National Academic Reference Standards (NARS)
Biological Sciences

The study of biological sciences emphasizes on understanding of life's basic processes for biological elements including respiration, metabolism, movement, sensation and digestion. In addition, biological sciences are concerned with the environmental aspects, including ecosystem composition, protection, conservation, economics, utilization, interaction, competition and breeding between the biological elements of the ecosystem. The study of biological sciences serve as basic information for a wide range of disciplines such as medicine, pharmacology, veterinary medicine, dental medicine and agriculture. It contributes effectively to the human health which is the wealth of the nation, and disease fundamentals through the study of the microorganisms together with the development of new vaccines, drugs and antibiotics.

Biological sciences of the basic science sector given under a number of specializations such as: entomology, botany and zoology. In addition to, the sub-disciplines within this area that focus on particular groups of organisms such as microbiology and other interdisciplinary specializations as biotechnology.

There are various job opportunities for biologist as researcher in academic, educational and environmental institutions. Other work opportunities are in drug, biotechnology, food, agricultural, chemical, biological supplies, forensic sectors and others.

6.1. Attributes of a Biologist

In addition to the general attributes, the graduates must be able to:

6.1.1 Understand the life's basic processes in relation to organisms and ecosystems.

6.1.2. Recognize, understand and assess different levels of organization in biological systems.

6.1.3. Identify and characterize different communities and ecosystems supporting the biological organism.

6.1.4. Be acquainted with the modern subjects and bio-techniques.

6.2. Knowledge and understanding in biological sciences

In addition to the knowledge mentioned in the general part for the Basic Sciences graduates, the Biologist must know and understand the:

6.2.1. Life of representative Taxa in different disciplines from cellular to organism.

6.2.2. Physiological aspects of organisms.

6.2.3. Taxa limit and the characteristic habitat features of representative organisms.

6.2.4. Processes and mechanisms in different ecosystems.

6.2.5. Theories applied for interpreting and analyzing biological information.

6.2.6. Complexity and diversity of organisms through the study of genetics, developmental stages and evolution.

6.3. Professional and Practical Skills

The Graduates of Biological Sciences programs must be able to:

6.3.1. Solve Biological problems by a variety of methods including computers and other recent tools.

6.3.2. Collect, record and analyze biological data using appropriate techniques in the field and laboratory.

6.3.3. Apply field and laboratory investigations of living systems in an ethical and responsible manner.

6.3.4. Select a representative sample considering its validity, accuracy and reliability during collection.

6.4. Intellectual Skills

The Graduates of Biological Sciences programs must be able to:

6.4.1. Interpret the subject-related knowledge to solve problems.

6.4.2. Formulate data and select the proper mechanism for their setting within a theoretical framework.

6.4.3. Assess the interrelationships and the impact of a specific organism on its ecosystem.

6.4.4. Evaluate the ecosystem, its conservation, economics and sustainability.

6.4.5. Interpret biological data and respond to a variety of information sources.

National Academic Reference Standards (NARS)

For Zoology

1. Introduction

Zoology is the branch of biology which relates to the animal kingdom, including the structure, embryology, evolution, classification, habits, and distribution of all animals, both living and extinct, including their structure, function, growth, origin, evolution, distribution, and taxonomy.

Zoology contributes to the human health, wealth of the nation and disease fundamentals through the study of the microorganisms and related topics, together with the development of new vaccines drugs and antibiotics. Knowledge of zoology is essential for a viable human future. It is therefore important for leaders of society whether in government, industry, business or education and for an informed electorate to appreciate and understand the scope and limitations of zoological knowledge and techniques. Only then can we face the challenging social, ethical and legal problems posed by new developments such as stem cell cloning, gene patenting and gene therapy while working to maintain biodiversity and a stable and sustainable environment.

Zoology is studied under many different titles and in many different sorts of departments, schools, faculties, and institutions. Some zoologists are ecologists and will do much of their work in the field. Many of them work in laboratories; some in university, departments, others in the biotechnology, pharmaceutical, health, and food industries.

Zoology is divided into many specializations such as anatomy, physiology, histology, embryology, teratology, and ethology. Gradually zoology expanded beyond Huxley's comparative anatomy to include the sub-disciplines: Zoography

(also known as descriptive zoology that describes animals and their habitats), comparative anatomy (studies the structure of animals), animal physiology, behavioral ecology, ethology (the study of animal behavior), in addition to various taxonomically oriented disciplines such as mammalogy, herpatology, ornithology, and entomology. Moreover, zoology has many related fields such as evolutionary biology (development of both animals and plants is considered in the articles on evolution, population genetics, heredity, variation, Mendelism, and reproduction), molecular biology (studies the common genetic and developmental mechanisms of animals and plants), palaeontology, systematics, cladistics, phylogenetics, phylogeography, biogeography and taxonomy (classify and group species via common descent and regional associations).

Zoology serves as basic information for wide range of disciplines such as medicine, veterinary medicine, dental medicine and agriculture. Students belonging to the earlier mentioned disciplines take an intercalated honors course; these courses are frequently shared with biological sciences students. However, the National Academic Reference Standards applied to each discipline is that addressed to the graduate sector name (the Biology Department in Faculty of Science referred to the NARS of basic science (zoology).

Recently, zoologists are working in disciplines that might previously have been classified among the unrelated topics such as: physical sciences, organic chemistry, drug interaction, engineering, informatics, statistics and software. The development in such disciplines has begun to collaborate with zoologists to form

multidisciplinary teams tackling topics such as the human genome project and bioengineering.

There are various job opportunities in zoology as it is an ever expanding field within the biotechnology sector, some career options may include secondary school teacher – with skills ascertained from a zoology degree, graduates have the option of developing the knowledge of secondary students, usually this requires some form of education associate degree/diploma in education, but is a viable option for any graduate. Research scientist in zoology in academic institutions and the graduate may have positions at the following: in drug companies, biotechnology firms, food companies, fruit growers, chemical companies, biological supplyhouses, environmental consultant, Pathologist, animal and wildlife educator or rehabilitator, animal behaviorist zoo curator, entomologist, pests-control to homeowners, farmers and others.

2. Program Aims:

The program aims to:

1- Offers a stimulating environment that will encourage our students to attain their full academic potential, with academic staff members who undertake research at the cutting edge of their fields, and who focus their teaching on the latest developments in many disciplines of biology.

2- Fosters in our students enthusiastic and life long interests in biology, through a developing understanding of the diversity of life and its processes and mechanisms.

3- Provides the foundations essential for further training and for development of

skills and knowledge of program student's future careers, whether in specific areas of biology or in any other discipline or vocation.

4- Trains our students to analyze complex problems of every kind, so that they can reach considered and appropriate conclusions on the basis of the widest range of evidence, and can communicate their conclusions to others.

5- Offers a range of undergraduate degree programs covering diverse topics of organismal, environmental and functional biology, including the opportunity to specialize in zoology, animal behavior, and toxicology.

6- Makes available to our student's clear and accurate information on our teaching programs, on what is expected of them, and on how successfully they are achieving the goals we demand of them.

7- Develops the intellectual and practical skills and the capacity for individual work and teamwork.

8- Provides students with risk assessment, health and safety regulations and respect for animal and plant life.

3. Student attributes in Zoology:

The ability to:

1- Know and understand the processes and mechanism of life from molecular to cellular and from organism to community.

2- Engagement with essential facts, major concepts, principles, theories associated with the program curriculum.

3- Understand information and data, and their setting within theoretical framework.

4- Familiarize with terminology, nomenclature and classification system.

5- Develop knowledge about diversity and evolution.

6- Read and use appropriate literature with a full and critical understanding.

7- Appreciate of the complexity and diversity of life processes through the study of organisms, their molecular, cellular and physiological processes, their genetic and their relationships between them and their environment.

8- Analyze and summarize information and apply subject knowledge and understanding to address problems.

9- Recognize and apply subject-specific theories, concepts or principles.

10- Design, plan, conduct and report on investigations, individually or in a group projects.

11- Think independent, set tasks and solve problems by using a variety of methods including the use of computers.

12- Use the Internet and other electronic sources critically as a mean of communication and a source of information.

13- Prepare, process, interpret and present data using appropriate qualitative and Quantitative techniques (statistical programs, spreadsheets, seminars).

4. **National Academic Reference Standards of Zoology:**

National Academic Reference Standards (NARS) mentioned herein justify and characterize the skills and achievements of the zoology graduate students. Zoological Sciences described herein are those related to the basic science sector, addressed mainly to the graduates from Faculty of Science (Zoology).

4.1.a Knowledge and understanding:

By the end of the program the students will be able to:

a1- Have a clear understanding of the evolutionary processes which mould living organisms, and knowledge of the diversity of the major groups of organisms including the general biological principles of physiology, biochemistry, genetics, ecology and their relationships between them and their environment.

a2- Have a broad objective understanding of the main subjects required by zoologists (Marine biology, local fauna, Parasitology, Embryology and Entomology.

a3- Have a great knowledge of terminology, nomenclature, and classification system in different animal species including invertebrates and insects.

a4- Have understanding of the essential facts major concepts, principles, and theories in basic sciences (Chemistry, Physics, Mathematics and Statistics).

a5- Have a developing knowledge of English language which is used in teaching the program courses.

a6- Analyze the complex problems by using computer programs and principles in mathematic science.

a7- Acquire the basic principles in all aspects of basic sciences, including chemistry, geology, botany, zoology, physics, mathematics, statistics, English language, and computer sciences.

4.1.b Intellectual Skills:

By the end of the program the students will be able to:

b1- Have conceptual understanding that enables them to analyze and solve

problems effectively in science.

b2- Apply their knowledge and understanding to new areas of study such as carry out projects.

b3- Have critically analyze syntheses and summaries information from a variety of sources and communicate these both orally and in writing in English .

b4 - Develop and sustain arguments in the analysis and solving of problems.

b5- Apply the investigations in a responsible, safe and ethical manner, paying attention to risk assessment and safety regulations.

4.1.c Practical and professional skills:

By the end of the program the students will be able to:

c1- Carry out basic experiments in the laboratory and the field safely and effectively.

c2- Communicate through team work assessed through successful completion of group activities in practical and field work.

c3- Plan and organize practical projects through team work and make a reports .

4.1.d General and transferable skills:

By the end of the program the students will be able to:

d1- Manage their own learning and make use of scholarly reviews and primary scientific literature.

d2- Communicate and exchange the information effectively in seminars and discussion meetings.

d3- Learn the ability needed to undertake appropriate further professional training.

d4- Prepare, interpret, discuss their information using suitable techniques.

References:

http://srv63.mans.edu.eg/eu/QA/showAcadProgs/showAcadProg.py

http://www.liv.ac.uk/science/progspecs/biologicalsciences/C100.pdf