

Introduction

Outcomes based education (OBE) is a process that involves the restructuring of curriculum, assessment and reporting practices in education to reflect the achievement of high order learning and mastery rather than the accumulation of course credits” (Tucker, 2004).

OBE embodies the idea that the best way to learn is to first determine what needs to be achieved. Once the end goal (product or outcome) has been determined the strategies, processes, techniques, and other ways and means can be put into place to achieve the goal.

1. Graduate Attributes

The Institute has well defined Graduate Attributes. The salient features of the Graduate Attributes are reflected in the Programme Educational Objectives, and Programme Learning Outcome of the various programmes being offered by the Institute.

Graduate attributes of the Institute are as follows

- *Develop a basic understanding and experimental skills in biological sciences and mastery of the advanced theoretical principles*
- *Well versed in experimental techniques and applications of these biological processes with a sound and practical knowledge of laboratory techniques and practices*
- *Understanding of the diversity of medical and industrial practices*
- *Greater appreciation of the moral, ethical, legal and social issues and values in relation to professional practices in biotechnology*
- *Gain flexibility of thought, independence as well as teamwork, safe laboratory practices, record-keeping skills, information gathering, evaluation of published information and problem-solving abilities.*

2. Programme Learning Outcomes

On satisfactory completion of the programme, students will be able to:

A| Academic literacy

- Critically evaluate research findings that underpin biotechnology and apply them appropriately
- Apply recombinant DNA techniques, bioinformatics and high throughput technology underpinned by the theoretical and technical knowledge to solve methodological problems
- Apply drug and product development concepts and strategies within their professional career
- Apply knowledge and understanding of the principles of genome science and genome analysis to experimentally approach research questions and hypothesis, select and apply

appropriate advanced experimental techniques based on their knowledge and understanding of theories underpinning these advanced techniques

- Select, use and understand the development and limitations of databases and their use as tools in genomic analysis.
- Apply their knowledge of management, leadership, knowledge transfer, patenting and entrepreneurship in the work-place
- Acquire, critically evaluate and apply innovative research findings from the literature to their current research or employment

B) Research literacy

- Undertake a sustained piece of original research on a topic of relevance to the context and content of the programme.
- Apply key concepts learned in the course to arising problems in subsequent biological science research settings, synthesize relevant information from a range of appropriate sources to construct and support a rational argument.
- Critically evaluate evidence and argument rationally to produce or judge the validity of conclusions.
- Identify research questions, design the approach and conduct experiments to solve them.
- Interpret data with reference to good scientific practice in experimental design and data collection.
- Conduct research that conforms to ‘good lab practice’ guidelines.

C) Critical self-awareness and personal literacy

- Understand the limits of various techniques to interpret results, apply them effectively in the work-place
- Take on a management, leadership and/or entrepreneurial role, utilise the skills and theoretical knowledge gained on the course to embark on a range of careers in industry or research
- Apply their skills and knowledge to problem solve in professional situations within the biological science sector.
- Reflect upon learning experiences and apply learned experience to guide personal development and workplace practice
- Use a variety of forms of written communication according to context, including writing full research proposals, abstracts, and thesis, demonstrate effective skills of oral presentation, debate and academic discussion.
- Work independently and manage their own time to complete several tasks in the same time frame.
- Take a strategic, analytical and a creative approach to problem solving.

Programme Specific Objective for Biotechnology Programme

The two years study of Master of Biotechnology will impart in-depth understanding of basic aspects of biological science pertaining to industrial applications. The courses of Industrial Microbiology & Fermentation Technology, Genetic Engineering, Microbial Genetics, Bio-analytical Techniques, Molecular Microbial Physiology, Agriculture & Environmental

Microbiology, Animal Biotechnology, and Vaccinology will make the students ready to contribute to;

- Industry applications of better understanding of the key principles of biochemical functioning at an advanced level
- better awareness of the major issues at the forefront of the discipline
- will possess an in-depth understanding of the area of biochemistry chosen for research emphasis
- ability to design and carry out experiments (safely) and to interpret experimental data
- production of substantial original research of significance and quality sufficient for publication
- ability to present their work through written, oral, and visual presentations, including an original research proposal
- awareness of ethical issues in biochemical research and careers options

Programme Specific Objective for Biochemistry Programme

- The students opting for the Biochemistry programme will have an advanced in depth understanding on all the human biochemical aspects pertaining to the well being and in the pathological state. The programmes covers the functioning of the major systems such as neurobiochemistry, reproductive physiology, human genetics and endocrinology as well as talks about the application of these systems for the disease condition such as Biochemical Toxicology, Cancer Biology, Clinical Biochemistry and Structural Biology.

The students graduating from the Biochemistry program will have

- a better understanding of the key principles of biochemical functioning at an advanced level
- better awareness of the major issues at the forefront of the discipline
- will possess an in-depth understanding of the area of biochemistry chosen for research emphasis
- ability to design and carry out experiments (safely) and to interpret experimental data
- production of substantial original research of significance and quality sufficient for publication
- ability to present their work through written, oral, and visual presentations, including an original research proposal
- awareness of ethical issues in biochemical research and careers options

Programme Specific Objective for Microbiology Programme

- The two years study of Master of Microbiology will impart in-depth understanding of basic aspects of microbiological science pertaining to industrial applications. The courses of Industrial Microbiology & Fermentation Technology, Genetic Engineering, Microbial Genetics, Bio-analytical Techniques, Molecular Microbial Physiology, Agriculture & Environmental Microbiology, Animal Biotechnology, and Vaccinology will make the students ready to contribute to;
- Molecular, Biochemical, Industrial, medical and other basic and applied applications of better understanding of the key principles of microbial functioning at an advanced level
- better awareness of the major issues at the forefront of the discipline

- will possess an in-depth understanding of the area of Microbiology chosen for research emphasis
- ability to design and carry out experiments (safely) and to interpret experimental data
- production of substantial original research of significance and quality sufficient for publication
- ability to present their work through written, oral, and visual presentations, including an original research proposal
- awareness of ethical issues in Microbiology research and careers options

3. Programme Educational Outcomes

A| Biotechnology programme

The objective of the Master's Programme in Biotechnology is to equip the students to apply knowledge of molecular mechanisms of cellular processes in living systems including microbes, plants, and higher order organisms to applied aspects. The laboratory training in addition to theory is included to prepare them for careers in the industry, agriculture, and applied research where biological system is increasingly employed. Basics and current updates in the areas of Industrial Microbiology, Fermentation Technology, Agriculture & Environmental Microbiology are included to train the students and also sensitize them to scope for research. The Masters in Biotechnology Programme will address the increasing need for skilled scientific manpower with an understanding of research ethics involving animals and humans to contribute to application, advancement, and impartment of knowledge in the field of biotechnology globally.

B| Biochemistry programme

The objective of the Master's Programme in Biochemistry is to prepare students for future careers in the various fields in which a core understanding of the chemistry of biological processes is important. Scientific disciplines such as human biochemistry, medical biochemistry and biotechnology will enhance the understanding of human health. The Biochemistry Programme will benefit the society on the whole by adding to the highly skilled scientific workforce, particularly for the biomedical research sectors, in the academic, industry as well as for research laboratories across the country and the globe.

C| Microbiology Programme

The objective of the Master's Programme in Microbiology is to equip the students to apply knowledge of prokaryotic and eukaryotic cellular processes, classification, interaction of microorganisms among themselves, with physical and chemical agents and higher order organisms. The laboratory training in addition to theory is included to prepare them for careers in the industry, agriculture, and applied research where biological system is increasingly employed. Basics and current molecular updates in the areas of Industrial Microbiology, Fermentation Technology, Agriculture & Environmental Microbiology are included to train the students and also sensitize them to scope for research. The Masters in Microbiology Programme will address the increasing need for skilled scientific manpower with an understanding of research ethics involving microorganisms to contribute to application, advancement and impartment of knowledge in the field of microbiology and molecular biology globally.