

**7.0****CURRICULA AND COURSE DESCRIPTIONS**

The following is the list of courses taken by the students registered for the B. Sc. programme in the Department.

**YEAR ONE****FIRST SEMESTER**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT HOURS</b>
GSS 101	Use of English and Library I	2
GSS 111	Introduction to Computer Studies	2
BIO 101	General Biology I	3
CHM 101	General Chemistry I	3
PHY 101	General Physics I	3
PHY 181	General Physics Laboratory I	1
MTH 111	Algebra and Trigonometry	3
CHM 107	General Chemistry Laboratory I	1
	<b>Total Number of Credit Hours</b>	<b>18</b>

**SECOND SEMESTER**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT HOURS</b>
GSS 102	Use of English and Library II	2
GSS 114	Computer Applications	2
GSS 122	History and Philosophy of Science	2
BIO 102	General Biology II	3
CHM 102	General Chemistry II	3
PHY 102	General Physics II	3
PHY 182	General Physics Laboratory II	1
MTH 112	Coordinate Geometry and Calculus	3
CHM 108	General Chemistry Laboratory II	1
	<b>Total Number of Credit Hours</b>	<b>20</b>

**YEAR TWO****FIRST SEMESTER**

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT HOURS</b>
GSS 201	Introduction to Entrepreneurial Studies	2
BOT 221	Seedless Plants	2
BTG 201	Introduction to Genetics	2
BCH 201	General Biochemistry I	3
BIO 237	Biological Techniques	2
ZOO 203	General Physiology	2
MCB 201	General Microbiology	3
BOT 241	Introduction to Ecology	2

<b>ELECTIVE COURSES</b>		2
BOT 299	Environmental and Aquatic Pollution	2
BTG 203	Molecular Biology I	
	<b>Total Number of Credit Hours</b>	<b>20</b>

### SECOND SEMESTER

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT HOURS</b>
BTG 252	Introductory Developmental Cell Biology	2
BOT 222	Seed Plant	3
MCB 202	General Microbiology II	3
CHM 232	Organic Chemistry I	3
BIO 222	Statistics for Biological Sciences	3
BOT 212	General Mycology	3
BTG 202	Introduction to Biotechnology	2
	<b>Total Number of Credit Hours</b>	<b>19</b>

### YEAR THREE

#### FIRST SEMESTER

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT HOURS</b>
GSS 300	Introduction to Entrepreneurial Skills	2
BOT 311	Introductory Ethno botany (Medicinal Plants)	2
BOT 303	Plant Physiology	2
BOT 301	Plant Taxonomy	3
BOT 321	Anatomy of Vascular Plants	3
BOT 351	Plant Breeding	2
BOT 352	Landscaping and Ornamental Horticulture	2
BIO 307	Field Operations	1
BOT 331	Introductory Phytopathology	2
<b>ELECTIVE COURSES</b>		
BOT 317	Waste Management	2
ZOO 331	Biology of Tropical Parasites	2
	<b>Total Number of Credit Hours</b>	<b>21</b>

#### SECOND SEMESTER

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT HOURS</b>
BIO 302	Industrial Training (SIWES)	6

	<b>Total Number of Credit Hours</b>	<b>6</b>
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## YEAR FOUR

### FIRST SEMESTER

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT HOURS</b>
BOT 401	Seminar in Botany	1
BOT 441	Plant Reproduction	2
BOT 421	Economic Botany	2
BOT 411	Plant and Environmental Pollution	2
BOT 431	Plant Pathology & Protection	2
BOT 403	Nigerian Vegetation	2
BOT 417	Plant Cytology	2
BOT 415	Paleobotany and Paleontology	2
BIO 401	Research Methods and Scientific Writing	3
	<b>Total Number of Credit Hours</b>	<b>18</b>

### SECOND SEMESTER

<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CREDIT HOURS</b>
BOT 400	Research Project in Botany	6
BOT 412	Soil Sciences	2
BOT 442	Plant Tissue and Organ Culture	3
BOT 452	Plant Population Ecology	2
BOT 444	Plant Virology	2
BOT 414	Molecular Biology	2
BOT 462	Conservation and Development of Natural Resources and Forest Products	2
	<b>Total Number of Credit Hours</b>	<b>19</b>

## COURSE DESCRIPTIONS

### **BIO 101    GENERAL BIOLOGY I – 3 Credit Hours**

This is an introductory Biology course, the aim of which is to give the students a background into the general concepts in biology and also introduces the study of plants.

1. Taxonomy and characterization of living things, hierarchy of living things, organization of life.

2. The cell (plant and animal); history, the cell theory, structure, organization and functions of organelles.
3. Prokaryotes, Eukaryotes, Viruses, Bacteria, Fungi, Algae.
4. Bryophytes and Pteridophytes.
5. General characteristics, Biology and Evolutionary trends of:
  - Protozoa
  - Porifera
  - Cnidaria
  - Platyhelminthes
  - Nematodes
  - Annelids
  - Echinoderms

### **BIO 102      GENERAL BIOLOGY II – 3 CREDIT HOURS:**

This course is intended to give a comparative study of the major morphological characteristics of the different animal kingdoms, showing the gradual evolution from lower to higher organisms.

1. Interrelationship of the Kingdom Animalia/Plantae.
2. Basic ecological concepts; organizational levels of ecology, ecological niche, population, community, ecosystem, food chain and food web.
3. Habitats; terrestrial and aquatic.
4. Heredity; Mendelian inheritance, sex determination, application and genetics.
5. Plant and Animal reproduction; vegetative propagation, budding, gammae, layering, fission, spore formation, sexual and asexual reproduction.
6. Laws of thermodynamics; Biogeochemical cycles: carbon, water and nitrogen.
7. Evolution: Lamarck's theories, Darwin's theory, modern views in evolution.
8. Gymnosperms and Angiosperms.
9. Chordates

### **BOT 221      SEEDLESS PLANTS – 2 Credit Hours**

The morphology and reproduction of algae and bryophytes including fossil forms will be treated. The course will cover range of forms, reproduction nutrition and life history of selection algae to illustrate the evolutionary trends and features of interests (ecological and biological) among the algae fungi bacteria and bryophytes. This course is a one –semester course designed to

present to the students, the morphology and reproduction of the lower plants abundant in the tropical environments around us.

### **BOT 212 GENERAL MYCOLOGY – 3 CREDIT HOURS**

This course is intended to provide the student of Botany and Microbiology who may or may not anticipate becoming professional mycologists with a broad perspective of mycology as a whole. Attempt will be made to emphasize the general feature common to the majority of fungi and to relate the broad trends (stressing phylogenetic relationship) in structure and behavior in the group. Topics such as fine structure, growth development and reproduction will be examined in details. Fungal taxonomy will also be treated. Characteristics, habit of vegetative and reproductive structures, classifications. A systematic study of representatives of various subdivisions and classes. A study of economically important fungi; peronosporaceae (downy mildews), phytothora late blight of potato black pod disease of cocoa; Mucorales basic biology of yeast, fermentation and its industrial applications. Eurotiales (smut disease). Edible and poisonous mushrooms: physiology –dormancy and spore germination, environmental requirements for growth and reproduction.

### **BIO 222 STATISTICS FOR BIOLOGICAL SCIENCES – 3 CREDIT HOURS**

This is a course in basic statistics as it relates to biological concepts. It is intended to make students aware of the basic statistical tools available to biologists for the planning of experiments and for analysis of experimental data in order to draw valid inferences.

The following areas will be covered: Estimates of sample parameters, Data collection and presentation, Probability and significance tests, Poisson distribution, experimental designs, simple analysis of variance, simple regression and correlation tests.

### **BOT 222 SEED PLANT - 3 CREDIT HOURS**

Topics treated will include general features of gymnosperms, morphology, modification of vegetative parts of Angiosperms, pollination and fertilization in gymnosperms and angiosperms. Fruit and seed germination as well as selected dicot families with examples and economic importance will be treated. Among gymnosperms, a detailed study of the morphology, anatomy and reproduction in Cycas, pinus and Gnetum will be undertaken. The per-requisite for this course is BOT 221-seedless plants.

### **ZOO 203      GENERAL PHYSIOLOGY 1 - 2 CREDIT HOURS**

The course topics include water and solutions, colloidal systems, energy and nutrients, respiration and metabolism in plants; movement of water and minerals in solution, basics of photobiology. Some of these principles will be discussed and used to illustrate some physiological processes.

### **BOT 241                  INTRODUCTORY PLANT ECOLOGY - 2 CRED IT HOURS**

This course covers basic concept and definitions of eco-systems in ecology including the levels of as well as population dynamics of organisms and their distribution.

### **BOT 201    INTRODUCTION TO GENETICS - 2 CREDIT HOURS**

Heritable and non-heritable characteristics, Mendelian genetics, Gene interactions, quantitative genetics, Extrachromosomal inheritance, Sex determination, linkage and recombination in eukaryotes, Introduction to recombination in prokaryotes.

### **BCH 201 GENERAL BIOCHEMISTRY 1   - 3 CREDIT HOURS**

Chemistry of amino acids, proteins and their derivatives; methods of isolation and identification, acidity and alkalinity, pH and PK, values and their effects on cellular activities, buffers, chemistry/structures of carbohydrates, lipids and nucleic acids. Practical laboratory exercises in areas of interest to cut across wide spectrum of general biochemistry. Principles of instrumentation. Methodologies and applications of electrophoresis, Chromatography, thin layer chromatography, spectroscopy and spectrophotometry centrifugation, (and isotopic techniques). Laboratory practical may be arranged on the basis of 3 hours per week.

### **BIO 207 BIOLOGICAL TECHNIQUES -2 CREDIT HOURS**

This course is expected to provide an overview as well as practical demonstrations and application to basic techniques in Biology. The course will span from proper use of equipment and instruments example microscope, to the preparation of biological specimens (slide skeletons etc.). Insect preservation, herbarium materials, microtome techniques etc., chromatography, cytology techniques, collection and preservation of biological specimens. The basic

approaches for research and experimental designs will be outlined. Some modern techniques will also be taught.

### **MCB 201 GENERAL MICROBIOLOGY I- 3 CREDIT HOURS**

Historical aspects and scope of microbiology. General characteristics of microorganisms. Growth and reproduction. Sterilization techniques and disinfection. A brief survey of microorganisms as friends and foes of man. Environmental factors governing microbial growth. Introduction to bacteria, fungi, viruses, algae. Major differences between prokaryotes and eukaryotes. Morphology, reproduction and life cycles of some representatives of each group of microorganisms and their possible relationships. Their distribution in nature, beneficial and harmful effects on man, animals and plant. Laboratory methods involved in the isolation, culture, characterization and identification of microorganisms of medical, environmental and industrial importance.

### **BOT 299 AQUATIC AND ENVIRONMENTAL POLLUTION- 2 CREDIT HOURS**

This course will provide awareness of the effects of different sources of pollution and types of pollutants, methods of detecting, measuring and monitoring biological changes associated with aquatic, terrestrial and air pollution. Distribution of chemical in these environments and their roles in the metabolism and productivity, effects of pollution on plant and animal communities that constitute the food chain. Physiological effects of water pollution on economically important and endangered species, methods of pollution abatement

### **BTG 203 MOLECULAR BIOLOGY 1- 2 CREDIT HOURS**

This course provides an integral approach to the modern concepts and techniques in molecular genetics. The course includes basic topics such as nucleic acid structure and functions: mutation molecular basic mutagenesis, gene concept, gene transfer methods, genetics of bacteriophage, OX174 and MIZ; complementation; recombination, restriction and modification in bacteria, transcription replication. Translation and post translational events.

**BTG 252 INTRODUCTORY DEVELOPMENTAL/CELL BIOLOGY – 2 CREDIT HOURS** This course will focus on the process and requirement of cells during development. The history, mechanism and present trends in cell

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

### **MCB 202 GENERAL MICROBIOLOGY II - 3 CREDIT HOURS**

The problems and techniques involved in the systemic classification of bacteria, fungi, viruses and algae. Introduction to microbial variation and hereditary characteristics. Biogeochemical cycles of elements and materials in nature with emphasis on carbon, phosphorus, nitrogen, sulphur. Nitrogen fixation. Biological, biochemical and serological reactions of microorganisms. Prerequisite –MCB 201

### **BTG 202 INTRODUCTION TO BIOTECHNOLOGY – 2 CREDIT HOURS**

This course treats the basic topics and historical developments in Biotechnology. The topics will include: historical background and developments in biotechnology, bacterial genetics, manipulation of bacterial genes, application of biotechnology in the industry, agriculture and food production, health care and bioterrorism, legal implications in biotechnology, Bioremediation and pollution control.

### **BOT 301 PLANT TAXONOMY - 3 CREDIT HOURS**

This is designed to provide a broad foundation in taxonomy for students in Botany. It covers the theory and practice of taxonomy as well as the study of characteristics of selected angiosperm families. A good grasp of the principles and concepts in plant taxonomy, construction and use of taxonomic keys, morphology and classification of selected groups.

### **BOT 351 PLANT BREEDING – 2 CREDIT HOURS**

The objectives of plant breeding; origin and domestication of basis of breeding self-pollinated and cross pollinated crops. Breeding methods, pure line breeding and mass selection, pedigree method, bulk population breedings, back cross breeding. Recurrent selection, heterosis, chromosome manipulation.

### **BOT 321 ANATOMY OF VASCULAR PLANT – 3 CREDIT HOURS**



This course is meant to give students of Botany sound background knowledge of the general structure of plant body, tissue systems, organization of meristems, evolution of vascular tissue, comparative wood anatomy, anatomical adaptation to specialized habitats and applied aspects of plant taxonomy.

**BOT 331                    INTRODUCTORY PHYTOPATHOLOGY – 2 CREDIT HOURS**

Students will be taught on microbial diseases economically important to plants with particular reference to Nigerian plants. There will also be some emphasis on diseases caused by insects, nematodes and phanerogams. The fundamental principles in epidemiology and disease control will be highlighted; some genetic aspects of pathogenicity will be introduced. At the end, students should be able to recognize outbreak and design methods of control for such diseases.

History of plant pathology, principles and concepts in plant pathology. The concept of disease infection, pathogenesis, host-pathogen relationship and chemotherapy.

**BOT 311                    INTRODUCTORY ENTHNOBOTANY (MEDICINAL PLANTS) - 2 CREDIT HOURS**

The course deals with the historical, traditional and contemporary use and value of plants. It is designed to take advantage of the knowledge of local communities in traditional medical practice. The course will review the medicinal, nutritional and economic uses values of plants and products. The potentials of unexploited plants will also be highlighted. The course will expose students to the knowledge of taxonomy, economic botany and medicinal plant technology (pharmacognosy) of locally available plants.

**BIO 307    FIELD OPERATIONS – 1 CREDIT HOURS**

Students accompanied by lecturers will undertake a field trip to specific geographical Area in Nigeria. In the area, they will explore the Environment, and habitats relevant to the study of Botany.

This course is intended to expose all third year students of Botany who are expected to present bound copies of the report of the field trips project, which include familiarization of students with practical knowledge of general patterns of abundance ecology, distribution and importance of plants. Knowledge of habitat factors and features that may be significant to the patterns of abundance of certain species in a habitat; qualification of relationships between key habitat factors, plant features, characteristics, adaptation and population size. Students

are expected to possess items such as cameras, plant sheets, specimen bottles, sharp knives for cuttings, marking tape for labeling.

### **BOT 303 PLANT PHYSIOLOGY -2 CREDIT HOURS**

This course is intended to expose students to some of the fundamental principles in the functioning of plants as a whole and effects of the various environmental factors influencing plant growth and development. The course intends to relate crop yield with the physiology of plants. A study of water relations of cell and plants to include water intake, root pressure, guttation, transport and ascent of sap, photosynthesis, respiration, growth and regulation, senescence will also be studied. Other topics include flowering, seed dormancy and germination. Aspects of crop physiology will be highlighted.

### **BOT 353 LANDSCAPING AND ORNAMENTAL HORTICULTURE- 2 CREDIT HOURS**

Selection and use of trees and shrubs species for the beautification of different landscapes and environment, landscape planning. Residential landscaping. Institution and recreational landscaping. Consideration of design principles and visits to landscaping areas. Horticulture machines and equipment. Principles of producing, planning, maintenance of ornamental trees and shrubs in the nursery, homes and parks.

### **BOT 317 WASTE MANAGEMENT- 2 CREDIT HOURS**

Biological and non-biological waste, strategies of waste management and control, treatment of degradable waste, management in urban and urban areas, organisms association with waste. Engineering methods of waste management. Assessment of management approaches.

### **ZOO 331 BIOLOGY OF TROPICAL PARASITES -2 CREDIT HOURS**

Classification, adaptation morphology. Anatomy, life cycle and other features of interest in the protozoans, plathyhelminthes, nematodes and parasitic arthropods; drawing particular attention to various adaptations to the drawing of life exhibited by selected members of the group.

### **BIO 302 INDUSTRIAL ATTACHMENT (SIWES)**

This course will be taken during the second semester of third year extending to long vacation and will last for six (6) months.

### **BOT 400 PROJECT – 6 CREDIT HOURS**

Students are expected to carry out short but meaningful experiments in the areas of plant Ecology, Plant Virology, plant physiology and Phytopathology. This will be examined by external examiners to be appointed by the University in conjunction with the department.

### **BIO 401 Research Methods and Scientific Writing - 3 CREDIT**

The aim of this course is to enable student develop research skills, to access information on biomedical research and to present scientific ideas coherently in writing and orally. The course outline will include: project design and project cycle. Project planning and formulation, formulation objectives and outputs; how to conduct literature reviews, Review of method and results. Situation analysis/conducting need assessments. Developing verifiable indicators, monitoring and evaluation. Selecting a statistical methods. Data presentation, writing prose that complements a table or figure. Discussion, getting to the main point and summarizing effectively. Research proposal writing, Grant proposal, writing a mission statement. Guidelines for writing a research paper. Guideline for writing scientific and technical reports

### **BOT 401 SEMINAR IN BOTANY- 1 CREDIT HOUR**

Students will be expected to carry out a review in the areas of their chosen topics (all project topics should be related to the course taught). Such reviews will be presented as Seminars.

### **BOT 431 PLANT PATHOLOGY AND PROTECTION- 2 CREDIT HOURS**

BOT 461 together with BOT 341(Introductory phytopathology) is designed to provide the students with total perspectives of diseases of plants, their protection and control. It continues from BOT 341 but focuses more on special areas of plants diseases caused by insects, nematodes, phanerogams. It deals with environmental and nutritional impacts on disease development as well as fundamental principles in epidemiology, disease control, and genetics of pathogenicity and application of biotechnology to pathology.

**BOT 412 SOIL SCIENCE – 2 CREDIT HOURS**

This course is intended to the critical effects of soil devastation and the techniques for the restoration of soil productivity following devastation classification and characteristics of soil, formation, influence of climate and vegetation, soil devastation and restoration. Chemical components and analysis of soil and plant tissues. Plant soil water relations. Trips will be undertaken to devastated areas within the forest zone. Practicals will include student s participation in on going soil restoration programs.

**BOT 422 NIGERIAN VEGETATION-2 CREDIT HOURS**

This course is designed to give the students an elaborate idea of the Nigerian field. The various vegetation covers from the South of the country to the North will be studied in detail. The environmental condition of the various belts, soil types, productivity and ecological relationships existing between the various species will be examined. Climate zones in Nigeria, diagrams of other climate meters, florist composition of the major belts, forest stratification, formations, associations and soil types, productivity, interaction in each belt; Effects of human activities (deforestation etc.) and the future of the Nigerian vegetation.

**BOT 441 PLANT REPRODUCTION- 2 CREDIT HOURS**

Plant reproduction is offered with the objective of providing the students with a sequential study of development trends of sexual and asexual and reproduction in plants related to a gradual movement from aquatic habitat, from primitive habits to advanced tendencies. At the end of the course, students should be able to trace the trends and advancement in the reproduction processes of plants from the primitive unicellular thalophytes to the advanced complex multicellular angiosperms.

**BOT 442 PLANT TISSUE AND ORGAN CULTURE-3 CREDIT HOURS**

The objective of this course is to expose student to the potentials of plant tissue culture techniques as a tool of biotechnology research and its importance on agriculture, horticulture, forestry and industrial development. The course will entail the scope of technique and organization, history of tissue culture. Procedures of micropropagation germplasm storage, morphogenesis and protoplast culture and fusion. The role of plant hormones and vitamins,

techniques in plant tissue cultures. Application of plant tissue culture in plant breeding.

**BOT 452 PLANT POPULATION ECOLOGY-2 CREDIT HOURS**

Final year students of Botany will be exposed to detailed studies on the basic concepts in plant population Ecology. Areas such as plant Association, positive and Negative Associations-Test of Association (T-test for significance and difference position series as well as detection of non-randomness. Detailed studies on plant growth analysis (Growth parameters – Ontogenic drift and allometry and plant growth) population, age structure and distribution. Ecological adaptations with respect to gas exchange, chemical controls, reproduction in plants, energy transformation.

**BOT 462 CONSERVATION AND DEVELOPMENT OF NATURAL RESOURCES AND FOREST PRODUCTS - 3 CREDIT HOURS**

Introduction to conservation, Natural resources, biodiversity, conservation and sustainable development, in-depth study of conservation programs in Nigeria; Biodiversity conservation efforts in Nigeria, factors militating against conservation efforts, legislature in environmental conservation.

**BOT 444 PLANT VIROLOGY -3 CREDIT HOURS**

Characteristic, classification and taxonomy, physical and biological properties, transmission and replication of plant virus. Students of Botany should know the effects of plant viruses on physiology (photosynthesis and transpiration etc.) of infected plants. Specific examples of viruses of economic crops e.g. cocoa, cassava, maize, vegetable crops and cowpeas etc.

**BOT 414 MOLECULAR BIOLOGY - 2 CREDIT HOURS**

Background: Mendel and genes; genetic terminology; cells and chromosomes; Discovery of the role of DNA, DNA structure, protein structure: the structure, conformation and other properties of proteins with special reference to x-ray crystallography and other physical techniques. Polysaccharides, glycoprotein cell wall structures etc. and related biological macromolecules. Structure and properties of DNA and RNA, DNA replication: DNA polymerase; issues of the replication processes, topoisomerases. Transcription: the basic of making RNA, introduction to regulation. How RNA polymerase recognizes and distinguish genes, promoters, interaction of transcription and DNA super coiling.

Elongation and termination. Gene regulation: DNA-protein interaction. Proteins interact with DNA and modulate its structure and function. Types of DNA-binding proteins, sequence recognition, DNA-bending. Transcription in eukaryotes: An introduction to the complexity of the transcriptional apparatus in higher organisms. Translation: formation of initiation complex, prokaryotes and eukaryotes. Genetic code: standard and variations; recoding, mRNA, tRNA activating enzymes, ribosomes, factors. Post-transcriptional processing of RNA. Changes in RNA after synthesis and usually before. Splicing, including alternative splicing; capping, polyadenylation. Trimming, mRNA degradation, molecular techniques: DNA extraction techniques, gel electrophoresis, transformation, PCR and molecular markers, restriction enzymes.

**BOT 415 PALEONTOLOGY AND PALEONTOLOGY -2 CREDIT HOURS**

Morphology and classification of spores and pollen, their stratigraphic and pale environment application. Study of fossils. Oil implication of fossils.

**BOT 421 ECONOMIC BOTANY- 2 CREDIT HOURS**

The botany, cultivation and uses of tropical plants with particular reference to Nigerian economic plants.

**BOT 411 PLANT AND ENVIRONMENTAL POLLUTION MONITORING -2 CREDIT HOURS**

The use of algae, lichens, bryophytes and higher plants in monitoring environmental pollution. The use of algae as indicators of aquatic pollution. The merits and demerits of using various taxonomic groups as indicators.

**BOT 417 PLANT CYTOGENESIS-2 CREDIT HOURS**

Morphology and behavior of chromosomes. Chromosomal aberrations and polyploidy, importance of polyploidy. Population cytogenetics, examples with reference to specific individuals.