Ph. D
In
Biotechnology

Department of Bio & Nano Technology
Guru Jambheshwar University of Science & Technology, Hisar-125001, Haryana

SCHEME OF EXAMINATION Ph.D (NANO SCIENCE & TECHNOLOGY)

Sr. No.	Course No.	Title	L	T	P	Credits
1	DBL-811	**Advances in Molecular Biology**	4	0	0	4
2	DBL-812	**ADVANCES IN AGRICULTURAL BIOTECHNOLOGY**	4	0	0	4
3	DBL-813	**Advances in Microbial Biotechnology**	4	0	0	4
4.		Common Paper*	4	0	0	4
Total			16	0	0	16

***Any one of the following below mentioned courses:**

1. Statistical Methods

2. Information and Communication techniques.

3. Analytical /Fabrication Technologies.

DBL-813 Advances in Microbial Biotechnology Credit 4+0

Advances in Microbial Physiology: oxidative stress, regulation of cell cycle.
Advances in Microbial Molecular Biology: Molecular evaluation, molecular biology of, nif genes, site directed mutagenesis.
Advances in Molecular Ecology and Bio-diversity of Microorganisms: Nucleic acid techniques in diagnostic microbiology, Microarray technology.
Advances in Industrial Microbial Technology: Recombinant DNA Technology for genetic improvement. Recent advances in production of antibiotics, pharmaceutical products, enzymes, Biofules, Biosensors, Biopesticides, Biofertilizers, Biodegradable plastics, SCP. Products of nonmicrobial origin produced by genetically engineered microorganisms.

Recommended Books:

1. Towner K. J. and Cockayne A (2000), Molecular methods for microbial identification and typing, Chapman & Hall London.
2. Paul A. Rochelle, Environmental Molecular Microbiology: (2002) Protocals and Applications, Horizon Scientific press England.
3. Lewin B. (2004) Gene VIII, Pearson Prentice Hall, New Delhi.
4. Rehm H. J. Reed G. B. Punler A and Standler, Biotechnology, Vol. 1-8 VCH. Publication.
5. Isacc S. Kohane, Aluin T. Kho and Atul J. Butte. (2004) Microarrays for an integrative genomics, Ane Books, India.
6. Edward A. Birge. (Fourth Edition) Bacterial and Bacteria phage genetics.Springer, New York
7. Uldis N. Streips & Ronald E. Yasbin (Second Edition) Modern Microbial genetics. Wiley –Liss New York
8. Glick B. R. & Jack J. Pasternak. (Second Edition) Molecular Biotechnology. Principles and Application of Recombinant DNA.
9. Review of current- topics in microbiology, Microbial Biotechnology and molecular biology. Critical reading and evaluation of current literature.

DBL-811 Advanced Molecular Biology Credit 4+0

Gene Organization and Regulation

Concept of gene and genome, general organization of nuclear, mitochondria and chloroplast genomes, tissue specific expression of genes; structural organization and regulation of nuclear gene concerning storage proteins, sugar and starch synthesis, genes responding to hormones, phytochromes, abiotic and biotic stresses, gene involved in photosynthesis and nitrogen fixation.

Regulation of gene expression in prokaryotes and eukaryotes.

Gene Silencing and Antisense technology.

Concept and reasons for gene silencing, gene silencing – potential and utilization, gene silencing in crop plants, gene silencing and metabolic pathway engineering, post transcriptional genes silencing– characteristics and mechanism, antisense technology, inhibition of gene expression by antisense RNA; plants for antisense technology, RNA interference and its applications.

Recommended Books

1. Brown T. A. (2002). Genomes, 2nd Edition, John Willey, New York.
2. Buchanan B. B. et al (2000) Biochemistry and Molecular Biology of Plants, American Society of Plant Physiologist, Rockville, Maryland, USA.
3. Peterson, A. H. (1996). Genome Mapping in Plants. Academic Press, USA.
4. Old and Primrose (1995) Principles of Gene Manipulation, Blackwell's Publishers

DBL-812 ADVANCES IN AGRICULTURAL BIOTECHNOLOGY Credit 4+0

Plant Biotechnology: Advances in plant tissue culture and its applications; Gene transfer methods in plants; Genetically modified plants for crop improvement towards designer crops; Present status of GMP's worldwide. Relevance of medicinal plants in biotechnology.

Animal Biotechnology: Various Transfection techniques in animals; Present status of transgenic animals; Cloning of animals; Hybridoma technology and Monoclonal antibodies.

Genome & Genomics: Applications of molecular markers for crop improvements; Whole genome sequencing of human, animals and plant; Deciphering the function of genes in crop plant; Functional genomics; Microarray.

Molecular Tools for Plants Development: A brief account of molecular and genetic tools for studying plant development; regulation of gene expression.

Signal Transduction in Plants: G-protein-coupled receptors and heterotrimeric G proteins; other elements of G protein signaling pathway; Transmembrane rec eptor enzymes and MAPK cascade; Calcium as a second messenger, Phytochromes and Cryptochromes, plant hormones and light signaling.

Current Scenario and Future Prospects Research in Agricultural Biotechnology:

Recommended Books:

1. Shrivastava P. S., Narula A. and Shrivastava S. S. (2004), Plant Biotechnology and Molecular Markers, Anamaya Publisher, New Delhi.
2. Altman A. (1998), Agricultural Biotechnology, Marcel Dekker.
3. Kirsi-Marja Oksman-Caldentey, Wolfgang Barz (2002) Plant Biotechnology and Transgenic Plants, Marcel Dekker. http://www.cplbookshop.com/contents/C787.htm
4. Adrian Slater, Nigel W Scott, and Mark R Fowler (2004), Plant Biotechnology: The Genetic Manipulation of Plants, Oxford University Press.
5. A Wiseman (2004), The GMO Hand Book: Genetically Modified Animals, Microbes and Plants, Edited by Sarad R. P. Humana Press, New Jersey, USA. ISBN 1 588 29 307 6 pp 386.
6. In: Vasil IK. (ed) (2003) Plant Biotechnology 2002 and Beyond: Proceedings 10th IAPTC&B Congress: Florida, USA. 23-28 June 2002. Kluwer Academic Publishers.