Learning Outcomes	It will equip the student with a broad perspective of integrating physics with biology at the cellular level with detailed information to pursue a career in newly evolving and dynamic fields of Neurobiology.	

Programme: M. Sc. Biotechnology
Course Code: GBO-190 **Title of the Course:** Environment Biotechnology

Number of Credits: 2

Effective from AY: 2019-2020

Prerequisites for the course:	No prerequisites required.	
Objective:	The objective of this course is to impart knowledge on biotechnological applications that can be used to tackle environmental issues emerging due to industrialization and globalization.	
Content:	**MODULE I** Environment pollution, Hazardous wastes: Definition, sources and characteristics: Hazardous waste categorization, generation, collection, transport, treatment and disposal; Collection, segregation and transport of solid wastes handling and segregation of wastes at source. Collection and storage of municipal solid wastes. Solid waste processing technologies. Waste water collection; control and management; Waste water treatment from dairy, distillery, sugar and antibiotic industries; Sewage treatment through chemical, microbial and biotech techniques; Anaerobic processes; Anaerobic filters; Anaerobic sludge blanket reactors. **MODULE II** Bioremediation of organic pollutants, contaminated soil, ground water; Use of bacteria, fungi, plants, enzymes, and GE organisms; Bioaugmentation; Macrophytes in water treatment; Phytoremediation of soil metals; Bioreactors; Rural biotechnology; Biocomposting; Biofertilizers; Vermiculture; Organic farming; Bio-mineralization;	12 hours 12 hours

	Biomass as source of energy; Biofuels; Biodisel, environmental toxicants and human health; Nano materials: their properties and influence on human health, environment,Gene mutation; Genetic testing; Genetic sensors.	
Pedagogy:	lectures/ tutorials/assignments/self-study	
References/Readings	1. MetCalfe and Eddy Inc., Wastewater Engineering: Treatment, Disposal and Reuse", 4 th Edition, McGraw HillBook Co., 2003 2. Mackenzie L. Davis and David A. Cornwell, Introduction to Environmental Engineering, 4 th Edition, McGraw Hill Book Co., 2006. 3. R.M.Maier, I.L.Pepper and C.P.Gerba, Elsevier, Environmental Microbiology: A Laboratory Manual, 2 nd Edition, Academic Press, 2004. 4. B.C.Bhattacharyya and R.Banerjee, Environmental Biotechnology, Oxford University Press 5. I.S.Thakur, Environmental Biotechnology: Basic Concepts and Applications, I.K.International.	
Learning Outcomes	On completion of this course, students should be able to Identify interaction between living organisms and environment and employ environmental pollution management technologies to come up with solutions against growing industrial pollution.	

Programme: M. Sc. Biotechnology

Course Code: GBO-281 **Title of the Course:** Advances in Plant and Animal Biotechnology

Number of Credits:3

Effective from AY: 2019-2020

Prerequisites for the course:	No prerequisites required.	
Objective:	The course is designed to provide a comprehensive exposure to advances in animal and plant biotechnology. Student is expected to have a clear understanding of basic biotechnology techniques to learn recent advances in the	