

UG MICROBIOLOGY

UEMBD20 - ELECTIVE II B: MICROBIAL NANOTECHNOLOGY

Year 2020	Course Code	Title Of The Course	Course Type	Course Category	H/W	Credits	Marks
SEM: VI	UEMBD20	Elective II B: Microbial Nano Technology	Theory	Core Elective	4	4	100

Course Objective: To facilitate students understanding on microbial nanotechnology and its applications.

Course Outcomes (CO):

At the end of the course, the learners will be able to;

CO1: Outline evolution of nanoscience and hurdles in the development of nanotechnology.

CO2: Understand the use spectroscopy for nanotechnology research.

CO3: Discuss the role of microscopy in nanotechnology research.

CO4: Utilize nano materials for drug development and its application in nuclear medicine.

CO5: Apply nanotechnology for air and water treatment and become familiar with nanoscience education in India and abroad.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	H	M	M	M	H
CO2	H	H	H	L	L	M
CO3	H	M	M	H	L	M
CO4	H	M	H	H	M	M
CO5	H	L	M	M	H	H

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	H	H	L	M	H
CO2	H	H	H	L	L	M
CO3	H	H	H	L	L	M
CO4	H	H	H	M	M	M
CO5	H	H	H	M	H	H

H – HIGH (3)

M – MODERATE (2)

L – LOW (1)

COURSE SYLLABUS

UNIT I: History and evolution of Nano Science. (12 hours)

- 1.1 Definition – Evolution of Nano science. (K1,K2)
- 1.2 Need of Nano technology. (K1,K2)
- 1.3 Hurdles for Nanotechnology development. (K1,K2)
- 1.4 Factors affecting the manufacturing process of nano materials. (K1,K2)
- 1.5 Role of physicists, chemists, computer scientists, engineers in nanotechnology. (K1,K2)
- 1.6 Role of Medical doctors, biologists in nano technology. (K1,K2)

UNIT II: Spectroscopy in nanotechnology research. (12 hours)

- 2.1 Spectroscopy- An overview. (K1,K2)
- 2.2 Importance of spectroscopy in nano technology research. (K1,K2)
- 2.3 Mass spectroscopy. (K1,K2)
- 2.4 Infra-red spectroscopy. (K1,K2)
- 2.5 Raman spectroscopy. (K1,K2)
- 2.6 Ultra violet-visible spectroscopy. (K1,K2)

UNIT III: Microscopy in nanotechnology research. (12 hours)

- 3.1 Microscopy in nanotechnology research- An over view. (K1,K2)
- 3.2 Atomic force microscope. (K1,K2)
- 3.3 Scanning electron microscope. (K1,K2)
- 3.4 Transmission electron microscope. (K1,K2)
- 3.5 Magnetic resonance force microscopy. (K1,K2)
- 3.6 Nano probes for nucleic and hybridization detection. (K1,K2)

UNIT IV: Nanotechnology for drug development and medical applications. (12 hours)

- 4.1 Nanotechnology for drug development and medical applications. (K1,K2)
- 4.2 Nanotechnology for drug solubilization and drug delivery. (K1,K2)
- 4.3 Diagnosis using nanomaterials. (K1,K2)
- 4.4 Nanotherapy for cancer treatment. (K1,K2)
- 4.5 Nanotherapy for interior artery embolisms. (K1,K2)
- 4.6 Radioactive tubereine cages in Nuclear medicine. (K1,K2)

UNIT V: Cleaning the air with nanotechnology. (12 hours)

- 5.1 Cleaner environment with Nanotech. Cleaning the air with Nanotechnology. (K1,K2)

- 5.2 Nanotechnology for water treatment. (K1,K2)
- 5.3 Microbial nanoparticles used in cleaning air. (K1,K2)
- 5.4 Nanocarbon ball as deodorizer in fermentation process. (K1,K2)
- 5.5 Possible harm from Nanomaterials. (K1,K2)
- 5.6 Nanoscience in India – Nanoscience education abroad – ethics and society. (K1,K2)

TEXT BOOKS:

1. Richard Brooker and Earl Boysen (2006). Nanotechnology. 1st edition, Wiley Publishing Inc., India.
2. Bernd H.A.Rehm (2006). Microbial Bionanotechnology: Biological self-assembly systems and Biopolymer Based Nanostructures. 1st edition, Horizon Bio Science.UK.
3. Nicola Cioffi and Mahendra Rai (2012). Nano - Antimicrobials.1st edition, Springer. United States.

REFERENCE BOOKS:

1. Duckruix, A. and R. Giege (1992). Crystallization of Nucleic acids and Proteins. A practical approach, 1st edition, Oxford University Press, England.
2. Vadlapudi Varahalarao and Nayak B.K (2017). Microbial Nanotechnology: Mycofabrication of Nano particles and their Novel Applications.1st edition.IGI global publishers. India.
3. Nicola Cioffi and Mahendra Rai (2012). Nano - Antimicrobials.1st edition, Springer. United States
4. Anton Ficai and Alexandru Grumaezescu.(2017) .Nanostructures for Antimicrobial Therapy. 1st edition, Elsevier. Netherlands.

OER:

DIGITAL LIBRARIES:

1. <http://www.loc.gov/>
2. <http://library.clark.edu/>
3. <http://www.dli.ernet.in/>
4. <http://www.loc.gov/education/>