

Programme: M.Sc. (Biochemistry)

Course Code: BCO 117

Title of the Course: BIOPROSPECTING

Number of Credits: 4

Effective from Academic Year: 2018-19

Prerequisites	It assumed that students have basic knowledge about bioactive molecules like enzyme, antibiotics.	
Objective:	This course develops concept of Bioprospecting. Different sources and types for bioactive compounds and their application. Characterization using separation and analytical techniques for identification of the novel metabolites from biological sources.	
Content:		
1	Introduction	(12)
	Search for (i) newer sources (ii) newer metabolites and its significance	
2	Sources - microbes and plants	
A.	Marine ecosystem: Water and sediment; sponges; corals – microbes, thraustochytrids, others.	
B.	Coastal: mangroves; sand dunes; salterns.	
C.	Terrestrial: Forest/Ghats; industrial waste.	
D.	Extreme environments: thermophilic; psychrophilic; halophilic; alkaliphilic; others.	
3	Sampling	(09)
A.	Microorganisms.	
(i)	Samplers – Niskin water sampler and Van Veen Grab sediment sampler; aseptic collection of samples	
(ii)	Isolation: Enrichment procedures; plating on selective media.	
B.	Plants.	
(i)	Selection criteria viz. Type, physical condition, stage of growth, plant part.	
(ii)	Sample treatment – surface sterilization; excision of desired plant component; extraction.	
4	Strain improvement	(03)
A.	Microorganisms: UV radiation mutation; genetic engineering.	
B.	Plants: Hybrid technology; tissue culture	
5	Metabolites from microbes and plants – Screening, detection and characterization	(09)
A.	<i>Industrially important biomolecules</i>	

(i)	Enzymes – extremozymes; food additives/ quality enhancers; medicine.	
(ii)	Pigments – food colorants; fabric dyes	
(iii)	Biocontrol agents – herbicides; pesticides	
(iv)	Nanoparticles – medicine, drug carriers.	
(v)	Biofuels – microbially produced; plant based	
(vi)	Optical and electronic devices – archaeal metabolites: bacteriorhodopsin and cell wall S-layer as membrane for ultrafiltration	
(vii)	Biopolymers – biodegradable plastics: PHAs; EPS; biosurfactants and bioemulsifiers	
(viii)	Plant growth promoters- gibberellins	
B.	<i>Biologically important molecules and applications.</i>	
(i)	Pharmaceuticals: Antimicrobials; Antitumour agents; drug carriers.	(03)
(ii)	Nutraceuticals: PUFAs, β -carotenes; antioxidants	
(iii)	Cosmeceuticals: humectants (polyols).	
5.	Metabolomics	
(i)	Characterization using separation and analytical techniques for identification of the metabolite.	(04)
(ii)	Study and/or manipulation of pathways for enhanced production of a specific product.	(04)
(iii)	Overall chemical composition of the product	(01)
6	Intellectual property and Intellectual rights	(03)
A.	Patent laws – International, Indian.	
B.	Biopiracy	
Pedagogy:	Lectures/ tutorials/ assignments/ students' seminars/ interactive learning/ self-study.	
References/ Readings	Jogdand, S.N. Gene Biotechnology. Himalaya publishing house.	
	Ravi, I., Baunthiyal, M. & Saxena, J., (Eds.). Advances in Biotechnology. Springer.	
	Altman, A. & Hasegawa, P. Elsevier Plant Biotechnology and Agriculture.	
	Clark, D. & Pazdernik, N. Biotechnology.	
	Pongracz, J. & Keen, M., Medical Biotechnology.	
	Shenoy, M. Animal Biotechnology. Laxmi Publication.	
	Verma, A. & Singh, A. Animal biotechnology models in discovery and translation.	
Learning Outcomes	Development of skilled person for bioprospecting of novel bioactive compounds from different biological sources. Bioprospecting and development of industrially important molecules e.g. Pharmaceuticals, nutraceuticals, Cosmeceuticals, enzymes, and biocontrol agents.	