

MANGALORE UNIVERSITY
DEPARTMENT OF BIOSCIENCES
MSc BIOTECHNOLOGY

BTE 463 FUNDAMENTAL BIOTECHNOLOGY (OPEN ELECTIVE) Hours: 40

Course outcome

Students will be able to:

- Understand microbial diversity and microflora associated with humans and animals, interaction between microbes, plants and animals and design procedures for the production of various industrially important compounds.
- Demonstrate genetic manipulation of plants for the production of elite plants with superior traits such as insect resistance, improved nutrient content etc. and apply plant tissue culture methods for the propagation of plants
- Compare the interaction of microbes with plants based on benefits and harmful effects, and application of microflora in the improvement of environment.
- Differentiate the techniques involved in the animal biotechnology for production of superior livestock, uses of assisted reproductive techniques for preservation and propagation of superior germplasm, genetically modified organisms, uses in therapy, cloning etc.

UNIT I (13hrs)

Origin of life. Microbial diversity – bacteria, viruses, fungi; Beneficial and harmful microbes. Normal microflora associated with humans and animals. Microbes in human and animal nutrition (e.g. ruminants and non-ruminants) and health. Interactions between microbes, plants and animals. Microbial biotechnology: Fermentation (e.g. ethanol, enzymes, hormones, biogas, biofuels, vitamins), Antibiotics and probiotics.

UNIT II (13hrs)

Plant biotechnology: Genetic manipulation (GM) of plants, GM plants (e.g. BT cotton, BT brinjal, Golden rice, Flvr-savr tomato), GM foods, Farmers Rights, Seed terminator technology. Litigations related to life (e.g. neem, Basmathi rice, turmeric). Nutraceuticals. Plant tissue culture, synthetic seeds. Plant health and diseases. Edible vaccines. Plant-microbe associations, interactions (e.g. symbiosis, mutualism) and benefits. Plant cells to generate biochemicals and medicines. Micropropagation. Environmental Biotechnology: Revegetation and energy plantations (e.g. Neem, *Jatropha*, *Pongamia*). Bioremediation (plant and microbial). Microbes in mining. Waste processing and utilization.

UNIT III (14hrs)

Animal biotechnology: Transgenic animals (e.g. mice, sheep, fish). *In vitro* fertilization and (IVF) and embryo transfer (ET), test-tube babies. Ethical issues (e.g. human and animal rights, surrogate mother). Animal cloning -Somatic and therapeutic cloning. Animal cell culture and organ culture. Animal cells as source of biochemicals (e.g. vaccines, hormones). Animals as bioreactors (e.g. mice).

References

1. Biology of microorganisms. Brock, T.B. & Madigan, M.T., Prentice Hall, 1996
2. Basic Biotechnology. Ratledge, C. & Kristiansen, B., Cambridge Univ. Press, 2006
3. Microbial Ecology. Atlas, R.M. & Bartha, R. Benjamin Cummings, 1997
4. Microbial Biotechnology. Glazer, A.G., WH Freeman & Co., 1994
5. Biotechnology of Higher Plants. Russell, G.E. Intercept Pub., 1988
6. Plant Biotechnology. Mantell, S.H. & Smith, H. Cambridge University Press, 1983

7. Animal Transgenesis and Cloning. Houdebine,L.-M. John Wiley & Sons, 2003
8. Gene VII. Lewin,B., Oxford University Press, 2000
9. Environmental Biotechnology. Jogdand, S.N., Himalaya Publishing House, 2012

