



ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ

GULBARGA UNIVERSITY Jnana Ganga, KALABURAGI-585 106

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ವಿದ್ಯಾಮಂಡಲ ವಿಭಾಗ



ಕ್ರ.ಸಂ.ಗುವಿಕ/ವಿಮವಿ/ಬಿಟಎಸ್/2020-21/ ೩೨

ದಿನಾಂಕ: ೨/೪/೨೦೨೧

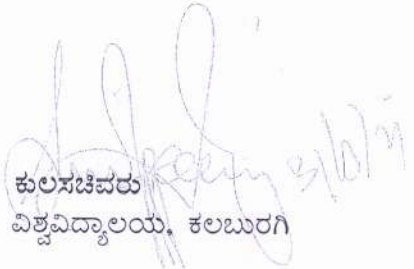
ಅಧಿಸೂಚನೆ

ವಿಷಯ : ಎಂ.ಎಸ್ಸಿ ಸೂಕ್ಷ್ಮ ಜೀವಶಾಸ್ತ್ರ ಕೋರ್ಸಿನ I ರಿಂದ IVನೇ ಸೆಮಿಸ್ಟರ್‌ನ ಪಠ್ಯಕ್ರಮ ತಿದ್ದುಪಡಿ ಮಾಡಿ ಪರಿಷ್ಕರಿಸಿದ ಕುರಿತು.

- ಉಲ್ಲೇಖ: 1. ಸ್ನಾತಕೋತ್ತರ ಅಧ್ಯಯನ ಮಂಡಳಿ ಸಭೆ ದಿನಾಂಕ 23.11.2020
2. ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಗೊತ್ತುವಳಿ ಸಂಖ್ಯೆ 18 ದಿನಾಂಕ 23.02.2021
3. ಕುಲಪತಿಗಳ ಅನುಮೋದನೆ ದಿನಾಂಕ 20.03.2021

ಉಲ್ಲೇಖ (2) ರಲ್ಲಿನ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್‌ನ ಸಭೆಯ ಗೊತ್ತುವಳಿ ಸಂಖ್ಯೆ 18 ನ್ನು ಅನುಷ್ಠಾನಗೊಳಿಸುತ್ತ; ಎಂ.ಎಸ್ಸಿ ಸೂಕ್ಷ್ಮ ಜೀವಶಾಸ್ತ್ರ ಕೋರ್ಸಿನ ವಿಷಯದ I ರಿಂದ IVನೇ ಸೆಮಿಸ್ಟರ್‌ವರೆಗಿನ ಪಠ್ಯಕ್ರಮದಲ್ಲಿ ತಿದ್ದುಪಡಿ ಮಾಡಿ, ಸ್ನಾತಕೋತ್ತರ ಅಧ್ಯಯನ ಮಂಡಳಿ ಸಭೆಯ ಅನುಮೋದನೆ ನೀಡಿದ್ದು ಹಾಗೂ 2020-21ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಪೂರ್ವಾನ್ವಯವಾಗುವಂತೆ ಜಾರಿಗೊಳಿಸಿದೆ.

ಈ ಮಾಹಿತಿಯನ್ನು ಸಂಬಂಧಪಟ್ಟ ಶಿಕ್ಷಕರ ಹಾಗೂ ವಿದ್ಯಾರ್ಥಿಗಳ ಗಮನಕ್ಕೆ ತರಲು ಸೂಚಿಸಲಾಗಿದೆ. ಪಠ್ಯಕ್ರಮದ ವಿವರವನ್ನು ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್‌ಸೈಟ್ www.gug.ac.in ದಿಂದ ಪಡೆಯಬಹುದು.


ಕುಲಸಚಿವರು
ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ

ಗೆ,

1. ಮುಖ್ಯಸ್ಥರು, ಸೂಕ್ಷ್ಮ ಜೀವಶಾಸ್ತ್ರ ಅಧ್ಯಯನ ವಿಭಾಗ, ಗು.ವಿ. ಕಲಬುರಗಿ

ಪ್ರತಿಗಳು:

1. ಡೀನ್‌ರು, ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ ನಿಕಾಯ, ಗು.ವಿ.ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
2. ಕುಲಸಚಿವರು, (ಮೌಲ್ಯಮಾಪನ) ಗುಲಬರ್ಗಾ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
3. ನಿರ್ದೇಶಕರು, ಪಿಎಂಇಬಿ, ಗು.ವಿ. ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿಗಾಗಿ.
4. ವಿಶೇಷಾಧಿಕಾರಿಗಳು, ವಿದ್ಯಾಮಂಡಲ ವಿಭಾಗ, ಗುವಿಕ ರವರ ಮಾಹಿತಿಗಾಗಿ.
5. ಮುಖ್ಯಸ್ಥರು, ಗಣಕಕೇಂದ್ರ ಗು.ವಿ.ಕಲಬುರಗಿ ರವರ ಮಾಹಿತಿ ಹಾಗೂ ವೆಬ್‌ಸೈಟ್‌ನಲ್ಲಿ ಪ್ರಕಟಿಸಲು ತಿಳಿಸಿದೆ.
6. ಕುಲಪತಿಗಳ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿ/ಕುಲಸಚಿವರ ಆಪ್ತ ಸಹಾಯಕರು ಗು.ವಿ. ಕಲಬುರಗಿ ಮಾಹಿತಿಗಾಗಿ



GULBARGA UNIVERSITY
DEPARTMENT OF MICROBIOLOGY
M.Sc. DEGREE (SEMESTER) COURSE UNDER CBCS SCHEME
SCHEME OF TEACHING AND EXAMINATION
 (Effective from the academic year 2020-21 and onwards)

PAPER	Teaching	Examination	Marks	IA	Credits
	Hours/week	Hours			
I SEMESTER:					
1.1 HC Fundamentals of Microbiology	4	3	80	20	4
1.2 HC Biochemistry and Microbial Enzymology	4	3	80	20	4
1.3 HC Bacteriology	4	3	80	20	4
1.4 SC Virology and Mycology	4	3	80	20	4
1.5 Practical Based on paper 1.1	4	3	40	10	2
1.6 Practical Based on paper 1.2	4	3	40	10	2
1.7 Practical Based on paper 1.3	4	3	40	10	2
1.8 Practical Based on paper 1.4	4	3	40	10	2
II SEMESTER:					
2.1 HC Microbial Physiology and Metabolism	4	3	80	20	4
2.2 HC Microbial Genetics and Molecular Biology	4	3	80	20	4
2.3 SC Environmental Microbiology	4	3	80	20	4
2.4 OE Microbes in Human Welfare	4	3	80	20	4
2.5 Practical Based on paper 2.1	4	3	40	10	2
2.6 Practical Based on paper 2.2	4	3	40	10	2
2.7 Practical Based on paper 2.3	4	3	40	10	2
2.8 Practical Based on paper 2.4	4	3	40	10	2
III SEMESTER:					
3.1 HC Recombinant DNA Technology	4	3	80	20	4
3.2 HC Immunology and Immunotechnology	4	3	80	20	4
3.3 SC Food and Dairy Microbiology	4	3	80	20	4
3.4 OE Microbes and Environment	4	3	80	20	4
3.5 Practical Based on paper 3.1	4	3	40	10	2
3.6 Practical Based on paper 3.2	4	3	40	10	2
3.7 Practical Based on paper 3.3	4	3	40	10	2
3.8 Practical Based on paper 3.4	4	3	40	10	2
IV SEMESTER:					
4.1 HC Fermentation Technology and Bioprocess Engineering	4	3	80	20	4
4.2 HC Medical Microbiology and Diagnostics	4	3	80	20	4
4.3 HC Project - Dissertation	4	3	90	20	4
4.4 SC Agricultural Microbiology	4	3	80	20	4
4.5 Practical Based on paper 4.1	4	3	40	10	2
4.6 Practical Based on paper 4.2	4	3	40	10	2
4.7 Project colloquium and Viva	4	3	30	10	2
4.8 Practical Based on paper 4.4	4	3	40	10	2
TOTAL MARKS (I TO IV SEMESTERS)			1920	480	96
HC – Hard core, SC – Soft core, OE – Open Elective					

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(Signature)
CHAIRMAN
 Department of Microbiology
 Gulbarga University, Kalaburagi-587101

Paper-3.1 IIC: Recombinant DNA Technology

1. Methods of studying DNA – Density gradient sedimentation, zonal centrifugation, isopycnic separation, electrophoretic separation, agarose, polyacrylamide, pulse field electrophoreses, southern blotting, northern blotting, labeling – radioactive and non-radioactive labeling. 8 h
2. DNA sequencing - direct sequencing, indirect sequencing, Maxam and Gilbert method, Sangers method, RNA sequencing. 4 h
3. Nucleic acid hybridization - Design and construction of probes, nick translation, hybridization, liquid hybridization, solid hybridization, determination of stringency conditions. Applications of nucleic acid hybridization. 6 h
4. Enzymes used in recombinant DNA technology, Restriction endonucleases – Type, I, II & III, Nucleotide kinas, reverse transcriptase, T4 DNA ligase, klenopolymerase and others, restriction mapping, RFLP and RAPD 4 h
5. Plasmid vectors - Use of natural plasmids as vectors, artificial plasmid vectors, pSC 101, pBR 322, pUC 18, Ti and Ri plasmid vectors. 6 h
6. Bacteriophage vectors – Insertion vectors, replacement vectors, cosmid vectors, phagemid vectors, shuttle vectors and M13 based vectors. BACs, YACs and HAC 4 h
7. Hosts for recombinant DNA technology: Prokaryotes Bacteriophages, *E. coli*, *B. subtilis*, *Streptomyces*, Eukaryotic – Yeasts and Fungi 4 h
8. Construction of recombinant DNA, selection of DNA fragments for cloning, chemical synthesis, gene synthesizers, ligation with RES, homopolymer tailing, blunt end ligation, linkers, monitoring restriction and ligation. 4 h
9. Genome libraries – construction and screening of genome libraries, chromosome walking, cDNA libraries. 2 h
10. Insertion of recombinant DNA – Host selection, transformation, transfection, electroporation, lipofection, Screening of recombinant, Applications of rDNA technology 8 h
11. PCR – principles, types and applications, primer design and applications. 2 h
12. DNA micro array - principle, types, construction and applications, *in vitro* approach for studding DNA- Protein interactions. 2 h

Reference Books:

1. Brown TA, Ed, Homes BD & Richwood D, 1998; Molecular Biology LABFAX, Academic Press.
2. Gerard Karp, 1999; Cell and Molecular Biology, John Wiley & Sons Inc., New York.
3. Miller G et al, 1996; An introduction to Genetic analysis, Freeman & Co., New York.
4. Watson JD et al, 1992; Recombinant DNA, Scientific American Books.
5. Desmond ST & Nicoll, 1994; An introduction to Genetic Engineering, Cambridge Uni. Press.
6. Nicholl DST, 1994, An introduction to Genetic Engineering, Cambridge Univ. Press.
7. Trapp BE & Freifelder D, 2007; Molecular Biology – Genes to proteins, Jones & Bartlet Publ. Inc. Learning.
8. David P Clark, 2005; Molecular Biology, Academic Press
9. Harvey F Lodish, 2008; Molecular Cell Biology, W.H. Freeman
10. Cornell Mechardt, 2007; Molecular Biology & Genomics, Academic press

Paper-3.3 SC: Food and Dairy Microbiology

1. Introduction: Origin, Concept, Scope and historical developments 2 h
2. Food as substrate for microorganisms: Hydrogen ion concentration (pH), Moisture requirement, Water activity, Oxidation-Reduction potential, Nutrient content, Inhibitory substances and Biological structure. 4 h
3. Food contamination: Contamination of foods from green plants, animals, sewage, soil, water, air and handling. 3 h
4. Food spoilage: General principles of food spoilage, Causes of food spoilage, Factors affecting kind and number of microorganism, Chemical changes caused by microorganisms, Spoilage of Meat and Meat products, Egg and Egg products, Fish and Marine products, Cereal and Cereal products, Fruits and Vegetables. 7 h
5. Food Preservation: General principles, Physical methods of food preservation (High temperature, Low temperature and Drying), Chemical methods of food preservation (Food additives) and Biological methods of food preservation. 8 h
6. Food borne diseases and their control: Food Infection and Intoxication, Detection of food borne pathogens and their toxins by various methods. 5 h
7. Fermented foods (Bread, Sauerkraut and temphe), Probiotics and Prebiotics, Concept and importance of Nutraceuticals and Nutraceutical products. 4 h
8. Milk: Definition, Composition, Nutritive value and Properties, Microbiology of milk, Testing of milk quality. 3 h
9. Contamination, spoilage and preservation of milk and milk products. 3 h
10. Fermented milk products: Production, Quality control and Significance of Cheese, Yogurt, Shrikhand and Acidophilus milk. 3 h
11. Food sanitation and food safety: Concept, Importance and Safety laws, GMP and LP. 3 h
12. Quality control and food standards: Bureau of Indian Standard (BIS), PFAA, FPO, MPO, CSO, Agmark Standards, International standards - HACCP, ISO 9000 Series, Food testing laboratories. 5 h

Reference Books:

1. Doyte MP, Loory RB & Thomas JM: Food Microbiology, ASM Pres. Washington DC.
2. Jay JM. Modern; Food Microbiology, Chapman & Hall, New York.
3. Joshi VK & Pandey Ashok: Biotechnology of Food Fermentation, Asia tech Publ, Delhi, India.
4. Frazier WC & Westhof DC: Food Microbiology, 3rd Ed., Tata McGraw Hill.
5. Doyle PM et al: Food Microbiology – Fundamentals & Frontiers, 2nd Ed., ASM Press.
6. Danwart GJ; Basic Food Microbiology, CBS Publ, Delhi.
7. Pitt J & Hocking, (1985); Fungi & Food spoilage, Academic Press.
8. Sandeep Sareeen: Food Preservation, Sarops & Soni, New Delhi.
9. Ananthakrishnan CP, Et al. (1994); Dairy Microbiology, Sreelakshmi Publ, Chennai.
10. Rabinson RK, (1990); Dairy Microbiology, Elsevier Applied Science, London.

Paper-3.4 OE: Microbes and Environment

1. Concept of environment: Atmosphere, lithosphere, hydrosphere and biosphere; Ecological niche - ecosystems, organization of ecosystems, food and energy triangles, position of microorganisms in the ecological niche. 4 h
2. Origin and evolution of microorganisms: Origin and early evolution of microorganisms, relationship with the early stages of life on the earth, microbes as models for understanding how evolution works and the origin of all life on earth. 4 h
3. Biodiversity of microorganisms: Richness and expanding microbial world, distribution of microorganisms in various environments, tools used for studying *in situ* and *ex situ* microbial diversity, culturable and non-culturable bacteria. 2 h
4. Cosmopolitan nature of microorganisms: Exobiology -- does life exist elsewhere in the universe? X- files, news stories of 1996 -- evidence for microbial life on Mars, debate, exploration for extraterrestrial life based on microbial life. 4 h
5. Microbial Ecology: Use of microorganisms as clues to study complex ecosystems; Natural resources -- renewable and non-renewable, microorganisms as renewable resources; Microbial community within a human being - humans are microbes' invention to move around. 4 h
6. Microbial interactions: Mutualism, synergism, commensalism, competition, amensalism, parasitism, predation. Microbe-Plant interaction: Symbiotic and non-symbiotic interactions. 5 h
7. Biodegradation and bioremediation: Principles and degradation of common pesticides, organic (hydrocarbon, oil spills), industrial wastes, biomagnifications and bio-augmentation. 6 h
8. Microbial mining: Microbial leaching of metallic ores, microbial recovery of precious elements - Copper, Iron and Gold. 4 h
9. Biofuel and Bioenergy: Crisis of dwindling fuel resources, microbial ethanol and bio-diesel production; commercial production from lignocellulosic waste and algal biomass. Methane and hydrogen production using microbial culture. 4 h
10. Composting and soil fertility: Yard composting, municipal composting, role of microorganisms in solid waste management. 4 h
11. Water pollution: Microorganisms as indicators of water pollution - waste water treatment methods, role of microorganisms. 5 h
12. Green house gases, Green house effect, Climate change, Global warming, role of microorganisms in El Nino effect, role of microorganisms in Global warming and Gaia 4 h

Reference Books:

1. Steinhaus. 1963. Insect Pathology. Vol I & II. Academic Press, New York.
2. Burges H D. 1970-1980. Microbial Control of Pests and Plant Diseases.
3. Plant pathology. By George Agrios; Academic Press, New York.
4. Microbial Ecology: Fundamentals and Applications by Rinald Atlas and Richard Bartha; Benjamin/Cummings Science Publis., 2725 Sand Hill Road, Menlo Park, California 94025.
5. Plant pathology. By George Agrios; Academic Press, New York.
6. Criston J. Hurst. Manual of Environmental Microbiology, ASM Publ., New York.
7. Felcher, M. & Grey TRG. 1987, Ecology of Microbial Communities, Cambridge Univ. Press.
8. Rose R.D. Air Pollution & Industry. Reinhold Co., New York.
9. Metcalf and Eddy. 1991. Waste Water Engineering. McGraw Hill Int. Publ.
10. APHA, 1994, Standard Methods, 17th Ed., American Public Health Association