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Maharani Lakshmi Ammanni College for Women **Autonomous**

Affiliated to Bengaluru City University
Re-accredited by NAAC with "A" grade, Recognised by UGC
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Conferred the Status of 'College with Potential for Excellence' by UGC

MAHARANI LAKSHMI AMMANNI COLLEGE FOR WOMEN AUTONOMOUS

ENTREPRUENERSHIP TRAINING PROGRAMME

IN

Module :2- Extraction, Purification & Production of Organic Dye from Natural Sources

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Course Details	
Name of the course	**Entrepreneurship Training Program**
Course module :I	**Module :2- Extraction, Purification & Production of Organic Dye From Natural Sources.**
Course Co-ordinators	Dr. Jolitha A.B, PG Biotech Coordinator, Dept. of Biotechnology, mLAC. Dr. Nagalaxmi B.N, HoD, Dept. of Chemistry, mLAC
Collaborating Faculty and Departments	1. Dr. K.M Harini Kumar, Prof, Dept.of Plant Biotechnology, University of agricultural Sciences, GKVK campus 2. Dr. Nagalaxmi B.N, HOD Dept. of chemistry, mLAC 3. Dr. Manjula K.R, Asst. prof. Dept. of Biotechnology, Reva University 4. Mr. Suraj Madhavan, Co-founder and Director Innvocept Solutions. Business Development and Project Management 5. Mrs. Vandana Parashar, BiSEP faculty, mLAC 6. Mrs. Chaya M.R, Associate Prof, Dept. of chemistry, KLE's Nijlingappa College, Bangalore 7. E- cell, mLAC
Stream **Subject**	Science Biotechnology/Biosciences
Duration	3 months
Eligibility	Any Life Science Undergraduate, Post Graduate students, UG/PG diploma students with minimum 55% in their qualified examination
Course Intake	20 students
Total hrs	72
Criteria for evaluation	1. Submission of business plan for the project work undertaken 2. Viva- voce

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Course Description

- **Note: The progamme will tie-up with MSME approved industries for internship and product development**
- **The course is designed in consultation with the MSME Development institute, Ministry of MSME, Govt of India, Bangalore**

The objective of this program is to impart knowledge & skills in biotechnology or biosciences enabling them with tools and capabilities to own a Start-ups in this sector.

- The programme intends to give a conventional training in the entrepreneurship skills in enzyme/dye production and soap and detergent manufacturing
- It also aims at imparting innovative technology to bring novelty in their products like more eco-compatible, less carbon footprint etc.
- Emphasizes on students to think out of the box to integrate technology to make the product unique and consumer friendly

The course comprises of two modules THEORY and PRACTICAL hands-on skill training. Students will be introduced to the entire process of starting and nurturing a biotechnology company. Technical & financial skills to forecast growth & health of their company.

THE PRACTICAL COMPONENT HANDS-ON TRAINING ON

- Production, Extraction and Purification of commercially important enzymes from bacteria and fungus
- Production of soaps and detergents utilizing the extracted enzymes.
- Formulation of enzyme-based detergents/ cleaning solution (also other applications of the enzymes produced which will be given as a project to the students)
- Labelling, Packing and Marketing

Learning Objectives- Theory

- To familiarize students with various aspects of of entrepreunership skills
- Road map for bioscience students who are interested in owning a startup/ company
- Scope of Entrepreneurial ventures, forecasting, business problems faced during early stages of a start up
- Self-sustainability
- Financial Management
- Insights into funding protocol and procedures
- IP, Legal and other issues related to bioentrepruenership

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Learning outcome

- Analyze the business environment in order to identify business opportunities,
- Consider the legal and financial conditions for starting a business venture,
- Critical analysis of the multifaceted application of the product manufactured
- Evaluate the effectiveness of different entrepreneurial strategies,
- Interpret their own business plan, construct a business model and team

Learning Objectives- Hands-on skill training

- Insight into the significance of R& D in bioentrepreunership programme
- Primary requirement to set up a production facility
- Importance of GLPand GMP and generation of SOP'S
- Selection, maintenance and costing of the raw materials used for production
- Importance of consistency in results for product quality, troubleshooting etc
- Costing analysis Scale up process and yield calculation

Learning Outcome- Hands-on skill training

- Stimulate innovative methods of production, reduce costs and improve product quality
- Planning and execution of and setting up an experiment from the start to finish
- Handling and maintenance of biological products such as enzymes, Instruments etc

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Details of Syllabus: Theory-24hrs

Course Plan			
	Hours	**Total duration**	**Total no. of hrs**
No theory/week	2hrs x 2 days =4hrs week	2 months	24 hrs
No. of Practical sessions/week	3hrs x 2days= 6 hrs/ week	2 months	48hrs
Project duration		1 months	1 months
Industry internship		10 days	10 days
Semester evaluation		15 days	15 days

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Module :2- Extraction, Purification & Production of Organic Dye From Natural Sources

Course Description

This course is designed to train students to establish a startup in manufacturing the organic dye from natural resources. The program will impart modern and cost effective method for extraction of dyes. The practical component will deal with the hands on training on

- Identification of cheap natural products for dye extraction
- Production of organic dyes
- Purification of the dyes
- Labelling, Packing and marketing

Learning Objectives

Theory

- Introduction to the course
- Scope ofEntrepreneurial ventures, issues faced as their company progresses from its earliest stages
- Self-sustainability
- Financial Management
- Insights into funding protocol and procedures
- IP, Legal and other issues related to bioentrepruenership

Learning outcome

- Students will be able to extract , purify, and test the toxicity of toxicity of the organic dyes
- Analyse the business environment in order to identify business opportunities,
- Consider the legal and financial conditions for starting a business venture,
- Evaluate the effectiveness of different entrepreneurial strategies,
- Interpret their own business plan.

Learning Objectives- Practicals

- Techniques to isolate commercially important organic dyes from natural resources
- Extraction and purification of dyes
- Testing of the toxicity of the dyes
- Incorporation of the dye in the textile industry
- Packing , labeling and marketing

- Maintenance of records
- Quality check and consistency of the product
- Labelling and packing techniques of the product

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Skill development training – MODULE II

Production, extraction and partial purification of organic dyes from natural resources

Detailed Phase wise execution of the hands-on skill training

Phase-I- Collection of raw material and extraction of organic dyes		
Objectives/action plan	**Details**	**Observation/comments**
a) collection and identification natural resources for organic dye extraction	i) Identification of plant resources ii) crude extraction and testing iii) characterization and confirmation of the plants	The good organic source for dye is identified and extracted by alcohol extraction, solvent extraction and aqueous extraction method
b) Efficient extraction methods	Efficient extraction of the dye from the plant material is very important for standardization and optimization of vegetable dyes. Utilizing a) Soxhlet b) Supercritical fluid extraction c) Subcritical water extraction and d) Sonicator methods	Students learn the efficient methods of dye extraction and comparative analysis of the same
c)extraction sources	Natural products like • Marigold blossoms (*Tagetes erecta, Tagetes patula*) • Tansy (*Tanacetum vulgare*) • Solidago (*Solidago spp.*) • Chrysanthemum blossoms (*Chrysanthemum morifolium*) • Sunflower heads (*Helianthus annuus*) Will be used	Students will learn to identify the cheap resourses

Phase II- Packing , labeling and marketing	
Objective/ action plan	**Details**
Packing methods	Efficient packing methods , cost effective methods will be thought
Marketing of the product	Marketing strategies , cost calculation and maintenance of financial budget

Phase-III- Industrial Internship, Project dissertation and Business proposal write-up	
Objectives	**Details**
Industrial Internship	10 days industrial internship programme with the collaborated industries
Project	**Students will be assigned projects based on the skill development training**
Business proposal write up	Students will be asked to write up a business proposal to evaluate the overall outcome of the training and encouraged to submit for a funding agencies

References:

1. Cardon, Dominique (2016). *The Dyer's Handbook Memoirs On Dyeing* (Translation into English of an anonymous French manuscript held in a private collection consisting of four essays produced around 1763. ed.). Oxford, Philadelphia: Oxbow Books. ISBN 9781785702112. OCLC 950262477

2. NPTEL course on dye technology