**Programme: M.Sc. (Microbiology)**

**Course Code: MIO 116**

**Title of the Course: MICROBIAL TECHNOLOGY [T]**

**Number of Credits: 3**

**Effective from Academic Year: 2018-19**

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| **Prerequisites** | It is assumed that students have a basic knowledge of different techniques in instrumentation- their principle and applications. | |
| **Objective:** | This course develops concepts in technologies used in agriculture, mining, energy production and human health with respect to microorganisms and genetically engineered microorganisms. Introduces concept of nanotechnology. | |
| **Content:** | | |
| **1.** | **Biotechnology and prospecting with microbes.** | **(04)** |
| A. | Advantages of using microbial technology over chemical and physical technology. | |
| B. | Ethics in the use of GEMs. | |
| C. | Commercialization of Microbial Biotechnology. | |
| D. | Introduction to Nanotechnology. | |
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| **2.** | **Microbial technology in agriculture** | **(08)** |
| | Production of microbial biofertilizers, biopesticides, soil conditioners to enhance crop yields. | |
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| **3.** | **Microbial technology in mining** | **(12)** |
| A. | Bioleaching. | |
| B. | Biomining. | |
| C. | Recovery of oil. MEOR | |
| D. | Microbial technology in waste and pollution management in mining: Bioconversions, Bioremediation, Biosedimentation, Bio-beneficiation, Aquifer cleaning. | |
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| **4.** | **Microbial technology for energy production** | **(07)** |
| A. | Microbial fuel cell. | |
| B. | Biogas. | |
| C. | Microbial cell mass. | |
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| **5.** | **Microbial technology in Human health & aquaculture** | **(05)** |
| | Pigments, Nutraceuticals, Probiotics, Bioplastics, Microbes as bio-weapons. | |
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| **Pedagogy:** | Lectures/tutorials/assignments/self-study | |
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| **References/ Readings** | 1. Arora, R., Microbial Biotechnology: Energy and Environment, CABI Publishing. | |

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|---|---|---|
| | 2. Ahmad, I., Ahmad, F. and Pichtel, J. Microbes and Microbial Technology: Agriculture and Environmental Applications, Springer.<br>3. Peppler, H.J., Microbial Technology: Microbial Processes, Academic Press.<br>4. Sukla, L. B., Pradhan, N., Panda, S. and Mishra, B. K. Environmental Microbial Biotechnology, Springer.<br>5. Bull, A. T., Microbial Diversity and Bioprospecting, American Society for Microbiology. | |
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| **Learning Outcomes** | 1. Apply the knowledge of various techniques in developing technology for sustainable development.<br><br>2. Explain commercialization of a technology. | |