OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, NIGERIA

FACULTY OF SCIENCE

DEPARTMENT OF BOTANY

REVIEW OF THE CURRENT UNDERGRADUATE DEGREE PROGRAMME IN BOTANY

1. Background Information and Justification

The Departments of Botany and Zoology that made up of Biological Sciences Section of the Faculty of Science moved (along with the Faculty of Agriculture) to Ile-Ife in January 1968. These two Departments were later merged and expanded to make the Department of Biological Sciences with programmes in Botany, Biochemistry, Zoology and Microbiology. They were all housed in the Agriculture buildings until, the Biological Sciences buildings were completed at the beginning of the 1974/75 session. The different programmes were upgraded into full-fledged Departments as they moved into the new buildings in 1975 and they remained so till today. Thus the Department of Botany, Obafemi Awolowo University, Ile-Ife came into being for the second time and has graduated a large number of students at the B.Sc., M.Sc., Ph.D levels since then.

The last review of the B.Sc. (Botany) programme of the Department of Botany was in 1998. Since then there have been changes in the field of Botany. With increasing globalization, the review of the Department's programme is thus important to keep pace with current developments and keep up with the standard Obafemi Awolowo University is known for. It is also necessary to provide the students with cutting edge knowledge to enable them compete favourably anywhere in the world. Units for graduation in the current curriculum totaled 155 Units while it is 168 Units in the proposed curriculum herein presented.

2. Degree Offered

Bachelor of Science (B.Sc.) Degree in Botany.

3. Admission Requirements

Requirements for students intending to obtain the B.Sc. Degree in Botany are those for admission to the University and to the Faculty of Science, except that the qualifying subjects must include credits in Biology or Agricultural Sciences, Chemistry in addition to English and Mathematics at the Ordinary Level of the General Certificate of Education, Senior Secondary School Certificate or its equivalent. Candidates with G.C.E. A/L passes in Chemistry and Botany or Biology may be offered direct entry into Part II of the Degree Programme provided they satisfy the requirements for admission to the University and the Faculty of Science.

4. Requirements for the Award of Degree

The minimum requirement for the award of the B.Sc. Degree in Botany is satisfactory completion of not less than 168 units of course work, made up of:

a) Foundation programme Option B Units	43
b) Special Electives	12
c) Departmental Requirements	92
d) Restricted Electives	15
e) Free Electives	06
Total	**168**

5. Specific changes to the current programme

(i) Botany courses for 100 level students have been slightly modified.

(ii) Faculty courses on Entrepreneurship have been accommodated.

(iii) New compulsory courses are: Horticultural Botany and Landscaping; Ethnobotany and Medicinal Plants; Tropical Tree Biology and Ecology

(iv) Some courses have their units reduced while the content of some courses were slightly modified

(v) Introduction to Methods of Genetic Analysis, Pteridology, Palynology and Global Environmental Issues are newly introduced restricted electives.

6. Objectives

The Objectives of the Botany Programme is to equip graduates of Botany with a thorough grounding in modern descriptive and experimental Biology and allied disciplines, and also prepare them for further work in several areas of Botany and related disciplines. The varied course contents in Botany, in addition to exposure to other science-related courses, serve as a foundation for later courses and by introducing the student to the range of modern botanical science, he/she is equipped to identify and pursue career interests in Science and Technology.

Outline of the revised programme

PART 1 NEW

HARMATTAN SEMESTER RAIN SEMESTER

Course Code	Course Title	L	P	T	U	Course Code	Course Title	L	P	T	U
BOT 101	Introductory Botany I	3	0	0	3	BOT 102	Introductory Botany II	3	0	0	3
BOT 103	Experimental Botany I	0	0	3	1	BOT 104	Experimental Botany II	0	0	3	1
CHM 101	Introductory Chemistry I	3	1	0	4	CHM 102	Introductory Chemistry II	3	1	0	4
CHM 103	Experimental Chemistry I	0	0	3	1	CHM 104	Experimental Chemistry II	0	0	3	1
PHY 105	Physics for Biological Sciences I	3	1	0	4	ZOO 102	Introductory Zoology II	2	0	3	3
PHY 107	Experimental Physics 1A	0	0	4	1	PHY 106	Physics for Biological Sciences II	3	1	0	4
ZOO 101	Introductory Zoology	2	0	3	3	PHY 108	Experimental Physics 1B	0	0	4	1
ZOO 103	Experimental Zoology	0	0	3	1	SSC 102	Element of Economic Principle and Theory	3	0	0	3
SSC 101	Man in his Social Environment				3		Special Electives				2
	Special Electives				2						
	Total				23		Total				22

The course content of BOT 102 was slightly modified

PART 1 OLD

HARMATTAN SEMESTER RAIN SEMESTER

Course Code	Course Title	L	P	T	U	Course Code	Course Title	L	P	T	U
BOT 101	Introductory Botany I	3	0	0	3	BOT 102	Introductory Botany II	3	0	0	3
BOT 103	Experimental Botany I	0	0	3	1	BOT 104	Experimental Botany II	0	0	3	1
CHM 101	Introductory Chemistry I	3	1	0	4	CHM 102	Introductory Chemistry II	3	1	0	4
CHM 103	Experimental Chemistry I	0	0	3	1	CHM 104	Experimental Chemistry II	0	0	3	1
PHY 105	Physics for Biological Sciences I	3	1	0	4	ZOO 102	Introductory Zoology II	2	0	3	3
PHY 107	Experimental Physics 1A	0	0	4	1	PHY 106	Physics for Biological Sciences II	3	1	0	4
ZOO 101	Introductory Zoology	2	0	3	3	PHY 108	Experimental Physics 1B	0	0	4	1
ZOO 103	Experimental Zoology	0	0	3	1	SSC 102	Element of Economic Principle and Theory	3	0	0	3
SSC 101	Man in his Social Environment				3		Special Electives				2
	Total				21		Total				22

PART II NEW

HARMATTAN SEMESTER RAIN SEMESTER

Course Code	Course Title	L	P	T	U	Course Code	Course Title	L	P	T	U
MTH 105	Mathematics for Biology Students	4	1	0	4	BOT 202	Biometry	2	0	0	2
CHM 205	Physical and Inorganic Chemistry	3	1	0	4	BOT 204	Plant Morphology	2	0	3	3
CHM 207	Experimental Physical and Inorganic Chemistry	0	0	4	1	BCH 202	Cell and Molecular Biology	2	0	0	2
BOT 201	Form and Function in Plants	2	0	3	3	CHM 202	Basic Organic Chemistry	3	1	0	4
BOT 203	Introductory Genetics	3	0	3	4	CHM 206	Experimental Organic Chemistry	0	0	4	1
BOT 205	Biological Techniques	2	0	3	2	MTH 106	Mathematics for Biology Students I	4	1	0	4
CSC 201	Introduction to Computing	2	0	3	3	CSC 208	Introduction to Programming Applications	1	0	3	2
	Total				21		2 Special Electives				4
							Total				22

PART II OLD

HARMATTAN SEMESTER RAIN SEMESTER

Course Code	Course Title	L	P	T	U	Course Code	Course Title	L	P	T	U
MTH 105	Mathematics for Biology Students	4	1	0	4	BOT 202	Biometry	2	0	0	2
CHM 205	Physical and Inorganic Chemistry	3	1	0	4	BOT 204	Plant Morphology	2	0	3	3
CHM 207	Experimental Physical and Inorganic Chemistry	0	0	4	1	BCH 202	Cell and Molecular Biology	2	0	0	2
BOT 201	Form and Function in Plants	2	0	3	3	CHM 202	Basic Organic Chemistry	3	1	0	4
BOT 203	Introductory Genetics	3	0	3	4	CHM 206	Experimental Organic Chemistry	0	0	4	1
BOT 205	Biological Techniques	2	0	3	3	MTH 106	Mathematics for Biology Students I	4	1	0	4
CSC 201	Introduction to Computing	2	0	3	3	CSC 208	Introduction to Programming Applications	1	0	3	2
	Total				22		Special Electives				2
							Total				20

PART III NEW

HARMATTAN SEMESTER RAIN SEMESTER

Course Code	Course Title	L	P	T	U	Course Code	Course Title	L	P	T	U
BOT 301	Whole Plant Physiology	2	0	3	3	BOT 302	Plant Anatomy I	2	0	3	3
BOT 303	Angiosperm Taxonomy	2	0	3	3	BOT 304	Systematics of Non-Flowering Plants	2	0	3	3
BOT 305	Autecology	2	0	3	3	BOT 306	Evolutionary Processes	2	0	3	2
BOT 307	Plant Tissue Culture	2	0	3	3	BOT 308	Plant Biotechnology	2	0	3	3
BCH 303	Introductory Biochemistry I	2	0	3	3	BOT 310	SIWES (Vacation)	2	0	3	2
MCB 201	General Microbiology I	2	0	3	3	**BOT 312**	**Horticultural Botany and Landscaping**	2	0	3	3
FSC 201	**Entrepreneurship for Science Students I**				2	MCB 202	General Microbiology II	2	0	3	3
						FSC 202	**Entrepreneurship for Science Students II**				2
	Special Elective				2		Special Electives				2
	Total				22		Total				23

1. FSC 201 and FSC 202 are newly introduced Faculty courses on Entrepreneurship
2. BOT 306 course unit was reduced to 2 from 3
3. BOT 312 is a newly introduced compulsory course

PART III OLD

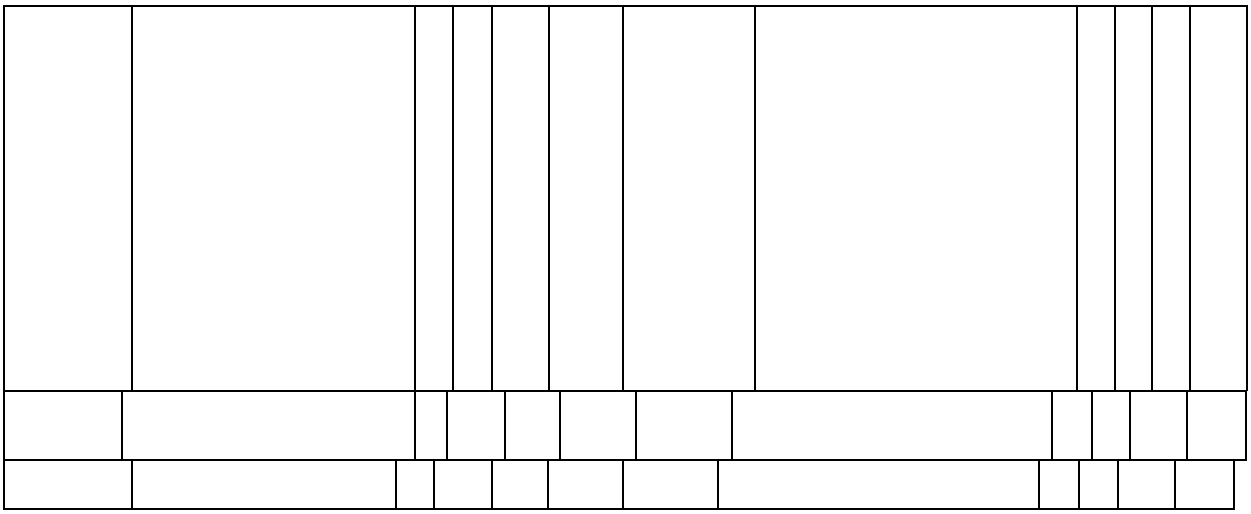
HARMATTAN SEMESTER RAIN SEMESTER

Course Code	Course Title	L	P	T	U	Course Code	Course Title	L	P	T	U
BOT 301	Whole Plant Physiology	2	0	3	3	BOT 302	Plant Anatomy I	2	0	3	3
BOT 303	Angiosperm Taxonomy	2	0	3	3	BOT 304	Systematics of Non-Flowering Plants	2	0	3	3
BOT 305	Autecology	2	0	3	3	BOT 306	Evolutionary Processes	2	0	3	3
BOT 307	Plant Tissue Culture	2	0	3	3	BOT 310	SIWES (Vacation)				2
BCH 303	Introductory Biochemistry I	2	0	3	3	BOT 308	Plant Biotechnology	2	0	3	3
MCB 201	General Microbiology I	2	0	3	3	MCB 202	General Microbiology II	2	0	3	3
	Special Elective				2		Special Electives				4
	Total				20		Total				21

PART IV NEW

HARMATTAN SEMESTER RAIN SEMESTER

Course Code	Course Title	L	P	T	U	Course Code	Course Title	L	P	T	U
BOT 407	Field Work and the Vegetation of Nigeria	2	0	3	3	BOT 410	Plant Anatomy I	2	0	3	3
BOT 409	**Ethnobotany and medicinal Plants**	2	0	3	3	BOT 412	Systematics of Non-Flowering Plants	2	0	3	3
BOT 411	Economic Botany	2	0	3	2	BOT 422	Evolutionary Processes	2	0	3	3
BOT 417	**Biodiversity and Conservation Ecology**	2	0	3	3		Any three of the restricted electives				9
BOT 421	**Tropical Tree Biology and Ecology**	2	0	3	3	BOT 402 **BOT 404** BOT 406 **BOT 416** **BOT 418** CHM 306 MCB 302 MCB 310 MCB 406 PSC 304 PSC 512	Ecology of Communities and Ecosystems **Pteridology** Plant Growth and Development **Palynology** **Global environmental Issues** Application of Spectroscopic Methods Pathogenic Bacteriology Mycology Medical Virology Plant Pathology Plant Breeding	2 2 2 2 2 2 2 2 2 2 2	0 0 0 0 0 0 0 0 0 0 0	3 3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3 3
	Any two restricted electives				6		Total				18
BOT 423 ZOO 307 BCH 304 BCH 407 BOT 401 BOT 403 BOT 405 BOT 413 BOT 415	**Introduction to Methods of Genetic Analysis** Limnology Introductory Biochemistry II Nucleic Acids and Protein Synthesis Plant Metabolism Algology Bryology Introductory Cytogenetics Advanced Plant Taxonomy Total				3 3 3 3 3 3 3 3 3 20		BOT 409 and BOT 421 are newly introduced compulsory courses. BOT 411 course content was slightly modified, unit reduced to 2 from 3. BOT 417 course title and content were modified. BOT 404, 416, 418 and 423 are newly introduced restricted electives				



PART IV OLD

HARMATTAN SEMESTER RAIN SEMESTER

Course Code	Course Title	L	P	T	U	Course Code	Course Title	L	P	T	U
BOT 407	Field Work	2	0	3	3	BOT 410	Research Project	0	0	9	3
BOT 409	Research Project	2	0	3	3	BOT 412	Seminar	1	0	0	1
BOT 411	Economic Botany	2	0	3	3	**Restricted Electives**		2	0	3	3
BOT 417	Environmental Pollution and Conservation Biology	2	0	3	3	BOT 402 BOT 406 CHM 306 MCB 302 MCB 310 MCB 406 PSC 304 PSC 512	Ecology of Communities and Ecosystems Plant Growth and Development Application of Spectroscopic Methods Pathogenic Bacteriology Mycology Medical Virology Plant Pathology Plant Breeding	2 2 2 2 2 2 2 2	0 0 0 0 0 0 0 0	3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3
Restricted Elective	Any two of the following				6		Special Elective				2
ZOO 307 BCH 304 BCH 407 BOT 401 BOT 403 BOT 405 BOT 413 BOT 415	Limnology Introductory Biochemistry II Nucleic Acids and Protein Synthesis Plant Metabolism Algology Bryology Introductory Cytogenetics Advanced Plant Taxonomy Special Elective	2 2 2 2 2 2 2 2	0 0 0 0 0 0 0 0	3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 2		Free Elective				3
	Total				19		Total				18

Students who are admitted directly into the Part II of the B.Sc. Programme may be exempted from courses adjudged equivalent to the required foundation courses. Other requirements are those stipulated by the University for the award of first degree under the course unit system.

7. Courses required for graduation

			Units	
(a)	**Foundation Programme Option B Units**			
	BOT 101	Introductory Botany I	3	
	BOT 102	Introductory Botany II	3	
	BOT 103	Experimental Botany I	1	
	BOT 104	Experimental Botany II	1	
	CHM 101	Introductory Chemistry I	4	
	CHM 103	Introductory Chemistry II	4	
	CHM 104	Experimental Chemistry II	4	
	MTH 105	Mathematics for Biology Students I	4	
	MTH 106	Mathematics for Biology Students II		
	PHY 105	Physics for Biological Science I	4	
	PHY 106	Physics for Biological Science II	4	
	PHY 107	Experimental Physics 1A	1	
	PHY 108	Experimental Physics 1B	1	
	ZOO 101	Introductory Zoology I	3	
	ZOO 102	Introductory Zoology II	3	
	ZOO 103	Experimental Zoology	1	
		Sub-total	**= 45**	
(b)	**Special Electives**		**= 12**	
(c)	**Departmental Requirements**			
	BOT 201	Form and Function in Plant	3	
	BOT 202	Biometry	2	
	BOT 203	Introductory Genetics	4	
	BOT 204	Plant Morphology	3	
	BOT 205	Biological Techniques	2	
	BCH 202	Cell and Molecular Biology	2	
	CHM 202	Basic Organic Chemistry	4	
	CHM 207	Physical and Inorganic Chemistry	4	
	CHM 205	Experimental Physical and Inorganic Chemistry	1	
	FSC 201	**Entrepreneurship for Science Students I**	**2**	**Newly Introduced**
	FSC 202	**Entrepreneurship for Science Students II**	**2**	**Newly Introduced**
	MCB 201	General Microbiology I	3	
	MCB 202	General Microbiology II	3	
	BCH 303	Introductory Biochemistry I	3	
	BOT 301	Whole Plant Physiology	3	
	BOT 302	Plant Anatomy I	3	
	BOT 303	Angiosperm Taxonomy	3	
	BOT 304	Systematics of Non-Flowering Plants	3	
	BOT 305	Autecology	3	
	BOT 306	Evolutionary Processes	2	
	BOT 307	Plant Tissue Culture	3	
	BOT 308	Plant Biotechnology	3	
	BOT 310	SIWES (Students Industrial Work Experience)	2	

BOT 312	**Horticultural Botany and Landscaping**	**3**	**Newly Introduced**
BOT 407	Field Work **and the Vegetation of Nigeria** 3		
BOT 409	**Ethnobotany and Medicinal Plants**	**3**	**Newly Introduced**
BOT 410	Project	5 Course unit for Harmattan and Rain merged.	
BOT 411	Economic Botany	3	
BOT 412	Seminar	1	
BOT 417	Biodiversity and Conservation Ecology	3 Course title and content Modified	
BOT 421	**Tropical Tree Biology and Ecology**	**3**	**Newly Introduced**
CSC 201	Introduction to Computing	3	
CSC 202	Introduction to Programming Applications	2	
	Sub-total	**92**	

(d) Restricted Electives:

A minimum of 15 Units of courses from the following:

CHM 306	Application of Spectroscopic Methods	3
MCB 302	Pathogenic Bacteriology	3
MCB 310	Mycology	3
MCB 406	Medical Virology	3
PSC 304	Plant Pathology	3
PSC 512	Plant Breeding	3
ZOO 307	Limnology	3
BCH 304	Introductory Biochemistry II	3
BCH 407	Nucleic Acids and Protein Synthesis	3
BOT 401	Plant Metabolism	3
BOT 402	Ecology of Communities and Ecosystems	3
BOT 403	Algology	3
BOT 404	Pteridology	3
BOT 405	Bryology	3
BOT 406	Plant Growth and Development	3
BOT 408	Plant Anatomy II	3
BOT 413	Introductory Cytogenetics	3
BOT 415	Advanced Plant Taxonomy	3
BOT 416	Palynology	3
BOT 418	Global Environmental Issues	3
BOT 423	Introduction to Methods of Genetic Analysis	3
	Sub-total	**15**

(e) Free Electives

6 units outside those listed in but equivalent to any in a-d above	6
Sub-total	**6**

Grand Total (a + b + c + d +e) = 168

8. COURSE CONTENT

BOT 101 ***Introductory Botany* I**: 3+0+0 (3 Units) Harmattan Semester

Biology in a modern world: The growth and ways of science. Scientific method. The science of Botany. Why study Botany? **The cell - Structure & Function**: Cell theory, Cell components; similarities and differences of animal and plant cells; similarities and differences between eucaryotic and procaryotic cell; Cell division-- mitosis, Cell in development--growth, differentiation, integration. **Elementary treatment of genetics;** The physical and chemical nature of genetic material; the major historical events in the elucidation of the nature of genetic material; equational and reductional division in cells. Mendelian genetics; human genetics and genetic counselling; genetic engineering and biotechnology. **Plant Physiology** - Elementary treatment of the mechanism of movement of materials in and out of the cell, transpiration, plant and mineral nutrition, photosynthesis, respiration; plant growth substances and their functions. Ecology definition; elementary consideration of biotic and abiotic components, cycling of matter and energy flow. Types of ecosystems. Pollution-water, air, oil pollution, global warming.

BOT 102 **Introductory Botany II:** 3+0+0 (3 Units) Rain Semester

Variety of forms: classification and evolution in the plant kingdom. **Elementary treatment of cryptogams** - algae, fungi, bryophytes. Pteridophytes--their distribution, classification, morphology, reproduction and economic importance. Evolution and significance of the seed habit in the spermatophytes (non-flowering and flowering seed plants). **Elementary treatment of the anatomy and morphology of angiosperms**: Simple and complex tissue systems in roots, stems and leaves. Scope of morphology--external and internal morphology; morphology of plant organs--root morphology and variations; leaf morphology and variations. Morphology of inflorescence and flowers. Fruit morphology and variations. Introduction to Ethnobotany.

BOT 103 ***Experimental Botany* I** 0+0+3 (1 Unit) Harmattan Semester

Brief history of a microscope, various parts of a light microscope, care of a microscope and how to use a microscope. Drawing and labeling of the essential parts of a microscope. Study of simple plant cell: Drawing and labeling of the inner face of a bulb scale of *Allium* (Onion) observed under a light microscope; study of unicellular cells using yeast cells obtained from palm-wine; drawing of the yeast cells under a light microscope. Study of starch grains using tubers; drawing of starch grains under a light microscope; study of colours in plant cells. Variation in organisms: continuous and discontinuous variations. Cellular substances in plants: test for cellulose, lignin, starch and protein. Adaptation of plants to the environment: estimation of seed production in plants.

BOT 104 ***Experimental Botany* II** 0+0+3 (1Unit) Rain Semester.

Use of Microscope. Prokaryotic and Eukaryotic cells: study of a representative member of each group; study of Fungi, Mosses, Club mosses and ferns: study of a representative member of each group. The study of flowers: flowers of typical anthophyta to know their parts. Essential parts of the flowers to be observed under a light microscope. Internal anatomy of a herbaceous dicot stem. The root system of an herbaceous dicot plant. The study of leaf morphology and the use of keys for identification of plants.

BOT 105 ***Introductory Ecology***: (For non-biology majors) 2+0+0 (2 Units) Rain Semester.

Ecology: its aims, methods and scope; relevance to Nigeria. Natural history and ecology. Population concept in ecology; growth regulation of populations. Habitat and community concepts; forest and savanna habitats; habitat factors--light, humidity, temperature, wind, soil biotic factors. Ecological zones of West Africa. Food chains and webs. Competition: feeding, protective and dispersal adaptation. Plant successions and their influence on animals. The Ecosystem concept. Conservation and pollution.

BOT 201 ***Form and Functions in Plants - Life Processes in Plants*****:** 2+0+3 (3 Units) Rain Semester.

Living and non-living things. Plants and other living things. Structure of plant cells. Structural patterns in plant nutrition: Sources of metabolisms. Uptake of nutrients. Translocation. Inorganic nutrition. Organic nutrition; Photosynthesis, synthesis of other organic substances, Respiration. Elimination of materials. Growth and Development; Pattern of growth. Growth in multicellular plants. Factors influencing plant growth. Plant growth substances. Reproduction: Asexual and sexual reproduction. Enzymes:Activation energy. Mechanisms of action. Properties, composition, types, factors affecting activity. Interactions amongst organisms: Social and nutritive interactions.

Prerequisite: BOT 101.

BOT 202 ***Biometry:*** 2+0+3 (3 Units) Harmattan and Rain Semester

Purpose and relevance of Biometry. Population and sample frequency distributions. Data gathering and presentation. Measure of location and dispersion. Probability. Normal Poisson and binomial distributions. Confidence limits. Analysis of variance (ANOVA). Non-parametric tests in lieu of ANOVA: regression and correlation, Analysis of frequencies; contingency and $\square^2$ - test, T-test, Z-test and F-test. Factorial experiments. Prerequisite: 'O' Level Mathematics.

BOT 203 ***Introductory Genetics*** 3+0+3 (4 Units) Harmattan Semester

The subject matter of Genetics. Heritable and non-heritable traits. A short history of Genetics. Sexual and asexual reproduction. Chromosome number and structure; chromosomes and genes. Meiosis and mitosis;alternation of generations. The transmission of hereditary character: Mendelism; gene interaction; quantitative genetics. Cytoplasmic inheritance. Sex determination and sex linkage. Probability in Genetics. Linkage and recombination. Genetics of Lower organisms—viruses, bacteria and fungi. The molecular basis of heredity. Introduction to population genetics. Introduction to evolution and its processes.

Prerequisite: BOT 101.

BOT 204 ***Plant Morphology*** 2+0+3 (3 Units) Rain Semester

General organisation of the angiosperm plant body. Treatment of the variations in the morphology of the root, stem, leaves inflorescences, flowers, fruits and seeds of angiosperm plants. Introduction to plant description and identification.

Prerequisite: BOT 101.

BOT 205 ***Biological Techniques***: 1+0+3 (2 Units) Harmattan Semester

Microscopy, Histological techniques, Photography, Colorimetry, Photometry, Chromatography, Conductometry. Biological illustration, sampling techniques, herbarium techniques.

Prerequisite: BOT 101.

BOT 301 ***Whole Plant Physiology*** 2+0+3 (3 Units) Harmattan Semester

Chemical background; cell structure and function; water relations of cells; cell wall and growth of cell; soil and mineral nutrition; uptake and movement of water; uptake and transfer of solute; translocation of solutes; partitioning and control mechanism; leaves and atmosphere; water loss--transpiration

Prerequisite: BOT 201.

BOT 302 ***Plant Anatomy*** I 2+0+3 (3 Units) Rain Semester

The Plant Cell; cell organelles and their functions.

Meristems and cell differentiation. Cell types, mature tissues and tissue system. Secondary growth in plants. The internal structure of the stem, root, leaves, flowers, fruits and seeds of monocotyledonous and dicotyledonous plants. The periderm; its structure and functions. The structure of plant organs in relation to their function and ecological modification. Emphasis to be placed on tissue identification.

Prerequisite: BOT 204.

BOT 303 ***Angiosperm Taxonomy*** 2+0+3 (3 Units) Harmattan Semester

The objectives of Plant Taxonomy and its relevance to human activities. History of plant Classification. Evolution and unit of plant classification; evolution and its significance to taxonomy. Principles and concepts of Plant Taxonomy; classification, nomenclature, identification. Current systems of classification; taxonomic characters; taxonomic literature. Introduction to plant geography. Treatment of selected orders and families of plants (dicotyledons and monocotyledons). Herbarium practice, organisation and management. Introduction to the preparation of local flora. Emphasis will be placed on plant identification, at least, to the family level.

Prerequisite: BOT 204

BOT 304 ***Systematics of Non-Flowering Plants*** 2+0+3 (3 Units) Rain Semester

Historical survey of the development of ideas and method of approach concerning the systematics of non-flowering plants. Evolution of the earliest plants. Structural organisation, primary classification and relationships of the Thallophyte, Lichens, Bryophyte, Pteridophytes and Gymnosperms. Problems of terrestrial environments. Review of evolution towards the root, stem, leaf and flower of the Anthophyte, Origin of the Anthophyta.

Prerequisite: BOT 101.

BOT 305 ***Autecology*** 2+0+3 (3 Units) Harmattan Semester

Units of Ecology: environmental factors, population, community, ecosystem, biosphere. Population: growth, interrelations dynamics-Letka-Velterra equations, differential and difference equations, Estimations of importance: cover, density, frequency, yield. Organism and population relationships: intra-and inter-specific competition: predation, symbiosis (mutualism), commensalism, independence. Measurement of environmental factors and effects of these on populations. The ecological niche overlap, diffuse competition, co-existence, resource shift. Conservation and Pollution,

Prerequisite: BOT 202.

Co-requisite: BOT 303.

BOT 306 ***Evolutionary Processes*** 2+0+0 (2 Units) Rain Semester

The theory of evolution. Chemical evolution and the origin of life. Sources of variation: mutation, chromosome re-arrangements, hybridization and recombination, changes in chromosome number. Natural selection: modes of selection, polymorphism. Speciation: isolation and genetic drift; isolating mechanisms. Selection pressures and the evolution of weeds, pests and pathogens. The wild relatives of crops and domesticated animals.

BOT 307 ***Plant Tissue Culture*** 2+0+3 (3 Units) Harmattan Semester

Techniques of plant tissue culture. Meristem culture. Embryogenesis and organogenesis. Isolation, culture and fusion of protoplasts from higher plants. Applications of plant tissue culture--somatic hybridization, production of haploids, induction of genetic variability, conservation of germplasm.

Prerequisite: BOT 201 and BOT 203

BOT 308 ***Plant Biotechnology*** 2+0+3 (3 Units) Rain Semester

Review of methods of plant biotechnology. T_1 plasmid. Recombinant DNA and transgenic plants. Introduction of genetic information into plant protoplasts. Continuous culture of plant cells. Secondary products and biotransformation. Nitrogen fixing association of Rhizobia and tissue culture. Applications of biotechnology--plant protection (herbicide resistance, insect resistance, disease resistance, plant products (biofuels, biofertilizers and other products); virus free plants through tissue culture.

Prerequisites: BOT 203, 307.

BOT 310 **SIWES** (Student Industrial Work Experience Scheme)

Horticulture (Recreational horticulture, floriculture). Afforestation (FRIN, NCRI, NACGRAB, NIFOR, NIHORT). Conservation sites (Forest Reserves, National Parks); Biosphere Reserve (National Parks Management Board). Aquatic Environment. Students are free to choose from any of the above-recommended areas of study. The exercise may be carried out during the vacation period for Part III going to IV students.

MODALITY: All Lecturers should be involved in the supervision of SIWES.

*BOT 312: ***Horticultural Botany and Landscaping*** 2+0+3 (3 Units) Harmattan Semester

State of the Horticulture industry in Nigeria; Economic importance of Horticulture; Career prospects in horticulture; Biology of Horticulture: plant growth and development, environmental factors affecting plant growth and development, classification of horticultural plants; Mechanisms of propagation: vegetative propagation and associated methods of obtaining propagules for rapid propagation – cuttings, marcotting, budding, layering, tissue culture techniques; Nursery practices; Dry season vegetable production; landscape management; Principles of landscape gardening; landscape maintenance; turfing and turf (grass) management.

Prerequisites: BOT 101, BOT 204

BOT 401 ***Plant Metabolism*** 2+0+3 (3 Units) Harmattan Semester

Photosynthesis: historical development. Chlorophylls and accessory pigments. Reduction of dye and NADP. Evolution of oxygen. Photophosphorylation. ATP hydrolysis. CO_2 fixation. Bacterial photosynthesis. Respiration. Structure of mitochondria. Glycolysis. Decarboxylation. Oxidative phosphorylation. Special oxidations. Nitrogen metabolism: Nitrogen fixation. Synthesis of amino groups. Secondary metabolism: alkaloids, flavonoids, steroids, Metabolic regulation.

Prerequisites: BOT 301, BCH 303.

BOT 402 ***Ecology of Communities and Ecosystems*** 2+0+3 (3 Units) Rain Semester

Community interacton. Succession. Species diversity and indices of diversity. Vegetation zones of West Africa, their climatic and edaphic features, their floral and fauna composition. Sampling and collection methods in the study of communities, ecosystems. Energy and materials flow, cycling. Correlation and regression. Introduction to multivariate analysis. Ecosystem description, evaluation; management problems.

Prerequisite: BOT 305.

BOT 403 ***Algology*** 2+0+3 (3 Units) Harmattan Semester

Primary algal classification. Structure, reproduction and life-histories of the algae with special reference to the Cyanophyceae, Chlorophyceae, Bacillariophceae, Rhodophceae and Phaeophyceae. Ecology of terrestrial and freshwater algae.

Prerequisite: BOT 304.

*BOT 404: ***Pteridology Rain Semester*****:** 2+0+3 (3 Units) Rain Semester

Structure, reproduction and life-histories of Pteridophytes. Homospory and Heterospory. Taxonomic characters and pteridophyte identification. Vascularity and water relations. Treatments of the classes of Eusporangiate and Leptosporangiate with special references to Filicales, Selaginellales, Marattiales, Salviniales, Osmudales and Ophioglossales.

Prerequisite: BOT 304

BOT 405 ***Bryology*** 2+0+3 (3 Units) Harmattan Semester

Structure, reproduction and life-history of the bryophytes: the protonema, metophyte and sporophytes. Spore dispersal mechanisms. The three classes of bryophytes-Hepaticae, Anthocerotae and Musci. Taxonomic characters and bryophyte identification. Treatment of selected families with special reference to tropical bryophytes.

Prerequisite: BOT 304

BOT 406 ***Plant Growth and Development*** 2+0+3 (3 Units) Rain Semester Principles of regulation: dynamic relation between internal chemical genetical factors and external environment. Plant response as a result of this dynamism, at level of cell differentiation and morphogenesis. Periodicity in plant response short period or circadian rhythms. "Biological clock" concept, Bunning's hypothesis. Long-period rhythms-flowering and dormancy: temperature, light, moisture effects. Plant growth substances: auxins, gibberellins, cytokinins, abscisic acid, ethylene; inhibitor systems.

Prerequisites: BOT 203, BOT 301 and BCH 303.

BOT 407 **Field Work and the Vegetation of Nigeria** (3 Units) Harmattan and Rain Semester

Floristic description of vegetation types. Impact of human activities on vegetation; Afforestation, Field report.

Prerequisites: BOT 201, BOT 303 and BOT 305

BOT 408 ***Plant Anatomy*** **II** 2+0+3 (3 Units) Rain Semester

The structure and properties of the cell wall. Bark and Wood anatomy.

Structure of the secondary xylem and wood identification Secondary growth in plants. Ecological Plant anatomy. Meristems and morphogenesis in plants. Applied Plant Anatomy.

Prerequisite: BOT 302.

BOT 409:** ***Ethnobotany and Medicinal Plants **(**2+0+3 (3 Units) Harmattan Semester**)**

Medicinal Plants Useful in Treating Various Ailments (Therapeutically Useful Plants) and their Bioactive Agents, Contribution of Medicinal Plants to Modern Medicine, Traditional Systems of Medicine by West Africans, Indian and Chinese Systems of Traditional Medicine, Uses of Plants by Nigerian Indigenous People (Ethnobotany).

Prerequisite: BOT 101, BOT 204.

BOT 410 ***Research Project*** (5 Units) Harmattan/Rain Semester

Upon the advice of the student's adviser and with the consent of the Head of Department, the student may engage in an honours project in any area of Botany for which suitable supervision and facilities are available. The project will consist of directed reading, tutorial discussion with the supervisor of the project (assigned by the Head of Department) and independent research work.

Prerequisites: Consent of the Head of Department.

BOT 411 ***Economic Botany*** 2+0+3 (3 Units) Harmattan Semester

Importance of Plants to Man. Cultivated Plants, their wild relatives and centres of origin. Inventory, botanical characteristics and cultivation of economic plants. Utilization of plants. Plants and world energy supply. Deforestation, devegetation and desertification. Conservation of germplasm.

Prerequisite: BOT 303.

BOT 412 ***Seminar*** (1 Unit) Rain Semester

Students are to participate in departmental seminars throughout the session. Each student will present a seminar on an assigned topic or his/her research project.

Prerequisite: Consent of the Head of Department.

BOT 413 ***Introductory Cytogenetics*** 2+0+3 (3 Units) Harmattan Semester

The subject matter of Cytogenetics, genophore, genetic material in protocell and eucells. The Eukaryotic Chromosomes, physical and chemical structure, heretochromatin and euchromatin, special types of chromosomes. Cell division: mitosis, meiosis, gametogenesis. Crossing over and chiasmata formation: factors affecting, cytological basis of; chromosome rearrangements: duplications, deficiencies, inversions, translocations; chromosome aberrations and evolution. Changes in chromosome number: euploidy and aneuploidy, polyploidy and evolution. Evolution of sex-determining mechanisms: balance theory of determination, chromosomal mechanisms, genic mechanisms, other systems. Chromosomes in biotechnology, whole Chromosome manipulations in plant breeding, gene cloning and prospects in plant improvement, somatic hybridization, tissue culture techniques.

Prerequisite: BOT 203.

BOT 415 ***Advanced Plant Taxonomy*** 2+0+3 (3 Units) Harmattan Semester

The herbarium and scientific research. Detailed treatment of the principles of classification, nomenclature and identification. Review of contemporary taxonomic systems. Taxonomic data; their extraction, analysis and interpretation. Evolution and taxonomy. Sources of variation in plants. Further treatment of selected families of plants. Intensive practice on plant description and identification. There will be a mini-project on herbarium practice and preparation of a local flora.

Prerequisite: BOT 303.

BOT 416:** ***Palynology **(**2+0+3 (3 Units) Rain Semester**)**

Brief history of palynology including evolutionary trends in spores and pollen grains; Deposits Containing Fossil Pollen: Peats, Lake Sediments, Soils, Air; Collection and Treatment of Pollen Samples: Pollen samplers, Pollen extraction; Structure and Composition of Pollen Grains and Spores; Application of Pollen Morphology in Taxonomy, Crime Detection etc.: Pollen Apertures, Pollen Sculptures; Identification of Pollen Grains and Spores; The Use of the Key in Pollen and Spore Identification.

Prerequisite: BOT 101, BOT 204.

*BOT 417: ***Biodiversity and Conservation Ecology*** (2+0+3 (3 Units) Harmattan Semester;

Nature of biodiversity; Patterns of distribution of biodiversity; Global, regional and ecosystem scales; Causes of observed biodiversity patterns; the main threats to and human influence on biodiversity; Extinction of species. Conservation: Definition a. Natural resources; Renewable and Non-renewable, Utilization and management. Rationale for conservation of species; criteria to identification of species and areas of conservation importance. Conservation Strategies: In situ and Ex-situ. Protected Areas: Strict Nature Reserves, National parks, Bird Sanctuary, Game Reserves Biosphere reserves Convention and Treaties on biodiversity conservation. Agencies involved in Conservation activities. Biodiversity conservation in Nigeria.

Prerequisite Courses -BOT 101, BOT 303 and BOT 305)

*BOT 418: ***Global Environmental Issues*** 2+0+3 (3 Units) Rain Semester

Energy flow and Material cycles; Implication, their - Definition/explanation/importance. Biosphere reactions/responses to Environmental Change. Atmospheric, soil and water Pollution, Impacts and Consequences. Acid rain, Eutrophication of water bodies; Global warming; Ozone layer depletion; Photochemical Smog; Metal pollution. Drought; Invasive plants species. Deforestation and desertification. Plants as receptors of Environmental pollution and mitigating agents in terrestrial ecosystems, food chain. Environmental Impact assessment and Monitoring, Environmental Change effect on Human population and food Production. Phytoremediation

Prerequisite - BOT 101, BOT 305 and BOT 407).

*BOT 421: ***Tropical Tree Biology and Ecology*** (2+0+3 (3 Units) Rain Semester;

Reproductive Biology of Tropical Trees.Sexual Systems and Reproductive Systems. Plant Pollinator Systems; Pollination Syndromes. Plant Strategies to assure Pollination. Adaptations of Fruits and dispersal Syndrome of Seeds. Seeds and Seedlings, Seed sizes,Viability, Dormancy, Germination, Soil Seed bank. Seedling growth and developments Establishment of survival. Propagation, Different methods/explanations on how to propagate tropical trees. Distribution and species diversity in tropical tree assemblages and distributions. Tree Guilds, Dynamics and growth forms of tropical trees. Microbial Association with tropical trees, Nutrient Acquisition strategies

*BOT 423: ***Introduction to Methods of Genetic Analysis*** (2+0+3 (3 Units) Harmattan Semester)

Summary of classical genetic ratios and their genetic underpinnings; Test of Association; Classification of data in segregating populations; Assessment of variability: genotypic variance, phenotypic variance, heritability, diallel crosses analysis; The role of experimental design in genetic analysis.

Prerequisites: BOT 101, BOT 203

ENTREPRENEURAL COURSES FOR THE FACULTY

Harmattan Semester. Course code: FSC 201, 2 Units.

Course Title: Entrepreneurship for science students I

Course content:

The definition of creativity and innovation.

The need to study creativity and Innovation.

The sources of Innovative opportunities.

Creativity and Product development process.

Product planning and execution.

The market, the target and the consumer.

Presentation of creativity ideas.

The world of business. Intellectual properties. Basics of planning.

Intellectual Property Management and Global Intellectual Property Protection.

Rain Semester. Course code: FSC 202, 2 Units

Course Title: Entrepreneurship for science students II

Course content:

The Characteristics of Entrepreneurship and Success Secret.

Business Plan Fundamentals. Business classification and Ownership Forms

Financial Aspects of Running a Small Business.

Marketing, Pre-business feasibility analysis and opportunity assessment.

Government Policies and Incentives for SME's and Entrepreneurs.

Getting started with your business.

Exit Strategies.

Course Lectures: Dr. I.O. Abereijo and D. A.O. Fayomi from Institute of Entrepreneurship and Development Studies.