Programme: M. Sc. (Zoology)
Course Code: ZOO-410 **Title of the Course:** Radiation Biology
Number of Credits: 2
Effective from AY: 2018-19

Prerequisites for the course:	Basic working knowledge of lifesciences.	
Objective:	This course is designed to introduce basic principles, concepts, and methodology of radiation, protection and radiological hazard evaluation.	
2ontent:	**Module 1:** Introduction: Definition, scope and significance of radiation biology; General classification of radiation. Ionizing radiation: Linear energy transfer; radiation dose and units; principles of radiation dosimetry; direct and indirect effects; Radiation lesions in DNA; major types of DNA repair; damage recognition and signaling; consequence of unrepaired DNA damage (chromosome damage). Cellular radiobiology: Radiobiological definitions of cell death; survival curves and models; cell cycle effects; relative biological effectiveness (RBE); cellular repair exemplified in survival curves; cellular hyper-radiosensitivity (HRS) and induced repair (IRR); Other molecular targets – bystander (epigenetic) effects; radiation sensitizers and protectors **Module 2:** Radiobiological basis of radiation protection: Health consequences after total body irradiation from radiation accidents; long term radiation risks from low radiation doses; radiation-induced cancer in the atomic bomb survivors; epidemiological studies in other radiation exposed populations; mechanisms of radiation induced cancer; radiation effects in the developing embryo and fetus; radiation induced heritable diseases.	12 hours 12 hours
Pedagogy:	Lectures/ tutorials/assignments/self-study	
References/Readings	1. Anonymous, Radiation Biology: A handbook for teachers and students; International Atomic Energy Agency (IAEA), Training Course Series 42, Vienna. 2. Albert P Li and Heflich RH, *Genetic toxicology*, CRC Press, USA. *3.* Steel GG, *Basic Clinical Radiobiology*, Amazon, UK.	
Learning Outcomes	1. Knowledge of the fundamentals of radiation transport, interactions and detection and with the principles required for the analysis, design and safe operation of radiation producing and using equipment and systems.	

Programme: M. Sc. (Zoology)
Course Code: ZOO-411 **Title of the Course:** Dissertation
Number of Credits: 8
Effective from AY: 2018-19

Prerequisites for the course:	As per the ordinance applicable for Dissertation	
Objective:	This module provide initialization of independent thinking and applications in research field.	
Content	Chosen scientific area.	
Pedagogy:	Discussion/ Experimental work/ field study/ /self-study	
References/Readings	1. Scientific Journals 2. Reference Books 3. Any other authentic source	
Learning Outcomes	1. Designing of research work 2. Formulation of research methodology 3. Methods implementation and gathering of research data and application of statistics. 4. Research result formulation and interpretation.	