacteriology / Microbiology / Virology and any other approved by the Department) of Nigerian Polytechnics or other approved comparable institution with distinction or upper credit.

7.2 M.Sc Degree in Microbiology

(i) M.Sc. in Food Microbiology

- a) B.Sc. in Microbiology or closely related disciplines not below second class lower division (minimum CGPA of 3.00).
- b) B.Sc. in related discipline, not below second class lower division (CGPA of 3.00 minimum) of HND upper credit plus a minimum of credit pass (B grade/4.00 CGPA in PGDM from University of Port Harcourt or any other approved University and in addition.

 A minimum grade of C in at least three of these courses: Food Microbiology; Biotechnology/Food processing/Preservation; General Microbiology and Analytical Microbiology & Quality control.

(ii) M.Sc. in Industrial Microbiology

Same as for Food Microbiology (2 above) except that the course "Industrial Microbiology" is substituted for Food Microbiology as one of the four courses indicated in 2 (c) above.

(iii) M.Sc. in Environmental Microbiology and Bioremediation

Same as for Food Microbiology 2(a) and (b) above but (c) is as follows: a minimum grade of C in at least three of these courses: Environmental Microbiology: Soil Microbiology: Microbial Physiology and Microbial Ecology.

(iv) M.Sc in Pathogenic Microbiology and Biotechnology

Same as for Food Microbiology (2(a) and (b) above but (c) is as follows: a minimum grade of C in at least three of these courses: General Microbiology; Pathogenic Microbiology; Pharmaceutical Microbiology.

7.3 Ph.D. in Microbiology (with different specializations)

a) M.Sc. in Microbiology or related discipline with an average score of at least 60% (i.e. B.grade).

b) A minimum grade of C is required in certain courses depending on the choice of specialization (see 2 above).

c) In addition to the above criteria, interview performance by the candidate is a major aspect of the admission process into the Ph.D. programme. Candidates are required to bring to the interview a proposal of their intended work.

7.4 PART-TIME CANDIDATES

Part-time candidates must:

- (i) Be engaged in approved employment
- (ii) Submit evidence that they can devote a substantial proportion of their normal time to their studies; and

(iii) Satisfy the Departmental Graduate Studies Committee that they will be available for attendance at courses and for regular consultation with their Supervisors.

8.0 DEFERMENT OF ADMISSION

Deferment of admission is permitted up to the official end of LATE registration period.

9.0 DURATION AND RESIDENTIAL REQUIREMENTS

(i) PDG IN MICROBIOLOGY

A minimum of 12 calendar months and a maximum of 24 calendar months are required for full-time studies.

(ii) M.Sc. IN FOOD MICROBIOLOGY, INDUSTRIAL MICROBIOLOGY, ENVIRONMENTAL MICROBIOLOGY & BIOREMEDIATION, AND PATHOGENIC MICROBIOLOGY& BIOTECHNOLOGY

Full-time students are required to spend a minimum of 12 calendar months and a maximum of 24 calendar months. Part-time students are required to spend a minimum of 24 calendar months and a maximum of 48 calendar months.

(iii) Ph.D. IN MICROBIOLOGY

Full-time candidates are required to spend a minimum of 24 calendar months and a maximum of 60 calendar months. In contrast, part-time candidates are required to spend a minimum of 36 calendar months and a maximum of 84 calendar months.

10.0 REGISTRATION

Both Full-time and Part-time students must register during the specified period of registration.

- The students shall register for all courses to be taken ONCE EVERY SESSION at the beginning of each academic year.
- (ii) Full-time students shall register for a maximum of five (5) course per semester.
- (iii) Part-time students (PGDM) shall register for a maximum of three (3) courses per semester.

11.0 POST-GRADUATE PROGRAMMES AND THEIR COURSES

11.1 POST-GRADUATE DIPLOMA IN MICRO BIOLOGY (PGDM)

The programme is designed to assist non-Microbiology graduate and other graduates including 3rd class in Microbiology who would normally not qualify to undertake further studies in Microbiology. It is therefore a window of opportunity for those who successfully completed the programme with outstanding overall results (Credit, B and above). Such graduates shall be eligible for higher degree programmes in the department and elsewhere. Three options are offered in the programme viz: Medical Microbiology, Food and Industrial Microbiology, and Medical Microbiology.

COURSES

- PGDM 700.1 Biology of Fungi
- PGDM 701.2 Industrial Application of Microbiology
- PGDM 702.1 Medical Microbiology
- PGDM 703.1 General Microbiology
- PGDM 704.1 Immunology and Disease
- PGDM 705.1 Genetics of Microorganisms
- PGDM 706.1 Microbiology of Foods
- PGDM 707.1 Microbiological Techniques
- PGDM 708.1 Biochemistry and Physiology of Microorganisms
- PGDM 709.1 Ecology of Microorganisms
- PGDM 710.1 Microbiology of the Environment
- MCB 706.2 Graduate Seminar in Microbiology & Biotechnology
- MCB 707.0 Research Project

OPTIONS

Environmental Microbiology	Food & Industrial Microbiology	Medical Microbiology
PGDM 700.1	PGDM 700.1	PGDM 700.1
PGDM 703.1	PGDM 703.1	PGDM 703.1
PGDM 705.1	PGDM 705.1	PGDM 705.1
	PGDM 701.1	PGDM 702.1
	PGDM 706.1	PGDM 704.1
PGDM 707.2	PGDM 707.2	PGDM 707.2

PGDM 708.1	PGDM 708.1	MCB 708.1
PGDM 709.2		
PGDM 710.1		
MCB 706.2	MCB 706.2	MCB 706.2
MCB 707.0	MCB 707.0	MCB 707.0

PGDM COURSES DESCRIPTIONS

PGDM 700.1 - Biology of Fungi

Microbiology, taxonomy, physiology, reproduction of various groups of fungi. Ecology of fungi. Relevance of fungi in the ecosystems.

PGDM 701.2- Industrial Application of Microbiology

Concept in Applied Microbiology/Biotechnology Fundamental of fermentation technology (history and principles). Fermentation and extraction of fermentation products. Fermentation device. Primary and secondary metabolites (selected examples). Role of yeast in fermentation industry, classification and production of alcoholic beverages. Microbial extracellular enzymes techniques. Composing, biogas production. Quality control in Microbiology.

PGDM 702.2 - Medical Microbiology

Pathogens, microorganisms and disease. Virulence, system of isolation of pathogens. Bacterial and fungi infections. Principles of epidemiological survey and control of outbreaks.

PGDM 703.1- General Microbiology

General characteristics of microorganisms of medical, agricultural and industrial importance. Isolation, purification, classification, structure, function of bacteria, viruses, fungi and Protozoa. Microbial multiplication at cellular level.

PGDM 704.1- Immunology and Disease

Immunity and immune responses. Anitgen-antibody reaction, antigens, antibody structure and formation. Blood groups complement; hypersentivity; allergic, prophylactic and therapeutic application of immunology.

PGDM 705.1- Genetics of Microorganisms

A Statutory of the current status of microbiology genetics including discussion of methods and findings in the areas mutagenetics, induction, isolation and biochemical characteristics of mutants, adaptation, transformation, transduction, conversion and conjugation.

PGDM 706.1- Food Microbiology

Food-mediated disease. Microbial spoilage of foods. Mechanisms of microbial spoilage/food ecosystems. Intrinsic, extrinsic factors influencing spoilage in food borne diseases. Microbiology quality of foods, indices of sanitary quality. Quality assurance, hazard assessment. Control of contamination, inhibition of growth of microorganisms. Food Spoilage and processing/fermentation; food biotechnology. Microbiological reference value for foods. Disease of animals transmissible to man via animal food products.

PGDM 707.2- Microbiological Techniques

Survey of basic laboratory equipment. Preparation of buffers and culture media. Staining techniques for identification of microorganisms. Sterilization techniques. Antimicrobial agents and sensitive tests. Microbiology of air, food, milk and water. Immunological methods for the study of microbial infections. Introduction to quality control in microbiology.

PGDM 708.1- Biochemistry and Physiology of Microorganisms

Macromolecles, biosynthesis and bioenergetics in microorganisms. Regulation of metabolism. Spore formation, composition and germination. Growth and survival of microorganisms. Electron transport systems.

PGDM 709.2- Ecology of Microorganisms

Influence of environmental factors or activities on microorganisms. Microbiology of the soil, air, water and sewage. Microbial association.

PGDM 710.1- Microbiology of the Environment

Microorganisms and other important organisms in aquatic systems. Freshwater microbial ecology. Pollution and water purification, transmission of water. Microbiology of waste disposal. Biological and chemical oxygen demand (BOD, COD). Characteristics of the soil environment. Soil organisms and their activities. Nitrogen, Carbon, Sulphur and phosphorous cycles; mineral transformation by microorganisms, Biodegradation and Biofuels generation.

MCB 706.2- Graduate Seminar in Microbiology and Biotechnology

A series of two seminars is to be delivered by each student. The first shall involve a literature review on topics of current research interest. The second shall center on data obtained from student's research project. Seminars are graded.

MCB 707.0- Research Project

Students are required to undertake approved research projects on relevant microbiological problems.

11.2 M.Sc. DEGREE PROGRAMME

(i) M.Sc. IN FOOD MICROBIOLOGY

The main objectives of this programme are to train specialized graduates to meet the local and national manpower needs of Agro-food and research establishments particularly in the areas of food processing, preservation and food safety.

The programme also emphasizes:

- (a) The role of the Food Microbiologist in control of food bio-deterioration, processes and quality control of food and beverage industries and biotechnological applications;
- (b) Contamination of food by environmental pollutants and microbial standards of foods in National and International Trade. Thus, the Food Microbiology Programme contributes immensely to the public health and economy of the Niger Delta region, the nation and the world.

COURSES

Six taught courses, a seminar course and a research projects are approved for the M.Sc. in Food Microbiology and they are:

MCB	803.1	-	Research Techniques in Microbiology
MCB	808.1	-	Biodeterioration of Foods
MCB	810.1	-	Food Processing and Preservation
MCB	811.1	-	Fermentation Microbiology

MCB	809.2	-	Biochemical Aspects of Food Quality
MCB	812.2	-	Food Sanitation, Toxicology and Quality Control.
MCB	806.2	-	Graduate seminar in Microbiology and Biotechnology
MCB	807.2	-	Research Project

COURSE DESCRIPTIONS

MCB 803.1 – RESEARCH TECHNIQUES IN FOOD MICROBIOLOGY

Media design and culture collection. Safety techniques and laboratory precautions. Separation procedures for biological components. Disintegration of Microbial cells. Methods of recovery of fermentation products. Isolation of protein. Microbial enzyme extraction, purification and assays. Estimation of microbial populations and interpretation of data. Methods of anaerobic bacteriology. Biodeterioration test techniques. Preparation of microbial materials for microscopy. Photo-micrography. Finger-printing, typing and taxonomic aspects of microbiology.

MCB 808.1 – BIODETERIORATION OF FOODS

Physiological aspects of microbial deterioration of foods. Types of deterioration. Defects caused by microorganisms. Mechanisms of deterioration. Cell wall structure and texture of perishable and their products. Microbial deterioration of carbohydrates, proteins and liquid products. Microbial deterioration of carbohydrates, proteins and liquid foods (meat and meat products, fish and sea food products, poultry and poultry products, milk and diary products). Economics of bio-deterioration. Ecology and taxonomy of major groups of spoilers (*Aspergillus, Penicillium, Rhizopus, yeast, etc*). Control of microbial spoilage.

MCB 809.1 – BIOCHEMICAL ASPECTS OF FOOD QUALITY

Food components. Quality and indices of quality. Methods of obtaining sensory information. Consumer tests. Biochemical and physiological changes in food plants. Bio-chemical reactions underlying quality change / organoleptic proportion of food. Colour changes, flavour production. Changes in carbohydrates and lipids during storage. Browning reactions in foods and the microbial implications.

MCB 810.1 – FOOD PROCESSING AND PRESERVATION

Raw materials and process suitability. Prinicples and methods of preservation. Thermal processing. Thermal destruction of spoilage/other microorganisms. Drying, freezing, chemical preservation and radiation methods. Microbial stress. Quality control. Behaviour of food components and micro flora during processing. Foood packaging and microbial dynamics. Chemical preservative/additive. Legislation and control. Plant sanitation.

MCB 811.1 – FERMENTATION MICROBIOLOGY

General consideration of solid state fermentations. Tropical and oriental fermented foods and beverages. Ecology and physiology, genetics of industrial microorganisms. Trends in genetic engineering, Microbial proteins (SCP process, nutritional aspects toxicity testing; utilization of hydrocarbons). Food enzymology.

MCB 812.2 - FOOD SANITATION, TOXICOLOGY AND QUALITY CONTROL

Microbial contamination of raw food materials of plant and non-plant origins (vegetables, fruits, and fruit juices, protein foods, dried foods, sea foods). Microflora or public health significance. Food poisoning mechanisms of survival of organism in foods. Microorganisms in preserved foods. Microbial contamination during and after processing. Indices of sanitary quality of food specification and standards. Methods for detection and estimation of bacteria and toxins in foods (effect of bacteria and endotoxins). Microbial toxaemia. Mycotoxins, fruits and fruit products. Residual analysis.

MCB 806.2 – GRADUATE SEMINAR IN MICROBIOLOGY AND BIOTECHNOLOGY

A series of two seminars is to be delivered by each student. The first shall involve a literature review on topics of current research interest. The second shall center on data obtained from student's research project. Seminars are graded.

MCB 807.0 – RESEARCH PROJECT

Students will undertake approved projects on microbiological problems relating to the Agro-food industries in consultation with their supervisors.

(ii) M.Sc. IN INDUSTRIAL MICROBIOLOGY

The programme aims to focus attention in the industrial aspect of Microbiology. Recently, the exploitation of microorganisms to enhance establishment of new industries and modification of obsolete ones has resulted in expansion of different industries especially in developed countries. Similar opportunities can be created in Nigeria by the Microbiologist working in collaboration with those from other disciplines such as Chemical Engineering. This programme therefore endeavours to reproduce:

- (a) Graduates for research and development purposes who will be involved in the production of microbial products.
- (b) Graduates who will be of great help to fermentation and petro-chemical industries; and
- (c) Microbiologist who are capable of utilizing microbial resources to ameliorate industrial and ecological problems.

COURSES

MCB 803.1	-	Research Techniques in Microbiology
MCB 811.1	-	Fermentation Microbiology
MCB 813.1	-	Biodeterioration of Industrial Materials
MCB 814.1	-	Principles of Genetics Engineering
MCB 815.2	-	Fermentation Technology
MCB 806.2	-	Graduate Seminar in Microbiology and Biotechnology
MCB 807.0	-	Research Project.

COURSE DESCRIPTIONS

MCB 803.1 RESEARCH TECHNIQUES IN MICROBIOLOGY

Media design and culture collection. Safety techniques and laboratory precautions. Separation procedures for biological components. Disintegration of microbial cells. Methods of recovery of fermentation products. Isolation of protein. Microbial enzymes extraction, purification and assays. Estimation of assessing quality of foods. Methods of anaerobic bacteriology. Bio-deterioration test techniques preparation of microbial materials for micrography. Finger-printing, typing and taxonomic aspects of microbiology.

MCB 811.1 - FERMENTATION MICROBIOLOGY

General consideration of solid state fermentations. Tropical and oriental fermented foods and beverages. Ecology and physiology, genetics of industrial microorganisms. Trends in genetic engineering, Microbial proteins (SCP process, nutritional aspects toxicity testing; utilization of hydrocarbons). Food enzymology.

MCB 813.1 - BIODETERIORATION OF INDUSTRIAL MATERIALS

Introduction and Terminology. Recognition and costing of bio-deterioration problems. Range of deteriogens. Biodeterioration of natural materials (cellulosic, wood, stored products and good, natural products of animal origin. Biodeterioration of refined and processed materials (fuels and lubricants, plastics and rubber, glass, paints, pharmaceuticals and cosmetics, metals adhesives and sealants). Structures, systems and vehicles. Control of bio-deterioration and test techniques.

MCB 814.1 - PRINCIPLE OF GENETIC ENGINEERING

This course emphasizes the technique of molecular genetics/genetic engineering and their industrial applications. Applications of genetic engineering to diagnostic medicine pharmaceutical industry, e.t.c. Gene cloning in different organisms. DNA cloning vectors and re-arrangement of genetic material. Control of gene expression. Protoplast fusion. Methodology, types and applications cell cultures.

MCB 815.1 - FERMENTATION MICROBIOLOGY

Methods for transformation of organic compounds. Microbial enzymes. Cell enzymes immobilization. Application of immobilized cells. Transport phenomena in biotechnological systems (mass transfer, serration and agitation; mixing and theology). Kinetics of biochemical reactions. Scale up of fermentation processes and computer control downstream processing. Storage of fermented materials (drying, evaporation and dehydration, freezing and irradiation). Case studies of microbiological and biochemical industries (Antibiotics, amino acids, methane production from waste, alcohol, polysaccharides, pesticides).

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MCB 806.2 – GRADUATE SEMINAR IN MICROBIOLOGY AND BIOTECHNOLOGY

A series of two seminars is to be delivered by each student. The first shall involve a literature review on topics of current research interest. The second shall center on data obtained from student's research project. Seminars are graded.

MCB 807.0 – RESEARCH PROJECT

Students will undertake approved projects on microbiological problems relating to various industries in consultation with their supervisors.

(iii) M.Sc. IN ENVIRONMENTAL MICROBIOLOGY AND BIOREMEDIATION

The increasing demand by student over the years has made it imperative to design this programme. Additionally, the emphasis placed by industry on use of natural processes in environmental restoration activity has accentuated the demand for experts in this area to be engaged in numerous environmental rehabitation projects.

COURSES

MCB 807.0 -	-	RESEARCH PROJECT.
MCB 806.2 -	-	Graduate Seminar in Microbiology and Biotechnology
MCB 823.2 -	-	Petroleum Microbiology
MCB 821.2 -	-	Environmental Bioremediation
MCB 820.1 -	-	Environmental Microbiology and Biotechnology
MCB 814.1 -	-	Application of Genetics Engineering
MCB 813.1 -	-	Biodeterioration of Industrial Materials
MCB 803.1 -	-	Research Techniques in Microbiology

MCB 803.1 – RESEARCH TECHNIQUES IN FOOD MICROBIOLOGY

Media design and culture collection. Safety techniques and laboratory precautions. Separation procedures for biological components. Disintegration of Microbial cells. Methods of recovery of fermentation products. Isolation of protein. Microbial enzyme extraction, purification and assays. Estimation of microbial populations and interpretation of data. Methods of anaerobic bacteriology. Biodeterioration test techniques. Preparation of microbial materials for microscopy. Photo-micrography. Finger-printing, typing and taxonomic aspects of microbiology.

MCB 813.1- BIODETERIORATION OF INDUSTRIAL MATERIALS

Introduction and Terminology. Recognition and costing of bio-deterioration problems. Range of deteriogens. Biodeterioration of natural materials (cellulosic, wood, stored products and good, natural products of animal origin. Biodeterioration of refined and processed materials (fuels and lubricants, plastics and rubber, glass, paints, pharmaceuticals and cosmetics, metals adhesives and sealants). Structures, systems and vehicles. Control of bio-deterioration and test techniques.

MCB 814.1 - APPLICATION OF GENETIC ENGINEERING

(Modified version of an existing course in M.Sc. Industrial Microbiology Programme). Concepts, ethnics and applications of genetic engineering with emphasis on microbial strain development and improvement. Application of genetic engineering in petrochemical, pharmaceutical, medical and multi-purpose industries. New techniques and use of plasmids for enhanced industrial processes. Ecological problems and application of biological control (*e.g. Bacillus thuringiensis*).

MCB 820.1 - ENVIRONMENTAL MICROBIOLOGY AND BIOTECHNOLOGY

Environmental pollution and industrial development. Pollution phenomena. Roles of microorganisms in the pollution and depollution of environmental media. Nitrogen and sulphur cycles. Biodegradation and cometabolism of pollutants/xenobiotic compounds. Microorganisms as bio-monitors of environmental pollution. Microbial indicators of water quality. Pathogenic contamination of water, soil and air. Use of microbial mats in agro-forestry. Solid waste treatment and disposal. The roles of microorganisms in sewage and waste management. Microbiological principles in modern aqua-culture. Properties of marine bacteria (bioluminescence).

MCB 821.2 - ENVIRONMENTAL BIOREMEDIATION

Introduction to bioremediation. Laboratory treatability studies, Microbiological protocols and analytical methodologies. Microbiological site characterization. Bioengineering of soils and groundwater. Remediation design. Monitoring requirements. Bioremediation of surface and subsurface soils. Bioremediation of

heavy metals. Use of microbial mat in bioremediation. Bioremediation in fresh and marine systems. Aerobic and anoxic /anaerobic bioremediation. Application of anoxic/anaerobic processes to environmental problems. Anaerobic digestion of municipal solid wastes and biogas generation. Composting. Bioremediation case studies. Regulatory consideration in environmental bioremediation.

MCB 823.2 - PETROLEUM MICROBIOLOGY

Petroleum and its origin. Microbial production of methane. Microbial metabolism of gaseous hydrocarbons. Microbial metabolism of straight-chain, branched and cyclic alkanes. Microbial transformation of aromatic hydrocarbons; Pathways for hydrocarbon degradation. Biosynthesis of surface-active agents and their role in bioemulsification of hydrophobic molecules. Genetics of hydrocarbon utilizing microorganisms. Genetics engineering of hydrocarbons biodegradation. Fates of petroleum pollutants in marine, freshwater and soil ecosystem. Effects of hydrocarbons in microorganism and their communities. Growth dynamics of microorganisms on hydrocarbons substrates. Microbiology of heavy crude's and oil shales. Microbially enhanced oil recovery (MEOR). Biotreatment and disposal of petroleum refinery wastes. Sulphate reducing bacteria (SRB) in the petroleum industry. Hydrocarbons as substrates in industrial fermentations. Bioprocessing of coal.

MCB 806.2 – GRADUATE SEMINAR IN MICROBIOLOGY AND BIOTECHNOLOGY

A series of two seminars is to be delivered by each student. The first shall involve a literature review on topics of current research interest. The second shall center on data obtained from student's research project. Seminars are graded.

MCB 807.0 – RESEARCH PROJECT

This will take the form of supervised research work on relevant environmental microbiological related problems culminating in a written thesis to be examined by a board of external and internal examiners.

(iv) M.Sc. IN PATHOGENIC MICROBIOLOGY AND BIOTECHNOLOGY

A master's degree programme in Pathogenic Microbiology and Biotechnology is expected to cater for the high volume of highly qualified products of the Bachelor degree in Microbiology who have combined interest in the Medical field of Microbiology, and Biotechnology. The programme is hoped, will provide the highly needed manpower in Medical Microbiology and Biotechnology Research and Development, investigations, and reliable diagnosis of infectious diseases. Apart from the products of the B Sc and the Post Graduate diploma in Microbiology degree awarding institutions in the country because of the reputation of the Microbiology Department of the University of Port Harcourt as the best Microbiology Establishment in the country. The programme shall consist of taught courses, Seminar presentations, Workshops, as well as field or laboratory based Research project.

Admission Requirement

Admission into the M.Sc. programme in Pathogenic Microbiology and Biotechnology shall be open to the following category of applicants

- a. B.Sc. degree in Microbiology from any reputable university with a CGPA not less than 3 in a 5 point calibration system
- b. B.Sc. in a related discipline including biotechnology, Pharmacy, and medicine with a CGPA not less than 3 where applicable
- c. HND upper credit with a post graduate diploma in microbiology (PGDM) from the University of Port Harcourt with a CGPA not less than 4.

In addition to the general qualifications above, all applicants are expected to obtain a minimum grade not less than "C" in of the following subjects namely, Pathogenic Microbiology, Immunology and Biotechnology, Pharmaceutical Microbiology, or Virology.

Mode of Study/Duration of Programme

The programme would be available to both fulltime and part-time candidates. Fulltime students would be required to spend a minimum of 12 calendar months and a maximum of 24 calendar months. Part-time students on the other hand may spend a minimum of 24 calendar months and a maximum of 48 calendar months. The

programme shall consist of taught causes, practical classes, seminars and a supervised research project on topics of local, national and regional interest.

Conditions for the award of degree

The award of the Masters of Science (M.Sc.) degree in Pathogenic Microbiology and biotechnology will be subject to

- a. Passing all approved courses with a grade point of net less than 3.0 within the duration of the programme; for the avoidance of doubt, these shall include not less than 75% attendance at lectures.
- b. Satisfactory presentation of required seminars during the duration of the programme
- c. Satisfactory completion of an approved laboratory based research project on relevant topics in Pathogenic Microbiology and biotechnology, including the production of a standard thesis.
- d. Satisfactory performance in an oral examination of the subject of the thesis and related subjects.

Course Outline

- 1. MCB 831.1 Microbes Of Medical Importance
- 2. MCB 832.1 Diagnostic Microbiology And Biotechnology
- 3. MCB 833.1 Epidemiology
- 4. MCB 814.1 Applications Of Genetic Engineering In Biotechnology
- 5. MCB 803.1 Research Techniques In Microbiology And Biotechnology
- 6. MCB 834.2 Biopharmaceutical Technology
- 7. MCB 835.2 Vaccine Technology And Production
- 8. MCB 806.2 Graduate Seminars In Microbiology And Biotechnology
- 9. MCB 807.0 Research Project In Medical Microbiology And Biotechnology

Course Description

-

1. MCB 831.1

Microbes Of Medical Importance

Host parasite relationships – detailed considerations. Commensalism, Parasitism and the symbiotic relationships. Community versus Nosocomial infections and their associated pathogens. Different categories of Microbes of Medical importance – the Universal/ traditional pathogens, the opportunistic pathogens and the normal flora.. Pathogens unique to different systems of human and animal including the major systems of the human host. Essays on New and Emerging pathogens, including the HIV, SARS, EBOLA, LASA fever etc. Epidemiology of selected infectious diseases.

2. MCB 832.1 - Diagnostic Microbiology And Biotechnology

General considerations in Diagnostic Microbiology and biotechnology. Various diagnostic tools. Discussions on the sensitivity, specificity, rapidity and simplicity of diagnostics methods. Considerations in the selection of diagnostic techniques in the diagnosis of common infectious diseases. Interpretation of results of diagnostic experiments. Application of diagnostic tools in the diagnosis of infectious and non infectious diseases. Preparation of simple diagnostic kits, principles and practice. Quality control in laboratory diagnosis and diagnostic products.

3. MCB 833.1 - Epidemiology

Terminology; Sporadic, Endemic Epidemic, Pandemic, Morbidity, Mortality and Prevalence rate. Features of Epidemics; Common-source epidemic, Propagated epidemic, Herd immunity, Attenuated virulence and Epidemic cycles. Propagation of Diseases; Reservoirs, inanimate and animate reservoirs, and carriers. Transmission Routes and Infectious Doses; Air borne, Water borne, Urogenital transmissions, Arthropod borne, Direct Contact, Nosocomial or latrogenic Diseases and Zoonoses. Controlling Epidemics; Reducing or eliminating reservoirs, breaking transmission routes, Reducing number of susceptible individuals, Quarantine. Origin of new diseases. Epidemiological investigations and Surveillance.

4. MCB 814.1 - Applications Of Genetic Engineering In Biotechnology
Concepts, ethics, and applications of genetic engineering with emphasis on
microbial strain development and improvement. Application of genetic

engineering in pharmaceutical, medical; and multipurpose industries. New techniques and use of plasmids for enhanced production of biological diagnostic tools. Ecological problems and application of biological control.

5. MCB 803.1 - Research Techniques In Microbiology And Biotechnology Media design and culture collections. Safety techniques and laboratory precautions. Separation procedures for biological components. Disintegration of microbial cells and application in biotechnology. Methods of recovery of fermentation products including antibiotics and other biologically active components. Microbial enzyme extraction, purification and assays. Estimation of microbial populations and interpretation of data. Methods in anaerobic bacteriology. Microscopy and Photomicrography. Current trends in microbial identification including phage typing and DNA finger printing.

6. MCB 834.2 - Biopharmaceutical Technology

Historical perspectives of Pharmaceuticals of Biological origin. Antibiotics and non antibiotic pharmaceutical products. Sources and chemical nature of antibiotics and related substances. Isolations, Purification and Production of antibiotics. Sourcing for new antibiotics and other Pharmaceutical products. Antibiotic resistance, Mechanisms, Impacts, and the race for new pharmaceuticals. Microbes as surrogate sources of Biopharmaceuticals, the case study of insulin. Essays on selected Biopharmaceuticals. Field trips to pharmaceutical industries.

7. MCB 835.2 - Vaccine Technology And Production

Definitions and Historical aspects of vaccines. Microbial infections and range of available vaccines in the control of infectious diseases. Types, efficiency and Potency of vaccines. Theoretical considerations in the development of vaccines. The immune systems and response to infectious diseases. Host parasite factors in the development of effective and ineffective responses to infective entities. Practical considerations in the production of vaccines, including personnel, equipment, general infrastructure, safety and quality control. Vaccine efficacy monitoring, including survival of vaccines strains in vaccinated populations and the development and maintenance of protective immunity. Field trips to vaccine production industries.

8. MCB 806.2 - Graduate Seminars In Microbiology And Biotechnology

Students will be required to present seminars in areas specialized areas of medical microbiology including current trends in diagnostic microbiological methods, vaccine production, current search for novel antimicrobial agents and their mechanisms of action, current trends in antibiotic resistance among microbes of medical importance, new and emerging pathogenic microorganisms and other areas that may gain prominence with time.

9. *MCB* **807.0** - *Research Project In Pathogenic Microbiology And Biotechnology* Students are required to undertake a research project in relevant fields of medical microbiology and biotechnology as approved by the project supervisor in order to fulfill the requirements for the award of the Master of Science degree in Pathogenic microbiology and biotechnology.

11.3 Ph.D. IN MICROBIOLOGY

This programme is aimed at training the students to become mature and independent scholars who will be capable of solving academic and industrially- related problems. They are therefore expected to provide leadership in academia, research and industrial establishments

Acceptance by an eligible staff to supervise a candidate is a pre-requisite to being recommended for admission by the Department Graduate Studies Committee. The areas of research are indicated below.

A series of three seminars (at least) are to be delivered by each student. The first shall involve a literature review on topics of current research interest. The second and third shall center on data obtained from student's project. The last seminar presented by each Ph.D. students will be organized by School of Graduate Studies. It is mandatory for students to register for and passed courses approved for the Ph.D. programme. (For more information, consult the General Prospectus of the School of Graduate Studies).

Ph.D Courses

Ph.D MICROBIOLOGY (OPTION: ENVIRONMENTAL MICROBIOLOGY)

S/No	COURSE CODE	COURSE TITLE	CREDIT UNITS
1	MCB 909.1	Current Advances in Environmental	3
		Microbiology	
2	MCB 902.1	General Seminar I	3
3	MCB 903.2	General Seminar II	3
		Qualifying Examination	
4	MCB 904.0	Doctoral Dissertation	12
		Total	21

Ph.D MICROBIOLOGY (OPTION: FOOD MICROBIOLOGY)

S/No	COURSE CODE	COURSE TITLE	CREDIT UNITS
1	MCB 901.1	Current Advances in Food Microbiology	3
2	MCB 902.1	General Seminar I	3
3	MCB 903.2	General Seminar II	3
		Qualifying Examination	
4	MCB 904.0	Doctoral Dissertation	12
		Total	21

Ph.D MICROBIOLOGY (OPTION: INDUSTRIAL MICROBIOLOGY)

S/No	COURSE CODE	COURSE TITLE	CREDIT UNITS
1	MCB 905.1	Current Advances in Industrial	3
		Microbiology	
2	MCB 902.1	General Seminar I	3
3	MCB 903.2	General Seminar II	3
		Qualifying Examination	
4	MCB 904.0	Doctoral Dissertation	12
		Total	21

Ph.D MICROBIOLOGY (OPTION: PATHOGENIC MICROBIOLOGY)

S/No	COURSE CODE	COURSE TITLE	CREDIT UNITS
1	MCB 906.1	Current Advances in Pathogenic	3
		Microbiology and Biotechnology	
2	MCB 902.1	General Seminar I	3
3	MCB 903.2	General Seminar II	3
		Qualifying Examination	
4	MCB 904.0	Doctoral Dissertation	12
		Total	21

COURSE DESCRIPTIONS

Ph.D MICROBIOLOGY (OPTION: ENVIRONMENTAL MICROBIOLOGY)

MCB 909.1: Current Advances in Environmental Microbiology

Biosensors in Microbiology. Microtox bioluminescence assay. Radiorespirometry. Quantitative and Qualitative microscopy (epifluorescence, scanning electron and brightfield microscopy). Molecular techniques in environmental microbiology: Polymerase chain reaction (PCR), gel electrophoresis e,g. Denaturing gradient gel electrophoresis (DGGE)/ Temperature gradient gel electrophoresis (TGGE); DNA microarray technologies. Plasmid profiling: DNA restriction analysis. Florescence in <u>situ</u> hybridization_(FISH). Sequencing and phylogenetic analysis. Community-level physiological profiling (CLPP). Compound separation techniques. Laboratory safety consideration. Scientific report writing and presentation.

Ph.D MICROBIOLOGY (OPTION: FOOD MICROBIOLOGY)

MCB 901.1: Current Advances in Food Microbiology

Quantitative aspects of bacteriology and their application to food processing. Mathematical consideration of thermal destruction. Advanced methods of detecting bacteria causing food-borne, diseases. Techniques of biology assay and immunological methods of detecting Microbial toxins in foods.

Ph.D MICROBIOLOGY (OPTION: INDUSTRIAL MICROBIOLOGY)

MCB 905.1: Current Advances in Industrial Microbiology

Pathways of biosynthesis and catabolites. Hypothesis for the occurrence of secondary metabolites. Advanced metabolic pathway of energy generation. Polysaccharases of industrial importance. Bioinformatics of relevance in Industrial Microbiology (PCR, DNA sequencing, microarrays and metagenomics). Recent techniques in search for microbial active compounds. Patent and intellectual properties laws. Microbial teaching.

Ph.D MICROBIOLOGY (OPTION: PATHOGENIC MICROBIOLOGY)

MCB 906.1: Current Advances in Pathogenic and Biotechnology

Safety consideration in pathogenic microbiology lab. Changing trends in host parasites relationship. Understanding host-parasite interactions in the gastrointestinal tract

infections.Relationship between Helicobacter pylori and allergies.Evolving challenges in infection control'.Impact of new diagnostic methods in control of infectious diseases. New and emerging infections –General considerations/bacterial infections.

The multiplicity of virulence factors in Escherichia coli infections associated with the gastroenteritis.

New and emerging viral infections:

- 1. HIV-1 evolution, diversity and drug resistance.
- 2. Multi factorial approach to control of the malarial plague.
- 3. New and emerging fungal and parasitic infections.
- The genetic basis of multi drug resistant (MDR) bacteria-A special group of emerging infections.
- 5. Multi drug resistant Mycobacterium tuberculosis.
- 6. Problems and prospect of vaccine development in parasitic infections.
- 7. Problems and prospect in vaccine development- Influenza and HIV
- 8. Updates on modern approaches to the development of therapeutic agents and vaccines for the prevention of microbial diseases.

11.4 Ph.D IN MICROBIOLOGY AT CENTRE FOR OIL FIELD CHEMICALS RESEARCH (CEFOR)

Admission Requirements

Students that have successfully completed the relevant M.Sc degree of the University of Port Harcourt with a minimum CGPA of 4.0 as well as minimum of CGPA of 3.0 in their first degree

Candidates with equivalent qualifications from other Universities.

Qualified industry staff with relevant M.Sc degree can apply.

Shortlisted candidates will be invited for interview/ presentation of research proposals. Limited sponsorship opportunity is available for students, however, candidates are encouraged to seek for sponsorship from other sponsoring agencies and employers.

Duration of Programme

Full-Time: Minimum, 24 months of intensive modular taught courses and research project.

Part-Time: Minimum, 36 months of intensive modular taught courses and research project.

Graduation Requirement

The CEFOR Ph.D programme require a total of thirty-three (33) credit units for graduation. The courses include six taught courses, research seminar and research project as follows:

S/No	COURSE CODE	COURSE TITLE	CREDIT UNITS
1	ACE 901	Research Methods and Statistics for Data Analysis	3
2	ACE 902	ICT, Technical Report Writing and Presentation Skills.	3
3	ACE 903	Entrepreneurship	3
4	ACE 904	Oil and Gas Industry Overview	3
5	ACE 905	Environmental Management and Pollution Control	3
6	ACE 906	Drilling Fluid Technology and Oilfield Chemistry	3
7	ACE 907	Seminar/Advances in Areas of specialization	3
8	ACE 908	Research Project	12
Total			33

12.0 RESEARCH AND PUBLICATION

Research is an important integral part of academic work carried out in the Department of Microbiology. This is aimed at advancing scientific and biotechnological knowledge in Microbiology.

One of the objectives of the Department is to train the students to acquire desired knowledge, techniques and skills to enable them carry out research work independently in future and to prepare then for gainful employment. The students are normally assigned supervisors for their research projects which covers a wide range of specialization.

Research studies by the academic staff of the Department have been funded partly or fully either by the National University Commission (through Senate) or grants from external sources such as the International Foundations for Science (Sweden), Netherlands Organization for Scientific Research or the World Bank. Results from these investigations are often published in local and/or International Journals.

The research areas of the staff include:

- * Bio-control and bio-preservations of foods
- * Biodeterioration of foods and industrial materials
- * Biofilms and Biopolymers
- * Bioremediation and Biodegradation
- * Environmental Microbiology
- * Epidemiology and Public Health Microbiology
- * Food Microbiology and Biotechnology
- * Food Fermentation and Quality changes
- * Food Safety and Hazard assessment
- * Medical and Pharmaceutical Microbiology
- * Microbial Enzymes/Physiology
- * Microbial Food Ecosystems and Microbial Dynamics
- * Microbial Genetics and Genetics Engineering
- * Plant Pathology and Post-harvest losses.
- * Probiotics and Novel products
- * Quality control/quality assurance
- * Soil Microbiology

13.0 Examination of Dissertation:

Based on the performance of the student at the School of graduate Studies seminar, the Department will be authorized to proceed with arrangement for the student to defend his/her Dissertation. The panel for the defence of student's dissertation is as recommended by the School of Graduation Studies. The examination shall be oral, based on the student's research work. Field of specialization and any other related area chosen by the examiners shall submit their report jointly signed by the examiners.

- Chairman of Examination Panel (Dean of Faculty)
- External Examiner
- Representative of Dean, School of Graduate Studies
- Head of Department
- Supervisor.

All the above are subject to the general University regulation governing higher degree programmes.

14.0 GRADING SYSTEM (PGDM AND M.Sc. PROGRAMMES)

Attendance at lectures and practical sessions are as applicable to undergraduates,

Mark (Scores)	Letter Grade	Point Grade	Description
70% and above	A	5.00	Excellent
60 – 69%	В	4.00	V. good
50 – 59%	С	3.00	Good
0 – 49%	F	0.00	Fail

The PGDM shall be awarded with a Distinction, Credit or Pass based on the candidate's average score as follows;

Distinctio	on -	4.50 – 5.00
Credit	-	4.00 – 4.49
Pass	-	3.00 – 3.99
Fail	-	0.00 – 2.99

Note: Any candidate who fails to meet the graduation requirements within the normal period of his programme shall be required to re-register with the School of Graduate Studies.

15.0 CONTINUATION REQUIREMENTS

(i) A minimum grade of 'C' is required as a pass for any graduate student in all courses.

(ii) If a student fails a course, he shall re-register for it at the next available opportunity within the allowable time frame.

(iii) At the end of the First Year Course Work, the student have a CGPA of not less that 2.75. Failure to meet this minimum CGPA at the end of the first year the student shall be asked to withdraw.

(iv) No student shall proceed to the thesis work (research project) without attaining CGPA of 3.00 or above. A student who fails to attain a CGPA of 3.00 after exhausting both opportunities (i.e. first attempt and following re-registration for the course(s) shall be asked to withdraw.

16.0 SEMINARS

Seminars on areas of topical interest and research work are integral part of the Graduate programmes. Presentation of seminars and attendance are mandatory for the students (see page 31 for more information).

17.0 TITLES OF THESES

The titles of the thesis/dissertation must be submitted by the candidate (following consultation with his supervisor) to the Department for approval. The student must thereafter in writing through the Head of Department, notify the Graduate school stating the full title of the thesis/dissertation. The notification shall not be less than two months before the student submit himself for the oral examination.

18.0 BINDING OF THESES

- Gold is the approved colour for Theses/Dissertations in the Faculty of Science (including the Department of Microbiology). If in doubt consult the University Library.
- Your name, degree, department and year of graduation must be on the spine of the bound theses/dissertations.
- (iii) All four copies must be arranged and paginated in the same manner.

19.0 SUBMISSION OF THESES/DISSERTATIONS

- (i) Four copies of the thesis/dissertation (in paper binding) shall be submitted by candidate to the Department and forwarded to the Graduate school through the Faculty. This should be not be later than the beginning of the last semester of the prescribed duration of study as well as not less than two months to the date of the oral examination.
- (ii) Prior to the conferment of the degree, three copies of every thesis/dissertation examined and accepted shall be bound in a manner approved by the University Library. These three copies shall be submitted by the candidate and they become the property of the University.

20.0 EXAMINATION REQUIREMENTS FOR THE AWARD OF DEGREE

The award of the degree is subject to passing the following a approved by Senate;

- (a) Written examination in the taught courses
- (b) Seminars as assessed by the Department
- (c) Oral examination on the subject of the thesis/dissertation and related subjects.

21.0 PRESENTATION AND EXAMINATION OF THESIS/DISSERTATION

(i) Size of Paper

A4 (210 x 297 mm) is the approved size of paper for graduate thesis/dissertation.

(ii) Length of theses/dissertations

A minimum of 25,000 and 50,000 words are normally required for M.Sc. and Ph.D respectively

(iii) Signatories

The under-listed members who constitute the Board of Examiners shall sign the certification of theses/dissertations.

- * Supervisor(s)
- * Head of Department
- * External Examiner; and
- * Chairman (Dean) Board of Examiners.

22.0 EXAMINATION MALPRACTICES

Various forms of examination malpractices are recognized by the University. These include the following.

(i) Cheating within an Examination Hall/Room

Many forms of cheating are in this category, e.g. copying from one another, bringing into examination hall/room prepared (extra-examination) materials, oral/written communication amongst students, impersonation, non-submission of answer scripts, refusal to stop writing at the end (within ½ min.) of the examination, illegal removal of answer scripts from the examination hall/room.

(ii) Cheating Outside the Examination Hall/Room

The offences are numerous and they include:

- (a) Plagiarism (i.e. using another person's work without appropriate acknowledgment both in the text and in the references). This is of particular concern in writing of theses/dissertations.
- (b) Colluding with a member of staff to modify (alter) questions, scores/grades, etc.
- (c) Colluding with a member of staff to submit a new prepared answer scripts as a substitute for the original script.
- (d) Soliciting for help after an examination, etc.

(iii) Related Offences

These are pertinent to the ones indicated above. Among these are (a) manipulation of registration forms in order to sit for an examination for which the student is not qualified, (b) Colluding with a medical doctor in order to obtain an excused duty/medical certificate on grounds of feigned illness, (c) assault and intimidation of invigilator within or outside the examination -hall/room etc.

Punishments for Examination Malpractice

- Any student found guilty of examination malpractice after due process shall be expelled from the University.
- (ii) The decision is given wide publicity and it takes immediate effect.

23.0 DRESS CODE AND CONDUCT

Habits have a lot to do in shaping our personality and style. Students of the Department should be good mannered, well behaved, and decently dressed at all

times. Corporate (formal) dressing is expected of students presenting seminars. Laboratory coats and preferably, flat covered shoes should be worn during practical sessions and while working in the laboratory.

Punctuality at academic activities and good study habits are some factors that enhance academic performance. Student must therefore, be punctual and regular at lectures and practical sessions. Hard work will pay off with good grades. Work hard and reap the benefits.