



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

Accredited with 'A' grade by NAAC
Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai - 600 119.
www.sathyabama.ac.in



DEPARTMENT OF BIOMEDICAL ENGINEERING

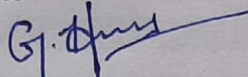
BOARD OF STUDIES – 2019 - 2020 (ODD Semester) Minutes of the Meeting

03-06-2019

1. SBT1101 Cell and Molecular Biology & SBT – Genetics has been merged as SBMA1101 – Cell Biology & Genetics depending upon the faculty expertise and infrastructure availability.

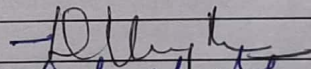
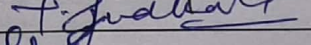
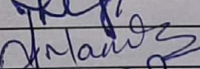
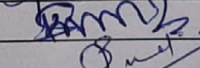
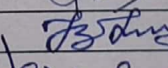
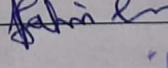

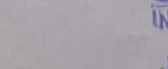
Members of Board of studies – Biomedical Engineering

EXTERNAL MEMBERS

Dr. G. Harikrishnan, 

Associate Professor & Research Coordinator,
Department of Electrical & Electronics Engg.,
Sree Vidyanikethan Engg. College, Tirupati

INTERNAL MEMBERS

S.No.	Name of the Internal Member	Signature
1	Dr. Daniel Alex Anand	
2	Dr. T. Sudhakar	
2	Dr. J. Premkumar	
3	Dr. Anima Nanda	
4	Dr. S. Krishnakumar	
5	Ms. Sindu Divakaran	
6	Ms. Bethanne Janney	
7.	Ms. A. Sabarivani	

HEAD OF THE DEPARTMENT
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HOD/BIO MEDICAL
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SBMA1101	CELL BIOLOGY AND GENETICS	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

- To introduce extensive knowledge in cell structure, functions, cell signaling pathways and transfer across membranes in cells.
- To learn about the transmission, distribution, arrangement, and alteration of genetic information and how it functions and is maintained in populations.

UNIT 1 CELL STRUCTURE AND TRANSPORT ACROSS CELL MEMBRANE 9 Hrs

Structure and functions of Eukaryotic cell, Membrane models and Permeases, Passive and active transports Sodium -potassium pumps, co- transport, symport, antiport, Endocytosis and Exocytosis

UNIT 2 CELL RECEPTORS AND CELL SIGNALING 9 Hrs

Membrane bound receptors, Cytosolic and Nuclear receptors, autocrine, paracrine and endocrine signaling, signal amplification, CAMP and G-protein role in signal transduction

UNIT 3 CELL DIVISION AND ROLE OF CHROMOSOMES 9 Hrs

Cell division-Mitosis & Meiosis, Structural organization of chromosome, variation in the number and structure of chromosome. Haploids, Euploid and aneuploid; Deletion, Duplication, Translocation

UNIT 4 GENETIC MATERIAL AND MUTATION 9 Hrs

Linkage and crossing over, DNA and RNA as genetic material; Mutations - types and causes of mutation, DNA repair Mechanisms. Physiochemical properties of DNA: Denaturation, Annealing and C-value paradox

UNIT 5 HUMAN GENETICS 9 Hrs

Human Chromosomes, Chromosomal abnormalities - sex chromosomal and autosomal. Inherited disorders Genetic engineering, gene therapy, inborn errors of metabolism and Genetic counseling

Course outcomes:

Max. 45 Hours.

On completion of the course students will be able to:

- CO1: Understanding the principles of cell structure and transport across the cell membrane. L2
 CO2: Demonstrate the role of various cell receptors and the signaling between the cells L4
 CO3: Learning the process of cell division and recognize the importance of chromosome L1
 CO4: To identify the genetic material and demonstrate the types of mutation and their importance L3
 CO5: Understanding the procedure of genetic engineering and gene therapy. L1
 CO6: Outline the problem encountered due to chromosomal abnormality and counseling to the society.

TEXT / REFERENCE BOOKS

- Principles of Molecular Biology: : Veer Bala Rastogi, : 2016
- Genetics: By: Veer Bala Rastogi, S. Chand publication: 4th Edition 2018
- Molecular Biology of Genes - Watson, 7th Edition, Benjamin Cummings, 2013
- Ajoy Paul, A text Book of Cell and Molecular Biology, Books and Allied Publishers 2007.
- David Friefelder, Molecular Genetics, Narosa publishing house, India, 2006.
- Kavita B Ahluwalia, Genetics, New age international publishers, India. 2008



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DEPARTMENT OF BIOMEDICAL ENGINEERING

BOARD OF STUDIES – 2019 - 2020 (EVEN Semester)

Minutes of the Meeting

04-11-2019

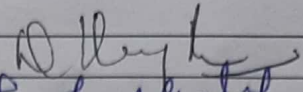
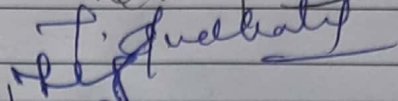
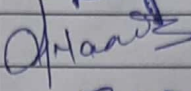
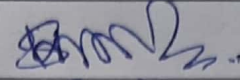
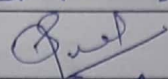
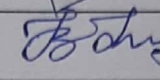
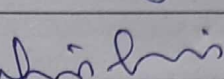
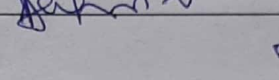
1. Board of Members has suggested revising the SBM1206 Microbiology has been changed as SBMA1201 Microbiology & Pathology due to redundancy with the Microbiology & pathology course. In view of this board has suggested some changes which were incorporated. The new syllabus of SBMA1201 Microbiology & Pathology is prepared as provided in Appendix I.
2. Industry 4.0 PG has been introduced
3. Students should be encouraged to focus on the self learning and problem solving. They should be encouraged to ask questions in the class.
4. Assignments should be designed properly so as to benefit the students. Give unsolved problems in the assignments.
5. The basic subject syllabi be carefully reviewed to be consistent with Gate syllabi, and semester exams should reflect the important concepts emphasized in Gate

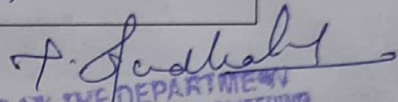
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Chennai 600 077

SBMA1201	MICROBIOLOGY AND PATHOLOGY	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVE

- To enable students to learn about the principles of Microbiology to emphasize structure and biochemical aspects of various microorganisms.
- To know the control and preventive measures of pathophysiology of various disorders

UNIT 1 INTRODUCTION TO MICROBIOLOGY AND MICROBIAL GROWTH 9Hrs
 History, overview and scope of microbiology, contributions of Leeuwenhoek, Louis Pasteur, Robert Koch, Edward Jenner, and Fleming. Structure of bacteria, (nucleoid, plasmid, ribosomes, cell wall, flagella), morphology, reproduction of bacteria and fungi (sexual and asexual reproduction). Microbial growth types of media, growth curve, pure culture and culture techniques (Pour plate, Spread plate, and Streak plate). Enumeration of microorganisms, preservation of pure culture.

UNIT 2 STAINING TECHNIQUES AND MICROSCOPY 9Hrs
 Microscope definition, classification- bright field microscope, dark field microscope, phase contrast microscope, fluorescent microscope, electron microscope- Transmission electron microscope, scanning electron microscope. Sterilization and disinfection methods, Staining techniques, simple staining, gram's staining, acid fast staining, capsule and spore staining.

UNIT 3 INFLAMMATION AND NEOPLASIA 9Hrs
 Introduction to pathology, Necrosis, inflammation, acute and chronic inflammation, apoptosis, neoplasia, classification, difference between benign and malignant, tumor spread of tumors and etiology of tumors.

UNIT 4 FLUID AND HEMODYNAMIC DEARRANGEMENT 9Hrs
 Edema, shock, hemorrhage, thrombus, embolism, disseminated intravascular coagulation, hematological disorder, bleeding disorder, leukemia and lymphoma.

UNIT 5 INFECTIOUS DISEASES AND IMMUNE DISORDER 9Hrs
 Bacteria, fungi and virus as potential pathogens, mechanism of pathogenicity mechanism of development of microbial resistance (Staphylococcus, Salmonella, Candidiasis, Filariasis, Influenza). Immune deficiency syndrome, Respiratory disorder, cystic fibrosis, tuberculosis, Neuropsychiatric disorder Parkinson's disease, Alzheimer's disease, skin disorder, eczema, psoriasis, molecular basis of diabetes.

Max. 45 Hours

Course outcomes

On completion of the course, student will be able to

- CO1: Understands the scope of microbiology, structure of microbes and their microbial growth.
- CO2: Demonstrates the morphology of microbes using various microscopes and staining techniques.
- CO3: Describes the basic elements in cell injury, inflammation and neoplasia.
- CO4: Explore the various pathological disorders and their clinical manifestations.
- CO5: Learning the process of infectious diseases and their immune disorders in day today life.
- CO6: Outline the problem encountered due to infectious microbes and their pathogenesis and clinical symptoms.

TEXT / REFERENCE BOOKS

- Pelczar, Jr E.C.S Chan and Noel R.Krieg, Microbiology, 5th edition Tata McGrawHill -2006
- Joanne M. Willey, Linda Sherwood, Christopher J. Woolverton, Prescott's Microbiology, 8th Edition, McGraw-Hill Higher Education, 2008
- Jawetz, Melnick and Adelberg's Medical Microbiology . McGraw-Hill Medical, 2007
- University of South Carolina School of Medicine (<http://pathmicro.med.sc.edu/book/bact-sta.htm>)

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

PART A: 10 questions of 2 marks each - No choice

PART B: 2 questions from each unit of internal choice; each carrying 16 marks

20 Marks

80 Marks

Exam Duration : 3 Hrs.

SCCA9501	INDUSTRY 4.0	L	T	P	Credits	Total Marks
		2	*	2	2	100

UNIT 1 TRANSFORMING TECHNOLOGIES IN BIOENGINEERING

7 Hrs.

Establishment of smart biotechnology factory, Artificial intelligence in Bioprocess technology, Omics – Big data analysis through automation, 3D bio printing for tissue engineering. Simulation tools, RSM and Box model. Cyber physical system based telemedicine, diagnosis and therapeutics through real time biosensors. Bionanotechnology. Intellectual Property rights (IPR): Case Studies.

UNIT 2 ADVANCEMENTS IN SUSTAINABLE BUILT ENVIRONMENT

7 Hrs.

Introduction – Technological developments in Architectural, Engineering and Construction (AEC) - Building Information Modelling (BIM) using Cloud computing technology and Internet of things (IoT) – Unmanned Aerial Vehicles, sensors – Additive manufacturing in construction – Concrete 3D printing - Materials used - Lightweight and functionally graded structures - Net Zero Energy buildings, Bioswales, Biofiltration pond, Ecosan systems- Recent developments in Waste water Management, Air pollution control, waste disposal - Integration of energy, water and environmental systems for a sustainable development- Emerging Technologies: Robot Highway- Vertical farming - Intellectual Property rights: Case studies

UNIT 3 SMART MANUFACTURING

8 Hrs.

Smart factories and interconnection, Smart Manufacturing – automation systems, Additive Manufacturing, Smart grids, Micro Electro Mechanical Systems (MEMS), Stealth technology, Metal Finishing, Self propelled vehicles, e mobility, Green fuels, drones – unmanned aerial vehicles(UAVs), aerodynamics. Robotic Automation and Collaborative Robots – Augmented reality and haptics, engineering cybernetics and artificial intelligence (AI), Disruptive Technologies – Frugal Innovations – Emerging Technologies- Autonomous Robots, Swam Robot, Modular Robotics, Space craft, Intellectual Property Rights (IPR): Case Studies.

UNIT 4 SMART WORLD

8 Hrs.

Smart Sensors and IIOT, Smart grid, Hybrid renewable energy systems, Electronics in Smart city, Integration of Sensors in Robots and Artificial Intelligence, 5G Technology, Communication protocols, Human-Machine Interaction, Virtual Reality, Quantum Computing: Changing trends in transistor technology: Processor, Emerging Trends: Deep Space, Swarm Robots, Cyborg, Geofencing, Pervasive Computing, Intellectual Property Rights- Case Studies.

UNIT 5 CYBER PHYSICAL SYSTEMS

8 Hrs.

Introduction to Cyber Physical Systems (CPS), Architecture of CPS, Data science and technology for CPS, Prototypes of CPS, Emerging applications in CPS including social space, crowd sourcing, healthcare and human computer interactions, Industrial Artificial Intelligence, Deep Learning, Gamification, Networking systems for CPS applications, Wearable cyber physical systems and applications, Domain applications of CPS: Agriculture, Infrastructure, Disaster management, Energy, Transportation, Intellectual Property Rights (IPR) : Case Studies.

Max. 45 Hrs.

TEXT / REFERENCE BOOKS

1. William D. Callister, "Materials Science and Engineering, An Introduction, John Wiley and Sons Inc. Singapore, 2001.
2. V. Raghavan, "Physical Metallurgy: Principle and Practice, Prentice Hall India Pvt. Ltd, 2006.
3. Flavio Craveiro, Jose Pinto Duarte, Helena Bartolo and Paulo Jorge Bartolo, "Additive manufacturing as an enabling technology for digital construction: A perspective on Construction 4.0", Automation in Construction, Vol. 103, pp. 251-267, 2019.
3. Klaus Schwab, "Fourth Industrial Revolution", Random House USA Inc, New York, USA, 2017.
4. Oliver Grunow, "SMART FACTORY AND INDUSTRY 4.0. The current state of Application Technologies", Study lab Publications, 2016.
5. Alasdair Gilchrist, "INDUSTRY 4.0: Industrial Internet of Things", Apress, 2016.
6. Sang C. Suh, U. John Tanik, John N Carbone, Abdullah Eroglu, "Applied Cyber-Physical Systems", Springer Publications, New York, 2013.