

SEMESTER I & II
LSM3244 – MOLECULAR BIOTECHNOLOGY

Prerequisite: LSM2102

Workload: 26 lecture hours + 4 tutorial hours + 20 laboratory hours

This module highlights the applications of recombinant DNA and transgenic technologies to produce useful biotechnology products (e.g.: molecular diagnostics, therapeutics, agrichemicals) or commercial processes in life science. Topics to be covered include: state-of-the-art molecular tools and systems for biotechnology; recombinant protein production and downstream processing; transgenic plants and animals as bioreactors for production of pharmaceuticals (e.g.: vaccines, antibodies); human molecular diagnostics, therapeutics and gene therapy; marine biotechnology; environmental biotechnology and its impact on human health; regulatory guidelines for biotechnology products and release of GMOs into the environment.

S/N	Topics	Lectures	
		S I	S II
1.	Introduction to Molecular biotechnology	1 L (JS)	1 L (Gong)
2.	Transgenic animals <ul style="list-style-type: none"> • Transgenic animal technology (basic technology and gene targeting) • Applications of transgenic animals in animal husbandry and aquaculture • Applications of transgenic animals in medicine and environmental science • Animal cloning, stem cells and gene therapy • Regulatory issues on GMOs 	7 L, 1.5 P (GR)	7 L, 1.5 P (Gong)
3.	Transgenic plants (as bioreactors for biomedical & industrial applications) <ul style="list-style-type: none"> • Plant cell technology • Plant transformation: DNA delivery systems • Production and applications of transgenic plants 	6 L, 1.5 P (SS)	6 L, 1.5 P (Yu)
4.	Recombinant protein production in eukaryotic hosts/microbes <ul style="list-style-type: none"> • Strategies for gene cloning and recombinant protein productions • Advantages and limitations of prokaryotic expression systems • Processing of products by filtration, centrifugation, precipitation • Chromatography methods for processing biotechnology products • Scale up of cell culture/microbial fermentation processes • Molecular diagnostics & drugs 	6 L (JS) 2P (JS)	6 L (JS) 2P (JS)
5.	Environmental biotechnology <ul style="list-style-type: none"> • Environmental pollutants and their impact on human health • Approaches and issues in environmental biotechnology • Biodegradation, biofuels and bioremediation 	2 L (Swarup S)	2 L (Yu)
		Total Lectures:	22 h
		Tutorials:	8h (Tutorials will be given by all staff)
		Practical:	4h x 5 = 20h (All staff will be involved in practical)
		Total hours:	50 h

TEXT BOOK:

Glick B.R. and J.J. Paeternak (2003) Molecular Biotechnology, 3rd ed, ASM Press, Washington DC.

MODE OF ASSESSMENT: CA (lab reports): 25%, Final Exam: 75%

MODULE CO-ORDINATOR:

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LECTURERS & GUEST LECTURERS:

Semester I

A/P J.Sivaraman
A/P Ge Ruowen
A/P Swarup S

Semester II

Prof Gong ZY
Dr. Yu H
Dr. J. Sivaraman