



DEPARTMENT OF ZOOLOGY
HONOURS
IN
ZOOLOGY
PROSPECTUS
2022

DEPARTMENTAL CONTACT INFORMATION

Should you have any queries; the following people in the Department can be contacted for further information.

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INTRODUCTION

The Honours course is only presented on a full-time basis. Therefore, students must be available full-time from Monday to Friday for lectures from February until the end of November (should there be a change in the start date, it will be communicated to the successful applicants).

In the Zoology Department, it is assumed that no student should leave the University before obtaining at least four years of training (Honours). Therefore, courses are developed to run from the first year to the fourth. Since the application process is competitive, all potential students cannot be accepted and therefore should apply online for admission before the specified deadline in the year preceding the study year.

APPLICATIONS

Applications open **1 April** and closes 30 September. The selection process is finalized after the final examinations of all applicants have been concluded. Students whose applications were successful, will be notified via email by the Department of Zoology.

Conditions of acceptance

A restricted number of students will be accepted annually. This number is determined by the available places in the department. The conditions of acceptance are:

- a) A BSc degree with Zoology as a major
- b) An average of 65 % in Zoology at graduate level
- c) As part of the application process, the department can, at its discretion, request an English proficiency test or a written essay, evaluated by the academic staff of the Department of Zoology.

Students can apply online at:

<https://www.uj.ac.za/studyatUJ/sec/Pages/postgraduate.aspx>

UJ Students apply as a Returning or Internal Applicant (Right-hand side of screen). Students applying from other universities may use the same link but will apply as a New Applicant.

Documents required for application:

South African students:

- Certified ID copy
- Certified copy of most recent Academic Record

Students applying from outside South Africa:

- Certified Passport copy
- SAQA evaluation of undergraduate degree
- Certified copy of most recent Academic Record

Checklist for application:

- Valid CURRENT email address
- All documents must be certified
- All documents scanned separately as tiff, pdf, jpg or gif

- Maximum file size of 512KB

FINANCIAL AID

Prospective students should note that a number of bursaries are available for students with merit and you must apply on the dates specified by the bursar.

Additional information is available here:

<https://www.uj.ac.za/postgraduate/Pages/Funding-for-Postgraduate-Studies.aspx>

You may also apply for an assistantship in the department.

RESEARCH PROJECT

As part of the Honours programme, each student must complete a research project. Supervisors provide the various topics and under their supervision, each student must complete the project and present it at a departmental colloquium and hand in a written scientific report. Subject to approval, students are welcome to submit their own project topics for consideration.

HONOURS PROGRAMME

NQF Level:	8
Credits:	124
Rules of access:	BSc degree with Zoology as a major

The BSc Hons Zoology (H2022Q) programme includes the following modules: ZOO8X03, ZOO8X04, ZOO8X06, ZOO8X07, ZOO8X08, ZOO8X09, ZOO8X10, OR ZOO8X11, ZOO8X13 and ZOO8X00. Scientific Methodology (ZOO8X13) is a prerequisite for the Research Project (ZOO8X00).

The department annually determines the specific modules that will be presented.

Assessment

Assessment of the modules will take place on a continuous basis throughout the year. Results will be published as it becomes available. The Academic Regulations with regard to continuous assessment will apply.

Summary of modules in Zoology Honours

Course	Module	Credits
ZOO8X03	Population Genetics and Biosystematics	12
ZOO8X04	Ecophysiology	12
ZOO8X06	Fish Histology and Histopathology	12
ZOO8X07	Mammal Diversity	12
ZOO8X08	Conservation Genetics	12
ZOO8X09	Indices for the Biotic Integrity of Aquatic Ecosystems	12
ZOO8X10	Aquatic Parasitology	12
ZOO8X11	Aquatic Resource Management and Remediation <i>(Not currently offered)</i>	12
ZOO8X13	Scientific Methodology	10
ZOO8X00	Research Project	30
	TOTAL	124

MODULE INFORMATION

Module ZOO8X03: Population Genetics and Biosystematics

NQF Level: 8

Credits: 12

Purpose: A student credited with this module will be able to effectively access levels of biodiversity variation within- and differentiation between taxa. Results are interpreted correctly and logically compared to other data sets. Genetic markers are defined for stock identification, geographic variation, gene flow, hybridisation and speciation and identify the processes that are involved in evolutionary changes. Phenetic and cladistic methods of data analyses are applied to define phylogenetic relationships; and predict the cumulative effects of evolutionary processes on successive generations.

Specific outcomes:

- Effectively access levels of biodiversity variation and differentiation
- Interpret and analyse results correctly and compare them logically with other data sets
- Show an understanding and ability to identify appropriate methods used to define genetic markers
- Critically review phenetic and cladistic methods to analyse data for phylogenetic inferences
- Use rigorous interpretations of appropriate methods to predict the effects of evolutionary processes on successive generations.

Module ZOO8X04: Ecophysiology

NQF Level: 8

Credits: 12

Purpose: To provide an opportunity to students to study the effect of the direct environment on the physiology of organisms, from invertebrates to vertebrates. Adaptations to extreme conditions e.g. from polar regions to deserts and adaptations in the functioning of different organs and organ systems of the organisms inhabiting these environments. Animal physiology is integrated into a holistic approach that includes the environment or habitat and the range of behavioural responses of individual organisms before a range of physiological responses need to be activated. An appreciation for the successful survival of organisms in different ecological settings is promoted amongst students.

Specific outcomes:

- Compare the available mechanisms of ion regulation and water balance in organisms in moderate to extreme environmental conditions
- Demonstrate knowledge and insight in the mechanisms of feeding in different habitats
- Identify and describe nutritional and nutrient requirements in moderate and extreme natural environments
- Estimate the energy cost to organisms for survival in specific environments
- Understand the role of metabolism in the survival of organisms under extreme climatic conditions
- Summaries the patterns and control mechanisms of reproduction in animals in different terrestrial and aquatic environments

- Demonstrate an understanding of temperature regulation and heat balance in organisms in moderate to extreme environmental conditions
- Analyse the effect of the physics of heat exchange during different environmental conditions
- Assess anthropogenic effects on environmental quality and organism survival.

Module ZOO8X06: Fish Histology and Histopathology

NQF level: 8

Credits: 12

Purpose: This module serves as an introduction to fish histology and fish histopathology and the techniques used to examine fish tissues. A learner credited with this module will be able to distinguish normal fish tissue from diseased or abnormal tissue, discuss artefactual changes in tissues not related to a disease process, describe basic pathological processes, identify possible causes for the pathology found during microscopic examination and be able to collect, prepare and stain fish tissue for histopathological investigation.

Specific outcomes:

- Distinguish normal fish tissue from diseased or abnormal tissue
- Distinguish and discuss artefactual changes in tissues not related to a disease process
- Describe and discuss the features and characteristics of normal fish histology
- Describe basic pathological processes
- Describe the possible causes for the pathology found during microscopic examination

Module ZOO8X07: Mammal Diversity

NQF Level: 8

Credits: 12

Purpose: This mammal diversity module equips the student with a working knowledge of the diversity and taxonomy of the mammals of southern Africa. To familiarise the student with aspects concerning the origin, radiation, adaptations and distribution of mammals. To demonstrate the dynamic relationship between mammals and their environment.

Specific outcomes:

- Identify the most important mammal species of Southern Africa
- Explain mammal classification
- Describe how the typical mammalian characteristics were acquired
- Describe the origin and diversification of mammals
- Interpret the distribution of mammals, behaviour and adaptation to habitats
- Explain the influence of mammals on their environment

Module ZOO8X08: Conservation Genetics

NQF Level: 8

Credits: 12

Purpose: To enable learners to gather genetic and general conservation information and data, assess these critically applying the latest conservation genetic principles, and apply the outcomes to conservation and management issues.

Specific outcomes:

- Gain an understanding of the theoretical approaches to and the placement of genetics in the context of conservation biology
- Understanding genetic diversity and its characterization
- Understanding the effects of population reduction and loss of genetic diversity in small or fragmented populations
- Defining management units and understanding the genetic management of wild and captive populations

Module ZOO8X09: Indices for the Biotic Integrity of Aquatic Ecosystems**NQF Level:** 8**Credits:** 12**Purpose:** To develop intellectual competence and practical skills in the analysis, interpretation and evaluation of the biotic integrity of aquatic ecosystems by using abiotic and biotic indices.**Specific outcomes:**

- Analyse integrity of an aquatic ecosystem using abiotic aspects in the form of indices
- Evaluate integrity of aquatic ecosystems using biotic aspects in the form of indices
- Assess the integrated biotic integrity of aquatic ecosystems using both abiotic and biotic indices
- Apply alternative bio-monitoring protocols to assess ecosystem integrity

Module ZOO8X10: Aquatic Parasitology**NQF Level:** 8**Credits:** 12**Purpose:** To provide students with an understanding of factors that has an influence on parasite ecology and distribution and to equip them with an understanding of the application of this knowledge in environmental studies**Specific outcomes:**

- Explore and explain host-parasite interactions
- Explore and explain the effects of ecological niche and parasite community structures on parasite distribution
- Reflect on the use of parasite distribution as an indicator of environmental health

Module: ZOO8X13 Scientific Methodology**NQF Level:** 8**Credits:** 10**Purpose:** The purpose of this module is to prepare students for scientific research methods and scientific reasoning. The aspects of scientific methods will include animal housing for research, preparing and analysing tissue samples, photographic techniques in the field and in the laboratory, working with data sets and scientific writing. The aspects of scientific reasoning will include the origin and development of the scientific method and its application in biological studies.

Specific outcomes: After successfully completing the course a candidate will:

- Criticize and evaluate the use, function and management of the aquarium and controlled environmental facilities and other animal housing methods.
- Practically demonstrate techniques for preparing animal tissues for microscopic investigation employing standard techniques. Discuss other tissues used in scientific study
- Demonstrate photographic techniques in the laboratory and in the field, show awareness of GIS applications.
- Create a data set in excel.
 - o Distinguish between nominal, ordinal and continuous graphs.
 - o Interpret univariate and multi-variate descriptive statistics and graphs.
 - o Formulate a null and alternative hypothesis.
 - o Test basic statistical hypotheses and interpret the results.
 - o Determine a simple linear regression equation and interpret the results.
 - o Interpret the results of logistic regression and chaid.
- Discuss the origin and further development of ideas and concepts related to the scientific methods and the contributions of 21st century science philosophers to the modern scientific method.
- Write a scientific manuscript according to the prescriptions of the scientific method, create figures and tables and add it to the manuscript.

Module ZOO8X00: Research Project

NQF Level: 8

Credits: 16

Purpose: Students have the opportunity to select a project of their choice, plan a project, generate and collect experimental data on a specific research topic in the research focus areas of the department, interpret results in terms of current subject information, make inferences and recommendations and present it as a written report and an oral presentation.

Specific outcomes:

- Gain theoretical and practical knowledge of the field of the project
- Collect experimental data on the aspects motivated in the project proposal
- Interpret the results obtained
- Make inferences and recommendations

A written and oral presentation of the project and results will have to be prepared/compiled

PREVIOUS PROJECTS

The following projects were done over the past three years in the Department:

2019

1. Determining the effect of climate change on South African species with small, southerly distributions using ecological niche modelling
2. Aspects of the pathology of *Argulus japonicus* Thiele, 1900
3. Do game farms contribute to conservation : using buffalo (*Syncerus caffer*) as a test organism
4. The Common Starling in South Africa: A tale of an invader told through ecological niche modelling
5. Morphological and molecular comparison and variation in occurrence of *Trypanosoma* sp. Infecting *Clarias gariepinus* (Burchell, 1822) in relation to water quality
6. Assessing the upper thermal tolerance of *Baetis harrisoni* Barnard, 1932 (Ephemeroptera) from mountain streams of the Magaliesberg (South Africa)
7. The use of differential stains to identify histopathological alterations in tilapia, *Oreochromis mossambicus* liver following acute exposure to waterborne selenium
8. A study on the pathology and gut content of the parasitic copepod, *Neoergasilus japonicus* (Harada, 1930)
9. Diversity and endemism of benthic macroinvertebrates in Magaliesberg mountain streams (North-West province, South Africa)
10. The identification and description of an unidentified monogenean parasite infecting the skin of *Clarias gariepinus* (Burchell, 1822) in the University of Johannesburg Research Aquarium
11. A histological assessment of the reproductive gonads of the female *Oreochromis mossambicus* exposed to sodium selenite
12. The development of the blowfly *Lucilia sericata* under simulated cave conditions in order to determine its role in cave taphonomy
13. The description of the musculature of the maxillules of *Dolops ranarum*
14. The presence and prevalence of Avian Malaria in the Greater Johannesburg Region
15. Assessing sediment toxicity using a Phytotoxkit with specific focus on metal accumulation
16. The effects of seasonal variation, thermal history and acclimation temperature on the thermal tolerance of caddisfly larvae (*Hydropsyche longifurca* Kimmins, 1957) from Magaliesberg mountain streams, South Africa
17. Genetic structure of two sengi species across South Africa

2020

1. Understanding aspects of the biology of Black soldier flies
2. Nematodes in the digestive tract of catfish
3. Genetic identification of smuggled seahorses
4. Biomarker responses of *Clarias gariepinus* from Lake Heritage, Crocodile River
5. Identification and DNA Barcoding of internal parasites of *Clarias gariepinus* in Lake Heritage, Crocodile River, South Africa

6. Evaluating the water quality at different impoundments in the greater Johannesburg area
7. The microbiome of selected chameleon species
8. Avian malaria in a vulture species

2021

1. Reproductive histology of fish from the highly polluted Roodeplaar Dam
2. The effects of pharmaceuticals in water on aquatic and human health and the associated pathological changes.
3. Bio-indicators to determine the effect of pharmaceuticals in water
4. The efficacy of worm bins for the production of earth worms
5. Assessing water quality of different water sources in the Johannesburg area using multiple aquatic organisms.
6. Modelling the distribution of species with different habitat requirements in Southern Africa – Identifying potential winners and losers in the climate change shakeup.
7. Do the leeches present in Emmarentia Dam pose a threat to recreational water users?
8. An Ecological Risk Assessment of sediment from the Vaal River system, South Africa.
9. Aquaponics project using *Clarias gariepinus*
10. Identification and DNA Barcoding of cestodes from *Clarias gariepinus* in Lake Heritage, Crocodile River, South Africa.
11. The effect of metals on survival and sequestration in *Macrogyrodactylus congolensis*
12. Oxidative stress and haematological assessment of *Clarias gariepinus* exposed to MC-LR