SCHOOL OF SCIENCES

DEPARTMENT OF BIOTECHNOLOGY & MICROBIOLOGY

Department of Life Science

School of Sciences

Attendance Sheet of the Board of Studies held on 02nd June 2021

Department of Life Science has organized an online BOS meeting on 02 June 2021. Following members were present in the meeting.

S.No	Name of Member	Designation	Address	Signature
1.	Prof. Richa Kothari	Chairperson (Dean School of Sciences, ITMU)	ITM University, Gwalior	
2	Dr. Sonia Johri	Dean Academics	ITM University, Gwalior	
3	Prof. A.K. Bhatnagar	External Expert Prof (Retd.)	Department of Botany University of Delhi Delhi- 110007	
4	Dr. Rita Sharma	Course Coordinator Biotechnology	ITM University, Gwalior	
5	Dr. Sujeet Kumar Mrityunjay	Course Coordinator Microbiology	ITM University, Gwalior	
6	Dr. Santosh Kumar	Exam Superintendent (SOS)	ITM University, Gwalior	
7	Dr. Moti Lal	Member (BOS)	ITM University, Gwalior	
8	Mrs. Trapti Pathak	Member (BOS)	ITM University, Gwalior	
9	Mrs Varsha Chauhan	Member (BOS)	ITM University, Gwalior	

Dean

Prof. Richa Kothari
Professor & Dean
School of Sciences
ITM University, Gwalior (M.P.)

Copy to:
1. Hon'ble Vice Chancellor
2. Registrar
3. Dean Academics For kind information
4. Concern Membe

Department of Life Science
Minutes of the Board of Studies held on
02nd June 2021

The chairman and coordinator welcomed the members of the board and outlined the changes to be made with the approval of the board as given here under.

1. Minutes of previous Board of studies were reviewed.

2. New courses have been approved

   ✓ BSBT/MB 406 A: Bioethics and Biosafety in B.Sc Biotechnology & Microbiology 4th sem.
   ✓ BSBT/MB 406 B: Molecular Diagnostics in B.Sc Biotechnology & Microbiology 4th sem.
   ✓ BSBT/MB 606 A: Nanobiotechnology in B.Sc Biotechnology & Microbiology 6th sem.
   ✓ BT/MB 205: Computer aided drug designing in M.Sc Biotechnology & Microbiology 2nd sem
   ✓ BT/MB 305: Stem cell Biology in M.Sc Biotechnology & Microbiology 3rd sem

3. It is decided to incorporate necessary changes in the syllabi of following programmes for AY 2021-22.

S.No.	Programme	Sem.	Branch	Subject Code	Sub. Name
1	B.Sc.	I, II, III, IV, V, VI,	Biotechnology	BSBT 106, BSBT 206 BSBT 302 BSBT3063 BSBT 401 BSBT 503 BSBT 6062	Plant diversity, plant physiology, Plant tissue culture, Genetic engineering, Entrepreneurship development, Climate Change & Remedial Technologies, Genomics & Proteomics
2	B.Sc.	I, II, III, IV, V, VI,	Microbiology	BSMB 103 BSMB 106, BSMB 206 BSMB 302 BSMB3063	General Microbiology Plant diversity, plant physiology, Plant tissue culture, Genetic engineering, Entrepreneurship development, Climate Change & Remedial Technologies, Genomics & Proteomics

				BSMB 401	
				BSMB 503	
				BSMB 6062	
3	M.Sc	I, III	Biotechnology	BT 103, BT 301, BT 3051	Cell biology, genetic engineering, Frontiers in Biotechnology
4	M.Sc	I, III	Microbiology	MB 103, MB 3051	Cell biology, Frontiers in Biotechnology

Suggested changes are:

➢ Some new topics are included in the syllabi and few topics are removed.

➢ Open elective papers have been added as per the Choice based credit system.

Changes incorporated in to syllabus

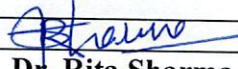| Programme & Branch	Subject Code	Sub. Name	Changes as Per Advice
B.Sc. Biotechnology/ Microbiology	BSBT/MB 106,	Plant Diversity,	Remove DNA Barcode, Add Distribution and features gymnosperm in India, Remove the binomial classification and add International Code of nomenclature plant and fungi
	BSBT/MB 206	Plant Physiology,	Add plant growth hormones Add plant phloem to unit 5
	BSBTMB 302	Plant Tissue Culture,	Add Soma clonal variation
	BSBT 502	Environmental Biotechnology	Environmental Protection Law Biodiversity Act Kyoto Protocol
	BSBT/MB 4063	Bioethics and Biosafety	Cartagena Protocol for biosafety
	BSBTMB 3063	Entrepreneurship Development,	Resource Mobilization and Management
	BSBT/MB 503	Genomics & Proteomics	DNA Barcode added
M.Sc. Biotechnology	BT 301,	Genetic Engineering	Advances and disadvantages of herbicide resistant plant
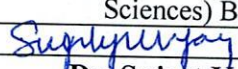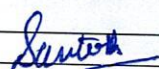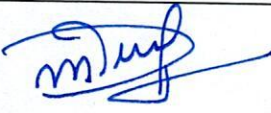
	BT 3051	Frontiers in Biotechnology	Gene drive	
M.Sc. Microbiology	MB 3051	Frontiers in Biotechnology	Gene drive	
	MB301	Bacteriology, mycology and virology	Future Aspects of viruses	

4. It is resolved to follow the revised curriculum and syllabi of B. Sc & M. Sc.

5. Biotechnology/microbiology for following programmes AY 2021-22.

6. Annexure 1: Syllabus of new courses has been attached.

Board of studies recommended the above resolutions to be presented in the Academic Council for further approval.

*As per the University Norms changes can be made accordingly.
Read and confirmed.

Prof. A.K. Bhatnagar External Expert BOS	**Dr. Richa Kothari** Chairperson (Dean School of Sciences) BOS	**Dr. Sonia Johri** Dean Academics
Dr. Rita Sharma Course Coordinator Biotechnology	**Dr. Sujeet Kumar Mrityunjay** Course Coordinator Microbiology	**Dr. Santosh Kumar** Exam Superintendent
Dr. Moti Lal Member (BOS)	**Mrs Varsha Chauhan** Member (BOS)	**Mrs. Trapti Pathak** Member (BOS)

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CELEBRATING DREAMS
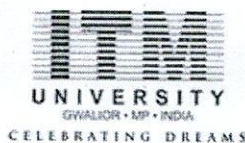
Syllabus-2021-2022

(SOS)(Bsc_Microbiology)

Title of the Course	Bioethics and Biosafety
Course Code	BSMB 406 (T)

Part A

Year		Semester		Credits	L	T	P	C
					2	0	0	2
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s	scientific communication approaches for Bioethics and Biosafety		Co-Requisite/s		concept of containment level and Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP).			
Course Outcomes & Bloom's Level	CO1- To remember the basic concepts and view of professional and scientific communication approaches for Bioethics and Biosafety **(BL1-Remember)** CO2- To understand the Introduction to science, technology and society, issues of access- Case studies/experiences from developing and developed countries. Ownership, monopoly and an environmental sustainability, public vs. private funding, biotechnology in international relations, globalization and development and their analysis.**(BL2-Understand)** CO3- To describe comprehensive understanding of Challenges for the Indian Biotechnological research and industries Bioethics – Necessity of Bioethics, different paradigms of Bioethics – National & International.**(BL3-Apply)** CO4- To provide Theoretical basis,and to enable students to analyze the basic concepts of the concept of containment level and Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP). Cartagena Protocol for biosafety **(BL4-Analyze)** CO5- To apply Appraise the current regulatory, quality control, and legal frameworksthat impact biotechnology and ethical behaviors that foster positive and productive interactions in diverse bioterrorism and convention on biological weapons. Social and ethical implications of biological weapons settings **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✓ Environment ✗	SDG (Goals)	SDG4(Quality education)					

Part B

Modules	Contents	Pedagogy	Hours
1	Biotechnology And Society: Introduction to science, technology and society, issues of access-Case studies/experiences from developing and developed countries. Ownership, monopoly, traditional knowledge, biodiversity, benefit sharing, environmental sustainability, public vs. private funding, biotechnology in international relations, globalization, and development divide.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	6
2	Public acceptance issues for biotechnology: Biotechnology and hunger: Challenges for the Indian Biotechnological research and industries Bioethics – Necessity of Bioethics, different paradigms of Bioethics – National & International. Ethical issues against the molecular technologies	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
3	Biosafety– Introduction to biosafety and health hazards concerning biotechnology. Introduction to the concept of containment level and Good Laboratory Practices (GLP) and Good Manufacturing Practices (GMP). Cartagena Protocol for biosafety	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	6
4	Biosafety assessment procedures in India and abroad. International dimensions in biosafety, bioterrorism, and convention on biological weapons. Social and ethical implications of biological weapons.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	6
5	Principles of bioethics: Legality, morality and ethics, autonomy, human rights, beneficence, privacy, justice, equity etc. The expanding scope of ethics from biomedical practice to biotechnology, bioethics vs. business ethics	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0	0	0	0	0	0

Part E

Books	Thomas J.A.-Biotechnology and Safety Assessment Thomas J.A., Fuch R.L Academic Press 3rd Edition 2002-ASM Press 3rd. ed. 2000
Articles	https://www.ndcebios.in/v1n1/2021010110.pdf https://www.researchgate.net/publication/353346609_ON_BIOETHICS_AND_BUSINESS_ETHICS
References Books	Fleming D.A., Hunt D.-Biological safety Principles and practices-ASM Press 3rd. ed. 2000
MOOC Courses	https://nptel.ac.in/courses/109106092
Videos	https://nptel.ac.in/courses/109106092

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO
CO1	3	2	3	3	1	3	3	3	1	2	3	1	3	2	3
CO2	1	1	2	3	1	3	3	3	2	1	3	2	1	1	2
CO3	3	3	2	1	3	3	3	2	1	1	3	2	2	3	2
CO4	3	3	3	3	2	2	3	3	1	1	3	2	3	3	2
CO5	3	3	2	2	1	3	3	3	1	1	3	2	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2021-2022

(SOS)(Bsc_Microbiology)

Title of the Course	Molecular Diagnostics
Course Code	BSMB 406 (T)

Part A

Year	Semester		Credits	L	T	P	C
				3	0	0	3

Course Type	Embedded theory and lab	
Course Category	Discipline Specific Elective	
Pre-Requisite/s	Student must be aware of basic immulogy and immunological assays.	Co-Requisite/s
Course Outcomes & Bloom's Level	CO1- understanding of the basic principles and clinical significance of laboratory testing in the field of molecular diagnostics.(BL1-Remember) CO2- Demonstrate an understanding of basic molecular diagnostic techniques(BL2-Understand) CO3- Demonstrate an understanding of electrophoresis in the separation of DNA fragments() CO4- Apply molecular diagnostic techniques to the identification and diagnosis of diseases(BL3-Apply) CO5- Understand the basics in quality control and quality assurance(BL2-Understand)	

Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✓ Environment ✗	SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth)

Part B

Modules	Contents	Pedagogy	Hours
I	Enzyme Immunoassays: Comparison of enzymes available for enzyme immunoassays, conjugation of enzymes. Solid phases used in enzyme immunoassays. Homogeneous and heterogeneous enzyme immunoassays.Enzyme immunoassays after immuno blotting.	lecture method,Demonstrations, experiments, ABL, PBL , case studies	6
II	Enzyme immuno histochemical techniques: Use of polyclonal or monoclonal antibodies in enzymes immuno assays. Applications of enzyme immunoassays in diagnostic microbiology; Molecular methods in clinical microbiology: Applications of PCR, RFLP, Nuclear hybridization methods, Single nucleotide polymorphism and plasmid finger printing in clinical microbiology	lecture method,Demonstrations, experiments, ABL, PBL , case studies	7
III	Laboratory tests in chemotherapy: Susceptibility tests: Micro-dilution and macro-dilution broth procedures. Susceptibility tests: Diffusion test procedures. Susceptibility tests: Tests for bactericidal activity. Automated procedures for antimicrobial susceptibility tests.	lecture method,Demonstrations, experiments, ABL, PBL , case studies	8
IV	Automation and rapid diagnostic approach: Automation in microbial diagnosis, rapid diagnostic approach including technical purification and standardization of antigen and specific antibodies.	lecture method,Demonstrations, experiments, ABL, PBL , case studies	8
V	Idiotypes and immunodiagnostic: Concepts and methods in idiotypes.Immunodiagnostic tests- Immuno florescence. Radioimmunoassay. Diagnostic tools: HPLC, Electron microscopy, flow cytometry and cell sorting.	lecture method,Demonstrations, experiments, ABL, PBL , case studies	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	To isolate genomic DNA from the animal sample	Experiments	BL3-Apply	6
II	To anlayse immunological activity using various assays	PBL	BL3-Apply	7
III	To perform ELISA test	PBL	BL5-Evaluate	6
IV	To preform radial immunodiffsion	Experiments	BL3-Apply	5
V	To analyse the AIDS patients through immunological assays and moelcular markers	Case Study	BL5-Evaluate	1 week
VI	Detection and identification of microorganisms using molecular techniques	PBL	BL3-Apply	1 week

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	60	18	40	

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	60	30	40	

Part E

Books	Williams, Bethany Jill, Chloe Knowles, and Darren Treanor. "Maintaining quality diagnosis with digital pathology: a practical guide to ISO 15189 accreditation." Journal of clinical pathology 72.10 (2019): 663-668. Modern Approaches to Quality Control. Croatia, IntechOpen, 2011.
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1214554/
References Books	Moumtzoglou, Anastasius, ed. Laboratory Management Information Systems: Current Requirements and Future Perspectives: Current Requirements and Future Perspectives. IGI Global, 2014. Burnett, David. A Practical Guide to ISO 15189 in Laboratory Medicine. United Kingdom, ACB Venture Publications, 2013.
MOOC Courses	https://nptel.ac.in/courses/127105391
Videos	https://nptel.ac.in/courses/127105391

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO
CO1	2	3	1	1	-	1	-	-	-	-	-	-	3	3	1
CO2	1	3	2	2	1	3	-	-	-	-	-	-	2	2	1
CO3	1	1	2	-	1	3	-	-	-	-	-	-	2	2	1
CO4	2	1	2	1	3	1	-	-	-	-	-	-	2	1	3
CO5	1	1	-	1	1	1	-	-	-	-	-	-	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2021-2022

(SOS)(Bsc_Microbiology)

Title of the Course	Basics of Forensic Science
Course Code	BSMB 406 (T)

Part A

Year		Semester		Credits	L	T	P	C
					2	0	0	2

Course Type	Theory only
Course Category	Discipline Electives

Pre-Requisite/s	Basic knowledge of science and tools in biology	Co-Requisite/s	

Course Outcomes & Bloom's Level	CO1- To remember the structure of various branches, tools and techniques and causes of crime in forensic science. **(BL1-Remember)** CO2- To comprehend the human genetics, mutation and DNA typing techniques.**(BL2-Understand)** CO3- To understand the importance of various chromatographic methods and their role in forensic science.**(BL2-Understand)** CO4- To provide experimental basis, of detection and identification of blood and other seminal fluids.**(BL3-Apply)** CO5- To evaluate various techniques of electrophoresis in the field of forensic science**(BL5-Evaluate)**

Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	SDG (Goals)	SDG4(Quality education)

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction and principles of forensic science, forensic science laboratory and its organization and service, tools and techniques in forensic science, branches of forensic science, causes of crime, role of modus operandi in criminal investigation.	ATutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	4
2	Introduction, History of DNA Typing, Human Genetics- Heredity, Alleles, Mutations and Population Genetics, Molecular Biology of DNA, Variations, Polymorphism, DNA Typing Systems- RFLP Analysis, PCR Amplifications, Sequence Polymorphism, Forensic Significance of DNA Profiling	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	5
3	History, Introduction, Definition, Principles of Chromatographic Techniques, Classification of Chromatographic Methods, Adsorption and Partition Chromatography, Application of different Chromatographic Methods in Forensic Science	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	4
4	Detection and identification of blood stains. Determination of blood group systems and species of origin. Techniques for the determination of blood group and stains. Detection of seminal and other body fluids, Red cells enzymes, Serum proteins of forensic significance.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	5
5	Introduction, Basic Principles, Instrumentation & Forensic Applications of various Electrophoresis, Paper Electrophoresis, Cellulose Acetate Membrane Electrophoresis, Gel Electrophoresis, Agarose Gel Electrophoresis, Polyacrylamide Gel Electrophoresis, Sodium dodecyl sulphate (SDS),Two Dimensional Electrophoresis, Capillary Electrophoresis.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments,	5

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Detection and Identification of Blood Stains	Seminar	BL3-Apply	2

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0	0	0	0	0	0

Part E

Books	S.H. James and J.J. Nord by, Forensic Science: An Introduction to Scientific and Investigative Techniques, Forensic Science: 2nd Edition, CRC Press, Boca Raton
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7838326/
References Books	Molecular Biotechnology☐Principles and Applications of recombinant DNA. ASM Press, Washington. Molecular Biotechnology☐Principles and Applications of recombinant DNA. 2 Edition ASM Press, Washington. B.B. Nanda and R.K. Tiwari, Forensic Science in India: A Vision for the Twenty First Century, Select Publishers, New Delhi (2001). Forensic Science in India: A Vision for the Twenty First Century, Publishers, New Delhi (2001). W.G. Eckert and R.K. Wright Introduction to Forensic Sciences, W.G. Eckert (ED.), CRC Press, Boca Raton (1997). 2nd Edition W.J. Tilstone, M.L. Hastrup and C. Hald Fisher's Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013
MOOC Courses	https://nptel.ac.in/courses/109106408
Videos	https://nptel.ac.in/courses/109106408

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO
CO1	3	-	-	-	2	2	-	-	-	2	-	-	1	-	1
CO2	2	3	2	2	2	2	-	-	-	2	-	-	1	-	3
CO3	3	1	1	2	1	-	-	-	-	-	-	-	3	2	3
CO4	3	2	-	2	1	-	-	-	-	-	-	-	2	3	3
CO5	3	1	-	-	1	-	-	-	-	-	-	-	2	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2021-2022

(SOS)(Bsc_Microbiology)

Title of the Course	Nanobiotechnology
Course Code	BSMB 606 (T)

Part A

Year		Semester		Credits	L	T	P	C
					3	0	0	3

Course Type	Theory only
Course Category	Open Elective

Pre-Requisite/s	student should have the knowledge of biochemical molecules and there extraction , DNA RNA attachment and structures	Co-Requisite/s	nanomaterials and there synthesis and nanoparticle synthesis

Course Outcomes & Bloom's Level	**CO1-** To Remember the Basis and History of Nanobiotechnology**(BL1-Remember)** **CO2-** To understand and apply the working principles of nanostructures.**(BL2-Understand)** **CO3-** To apply the uses of nanostructures in Biological cells and its product**(BL3-Apply)** **CO4-** To identify the application of nanosystem**(BL4-Analyze)** **CO5-** To develop an biotechnological application in health, medicine & environment**(BL5-Evaluate)**

Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✓	SDG (Goals)	SDG4(Quality education)

Part B

Modules	Contents	Pedagogy	Hours
1	Development of nanobiotechnology - timelines and progress, overview. Fundamentals of Nanoscience & Nanotechnology Introduction, classifications and definition	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
2	Types of nanomaterials and their classifications (1D, 2D and 3D) Nanocrystal, Nanoparticle, Nano tubes,Quantum dot, Quantum Wire and Quantum Well	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
3	Properties & characterization of nanomaterials -Optical (UV-Vis/Fluorescence) X-ray diffraction Imaging and size (Electron microscopy, light scattering) Biosensors: different classes - molecular recognition elements, transducing elements.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
4	Applications of Nano-Materials in Biosystems Nanomaterials and Diagnostics/Drug Delivery. Biological nanoparticles production - plants and microbial. Nano materials and Toxicity Evaluation Cyto-toxicity, Geno-toxicity In vivo tests/assays etc.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
5	Nanobiotechnological applications in health and disease - infectious and chronic. Nanobiotechnological applications in Environment and food - detection and mitigation.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0	0	0	0	0	0

Part E

Books	Tuan Vo-Dinh Nanotechnology in Biology and Medicine: Methods, Devices, and Applications. 4rd Edition
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9865684/
References Books	Christof M.Niemeyer, Chad A. Mirkin,Wiley VCH. 1 Nanobiotechnology: Concepts,Applications and Perspectives (2004) 3rd Edition 2. Chad A Mirkin and Christof M. Niemeyer (Eds), Wiley VCH. Nanobiotechnology - II more concepts and applications. (2007) 4rd Edition
MOOC Courses	https://nptel.ac.in/courses/118107015
Videos	https://nptel.ac.in/courses/118107015

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSC3
CO1	1	2	-	-	1	-	-	-	-	-	-	-	2	-	3
CO2	1	2	3	2	2	2	1	-	-	-	-	-	1	2	3
CO3	1	2	3	2	-	2	1	-	-	-	-	-	2	3	3
CO4	1	2	3	3	2	1	-	-	-	-	-	-	1	3	3
CO5	1	2	-	3-	2	1	-	-	-	-	-	-	1	3	3
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2021-2022

(SOS)(MSc_Biotechnology)

Title of the Course	Computer aided drug designing
Course Code	BT 205 (T)

Part A

Year	Semester		Credits	L	T	P	C
				4	0	0	4

Course Type	Embedded theory and lab
Course Category	Discipline Specific Elective

Pre-Requisite/s	The students will be highly motivated to this branch of biotechnology and will be acquainted with the different drug design processes, strategies to design and develop some important industrial lead molecules.	Co-Requisite/s	The students should be familiar with the basics of drug design, its databases, softwares, strategies adopted for drug design as well as the different methods used for drug design
Course Outcomes & Bloom's Level	CO1- The course prepares the student to understand the basic concepts of Drug Discovery(BL1-Remember) CO2- They understand the different CADD techniques and their applications(BL2-Understand) CO3- The course provides various strategies to design and develop new drug like molecules (BL3-Apply) CO4- They becom e aware about the working with molecular modeling softwares to design new drug molecules (BL4-Analyze)		
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✓ Environment ✓	SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education)

Part B

Modules	Contents	Pedagogy	Hours
Unit-I	Introduction to Drug Discovery and Development: Stages of drug discovery and development Lead discovery and Analog Based Drug Design Rational approaches to lead discovery based on traditional medicine, Random screening, Non-random screening, serendipitous drug discovery, lead discovery based on drug metabolism, lead discovery based on clinical observation	lecture method, collaborative learning, Field visits, ABL	8
Unit-II	Quantitative Structure Activity Relationship (QSAR) SAR versus QSAR, History and development of QSAR, Types of physicochemical parameters, experimental and theoretical approaches for the determimation of physicochemical parameters such as partition coefficient. Hammet's substitution constant and Tafts steric constant , 3D QSAR approaches like COMFA and COMSIA	lecture method, collaborative learning, Field visits, ABL, softwares, PBL	8
Unit-III	Molecular Modeling and virtual screening techniques Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening, Molecular docking: Rigid docking, flexible docking, manual docking, Docking based screening. De novo drug design.	lecture method, collaborative learning, Field visits, ABL, softwares, PBL	8
Unit-IV	Informatics & Methods in drug design Introduction to Bioinformatics, Chemoinformatics, ADME databases, chemical, biochemical and pharmaceutical databases	lecture method, collaborative learning, Field visits, ABL, softwares, PBL	8
Unit-V	Molecular Modeling: Introduction to molecular mechanics and quantum mechanics.Energy Minimization methods and Conformational Analysis, global conformational minima determination.	lecture method, collaborative learning, Field visits, ABL, softwares, PBL	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Stages of drug discovery	Case Study	BL2-Understand	2
2	Analog based drug design and its applications	Case Study	BL2-Understand	2
3	Quantitative structure activity relationship (QSAR)	Case Study	BL3-Apply	2
4	Methods of drug design	Case Study	BL3-Apply	2
5	Molecular modeling approaches	Case Study	BL3-Apply	2
6	Molecular Docking	Case Study	BL3-Apply	2

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	30

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	30

Part E

Books	1. Computational and structural approaches to drug discovery, Robert M Stroud and Janet. Moore, RCS Publishers. 2. Introduction to Quantitative Drug Design by Y.C. Martin, CRC Press, Taylor & Francis group.
Articles	https://onlinecourses.niptel.ac.in
References Books	1. Drug Design by Ariens Volume 1 to 10, Academic Press, 1975, Elsevier Publishers. 2. Principles of Drug Design by Smith and Williams, CRC Press, Taylor & Francis. 3. The Organic Chemistry of the Drug Design and Drug action by Richard B. Silverman, Elsevier Publishers.
MOOC Courses	https://onlinecourses.niptel.ac.in https://nptel.ac.in/courses/102106070
Videos	https://nptel.ac.in/courses/102106070 https://onlinecourses.niptel.ac.in

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO
CO1	1	2	1	-	-	-	-	-	-	-	-	-	-	1	2
CO2	1	2	2	1	-	-	-	-	-	-	-	-	-	1	1
CO3	1	1	2	2	-	-	-	-	-	-	-	-	-	3	1
CO4	1	2	1	2	-	-	-	-	-	-	-	-	-	2	2
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2021-2022

(SOS)(MSc_Biotechnology)

Title of the Course	Stem Cell Biology
Course Code	BT 305 (T)

Part A

Year	Semester		Credits	L	T	P	C
				4	0	0	4
Course Type	Theory only						
Course Category	Discipline Electives						
Pre-Requisite/s	Knowledge about cell and its structure and function		Co-Requisite/s				
Course Outcomes & Bloom's Level	CO1- To remember the basics of stem cell structure and properties.(BL1-Remember) CO2- To understand the techniques involved in the culturing of functional stem cell.(BL2-Understand) CO3- To apply the bioengineering and development of mammalian stem cells in the laboratory(BL3-Apply) CO4- To interpret the various applications of stem cells in treating various diseases(BL4-Analyze) CO5- To Justify the industrial approach to stem cells. Ethical and Legal issues: and Guidelines in conducting human stem cell research.(BL5-Evaluate)						
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✓ Environment ✓	SDG (Goals)	SDG3(Good health and well-being) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	Basic of biology of stem cells; Unique properties of stem cells. Types & sources of stem cells: embryonic, fetal, cord blood, placenta, adult, bone marrow: hematopoietic and Mesenchymal stem cells. Organ Derived Stem cells, Cancer stem cells, Induced pluripotent stem cells, Stem cell banking	Tutorials, Collaborative, Demonstrations, Project methods	8
2	Stem cell characterizations: Bone Marrow Mesenchymal Stem Cells, Hematopoietic Stem Cells isolation & characterizations, markers & their identification. Blood cell formation from Bone marrow stem cell.	Tutorials, Collaborative, Demonstrations, Project methods Experiments,	8
3	Growth factor requirement and stem cell maintenance in in☐vitro culture. Bone marrow transplantation versus Stem cell transplantation. Stem Cells and Cloning, Molecular basis of stem cell self-renewal, pluripotency, and differentiation, Metaplasia, and trans-differentiation.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, Video lectures	8
4	Role of signal transduction pathways in self-renewal and differentiation of stem cells. Cell cycle regulators in stem cells. Therapeutic application of stem cells: Current State and Future Perspectives, Neurodegenerative diseases, Spinal cord injury, Heart disease, Diabetes, Burns and Skin ulcers, Muscular Dystrophy.	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, Video lectures	8
5	Orthopedic applications, Stem cells, and gene therapy. An industrial approach to stem cells. Ethical and Legal Issues: ICMR DBT Guidelines in conducting human stem cell research	Tutorials, Collaborative, Demonstrations, Project methods, Hands on experience, Experiments, Video lectures	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	Identification of blood cell using different staining techniques	PBL	BL5-Evaluate	3

DEPARTMENT OF FOOD TECHNOLOGY

Minutes of Meeting -Board of Studies

Dated: 03 June 2021

Meeting of **Board of Studies in Department of Food Technology, School of Sciences, ITM University Gwalior was** held online on 03 June 2021, 03:30 PM through Google meet online Meeting platform with link:meet.google.com/evg-racj-qhd
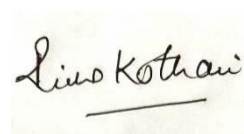
The following are the members:

S.No	Name of Faculty	Designation
1.	Dr. Richa Kothari	Chairman (Dean)
2.	Dr. Sonia Johri	Dean Academics
3.	Dr. D.N. Yadav	External Expert, Principal Scientist, Head, TOT Division, ICAR-CIPHET, Ludhiana-141004, Punjab, Ph. No- 9876530796
4.	Dr. Shailesh Kumar Singh	HOD, Department of Agriculture, Member,
5.	Dr.Hradesh Rajput	HOD, Department of Food Technology, Member,
6.	Dr. Sujeet Mritunjya	Member, Department of Microbiology
7	Dr. Santosh Kumar	Member, COE, School of Science

The agenda of the meeting was to approve scheme and syllabus of B.Sc and M.Sc Food technology according to the ICAR nomenclature for the coming semester.
Suggested changes are:-
1. No corrections in scheme and syllabus of B.Sc and M.Sc Food technology

Dr. Richa Kothari   Dr. Sonia Johri   Dr. D.N. Yadav

Dr. Shailesh Kumar Singh   Dr.Hradesh Rajput   Dr. Santosh Kumar

BSC (PCM/CS)

School of Sciences

31st May.2021

Agenda of BOS

School of sciences is going to organize a BOS meeting on 31st May. 2021 from 11.30 A.M. onwards in MG Block through on line platform (Google meet) at Turari Campus.

The agenda of the meeting is to finalize

- ☐ Finalization of the change Scheme and syllabus of in B.Sc. PCM/CS , 2021Batch

- ☐ Inclusion of CBCS & Swayam MOOC courses in the scheme.

All kindly attend the meeting and give their valuable suggestions.

List of Member for attending BOS

S.No	Name of Faculty	Designation
1	Dr. Richa Kothari	Chairman (Dean)
2	Dr. . Sonia Johri	Dean Academics
3	Dr. Joydip Dhar	Professor& Head Department of Mathematics ABVIIITM ,INDIA (Expert Maths)
4	Dr. . Mazahar Farooqui	External Expert (Chemistry) Principal, Maulana Azad College of Arts, Science & Commerce, Rauza Bagh, Aurangabad-431001 Ph.No- 9422214785
5	Dr. P. Shrivastava	Professor, ABVIIITM (Expert Physics)
6	Dr. Dinesh Singh Tomar	COE)
7	Dr. Y.C. Goswami	Member (Phy.)
8	Dr. Manish Sharma	Member (Maths)
9	Dr. Ranjana Goswami	Member(Chemistry)
10	Dr. Rupali Rastogi	Member(Chemistry)
11	Dr Uday P Gahlaut	Member(Physics)
12	Ms.Chanda Purushwani	Member

| 13 | Ms. Hema Purushwani | Member |
| 14 | Dr. Pallavi Khatri | Member |

Dean School of Sciences
Dr. Shobha Kothari ITM University
Professor & Dean INDIA-474001
School of Sciences

ITM University, Gwalior(M.P.)

Copy to:
1. Hon'ble Vice Chancellor
2. Registrar
3. Dean Academics   For kind information
4. Concern Member

School of Sciences
Attendance Sheet and Minutes of meeting of the Board of Studies held on 31st May. 2021

School of Sciences has organized an on line Board of Studies meeting on 31st May 2021, 11:30 AM through online platform

Following faculty members were present in the meetings

S.No	Name of Faculty	Signature
1	Dr. Richa Kothari	
2	Dr. Sonia Johri	
3	Dr. Joydip Dhar	
4	Dr. . Mazahar Farooqui	
5	Dr. P. Shrivastava	
6	Dr. Dinesh Singh Tomar	
7	Dr. Y.C. Goswami	

8	Dr. Manish Sharma	*Manish*
9	Dr. Ranjana Goswami	*Ranja*
10	Dr. Rupali Rastogi	*Rupali*
11	Dr Uday P Gahlaut	*Gahlaut*
12	Ms.Chanda Purushwani	*Cu*
13	Ms. Hema Purushwani	*Hu*
14	Dr. Pallavi Khatri	*Pallavi*

School of Sciences

Minutes of Meetings

The chairman and coordinator welcomed the members of the board and outlined the changes to be made with the approval of the board as given here

1. Minutes of previous Board of studies were reviewed.
2. Scheme and syllabus of the following new courses are approved

2.1 Linear Algebra (BSMA0310) introduced as a new course in B.Sc.(PCM),third semester, syllabus is attached in Annexure -1

2.2 Numerical Methods and Computer Simulation (BSMA0611) introduced as a new course in B.Sc.(PCM/CS), sixth semester, syllabus is attached in Annexure -1.

2.3 An optional paper (Statistical methods)(_BSCS0508) introduced as a new course in B.Sc.(CS), fifth semester, syllabus is attached in Annexure -1.

2. It is decided to incorporate necessary changes in the syllabi of B.Sc.(PCM) I to VI semester

1. Following subject syllabus are revised

(i) Physical Chemistry -III in IV semester

(ii) Organic Chemistry – III in V semester

(iii) Inorganic Chemistry – III in VI semester

(iv) Quantum Mechanics & Spectroscopy in V semester

(v) Solid State Physics & Devices in VI semester

Read and confirmed.

Dr. Joydip Dhar

Dr. Richa Kothari

Dr. Sonia Johri

Dr. Mazahar Farooqui

Dr. Y.C. Goswami
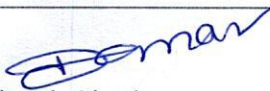
Dr. P. Shrivastava

Dr. Manish Sharma
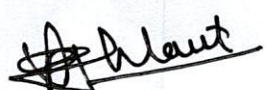
Dr. Dinesh Singh
Tomar

Dr. Ranjana Goswami

Dr. Rupali Rastogi

Dr. Uday P.
Gahlaut

Dr. Hema Purushwani

Dr. Pallavi Khatri

Dr. Chanda Purushwani

UNIVERSITY
GWALIOR · MP · INDIA
CELEBRATING DREAMS

Syllabus-2021-2022

(SOS)(BSc_ComputerScience)

Title of the Course	Numerical Methods and Computer Simulations
Course Code	BSMA0611[T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					4	1	0	5

Course Type	Theory only		
Course Category	Discipline Core		
Pre-Requisite/s	Basic of Linear Algebra and Numerical Methods	**Co-Requisite/s**	knowledge of differentiation ,integration , Matrix ,function ,set

Course Outcomes & Bloom's Level	**CO1-** To remember the basics of NM and Algebra evaluate integrating computation, visualization and programming so that the programming environment becomes easy to use.**(BL1-Remember)** **CO2-** To understand Numerical methods and tools that is essential for the empirical and analytical study of quantitative aspects regarding analysis**(BL2-Understand)** **CO3-** To apply the linear Algebra helps them to get optimum solutions of real-world problems safely and efficiently**(BL3-Apply)** **CO4-** To analyze the conversion of real life problems into mathematical models which enhance their problem solving and decision making abilities.**(BL4-Analyze)** **CO5-** To Evaluate the various quantitative techniques skills with the basics of Numerical Methods, and linear Algebra for solving real life problems**(BL5-Evaluate)**

Course Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	**SDG (Goals)**	SDG4(Quality education)

Part B

Modules	Contents	Pedagogy	Hours
UNIT01	Definition and examples of vector spaces, subspaces, sum and direct sum of subspaces, Linear span, Linear dependence, Independence and their basic properties, Basis, Existence Theorem for basis, Extension theorem, Invariance of the number of elements of a basis, Dimension, Finite dimensional vector spaces, Existence of complementary subspaces of a subspace of a finite dimensional vector space, Dimension of sum of subspaces, Quotient space and its dimension	Audio/Video clips, group discussion, lecture with ppt, quiz	10
UNIT02	Linear transformations and their representation as matrices, Algebra of linear transformations, Rank-Nullity theorem, change of basic, dual space, bi-dual space and natural isomorphism, adjoint of a linear transformation, Eigen values and Eigen vectors of a linear transformation, Diagonalization, Bilinear, Quadratic and Hermitian forms.	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	10
UNIT03	Inner Product Space- Cauchy-Schwartz inequality, orthogonal vectors, orthogonal complements, orthonormal sets and bases, Bessel's inequality for finite dimensional spaces, Gram-Schmidt orthogonalization process.	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	10
UNIT04	Solution of Equations: Bisection, Secant, Regula Falsi, Newton's methods, Roots of second degree Polynomials.Interpolation: Lagrange interpolation, Divided differences, Interpolation formula using Differences, Numerical Quadrature, Newton- Cote's Formulae, Gauss Quadrature formulae	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	8
UNIT05	Linear equations direct methods for solving systems of linear equations (Gauss elimination, LU decomposition, Cholesky decomposition); Iterative methods (Jacobi, Gauss- Seidel reduction	Audio/Video clips, group discussion, lecture with ppt	10

methods). Ordinary differential equations: Euler method, Single step method, Runge-Kutta's method, Multistep methods, Milne Simpson method, Methods based on numerical integration, Methods based on numerical differentiation

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
				60	28
100	40	40	12		

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
				0	0
0	0	0	0		

Part E

Books	K.B. Datta,Matrix and Linear Algebra,Pratice Hall of India Pvt. Ltd. New Delhi, 2000
Articles	
References Books	K. Haffiman and R. Kunze – Linear Algebra .2nd Edition. Prentice Hall Englewood Cliffs. New Jersey, 1971.
MOOC Courses	
Videos	

Part F

Project 1	No project available
Project 2	No project available
Project 3	No project available
Project 4	No project available
Project 5	No project available

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	2	-	1	-	-	-	-	1	-	1
CO2	3	3	1	3	3	2	-	1	-	1	-	-	2	-	2
CO3	3	2	-	1	3	-	-	-	-	-	-	-	1	3	2
CO4	3	2	-	2	-	-	-	-	-	-	-	-	-	3	1
CO5	2	2	-	1	-	-	-	-	-	-	-	-	-	2	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2021-2022

(SOS)(BSc_ComputerScience)

Title of the Course	Optonal Paper(CS)
Course Code	BSCS0508[T]

Year	3rd	Semester	6th	Credits	L	T	P	C
					4	1	0	5

Course Type	Theory only		
Course Category	Discipline Core		
Pre-Requisite/s	Basic of Linear Algebra and Numerical Methods	Co-Requisite/s	knowledge of differentiation ,integration , Matrix ,function ,set

Course Outcomes & Bloom's Level	**CO1-** To remember the basics of NM and Algebra evaluate integrating computation, visualization and programming so that the programming environment becomes easy to use.**(BL1-Remember)** **CO2-** To understand Numerical methods and tools that is essential for the empirical and analytical study of quantitative aspects regarding analysis**(BL2-Understand)** **CO3-** To apply the linear Algebra helps them to get optimum solutions of real-world problems safely and efficiently**(BL3-Apply)** **CO4-** To analyze the conversion of real life problems into mathematical models which enhance their problem solving and decision making abilities.**(BL4-Analyze)** **CO5-** To Evaluate the various quantitative techniques skills with the basics of Numerical Methods, and linear Algebra for solving real life problems**(BL5-Evaluate)**

Course Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	SDG (Goals)	SDG4(Quality education)

Part B

Modules	Contents	Pedagogy	Hours
UNIT01	Definition and examples of vector spaces, subspaces, sum and direct sum of subspaces, Linear span, Linear dependence, Independence and their basic properties, Basis, Existence Theorem for basis, Extension theorem, Invariance of the number of elements of a basis, Dimension, Finite dimensional vector spaces, Existence of complementary subspaces of a subspace of a finite dimensional vector space, Dimension of sum of subspaces, Quotient space and its dimension	Audio/Video clips, group discussion, lecture with ppt, quiz	10
UNIT02	Linear transformations and their representation as matrices, Algebra of linear transformations, Rank-Nullity theorem, change of basic, dual space, bi-dual space and natural isomorphism, adjoint of a linear transformation, Eigen values and Eigen vectors of a linear transformation, Diagonalization, Bilinear, Quadratic and Hermitian forms.	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	10
UNIT03	Inner Product Space- Cauchy-Schwartz inequality, orthogonal vectors, orthogonal complements, orthonormal sets and bases, Bessel's inequality for finite dimensional spaces, Gram-Schmidt orthogonalization process.	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	10
UNIT04	Solution of Equations: Bisection, Secant, Regula Falsi, Newton's methods, Roots of second degree Polynomials.Interpolation: Lagrange interpolation, Divided differences, Interpolation formula using Differences, Numerical Quadrature, Newton- Cote's Formulae, Gauss Quadrature formulae	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	8
UNIT05	Linear equations direct methods for solving systems of linear equations (Gauss elimination, LU decomposition, Cholesky decomposition); Iterative methods (Jacobi, Gauss- Seidel reduction	Audio/Video clips, group discussion, lecture with ppt	10

methods). Ordinary differential equations: Euler method, Single step method, Runge-Kutta's method, Multistep methods, Milne Simpson method, Methods based on numerical integration, Methods based on numerical differentiation

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
				60	28
100	40	40	12		

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0	0	0	0	0	0

Part E

Books	K.B. Datta,Matrix and Linear Algebra,Pratice Hall of India Pvt. Ltd. New Delhi, 2000
Articles	
References Books	K. Haffiman and R. Kunze – Linear Algebra .2nd Edition. Prentice Hall Englewood Cliffs. New Jersey, 1971.
MOOC Courses	
Videos	

Part F

Project 1	No project available
Project 2	No project available
Project 3	No project available
Project 4	No project available
Project 5	No project available

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	2	2	-	1	-	-	-	-	1	-	1
CO2	3	3	1	3	3	2	-	1	-	1	-	-	2	-	2
CO3	3	2	-	1	3	-	-	-	-	-	-	-	1	3	2
CO4	3	2	-	2	-	-	-	-	-	-	-	-	-	3	1
CO5	2	2	-	1	-	-	-	-	-	-	-	-	-	2	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1. Simple CMS (Content Management System):

- Build a basic CMS using PHP where users can create, edit, delete, and manage content (e.g., articles, blog posts).
- Include features like user authentication, role-based access control, and a WYSIWYG editor for content creation.

2. Online Quiz System:

- Develop an online quiz application where users can take quizzes on various topics.
- Implement features such as user registration, quiz creation, multiple-choice questions, scoring, and result display.

3. Online Task Management System:

- Create a task management application where users can create tasks, assign them to others, set deadlines, and track progress.
- Include features like user authentication, task categorization, priority levels, and status updates.

4. E-commerce Website:

- Build a simple e-commerce platform using PHP where users can browse products, add them to cart, and make purchases.
- Implement features like user registration, product catalog, shopping cart

functionality, and payment integration (e.g., PayPal).

Part D(Marks Distribution)

5. OnlineStudent Information System:

- Develop a student information system for managing student records, course details, grades, and attendance
- Include features such as user authentication, student enrolment, course registration, and grade management.

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	50	40	20	60	

Part E

Books	VIKRAM VASWANI PHP A Beginner's Guide Tata McGraw-Hill
Articles	Steven Holzner The PHP Complete Reference – Tata McGraw-Hil
References Books	
MOOC Courses	
Videos	

Part F

Project 1	No project available	
Project 2	No project available	
Project 3	No project available	
Project 4	No project available	
Project 5	No project available	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	1	2	-	-	-	-	-	-	-	1	2	1
CO2	2	2	-3	2	1	-	-	-	-	-	-	-	2	2	2
CO3	2	1	1	1	3	-	-	-	-	-	-	-	1	2	1
CO4	1	2	-1	2	2	-	-	-	-	-	-	-	2	2	1
CO5	2	2	2	1	2	-	-	-	-	-	-	-	1	2	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2021-2022

(SOS)(BSc_ComputerScience)

Title of the Course	Linear Algebra
Course Code	BSMA0310[T]

Part A

Year	2nd	Semester	3rd	Credits		L	T	P	C
						3	1	0	4

Course Type	Theory only

Course Category	Discipline Core

Pre-Requisite/s	Basic Knowledge of matrix & its operation and transformations.	Co-Requisite/s	Basic knowledge of LI, LD, orthorthogonality and other properties of vectors.

Course Outcomes & Bloom's Level	**CO1-** CO1: To get insight of fundamental knowledge of matrix, group theory and transformations.**(BL1-Remember)** **CO2-** CO2: To understand various techniques to solve real life problems through examples.**(BL2-Understand)** **CO3-** CO3: To apply concepts of matrix, vector space, linear transformation and inner product space on many branches of Physics, Engineering, Social sciences and Mathematics **(BL3-Apply)** **CO4-** CO4: To analyze properties of matrix, vectors, vector spaces and linear transformations.**(BL4-Analyze)** **CO5-** CO5: To evaluate Inverse, Eigen value and Eigen vector of matrix and orthonormal vectors/basis. **(BL5-Evaluate)**

Course Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	**SDG (Goals)**	SDG4(Quality education)

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Rank and Nullity of matrix, Solution of simultaneous equation by elementary transformation, consistency of equations, Eigen value and Eigen vectors, Calley Hamilton theorem, Inverse matrix, Digonlization.	Audio/Video clips, group discussion, lecture with PPTs, quiz	8
Unit 2	Definition and examples of vector spaces, subspaces, sum and direct sum of subspaces, Linear span, Linear dependence, Independence and their basic properties, Basis, Existence Theorem for basis, Extension theorem, Invariance of the number of elements of a basis, Dimension, Finite dimensional vector spaces, Existence of complementary subspaces of a subspace of a finite dimensional vector space, Dimension of sum of subspaces, Quotient space and its dimension.	Audio/Video clips, group discussion, lecture with PPTs, quiz	8
Unit 3	Linear transformations, Properties of linear transformation, Range and Kernel, The rank and nullity of linear transformations, Rank-Nullity theorem and its consequence, The matrix representation of a linear transformation, change of basic, dual space, bi-dual space and natural isomorphism, adjoint of a linear transformation.	Audio/Video clips, group discussion, lecture with PPTs, classroom presentations, Analysis	8
Unit 4	Eigen values and Eigen vectors of a linear transformation, Diagonalization, Bilinear, Quadratic and Hermitian forms.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8
Unit 5	Inner Product Space- Cauchy-Schwartz inequality, orthogonal vectors, orthogonal complements, orthonormal sets and bases, Bessel's inequality for finite dimensional spaces, Gram-Schmidt orthogonalization process.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	28

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0	0	0	0	0	0

Part E

Books	1. K.B. Datta, Matrix and Linear Algebra, Pratice Hall of India Pvt. Ltd. New Delhi, 2000 2. K. Haffiman and R. Kunze, Linear Algebra, 2nd Edition. Prentice Hall Englewood Cliffs. New Jersey,1971
Articles	
References Books	1. Marc Lipson and Seymour Lipschutz, Schaum'S Outline Of Linear Algebra, Key College Publishing (Springer – Verlag) 2001 2. S, Kumarsaran, Linear Algebra, A Bermetric Approach Prentice Hall of India, 2000
MOOC Courses	https://onlinecourses.nptel.ac.in/noc24_ma13/preview
Videos	https://onlinecourses.nptel.ac.in/noc24_ma04/preview https://onlinecourses.nptel.ac.in/noc24_ee48/preview https://onlinecourses.nptel.ac.in/noc24_ma11/preview

Part F

	Project 1	No project available
	Project 2	No project available
	Project 3	No project available
	Project 4	No project available
	Project 5	No project available

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	1	-	-	-	-	-	-	-
CO2	3	3	1	3	3	2	-	1	-	1	-	-	-	-	-
CO3	3	2	-	1	3	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	2	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2021-2022

(SOS)(BSc_PCM)

Title of the Course	Linear Algebra
Course Code	BSMA0310[T]

Part A

Year		Semester		Credits	L	T	P	C
					3	1	0	4

Course Type	Theory only

Course Category	Discipline Core

Pre-Requisite/s	Basic knowledge of Matrix & its operation and transformation.	Co-Requisite/s	Basic knowledge of LI, LD, orthogonality and other properties of vectors.

Course Outcomes & Bloom's Level	**CO1-** CO1: To get insight of fundamental knowledge of matrix, group theory and transformations.**(BL1-Remember)** **CO2-** CO2: To understand various techniques to solve real life problems through examples. **(BL2-Understand)** **CO3-** CO3: To apply concepts of matrix, vector space, linear transformation and inner product space on many branches of Physics, Engineering, Social sciences and Mathematics **(BL3-Apply)** **CO4-** CO4: To analyze properties of matrix, vectors, vector spaces and linear transformations.**(BL4-Analyze)** **CO5-** CO5: To evaluate Inverse, Eigen value and Eigen vector of matrix and orthonormal vectors/basis. **(BL5-Evaluate)**

Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	SDG (Goals)	SDG4(Quality education)

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Rank and Nullity of matrix, Solution of simultaneous equation by elementary transformation, consistency of equations, Eigen value and Eigen vectors, Calley Hamilton theorem, Inverse matrix, Digonlization.	Audio/Video clips, group discussion, lecture with PPTs, quiz	8
Unit 2	Definition and examples of vector spaces, subspaces, sum and direct sum of subspaces, Linear span, Linear dependence, Independence and their basic properties, Basis, Existence Theorem for basis, Extension theorem, Invariance of the number of elements of a basis, Dimension, Finite dimensional vector spaces, Existence of complementary subspaces of a subspace of a finite dimensional vector space, Dimension of sum of subspaces, Quotient space and its dimension.	Audio/Video clips, group discussion, lecture with PPTs, quiz	8
Unit 3	Linear transformations, Properties of linear transformation, Range and Kernel, The rank and nullity of linear transformations, Rank-Nullity theorem and its consequence, The matrix representation of a linear transformation, change of basic, dual space, bi-dual space and natural isomorphism, adjoint of a linear transformation.	Audio/Video clips, group discussion, lecture with PPTs, classroom presentations, Analysis	8
Unit 4	Eigen values and Eigen vectors of a linear transformation, Diagonalization, Bilinear, Quadratic and Hermitian forms.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8
Unit 5	Inner Product Space- Cauchy-Schwartz inequality, orthogonal vectors, orthogonal complements, orthonormal sets and bases, Bessel's inequality for finite dimensional spaces, Gram-Schmidt orthogonalization process.	Audio/Video clips, group discussion, lecture with PPTs, Quiz	8

Part D(Marks Distribution)

Theory

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	28

Practical

Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0	0	0	0	0	0

Part E

Books	1. K.B. Datta, Matrix and Linear Algebra, Pratice Hall of India Pvt. Ltd. New Delhi, 2000 2. K. Haffiman and R. Kunze, Linear Algebra, 2nd Edition. Prentice Hall Englewood Cliffs. New Jersey,1971
Articles	
References Books	1. Marc Lipson and Seymour Lipschutz, Schaum'S Outline Of Linear Algebra, Key College Publishing (Springer – Verlag) 2001 2. S, Kumarsaran, Linear Algebra, A Bermetric Approach Prentice Hall of India, 2000
MOOC Courses	https://onlinecourses.nptel.ac.in/noc24_ma13/preview
Videos	https://onlinecourses.nptel.ac.in/noc24_ma04/preview https://onlinecourses.nptel.ac.in/noc24_ee48/preview https://onlinecourses.nptel.ac.in/noc24_ma11/preview

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	1	-	-	-	-	-	-	-
CO2	3	3	1	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	1	3	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	2	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	-	1	-	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2021-2022

(SOS)(BSc_PCM)

Title of the Course	Numerical Methods and Computer Simulation
Course Code	BSMA0611[T]

Part A

Year		Semester		Credits	L	T	P	C
					4	1	0	5

Course Type	Theory only

Course Category	Discipline Core

Pre-Requisite/s	Basics of Algebra and Numerical	Co-Requisite/s	knowledge of function ,differentiation ,integration , matrix , system of equation

Course Outcomes & Bloom's Level	CO1- To remember the basics of NM and Algebra evaluate integrating computation, visualization and programming so that the programming environment becomes easy to use. **(BL1-Remember)** CO2- To understand Numerical methods and tools that is essential for the empirical and analytical study of quantitative aspects regarding analysis**(BL2-Understand)** CO3- To apply the linear Algebra helps them to get optimum solutions of real-world problems safely and efficiently**(BL3-Apply)** CO4- To analyze the conversion of real life problems into mathematical models which enhance their problem solving and decision making abilities.**(BL4-Analyze)** CO5- To Evaluate the various quantitative techniques skills with the basics of Numerical Methods, and linear Algebra for solving real life problems**(BL5-Evaluate)**

Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	SDG (Goals)	SDG4(Quality education)

Part B

Modules	Contents	Pedagogy	Hours
UNIT01	Definition and examples of vector spaces, subspaces, sum and direct sum of subspaces, Linear span, Linear dependence, Independence and their basic properties, Basis, Existence Theorem for basis, Extension theorem, Invariance of the number of elements of a basis, Dimension, Finite dimensional vector spaces, Existence of complementary subspaces of a subspace of a finite dimensional vector space, Dimension of sum of subspaces, Quotient space and its dimension	Audio/Video clips, group discussion, lecture with ppt, quiz	10
UNIT02	Inner Product Space- Cauchy-Schwartz inequality, orthogonal vectors, orthogonal complements, orthonormal sets and bases, Bessel's inequality for finite dimensional spaces, Gram-Schmidt orthogonalization process	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	10
UNIT03	Inner Product Space- Cauchy-Schwartz inequality, orthogonal vectors, orthogonal complements, orthonormal sets and bases, Bessel's inequality for finite dimensional spaces, Gram-Schmidt orthogonalization process	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	10
UNIT04	Solution of Equations: Bisection, Secant, Regula Falsi, Newton's methods, Roots of second degree Polynomials.Interpolation: Lagrange interpolation, Divided differences, Interpolation formula using Differences, Numerical Quadrature, Newton- Cote's Formulae, Gauss Quadrature formulae	Audio/Video clips, group discussion, lecture with ppt, classroom presentations	8
UNIT05	Linear equations direct methods for solving systems of linear equations (Gauss elimination, LU decomposition, Cholesky decomposition); Iterative methods (Jacobi, Gauss- Seidel reduction methods). Ordinary differential equations: Euler method, Single step method, Runge-Kutta's method, Multistep methods, Milne Simpson method, Methods based on numerical integration, Methods based on numerical differentiation	Audio/Video clips, group discussion, lecture with ppt	10

Part D(Marks Distribution)

Total Marks	Minimum Passing Marks	Theory				
		External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
100	40	40	12	60	28

Total Marks	Minimum Passing Marks	Practical				
		External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation
0	0	0	0	0	0

Part E

Books	K.B. Datta,Matrix and Linear Algebra,Pratice Hall of India Pvt. Ltd. New Delhi, 2000.
Articles	
References Books	K. Haffiman and R. Kunze,Linear Algebra,2nd Edition. Prentice Hall Englewood Cliffs. New Jersey, 1971.
MOOC Courses	
Videos	

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	2	-	1	-	-	-	-	1	-	1
CO2	3	3	1	3	3	2	-	1	-	1	-	-	2	-	2
CO3	3	2	-	1	3	-	-	-	-	-	-	-	1	3	2
CO4	3	2	-	2	-	-	-	-	-	-	-	-	-	3	1
CO5	2	2	-	1	-	-	-	-	-	-	-	-	-	2	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-