

## **Pharmaceutical Biotechnology**

Pharmaceutical Biotechnology is a relatively new field of pharmaceutical science which covers all biology-based technologies required for production and manufacturing of biological drugs. Pharmaceutical biotechnology is a rapidly evolving and multidisciplinary field involving biochemistry, molecular biology, genetic engineering, immunology, microbiology, bioinformatics, protein engineering and formulation, pharmacology, fermentation, and downstream processing. Pharmaceutical Biotechnology department is located in the Faculty of Pharmacy and has excellent infrastructure, state-of-art laboratories, and highly qualified faculty members specialized in Pharmaceutical Biotechnology. The department of pharmaceutical biotechnology offers the following theoretical and practical courses: Advanced cellular molecular biology, Immunology, Animal cell culture techniques, Genetic engineering, Molecular biology techniques, Biopharmaceuticals, Nanobiotechnology, Bioinformatics, Biotechnology bioprocessing, Protein chemistry and engineering, Protein formulation, and Quality control of Biopharmaceuticals. The MSc and PhD programs offered by the department of pharmaceutical biotechnology focus on the new developments in the production of microorganisms, therapeutic proteins, and vaccines using bioinformatics-based design and advanced molecular principles.

### **MSc program:**

Minimum requirement for enrolment in the MSc program is a Bachelor's degree in an appropriate area of study. The MSc program involves courses and a thesis research, which can be completed in two years of full-time study. During MSc program, the student learn the principles of biotechnology applied for the development of biological drugs and they will develop skills required for production of biopharmaceuticals. The MSc program prepares graduates for work in the growing pharmaceutical biotechnology sector.

### **PhD program:**

Requirements for our PhD program vary, but the minimum requirement is a MSc degree in an appropriate area of study or a Doctorate degree in pharmacy. The PhD program involves courses, a comprehensive board exam, and a thesis. The PhD program can be completed in four years of full-time study. In the first two years of PhD program, theoretical inputs on both basic and applied aspects of microbial biochemistry, immunology, advanced cell and molecular biology, genetic engineering, bioprocess engineering, animal cell culture techniques, drug discovery, protein chemistry and engineering, protein purification and characterization, and quality assurance of biopharmaceuticals are given. The students will also have extensive practical hands-on training in recombinant DNA technology, basic molecular biology techniques, animal tissue culture, fermentation, proteomics, and diagnostic tests. During the last two years of PhD program, the students undertake project works, during which they do extensive literature review to identify research gaps, formulate hypothesis, design research protocols and implement them to generate data followed by scientific interpretation and conclusions for the defined research problem. The skills gained by students during project works, will enhance their laboratory and professional capability at a supervisory level, allowing them to work independently and use their creativity to solve the diverse problems they may encounter. Our PhD program produces highly qualified and skillful graduates with critical and analytical capabilities. The PhD graduates of pharmaceutical biotechnology are expected to have ability to bring the innovative approaches to the development of new biotechnology products.