

**Department of Microbiology**  
**Revised Syllabus of II Year Advanced Diploma Program (PG)**

**Title of Program: Entrepreneurship in Microbiology**

**Syllabus Structure (PG)**

Year	Semester	Course No.	Course Code	Contact Hours	Credits (1Credit=15 H)	Total Marks	
II	III	CT III	ADMIT 303	30	2	75	
		CL III	ADMIL303	60	2	150	
	IV	CT IV	ADMIT 404	30	2	75	
		CL IV	ADMIL404	60	2	150	
	Annual	CP II	ADMIP202	60	2	150	
	Industrial and or Incubation and or Research and or Field Training				60	2	-
	<b>Total</b>				<b>270</b>	<b>12</b>	<b>600</b>
<b>Total</b>				<b>510</b>	<b>22</b>	<b>1200</b>	

AD: Advanced Diploma, \*: Departmental Code MI: Microbiology,

C: Course, T: Theory, L: Lab (Practical), P: Project

Total No. of Papers: 05 (Theory: 02, Practical: 02, Project: 01)

Theory and Practical: Semester, **Project: Annual**

**Semester III**

**CT-III: ADMIT 303: Title: Essentials of Agriculture Microbiology & Entrepreneurship**

(Contact Hrs: 30 Credits: 2)

**Learning Objectives:**

Students will be able to

1. To understand the production of biofertilizers and biopesticides.
2. Learn the basic processes employed in biofuel and enzyme production.

**Unit I: Essentials of Agriculture Microbiology (15)**

• **Biofertilizers:**

- a) Introduction, overview of various agricultural and biochemical products produced using microorganisms.
- b) Definition and types, importance of biofertilizers in agriculture.

- c) Characteristics of biofertilizers – *Rhizobium*, *Azotobacter*, *Azospirillum*, PSB microorganisms, *Cyanobacteria*, *Azolla*, *Mycorrhizae*.
- d) Production Technology.

- **Biopesticides:**

Introduction, overview of various agricultural and biochemical products produced using microorganisms.

- a) Definition and types, importance of biopesticides in agriculture
- b) Characteristics of Biopesticide
- c) Production Technology.

## Unit II: Biofuel Processes and Enzyme Technology

(15)

- **Biofuels:**

Introduction, overview of various biofuel produced using microorganisms.

- a. Definition and types, importance of biofuels.
- b. Characteristics of biofuels
- c. Production Technology.

- **Enzymes:**

Introduction, overview of various enzymes & their products produced using microorganisms.

- a) Definition and types, importance of enzymes
- b) Production Technology: Raw materials, microorganisms, production process, recovery and applications of industrially important enzymes.

### Learning Outcomes:

After completion of the unit, Student is able to

1. Overview of various agricultural and biochemical products produced using microorganisms.
2. Various biofuel produced using microorganisms

### Reference Books:

1. Biofertilizers and Biopesticides by Krishnendu Acharya
2. Biofuels and Bioenergy by John Love

**CL-III: ADMIL303: Practical****(Contact Hrs.: 30 Credits: 02)****Learning Objectives:**

Students will be able to

1. Learn the practical production of various biofertilizers.
2. Understand how to synthesize biopesticides and biofuels using microorganisms.
3. Understand the basic aspects of production involved in amylase, protease and lipase synthesis.

**List of Practical's**

1. Isolation of Rhizobium from root nodules.
2. Production of Rhizobium biofertilizer.
3. Isolation of Azotobacter from soil sample.
4. Laboratory production of Azofertilizer using isolate.
5. Isolation of Azospirillum from soil.
6. Production of Azospirillum biofertilizer.
7. Production of biofuel employing hydrogen producing bacteria.
8. Demonstration of biofuel technology in industry.
9. Laboratory production of alkaline protease by solid state fermentation.
10. Production of neutral protease by submerged fermentation.
11. Production of alpha amylases by using solid state fermentation.
12. Lipase fermentation by employing submerged fermentation.
13. Protease activity determination by tyrosine curve.
14. Determination of lipase activity by titrimetric method
15. Isolation of BGA

**Learning Outcomes:**

After completion of the unit, Student is able to

1. Learn the practical production of various biofertilizers.
2. Understand how to synthesize biopesticides and biofuels using microorganisms.
3. Understand the basic aspects of production involved in amylase, protease and lipase synthesis.

**Reference Books:**

1. Agriculture Microbiology – G. Rangaswami.
2. Soil Microbiology – N.S. Subba Rao.

**Semester IV****CT-IV: ADMIT 404: Title: Essentials of Entrepreneurship  
(Contact Hrs: 30 Credits: 2)****Learning Objectives:**

Students will be able to

1. Know about the various schemes and plans related to entrepreneurship.
2. Master the basics of accounting and auditing.

**Unit I: Essentials of Entrepreneurship (15)**

- Market Survey, Concepts of market survey, society need, Survey methods, Advantages of market survey.
- Government schemes, Site selection, Documentation, Various loans, subsidies and funding's, etc.
- Human resource management, Introduction and concepts, System and functions, Training & Development.

**Unit II: Accounting and Auditing (15)**

- **Essentials of Accounting**

Purpose of accounting, Source and recording of data: Journal Entries, Ledger Posting, business documents, Verification of accounting records, accounting principles & policies., Trial Balance and Finalisation of accounts

- **Essentials of Auditing**

Basic concept & need for auditing, Internal & External auditing, Detection and prevention of frauds and errors, Advantages, Disadvantages and limitations of auditing.

**Learning Outcomes:**

After completion of the unit, Student is able to

1. Essentials of Entrepreneurship
2. Accounting and Auditing

**Reference Books:**

1. The essence of financial accounting by Chadwick, 2<sup>nd</sup> Edition.
2. Financial and managerial accounting by Jan Williams.
3. Human resource management – C. B. Gupta.
4. Managing the human resource in 21<sup>st</sup> century – Aparna Sharma.

**CL-IV: ADMIL404: (Practical):****(Contact Hrs: 30 )****Learning Objectives:**

Students will be able to

1. Understand and conduct audits.
2. Analyze and compare statistical data using latest technologies.
3. Perform accounting operations.

**List of Practical's**

1. To conduct market survey for initiation of biofertilizer industry.
2. Conduct market survey for setup of biofuel producing plant.
3. Compilation of latest government schemes for entrepreneurship and its analysis.
4. Demonstration of mock documentation for an industry.
5. Demonstration of human resource management modules.
6. Analysis of audit of a small scale company.
7. Compilation and comparison of the auditing processes of two small scale industries.
8. Study of the basic parameters of accounting.
9. Study of latest technologies and software used in accounting and management.
10. Evaluation of the implementation of latest technologies for accounting and auditing in selected industries.
11. Isolation of Azospirillum from roots.
12. Conduct market survey for setup of dairy plant
13. Isolation of Mycorrhiza
14. Isolation of cellulolytic microbes for agro waste management
15. Isolation of Pectin degrading microbes for agro waste management

**Learning Outcomes:**

After completion of the unit, Student is able to

1. Understand and conduct audits.
2. Analyze and compare statistical data using latest technologies.
3. Perform accounting operations.

**CP-II: ADMIP202: Project**  
**(Contact Hrs. 30, Credits: 2)**

**Industrial and or Incubation and or Research and or Field Training**  
**(Contact Hrs. 30, Credits: 2)**

BOS Sub-Committee

1. Chairman: - Mr. Pawar B. S.
2. Member: - Dr. Patil P.S.