Examination Audit Report

Program: MSc Zoology

Institution: Central Department of Zoology, Tribhuvan University

Academic Year: 2080/81

1. Introduction

This report presents an evaluation of the examination system of the MSc Zoology program at the Central Department of Zoology, Tribhuvan University. This aims to assess the overall effectiveness, integrity, and timelines of the examination processes, ensuring alignment with the Tribhuvan University/Institute of Science & Technology guidelines.

2. Objectives

- To evaluate the quality of internal assessments.
- To verify the roles and responsibilities of the examination committee and faculty members.
- To assess the timelines and coordination in the announcement of results.
- To ensure compliance with the examination policy and procedures.

3. Scope

The audit focuses on the following areas of the examination process:

- Frequency of internal assessments
- Role of faculty members in question preparation, invigilation, and evaluation.
- Coordinating role of the examination committee.
- Results preparation and publication.

4. Methodology

The audit was conducted through:

- **Document review**: Review of internal assessment question papers, results, examination schedules, and invigilation records.

- **Discussions**: Discussions with past and present examination committee members and faculty members.
- **Student feedback**: Review of student responses regarding the examination process and feedback mechanisms.

5. Key Findings

5.1 Internal Assessments

- **Frequency**: Two internal assessments are conducted each semester, which ensures adequate evaluation of students' progress. The written examination of the midterm internal assessment carries 13 mark for each subject, while the pre-board examination carries 45 marks. Students who failed to attend the regular examination or did not obtain the required grades must appear in the re-examinations.
- **Compliance**: The assessments are aligned with the course curriculum and cover the theoretical aspects. The midterm internal assessment includes questions based on the curriculum taught up to that point, while the pre-board examination covers the entire course curriculum.

5.2 Roles of Faculty members

- **Question preparation**: Faculty members actively participate in preparing the internal assessment questions, ensuring that the content is relevant and adequately covers the syllabus following question preparation grid for each subject.
- **Invigilation**: Faculty members along with staff members are involved in invigilation duties, maintaining proper examination standards and minimizing misconduct.
- **Evaluation**: Teachers are responsible for answer copy corrections, with evaluation criteria generally consistent across each subject.

5.3 Examination Committee Activities

- **Coordination**: The examination committee efficiently coordinates all examination-related activities, including scheduling, communicating with faculty for question preparation, collecting questions, preparing question sets for each subject, moderation, finalization, printing, conducting exams, collecting and distributing copies for correction, data entry, verification, and result publication. This ensures the effective conduct of examinations.

- **Result publication**: Results of internal assessments are prepared and published on time, contributing to transparent academic progress tracking.

5.4 Challenges and Areas for Improvement

- **Consistency in evaluation**: In some instances, the consistency in awarding partial marks by different faculty varied slightly, indicating the need for more defined marking rubrics.
- **Feedback mechanism**: Although results are published in a timely manner, the feedback mechanism on student performance could be more comprehensive to support student learning.

6. Recommendations

- **Balanced question papers**: Ensure all question papers maintain a balance between theoretical and application-based questions.
- **Standardized marking rubrics**: Develop standardized marking schemes to ensure consistency in evaluation across all subjects and faculty members.
- **Detailed student feedback**: Encourage faculty members to provide more detailed feedback on internal assessment performance to guide students better.
- **Review follow-up mechanism**: Strengthen the feedback follow-up mechanism to improve responsiveness to student concerns.
- **Training sessions**: Organize periodic workshops for teachers focusing on best practices in question setting, evaluation, and invigilation.

7. Conclusion

The examination process at the Central Department of Zoology is well-structured and effectively coordinated by the examination committee, with active involvement from faculty members in all phases of the examination process. Results are published in a timely manner, promoting transparency. Implementing the suggested recommendations could further enhance the overall examination quality and student learning outcomes.

Academic Audit of Laboratories

Institution: Central Department of Zoology, Tribhuvan University

Academic Year: 2080/81

Introduction

The Central Department of Zoology (CDZ) at Tribhuvan University plays a significant role in fostering research and education in the field of zoology. The department is equipped with seven laboratories, including four dedicated to specialized courses—Parasitology, Fish and Aquaculture, Entomology, and Ecology. Additionally, there is a Museum for housing essential specimens, and two newly established laboratories: Molecular and Genomics Laboratory, and a Microscopic Unit. This audit aims to provide an overview of the existing laboratories, their resources, research activities, safety standards, strengths, weaknesses, and suggestions for improvement.

1. Laboratory Overview

The CDZ's seven laboratories cater to both specialized and advanced research in zoology, providing an environment conducive to learning, experimentation, and the advancement of scientific knowledge. Each laboratory plays a unique role in enhancing the department's academic offerings, ensuring that students can practically apply theoretical knowledge gained during coursework.

- **Specialized Course Laboratories**: The four specialized laboratories—Parasitology, Fish and Aquaculture, Entomology, and Ecology—focus on teaching and applied research, thereby covering a wide range of zoological sub-disciplines. These laboratories are equipped with basic tools and facilities for hands-on practice and experiments in their respective fields.
- **Museum**: This museum is primarily used for the preservation and display of museum specimens, which are crucial for taxonomic and ecological studies. It plays an essential role in enriching students' understanding of biodiversity and species classification.
- **Molecular and Genomics Laboratory**: The newly established Molecular and Genomics Laboratory is the cornerstone of advanced research at the CDZ, equipped with specialized

instruments for molecular research on animals and microorganisms. This laboratory supports high-level research in molecular barcoding, species identification, phylogeny, and studies of infectious diseases.

- **Microscopic Unit**: This unit is integral for examining minute details of zoological specimens, providing advanced microscopic techniques to study a wide range of biological samples.

2. Molecular and Genomics Laboratory

The Molecular and Genomics Laboratory plays a central role in supporting research in molecular biology. The laboratory is equipped with essential equipment, which allows students and researchers to carry out advanced studies in genetics, infectious diseases, and molecular taxonomy.

The main functions of this laboratory include:

- Providing facilities for research in molecular barcoding and species identification.
- Enabling research on infectious diseases through advanced molecular techniques.
- Supporting projects across various specializations, allowing interdisciplinary research that benefits students in Parasitology, Fish and Aquaculture, Entomology, and Ecology.

Research initiatives include molecular phylogenetic analysis, detection of zoonotic pathogens, and species characterization using advanced genetic tools. The laboratory has been instrumental in enabling students to conduct experiments that directly link with their coursework, thereby deepening their understanding of molecular zoology. The availability of specialized equipment, advanced reagents, and technical training is essential to maintain the high standard of research and enhance students' research experience.

3. Laboratory Equipment

The Molecular and Genomics Laboratory is equipped with the following key equipment essential for molecular research:

- **Thermal Cycler**: Used for Polymerase Chain Reaction (PCR) analysis, a vital technique for amplifying DNA sequences.

- **Gel Documentation System**: For visualizing DNA following electrophoresis, important for analyzing PCR products.
- **Table Centrifuge & Cooling Centrifuge**: For separating biological components through centrifugation, which is crucial for sample preparation.
- **Spectrophotometer**: Used to measure the concentration of DNA and RNA, enabling accurate quantification of nucleic acids.
- **Gel Electrophoresis Unit**: For separating nucleic acids by size, fundamental for molecular analysis.
- **Autoclave**: For sterilizing equipment and decontaminating materials, which is critical for maintaining a contamination-free work environment.
- **Freezers**: For storing samples, such as DNA extracts and reagents, at low temperatures to ensure their stability.
- **Vortex Mixers**: For mixing reagents and samples uniformly.

In addition to these advanced tools, the laboratory is stocked with other basic equipment, including refrigerators, pipettes, microwaves, and digital balances. This diverse array of equipment ensures that the laboratory is capable of supporting a variety of research activities.

4. Research Activities

The Molecular and Genomics Laboratory supports various research activities involving both PhD scholars and Master's students:

PhD Scholars: The laboratory has been instrumental in supporting four PhD scholars, each working on different aspects of molecular zoology such as, Cross-species transmission of Cryptosporidium species among Indigenous Tharu peoples and domesticated ungulates in Nepal; Molecular phylogeny of earthworms in central Nepal; Wildlife species identification using non-invasively sampled fecal samples from the Gauri Shankar Conservation Area; and Identification of bats using molecular techniques.

Master's Students: Numerous Master's students have utilized the laboratory for their thesis research. Currently, eight students are engaged in research involving molecular detection of pathogens, phylogeography, and taxonomy: Molecular detection of *Babesia* from cattle in Kathmandu Valley; Molecular detection of dengue virus; Molecular detection of free-living

amoeba in Kathmandu Valley; Molecular detection of tick-borne parasites from cattle; Molecular detection of rotavirus from bats; Integrative taxonomy of bent-toed geckos in Nepal; Phylogeography of Himalayan gorals in central Nepal.

These research projects demonstrate the laboratory's role in enabling students to explore diverse zoological topics using molecular techniques.

5. Laboratory Costs

The department supplies basic reagents for regular laboratory work, ensuring routine activities can be carried out effectively. However, thesis-related research costs are often covered by a combination of research grants, student funding, and collaborations with international universities. The following points highlight the laboratory cost management:

- **Research Grants**: Some students have successfully secured research grants to cover costs for specialized reagents and supplies.
- **Collaborations:** Collaborations with foreign universities have been beneficial in providing specific reagents that are otherwise difficult to source locally.
- **Supervisor's Research Funds**: Supervisors have also contributed to purchasing reagents through their own research grants.
- **Student Contribution**: In some cases, students have had to bear the costs of specialized materials that are not covered by department funding.

The funding challenges highlight the need for improved financial support to ensure uninterrupted access to necessary reagents and equipment.

6. Safety Measures

Ensuring safety is a priority in all the laboratories at the CDZ. Each laboratory follows established safety protocols and standard operating procedures (SOPs) to provide a secure working environment. The following safety measures are in place:

- **Maintenance and Calibration**: Equipment is regularly maintained and calibrated to ensure it functions optimally and safely.

- **Safety Instructions**: Students receive comprehensive training before using laboratory facilities, ensuring they are aware of the correct operating procedures.
- **Disposal of Hazardous Waste**: Specific disposal areas have been designated for hazardous waste, including biological materials, ensuring safety for students and staff.
- **Laboratory Logs**: The Molecular and Genomics Laboratory, along with the Microscopic Unit, maintains a logbook for tracking the use of equipment and reagents.
- **Standard Operating Protocols**: SOPs are readily accessible near key equipment, and detailed instructions are provided for using these instruments.

7. Research Output

The laboratories have been instrumental in contributing to the department's academic output. In the year 2023, the department published 59 research papers, with 46 of these involving work conducted in the department's laboratories. This high research output highlights the laboratories' vital role in fostering academic excellence.

8. Strengths of the Laboratories

- **Expert Faculty**: The department has faculty members who are experts in their respective fields, providing strong academic and research guidance to students.
- **Access to Laboratories**: The department's infrastructure includes several laboratories, providing sufficient opportunities for students to engage in hands-on research activities.
- **Interdisciplinary Research**: The presence of diverse laboratories allows for interdisciplinary research, enhancing the depth of studies conducted by students.

9. Weaknesses of the Laboratories

- **Space Constraints**: Laboratory space is limited, which restricts the number of students that can conduct research simultaneously.
- **Funding Limitations**: A lack of sufficient funding poses a challenge to acquiring the latest laboratory equipment and maintaining existing resources.

- **Environmental Control**: Laboratories, particularly the Museum and Molecular Laboratory, lack air-conditioning, which is crucial for maintaining appropriate temperature conditions for sensitive equipment and specimens.
- **Maintenance Challenges**: The absence of regular maintenance funds has affected the ability to keep laboratories in optimal condition.

10. Suggestions for Improvement

To address the weaknesses identified in this audit, the following recommendations are suggested:

- **Investment in Equipment**: It is crucial to allocate funds for the purchase of advanced laboratory equipment to keep up with recent developments in research technologies.
- **Infrastructure Improvement**: Installing air-conditioning units in the Museum and Molecular Laboratories would help maintain optimal conditions for equipment and biological specimens.
- **Regular Funding**: Establishing a dedicated budget for laboratory maintenance would help ensure that equipment is in good working order and that research can proceed without interruption.
- **Expansion of Laboratory Space**: Expansion of existing laboratory facilities could alleviate the current space constraints, enabling more students to engage in research simultaneously.
- **Securing External Funding**: Exploring opportunities for external funding, collaborations, and grants from national and international sources would help bridge the financial gap for equipment, reagents, and maintenance.

Conclusion

The laboratories at the Central Department of Zoology are equipped to provide foundational molecular research and contribute significantly to the research output of the department. However, addressing existing challenges such as funding gaps, space constraints, and the need for environmental control improvements will be crucial in enhancing the overall quality of research and academic learning. Investments in infrastructure, equipment, and regular maintenance will allow the department to fully harness its potential, thereby fostering advanced research and education for students and scholars alike.

Academic Audit of EMIS

Institution: Central Department of Zoology, Tribhuvan University

Academic Year: 2080/81

1. Introduction

The database of the Central Department of Zoology has been managed under the Educational Management Information System (EMIS) and made it fully functional to update the information about the academic programs, students, staff, store, library, museum and account. Recent updates on the EMIS system is described on separate subheading as follows:

a. Students

Student database includes both Master's and PhD programs. All 49 PhD students' data from the first PhD award in 1970s to the ongoing students are entered in EMIS. But the MSc student data from 2074 batch are entered in the system. Altogether 388 student from the academic batch 1974 to 2080 are included in the system. The personal data includes name and address (permanent and temporary), gender, date of birth, ethnicity, religion, nationality, father's name, mother's name, guardian's name, blood group, remarks. Similarly under the academic information, batch no., roll no., TU registration number, previous degree, date of admission, pass year, thesis title, project title, supervisor, viva date, external examiner, placement and scholarship and so on.

b. Staff

Total 30 staff including 17 teaching and 13 non-teaching staff data are available in the EMIS system. The data for every individual includes name, gender, address (permanent and temporary), nationality, date of birth, blood group, nationality, ethnicity, religion, Father's name, mother's name, current position, type of job, job start date and end date.

c. Library

Altogether 1374 books are entered in the system under the category of text books, reference books, reports, journals, theses and others. Each category has a call number, title, author name, page number, number of stock, source, edition, ISBN, publisher, publication date, subject, Key

words, price, purchase date. Each item is shown either it is issued by someone else and received date if received the issued stock.

d. Stores

Altogether 581 various items are available under the category of Chemicals, glassware, stationaries, equipment, furniture, miscellaneous and other. Details of each item is mentioned about the name, brand, purchased date, price and if someone else has issued it.

e. Museums

A total 412 entries of animals including birds (N=269), molluscs (N=139) and rodents (N=3) entries including type species of terrestrial land snails and donated marine shells from Royal Belgian Institute of Natural Sciences, Belgium.

f. Account

Account data include income, expenditure, financial statement, financial report and documents to be uploaded (e.g. audited report). The financial data of the last five fiscal years from 2077-078 to 2080-81 are available in the system.

2. Suggestions for the future improvement

The EMIS system is seen well managed and entered the relevant information in the respective fields such as student, staff, library, store, museum and account. All PhD student data, 388 students of MSc from the batch of 2074, 1374 publications available in the library, 581 store items are available in the EMIS of Central Department of Zoology. Details of personal information, and other entered items are given which is positive aspects. But to make it more reliable and sustainable following suggestions are recommended,

1. Personal details are enough but all personal details of the old batches are not relevant to fill all information because many of them are already changed such as address, Phone, email, placement etc. So if the personal details of old students need to be updated many information might not relevant.
2. Library data: there are lack of bookshelves to manage all theses available in the department. Only few theses are entered in EMIS data. So, theses items need to be arranged properly

and need to update in the system. Some of the book items, their details information need to be updated. The new purchased book item detail should be filled correctly in the system.

3. Some store items are entered haphazardly under irrespective category. So these items need be arranged properly.
4. Museum data are well managed for the identified species but there are many species which are available in the museum are yet to be entered in the system such as mammals, amphibians, reptiles, butterflies, fish and arthropods.
5. Accounting system is developed to make the system transparent. For future, monthly data need to be entered and updated for every transaction.
6. There is lack of manpower for museum. A position need to be created as a curator for the management of the museum and annual budget need to be allocated for the proper management of deposited museum specimens. .

3. Conclusion

The EMIS of the Central Department of Zoology is a web-based integrated system designed to connect administration, faculty, staff, and students by providing easy access to relevant departmental information. While the system demonstrates effectiveness in its current form, addressing existing challenges could significantly enhance its efficiency and contribute to more timely service delivery for all stakeholders.