DEPARTMENT OF BIORESOURCES
SCHOOL OF BIOLOGICAL SCIENCES
UNIVERSITY OF KASHMIR, SRINAGAR

BACHELOR OF SCIENCE
4th SEMESTER
DISCIPLINE SPECIFIC COURSE – 4 (CORE - 4)
BRS421C: BIORESOURCES: MICROBIAL & FUNGAL RESOURCES

CREDITS: THEORY: 4; PRACTICAL: 2
MAX MARKS: THEORY: 60; PRACTICAL: 30
MIN MARKS: THEORY: 24; PRACTICAL: 12

THEORY (Lectures: 60)

Unit: I **(14 Lecture)**

Introduction to Microbial Resources: Historical perspective; General characteristics of microbial resources (bacteria, fungi, algae and viruses).

Microorganisms and environment decontamination: Microorganisms in wastewater decontamination; Bioremediation through the use of microbial resources

Unit: II **(16 Lecture)**

Microbial resources and crop productivity: Mycorrhiza- concept and importance; Role of Trichoderma and biofilmed fertilizers; Production and application of *Rhizobium*, *Azospirillum*; Mushroom industry— Edible mushrooms (*Agaricus bisporus, Morchella esculentum*), Non-edible mushrooms (Amanita), Mushroom production and cultivation techniques.

Unit: III **(16 Lecture)**

Microbes of industrial importance: Probiotics in promoting human health; Potential anticancerous compounds from microbial resources; Microbial cells as food (single cell proteins); Bioconversions— production of alcohol, cheese and bread.

Unit: IV **(14 Lecture)**

Bioactive microbial agents: Biopolymer and biosurfactant production from microbial resources; Medicine from microbes, bioleaching; Antibiotics from fungi— penicillin, Ergot alkaloids; Fungi as biocontrol agents.

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Practical Work: 2 Credits

- Basic bacterial staining, fungal staining, capsule staining, flagella staining and algal staining.
- Preparation of solid and liquid culture media.
- Streak plate and spread plate, Isolation of single colonies of bacteria and fungi on solid media.
- Preparation of slides of rhizobium isolated from leguminous plants.
- Alcohol production by fermentation of sugars.
- Identification of permanent slides of penicillium, yeasts, chlorella, plasmodium and trypanosomas.
- Isolation of lactobacillus from milk products and observation of bacilli under microscope.

Suggested Readings:

- The handbook of microbial bioresources. Eds: Gupta, V. K., Sharma, G. D., Tuohy, M. G., Gaur, R. (2016) ISBN 9781780645216. DOI: 10.1079/9781780645216.0000.
- Mushroom Production and Processing Technology. Eds: Pathak VN / Yadav N / Gaur M (2013) Published by Agrobios (India), Jodhpur ISBN 13: 9788177540062.
- Introduction to Fungi 3rd edition by Webster, John, Weber, Roland (2007) Cambridge University Press. ISBN-13:9780521014830.
- Biotechnology of BiofertilizersEditors: Kannaiyan, Sadasivam (Ed.) (2002) Springer Netherlands ISBN: 978-1-4020-0219-9.
- Microbes as Bio-fertilizers and their Production Technology S. G. Borkar (2015) Woodhead Publishing India in Agriculture. ISBN 9789380308579.
- Bioremediation of Wastewater: Factors and Treatment. Ed: Olga Sanchez (2017) Apple Academic Press; 1st ed. (2015).ISBN-13: 978-177188162.
- Medically Important Fungi: A Guide to Identification – 5th Edition by Larone Davise H. (2011) ASM Press. ISBN: 978-1555816605.