



GOVT. COLLEGE FOR WOMEN PARADEGROUND
JAMMU (Autonomous)
(Erstwhile Maharani Mahila College) Estd 1944
Affiliated to University of Jammu

Programme: - Undergraduate programme(FYUGP) in Biotechnology
Semester- II
Course type: - Major-theory Course
Course title: -General and Applied Microbiology
Course code: -UBTMJT201

Objectives of the Course: -To impart elementary knowledge about the course General Microbiology and its application.

Learning outcomes of the course: -. Understand the distribution, morphology and physiology of microorganisms. Exploring the microbial world and analysing the specific benefits and challenges in health, agriculture, and food sectors. Understanding biochemical and physiological aspects of microbes and developing broader perspective against the challenges posed by microbes in future and current situations.

Total marks: - 100

Total credits: - 4

Total teaching hours: - 60 hrs

Syllabus

Unit-1

History and Development of Microbiology, General characteristics: A cellular microorganisms (Viruses, Viroids, Prions) and Cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) with emphasis on distribution and occurrence, morphology, mode of reproduction and economic importance. Methods in Microbiology, pure culture techniques, microbial culture media, sterilization, culture collection and maintenance of cultures. **12hr**

Unit-2

Bacteria and its types, classification on the basis of flagella and nutrition, mode of reproduction, Composition and detailed structure of Gram-positive and Gram-negative cell walls, Types: Archaeobacteria and Eubacteria and wall-less forms (Mycoplasma), simple staining, Gram and acid-fast staining mechanisms, Negative staining, lipopolysaccharide (LPS), spheroplasts, protoplasts, and L-forms. Viruses: Discovery, Classification and structure of viruses (Plant, animal and bacterial viruses), Retroviruses. **12hr**

Unit-3

General characteristics of algae including occurrence, thallus organization, algae cell ultra-structure, pigments, flagella, eyespot food reserves and vegetative, asexual and sexual reproduction. Applications of algae in agriculture, industry, environment and food. Introduction to Protozoa: General characteristics with special reference to Amoeba, Paramecium, Plasmodium, Leishmania and Giardia. **12hr**

Mohab Tufchi



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Unit-4

History and General characteristics of fungi including habitat, distribution, nutritional requirements, fungal cell ultra- structure, thallus organization and aggregation, fungal wall structure and synthesis, asexual reproduction, sexual reproduction, heterokaryosis, heterothallism and parasexual mechanism. Role of fungi in ecosystem, pathogenic fungi-mycotoxins. 12hr

Unit 5

Industrial products derived from microbes, industrial enzymes, production of antibiotics, vitamins and vaccines; Single cell proteins, biofertilizers, nitrogen fixation, vermiculture, composting, herbicides and biopesticide production, Biotransformation, bioremediation of contaminated soils, biodegradation of organic pollutants and xenobiotics; bioplastics and biomining. 12hr

Books Recommended:

1. Stainer, R.Y., Ingraham, J.L., Wheelis, M. and Painter, P.R. General Microbiology. The Mac Millan Press Ltd. London.
2. Pelczar, M.J.J., Chan, E.C.S. and Kreig, N.R. Microbiology. Tata McGraw Hill, New Delhi.
3. Prescott, L.M., Harley, J.P. and Klein, D.A. Microbiology. McGraw Hill, USA.
4. Mackie and McCartney. Medical Microbiology. Vol. 1. Microbial Infection. Churchill Livingstone.
5. A Textbook of Microbiology, R. C. Dubey and D. K. Maheshwari, 1st edition, S.Chand & Company Ltd.
6. Alexopoulos, C.J., Mims, C.W., and Blackwell, M. Introductory Mycology. John Wiley and Sons (Asia) Pvt. Ltd. Singapore.
7. Atlas, R.M. Basic and practical microbiology. Mac Millan Publishers, USA.
8. Toratora, G.J., Funke, B.R. and Case, C.L. Microbiology 9th ed. Pearson Education

Examination pattern shall be as under: -

1. 20 marks shall be earmarked for internal assessment (5 marks for attendance +15 for assessment test).
2. Scheme for award of marks for attendance shall be same as followed by the College
3. Internal assessment test shall be conducted after the completion of 40% of the syllabus in a particular course.

Pattern for setting internal assessment test paper

The paper shall comprise of three sections: -

Muhab Tufahy



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- Short answer questions - Attempt two questions of 2 marks each out of three questions (Maximum of 30 words each)
- Medium answer question - Attempt two questions of 3 marks each out of 3 questions (Maximum of 50 words each)
- Long answer question - Attempt one out of two questions of 5 marks (Maximum of 100 words)

Note: - Questions shall be set in such a way that the syllabi prescribed for the examination is fully represented

Duration of the paper: - 1 hour

Pattern of External Examination:

Total marks: - 80

Time allowed: - 3 hours

The paper shall comprise of 3 sections.

- Short answer questions - 5 questions of 3 marks each (one question shall be asked from each unit). All questions are compulsory
- Medium answer questions - 5 questions of 7 marks each (one question shall be asked from each unit). All questions are compulsory
- Long answer questions: - 5 questions be set from five units, and the students shall be asked to attempt 2 questions only. Each question shall be of 15 marks.

(The word limit shall be same as is the usual practice in external examination of similar weightage.)

Major-practical Course

Code: - UBTMJP201

Objective: - Hands on training to the students of different techniques used in Microbiology Course.

Learning outcomes: -To demonstrate the skills in aseptic handling of microbes including isolation, identification and maintenance. Learning and practicing professional skills in handling microbes and contaminants in laboratories and production sectors.

Total marks: - 50

Total Credits: - 2

Minimum No. of practical to be performed: -15

Mahab Tulyahy



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Practical Exercises

1. To study different components, use and care of the compound bright field microscope.
2. Culture characteristics of different microorganisms.
3. Different sterilization techniques used in microbiology.
4. Preparation of media for cultivation of bacteria
5. Preparation of media for cultivation of fungi.
6. Isolation of microorganisms from soil sample.
7. Isolation of microorganisms from air sample.
8. Isolation of micro-organism from water sample.
9. Isolation and preparation of pure cultures of bacteria using different techniques.
10. Enumeration of microorganisms; total vs viable count.
11. Study morphology and identification of bacteria through simple staining.
12. Gram's staining of bacteria to differentiate Gram (+ve) bacteria from Gram (-ve).
13. Biochemical activities of microorganisms.
14. Standard qualitative analysis of water.
15. Antibiotic sensitivity of microbes.

Books recommended:

1. Cappuccino, J.G. and Sherman, N. Microbiology – A Laboratory Manual. Addison – Wesley.
2. Aneja K.R. Experiments in Microbiology, Plant Pathology and Biotechnology (4th edition). New Age International (P) Limited, New Delhi.
3. Microbiology- Concepts and Applications, Pelczar Jr, Chan, Krieg, International ed, McGraw Hill.
4. Prescott, Harley, Klein's Microbiology, J.M. Willey, L.M. Sherwood, C.J. Pub. Sudbury, 835 pp.

Examination pattern: -

A) Internal assessment

Mehab Tuli



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Weightage of Internal assessment: - 50% i.e., 25 marks out of 50.

Components of internal assessment: -

- a) 5 marks for attendance. Marks shall be awarded as per the rules already followed by the College
- b) 6 marks earmarked for the daily performance of the students in the practical exercises. The evaluation of daily performance shall be undertaken as per the standard $\alpha \beta \gamma$ scheme being followed in the College.
- c) 6 marks are earmarked for minor project assigned to each student. Students shall have to submit the project report according to a prescribed format on the day of internal assessment test.
- d) 8 marks earmarked for internal assessment test in practical. The nature of the test shall be similar as is already followed by the College

External examination: -

Weightage of external examination: - 50% i.e. 25 marks out of 50.

The examination pattern shall be same as followed by the College.

Mahab Tutehi



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Programme: - Undergraduate programme (FYUGP) in Biotechnology
Semester- II
Course type: - Minor-theory Course
Course title: - General and Applied Microbiology
Course code: -UBTMNT201

Objectives of the Course: - To impart elementary knowledge about the course General Microbiology and its application.

Learning outcomes of the course: -. Understand the distribution, morphology and physiology of microorganisms. Exploring the microbial world and analysing the specific benefits and challenges in health, agriculture, and food sectors. Understanding biochemical and physiological aspects of microbes and developing broader perspective against the challenges posed by microbes in future and current situations.

Total marks: - 100

Total credits: - 4

Total teaching hours: - 60 hrs

Syllabus

Unit-1

History and Development of Microbiology, General characteristics: A cellular microorganisms (Viruses, Viroids, Prions) and Cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) with emphasis on distribution and occurrence, morphology, mode of reproduction and economic importance. Methods in Microbiology, pure culture techniques, microbial culture media, sterilization, culture collection and maintenance of cultures. **12hr**

Unit-2

Bacteria and its types, classification on the basis of flagella and nutrition, mode of reproduction, Composition and detailed structure of Gram-positive and Gram-negative cell walls, Types: Archaeobacteria and Eubacteria and wall-less forms (Mycoplasma), simple staining, Gram and acid-fast staining mechanisms, Negative staining, lipopolysaccharide (LPS), spheroplasts, protoplasts, and L-forms. Viruses: Discovery, Classification and structure of viruses (Plant, animal and bacterial viruses), Retroviruses. **12hr**

Unit-3

General characteristics of algae including occurrence, thallus organization, algae cell ultra-structure, pigments, flagella, eyespot food reserves and vegetative, asexual and sexual reproduction. Applications of algae in agriculture, industry, environment and food. Introduction to Protozoa: General characteristics with special reference to Amoeba, Paramecium, Plasmodium, Leishmania and Giardia. **12hr**

Mahab Tyagi



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Unit-4

History and General characteristics of fungi including habitat, distribution, nutritional requirements, fungal cell ultra- structure, thallus organization and aggregation, fungal wall structure and synthesis, asexual reproduction, sexual reproduction, heterokaryosis, heterothallism and parasexual mechanism. Role of fungi in ecosystem, pathogenic fungi-mycotoxins. **12hr**

Unit 5

Industrial products derived from microbes, industrial enzymes, production of antibiotics, vitamins and vaccines; Single cell proteins, biofertilizers, nitrogen fixation, vermiculture, composting, herbicides and biopesticide production, Biotransformation, bioremediation of contaminated soils, biodegradation of organic pollutants and xenobiotics; bioplastics and biomining. **12hr**

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4. Mackie and McCartney. Medical Microbiology. Vol. 1. Microbial Infection. Churchill Livingstone.
5. A Textbook of Microbiology, R. C. Dubey and D. K. Maheshwari, 1st edition, S. Chand & Company Ltd.
6. Alexopoulos, C.J., Mims, C.W., and Blackwell, M. Introductory Mycology. John Wiley and Sons (Asia) Pvt. Ltd. Singapore.
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Pattern for setting internal assessment test paper

Mahat Tripathi



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(The word limit shall be same as is the usual practice in external examination of similar weightage.)

Minor-practical Course

Code: - UBTMNP201

Objective: - Hands on training to the students of different techniques used in Microbiology Course.

Learning outcomes: - To demonstrate the skills in aseptic handling of microbes including isolation, identification and maintenance. Learning and practicing professional skills in handling microbes and contaminants in laboratories and production sectors.

Total marks: - 50

Total Credits: - 2

Maharaj Tyagi

Minimum No. of practical to be performed: -15

Practical Exercises

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5. Preparation of media for cultivation of fungi.
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Maharaj
Tuteja



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External examination: -

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Nehal Tulyah