

INSTITUTE	FACULTY OF AGRICULTURE
PROGRAM	BACHELOR OF SCIENCE (Hons.) AGRICULTURE
SEMESTER	1
COURSE TITLE	AGRICULTURAL MICROBIOLOGY
COURSE CODE	16AS0104
COURSE CREDITS	2

Objective:

- 1 To aware students about the various microbe life, its structures and functions.
- 2 To know the role of various microorganisms playing important role in the agriculture.

Course Outcomes: After completion of this course, student will be able to:

- 1 Students will be able to articulate and retain knowledge regarding importance of different microbes in agriculture.
- 2 Students will be able to know the role of microbes in soil fertility and crop productivity.
- 3 Students will be able to acquaint with the instruments used in the agricultural microbiology laboratory as well as isolation methods.
- 4 Students will be able to prepare various growth medium for the isolation of microbes from given sample.

Pre-requisite of course: To understand the basic knowledge regarding microorganisms.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
1	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Introduction, Microbial world, Prokaryotic and Eukaryotic microbes Introduction, Microbial world, Prokaryotic and Eukaryotic microbes.	1
2	Bacteria: cell structure, chemoautotrophy, photo autotrophy growth. Bacteria: cell structure, chemoautotrophy, photo autotrophy growth.	1
3	Bacterial genetics: Genetic recombination-transformation, conjugation and transduction, plasmids, transposon Bacterial genetics: Genetic recombination-transformation, conjugation and transduction, plasmids, transposon	3
4	Role of microbes in soil fertility and crop production Role of microbes in soil fertility and crop production	1

Contents : Unit	Topics	Contact Hours
5	Carbon, Nitrogen, Phosphorous and sulphur cycles Carbon, Nitrogen, Phosphorous and sulphur cycles	2
6	Biological nitrogen fixation- symbiotic, associative and asymbiotic Biological nitrogen fixation- symbiotic, associative and asymbiotic.	1
7	Azola, blue green algae and mycorrhiza Azola, blue green algae and mycorrhiza	1
8	Rhyzosphere and phyllosphere Rhyzosphere and phyllosphere	1
9	Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation	2
Total Hours		13

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Introduction to microbiology laboratory and its equipments Introduction to microbiology laboratory and its equipments	2
2	Microscope- parts, principles of microscopy, resolving power and numerical aperture Microscope- parts, principles of microscopy, resolving power and numerical aperture	2
3	Methods of sterilization Methods of sterilization	2
4	Nutritional media and their preparations Nutritional media and their preparations	2
5	Enumeration of microbial population in soil- bacteria, fungi, actinomycetes Enumeration of microbial population in soil- bacteria, fungi, actinomycetes	2
6	Methods of isolation and purification of microbial cultures Methods of isolation and purification of microbial cultures	2
7	Isolation of Rhizobium from legume root nodule Isolation of Rhizobium from legume root nodule	2
8	Isolation of Azotobacter from soil Isolation of Azotobacter from soil	2
9	Isolation of Azzospirillum from roots Isolation of Azzospirillum from roots	2
10	Staining and microscopic examination of microbes Staining and microscopic examination of microbes	2
Total Hours		20

Textbook :

- 1 NA, NA, NA, NA

References:

- 1 Microbiology, Microbiology, Prescott, Harley and Klein, 5th ed. The Mc Graw- Hill Companies, USA, 2007
- 2 Fundamentals of Microbiology , Fundamentals of Microbiology , Bhattacharjee R. N., Kalyani Publishers, New Delhi, 2019
- 3 An introduction to microbiology, An introduction to microbiology, Reddy, N. P. Eswara. and Surendra V, Kalyani Publishers, New Delhi, 2015
- 4 General Microbiology Vol II, General Microbiology Vol II, Powar C. B. and Dagainawala, H. F., Himalaya Publishers, Mumbai, 2010
- 5 Biotechnology of Biofertilizers, Biotechnology of Biofertilizers, Kannaiyan, S. , Narosa Publisher, 2002
- 6 Handbook of Biofertilizers and Microbial pesticides, Handbook of Biofertilizers and Microbial pesticides, Vora, M. S., Shelat, H. N. and Vyas, R. V., Satish Serial Publishing House, New Delhi, 2008
- 7 Handbook of biofertilizers, Handbook of biofertilizers, Somani, L. L., Agrotech Pub. Academy, Udaipur, 2004
- 8 Microbiology- A laboratory manual, Microbiology- A laboratory manual, James G., Cappuccino and Natalie Sherman, 4 th ed , Addison- Wesley Publication., 2013

Suggested Theory Distribution:

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
25.00	25.00	20.00	10.00	10.00	10.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board may also use any of tools such as demonstration, role play, quiz, brain storming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e- courses, Virtual Laboratory.