

Jaypee Institute of Information Technology

B.Tech. Biotechnology

Semester IV

Course Descriptions

Detailed Syllabus

Course Code	15B11BT312 C214	Semester: Even	Semester: IV Session: 2023-24 Month from: January to June
Course Name	Microbiology		
Credits	3-1	Contact Hours	4

Faculty (Names)	Coordinator(s)	Prof. Indira P Sarethy
	Teacher(s) (Alphabetically)	Dr. Rajneesh, Prof. Indira P Sarethy

COURSE OUTCOMES (New)		COGNITIVE LEVELS
C214.1	Explain the scope of microbiology	Understand level (C2)
C214.2	Identify and interpret the types of microorganisms	Apply level (C3)
C214.3	Make use of phylogenetic concepts in microbial taxonomy	Apply level (C3)
C214.4	Analyze microbial growth, metabolism and host-pathogen interactions	Analyze level (C4)
C214.5	Examine the suitability of microorganisms in industrial applications	Analyze level (C4)

Module No.	Title of the Module	Topics in the Module	# of lectures
1.	History and scope of microbiology	A timeline with emphasis on Pasteur's experiments disproving spontaneous generation, Koch's postulates	3
2.	Forms of microorganisms	Prokaryotes: Archaea & Bacteria (including cyanobacteria, mycoplasma & actinomycetes) Eukaryotes: Fungi, Algae, Protozoa, Viruses Morphological features and characteristics with emphasis on Gram positive and Gram negative bacteria, composition and functions of cellular structures.	6
3.	Microbial taxonomy and phylogeny	Taxonomic ranks, classification systems (phenetic, numerical, phylogenetic), major characteristics used for classification (classical and molecular approaches), the three domain system	5
4.	Methods in microbiology	Pure culture techniques, theory and practice of sterilization, principles of microbial nutrition, culture	6

		media and types (simple, complex, enriched, enrichment, selective & differential), replica plating techniques, preservation techniques, growth of microorganisms, control of microbes	
5.	Microbial metabolism	Photosynthetic mechanisms, CO ₂ fixation mechanisms, fermentation, anaerobic respiration.	6
6.	Microbial genetics	Conjugation, Transformation, Transduction	5
7.	Host-pathogen interactions	Defense mechanisms against microbes, Pathogenic microbes: Bacteria: (Pneumonia, Tuberculosis), Fungi: (Mycoses), Virus: (HIV), Protozoa (Malaria);	7
8.	Industrial applications with case studies	Biofertilizers, Biopesticides, Fermented foods, Single cell protein, Bioterrorism, Extremophiles	4
Total number of Lectures			42

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (class test, PBL)
Total	100

Project based learning: Each student will choose a topic based on the application sector where microorganisms can be used such as food, pharmaceuticals, detergent, environmental remediation, etc. They will get an insight into how different microorganisms can be employed for different biotechnological industrial applications.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	M. J. Pelczar, E. C. S. Chan and N. R. Krieg. <i>Microbiology: Concepts and Applications</i> . India: Tata McGraw Hill, 1993.
2.	M. T. Madigan, J. M. Martinko and J. Parker. <i>Brock Biology of Microorganisms</i> , 10 th Edition. New Jersey, USA: Prentice Hall, 2003.
3.	G. J. Tortora, B. R. Funke and C. L. Case. <i>Microbiology: An Introduction</i> , 8 th Edition. San Francisco, USA: Pearson/Benjamin Cummings, 2004.
4.	J. Black. <i>Microbiology: Principles and Applications</i> . New Jersey, USA: Prentice Hall, 2004.
5.	L. M. Prescott, J. P. Harley and D. A. Klein. <i>Microbiology</i> , 6 th edition. New York, USA: McGraw Hill, 2005.
6.	E. W. Nester. <i>Microbiology Study Guide</i> . New York, USA: McGraw Hill, 2004.

Detailed Syllabus
Lab-wise Breakup

Course Code	15B17BT372	Semester Even (specify Odd/Even)	Semester: IV Session 2023 - 2024 Month from: Jan-Jun 23
Course Name	Microbiology Lab		
Credits	1	Contact Hours	3

Faculty (Names)	Coordinator(s)	Dr Garima Mathur
	Teacher(s) (Alphabetically)	Dr. Smriti Gaur, Prof. Indira Sarethy, Dr. Garima Mathur
COURSE OUTCOMES		COGNITIVE LEVELS
C274.1	Understand the concept of microbial growth, media preparation and culturing techniques.	Understand (C2)
C274.2	Apply microbiological techniques to characterize microbes	Apply (C3)
C274.3	Analyze enumeration techniques for isolated microorganisms	Analyze (C4)
C274.4	Assess the antimicrobial activity of natural compounds	Evaluate (C5)

Module No.	Title of the Module	List of Experiments	CO
1.	Media preparation and sterilization	Sterilization techniques: Autoclaving, incineration, hot air oven, filtration and non-ionic radiation.	C372.1
2.	Media preparation and sterilization	Media preparation solid and liquid	C372.1
3.	Culturing sub culturing.	Preparation of plates (pouring of culture media).	C372.2
4.	Culturing sub culturing.	To learn different methods of Streaking.	C372.2
5.	Culturing sub culturing.	Miniaturized assay for growth curve of bacteria and calculation of generation.	C372.2

6.	Characterize of microbes	Staining techniques for bacteria: Endospore staining.	C372.3
7.	Characterize of microbes	Staining techniques for bacteria: Gram staining.	C372.3
8.	Characterize of microbes	Staining techniques for fungi: Lactophenol Cotton Blue and Methylene Blue staining. (Yeast/ fungus staining).	C372.3
9.	Characterize of microbes	Morphological characterization of microbes	C372.3
10.	Enumeration	Serial dilution with solid.	C372.4
11.	Enumeration.	Serial dilution with liquid.	C372.4
12.	Antimicrobial activity.	Antibacterial disc diffusion assay	C372.4
Evaluation Criteria			
Components		Maximum Marks	
Lab Record		15	
Performance based test		15	
Mid-term viva		20	
End term viva		20	
Day to day evaluation		20	
Attendance		10	
Total		100	

Project based learning: Students will be collecting different samples of food and water for isolation and characterization of microorganisms using serial dilution methods and various staining techniques. They will be doing this activity in group of 4-5 students. They will get an insight into how diversity in microbial population exist with different sources.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Maniatis Molecular Cloning A Laboratory Manual, Michael R. Green and Joseph Sambrook, FOURTH EDITION 2012 by Cold Spring Harbor Laboratory Press,
2.	.https://microbeonline.com/imvic-tests-principle-procedure-and-results/
3	Rompere A, Servais P, Baudart J, De- Roubin M and Laurent P. (2002)), Detection and enumeration of coliforms in drinking water: current methods and emerging approaches. Journal of Microbiological Methods; vol 49: 31- 54.
4	VashistHemraj , Sharma Diksha, Gupta Avneet (2013), A review on commonly used biochemical test for bacteria Innovare Journal of Life Science, Vol 1: Issue 1, 1-7

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B1NHS434	Semester Even (specify Odd/Even)	Semester IV Session 2023-24
Course Name	Principles of Management		
Credits	3	Contact Hours	(2-1-0)

Faculty (Names)	Coordinator(s)	Ms Puneet Pannu (Sec 62) Dr Deepak Verma (Sec 128)
	Teacher(s) (Alphabetically)	Dr Deepak Verma, Ms Puneet Pannu

COURSE OUTCOMES		COGNITIVE LEVELS
C303-1.1	Describe the functions, roles and skills of managers and illustrate how the manager's job is evolving	Understand Level (C2)
C303-1.2	Examine the relevance of the political, legal, ethical, economic and cultural environments in global business.	Analyze Level (C4)
C303-1.3	Evaluate approaches to goal setting, planning and organizing in a variety of circumstances.	Evaluate Level (C5)
C303-1.4	Evaluate contemporary approaches for staffing and leading in an organization.	Evaluate Level (C5)
C303-1.5	Analyze contemporary issues in controlling for measuring organizational performance.	Analyze Level (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Managers and Management	Management an Overview: Introduction, Definition of Management, Role of Management, Functions of Managers, Levels of Management, Management Skills and Organizational Hierarchy, Social and Ethical Responsibilities of Management: Arguments for and against Social Responsibilities of Business, Social Stakeholders, Measuring Social Responsiveness and Managerial Ethics, Omnipotent and Symbolic View, Characteristics and importance of organizational culture, Relevance of political, legal, economic and Cultural environments to global business,	7

		Structures and techniques organizations use as they go international .	
2.	Planning	Nature & Purpose, Steps involved in Planning, Objectives, Setting Objectives, Process of Managing by Objectives, Strategies, Policies & Planning Premises, Competitor Intelligence, Benchmarking, Forecasting, Decision-Making.	5
3.	Organizing	Nature and Purpose, Formal and Informal Organization, Organization Chart, Structure and Process, Departmentalization by difference strategies, Line and Staff authority- Benefits and Limitations-De-Centralization and Delegation of Authority Versus, Staffing, Managerial Effectiveness.	6
4.	Directing	Scope, Human Factors, Creativity and Innovation, Harmonizing Objectives, Leadership, Types of Leadership Motivation, Hierarchy of Needs, Motivation theories, Motivational Techniques, Job Enrichment, Communication, Process of Communication, Barriers and Breakdown, Effective Communication, Electronic media in Communication.	5
5.	Controlling	System and process of Controlling, Requirements for effective control, The Budget as Control Technique, Information Technology in Controlling, Productivity, Problems and Management, Control of Overall Performance, Direct and Preventive Control, Reporting, The Global Environment, Globalization and Liberalization, International Management and Global theory of Management.	5

Total number of Lectures			28
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Evaluation Criteria	
Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Project, Oral Questions)

Total	100
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Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Robbins S.P., Coulter M & Fernandez A, <i>Management</i> , Fourteenth Edition, Pearson Education India (2019)
2.	Robbins S.P., Coulter M & DeCenzo D., <i>Fundamentals of Management</i> , Ninth Edition, Pearson Education India (2016)
3.	Durai P., <i>Principles of Management Text and Cases</i> , Pearson Education India(2015)
4.	Aryasi A.R., <i>Fundamentals of Management</i> , McGraw Hill Education (2018)
5.	Stoner J, Freeman R.E & Gilbert D.R., <i>Management</i> , Sixth Edition, Pearson Education India (2018)
6.	Weihrich H, Cannice M.V.& Koontz H., <i>Management A Global, Innovative & Entrepreneurial Perspective</i> , Fourteenth Edition, McGraw Hill Education (2017)

GENETICS AND
DEVELOPMENTAL BIOLOGY

Detailed Syllabus Lecture-wise Breakup

Course Code	15B11BT313	Semester EVEN	Semester IV Session 2023-2024 Month: January to May
Course Name	Genetics and Developmental Biology		
Credits	4	Contact Hours	4

Faculty (Names)	Coordinator(s)	Dr. Pooja Choudhary
	Teacher(s) (Alphabetically)	Dr. Sonam Chawla Dr. Pooja Choudhary

COURSE OUTCOMES (NEW)		COGNITIVE LEVELS
C212.1	Explain principles of inheritance in genetics	Understand Level (C2)
C212.2	Identify the early developmental mechanics in invertebrates and vertebrates	Apply Level (C3)
C212.3	Analyze and solve the problems related to population genetics	Analyze Level (C4)
C212.4	Classify Human birth defects and genetic Disorders	Analyze Level (C4)

Mod ule No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Cell – The unit of life, Chromosomes and Heredity	Cell cycle, Chromosomal theory of inheritance, Chromosome – structure, karyotyping, and abnormalities (structural and numerical aberrations), Human Genetic Disorders arising due to chromosomal aberrations : Basis and Symptoms, DNA – validation of DNA as hereditary material, basic biochemical and molecular structure	06
2.	Principles of Inheritance: Mendelism	Genotype and phenotype, Inheritance of characters/genes from parents to offspring, Mendelian laws of inheritance: Genes and Alleles	02
3.	Principles of Inheritance: Beyond Mendelism and Extra-chromosomal	Beyond Mendelism: Lethal and Multiple alleles, Gene-gene interaction, Pleiotropism, Penetrance and expressivity, Sex determination and dosage compensation, Sex chromosomes in human, Human Sex-linked Genetic Disorders :Basis and symptoms, Extra-chromosomal inheritance: maternal inheritance	06

4.	Mutations, linkage And recombination	Molecular basis and functional relevance of mutations – spontaneous vs induced mutations, mutations in the coding regions of genes, loss of function vs gain of function mutations germline and somatic mutations, Chi Square test in genetics data, Linkage & Recombination, Molecular mechanism of recombination, Calculating Recombinant Frequencies, Linkage maps	04
5.	Population Evolutionary genetics And	Introduction to terms – evolution, variation, population, gene pool and Modern Theory of Evolution (Darwin's Theory) Calculation of genotypic frequency, allelic frequency and Hardy-Weinberg Principle, Forces responsible for evolution: Mutation, recombination, migration, genetic drift.	03
6.	Introduction to early developmental process	Fertilization, Cleavage, gastrulation, axis formation and fate map	04
7.	Developmental mechanics of cell specification	Autonomous Specification, Conditional specification, Syncytial specification, Mosaic and regulative development,	03
8.	Early development in Invertebrates and Vertebrates	Axis specification in <i>Drosophila</i> , Patterning and Axis specification in <i>Xenopus</i> , Gastrulation in Bird	07
9.	Regeneration & aging	Epimorphic Regeneration, Morphallactic Regeneration, compensatory regeneration. Causes of Aging, Genetic aging programs.	03
10.	Organogenesis	Development of tetrapod limb, heart	04
Total number of Lectures			42
PBL: Topics on human birth defects and various genetics disorder were given to students for project based learning			
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Assignment 1 and 2, Class Test 1 and 2)	
Total		100	

Detailed Syllabus

Lab -wise Breakup

Course Code	15B17BT373	Semester Even (specify Odd/Even)	Semester VII Session 2023-2024 Month from JAN-JULY
Course Name	Genetics and Developmental Biology Lab		
Credits	1	Contact Hours	3

Faculty (Names)	Coordinator(s)	Dr. Sonam Chawla
	Teacher(s) (Alphabetically)	Prof Sujata Mohanty, Prof Neeraj Wadhwa, Dr Sonam Chawla

COURSE OUTCOMES		COGNITIVE LEVELS
C272.1	Understand gametogenesis in plants and animals.	Understand level (C2)
C272.2	Solve pattern of inheritance observed in Drosophila and Human.	Apply level (C3)
C272.3	Examine morphogenesis in early development using model organisms.	Analyze level (C4)
C272.4	Analyze Human and polytene chromosome features.	Analyze level (C4)

Module No.	Title of the Module	List of Experiments	CO
1.	Cell architecture and Division	Observation of cells undergoing mitotic phases of cell division, using permanent slides	1
		Observation of cells undergoing meiotic phases of cell division using permanent slides	1
		Calculating the mitotic index from onion root tip	1
2.	Genotype vs. Phenotype	Introduction to Genetic model Drosophila, Study of life cycle ,Wild and mutant strain	3
		Sex comb-based species identification	3
3.	Specialised Chromosome	Cytogenetic preparation of polytene chromosome,	3
		Study of banding pattern and puff region, distinguishing hetero and euchromatic region	3

4.	Gene and allele frequency	Blood group test, Principle of antigen-antibody reaction, possible genotype. Calculation of genotype and allele frequency in the class population	2
		Study of inheritance pattern of common human genetic traits	2
5.	Reproductive system	Dissection of reproductive organs in plants, pollen germination and pollen tube observation	4
		Dissection of reproductive organs in Drosophila, No. of ovariole and sperm count	4
6.	Development	Permanent slides of various stages of frog and chick embryo development.	4

Evaluation Criteria

Components	Maximum Marks
Mid Term lab exam	20
End term lab exam	20
Day to Day	60
Total	100

Project based learning: To identify factors responsible for germination of pollen

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	M Demerec, <i>Biology of Drosophila</i> , Cold Spring Harbour laboratory Press.
2.	Monroe W Strickberger, <i>Genetics</i> , Prentice Hall.
3	B N Behera, <i>Genetics through Problems</i> , Sarup and Sons
4	Design of experiments, principle and the expected outcome and related literature will be provided to the student

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11BT411	Semester Even	Semester: IV Session: 2023-24
Course Name	Introduction to Bioinformatics		
Credits	4	Contact Hours	LTP 3 1 0

Faculty (Names)	Coordinator(s)	Dr. Nidhi Batra
	Teacher(s) (Alphabetically)	Dr. Nidhi Batra

COURSE OUTCOMES		COGNITIVE LEVELS
C213.1	Explain Bioinformatics resources, file formats, computational tools and associated algorithms.	Understand Level (C2)
C213.2	Apply the bioinformatics concepts in genomics, proteomics and drug discovery	Apply Level (C3)
C213.3	Analyze evolutionary tree to understand evolutionary genetics.	Analyze Level (C4)
C213.4	Compare sequence alignment tools to predict structures and functions of gene, RNA and proteins	Evaluate Level (C5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Biological data and Internet	Network terminologies, Introduction to Bioinformatics, Information flow, Scope of Bioinformatics, Growth of databases, genome sequencing, basics of internet, www, IP address, domain, Network-based services (Cloud & Grid Computing).	5
2.	Biological sequence data bases	Basics of Database designing and modeling, Designing policies, File formats (FASTA, PIR, Genbank), data storage, retrieval, Genbank, Swissprot, PIR, PDB, Pfam, KEGG, Brenda	6
3.	Sequence analysis (Sequence, retrieval, methods, substitution matrices,	String comparison (substring, subsequences) , Hamming and Levenshtein distance, Sequence alignment (pair wise, multiple) Dot plot method, Dynamic programming, Needleman–Wunsch <i>and</i> Smith–Waterman algorithm, BLAST algorithm ,FASTA algorithm comparison, PSI blast,	10

	submission and analysis)	gap penalty, e-value, statistical importance, PAM and BLOSUM matrices, log odd score, Sequence submission tools (BankIt, Sequin)	
4.	Gene predictions, promoter analysis and genome analysis tools	Gene structure (prokaryotes and eukaryotes), Genscan, Grail, Genemark, promoter region identification, promoter signals, repeats and identification in genome and computational tools	6
5.	RNA and protein structure predictions	RNA sequence and structures (secondary), Non-coding RNAs Primary, Secondary and Tertiary structure prediction , protparam, Chou–Fasmanalgorithm, GOR method, Concepts of structural modeling and tools (Comparative homology modeling, Threading),	4
6.	Phylogenetic analysis	Phylogeny, Phylogenetic reconstruction distance matrix, types of trees, Rooted un-rooted, distance based methods (UPGMA, FM, NJ Methods), Character based methods (Parsimony method, Maximum likelihood method), tree evaluation, (bootstrapping, Jackknifing), Substitution models (Juke-Cantor, Kimura-2 parameter), Issues in Phylogenetic Reconstruction, Biological inferences.	5
7.	Tools for proteome studies	AAcomplment, SOPMA PHD, ANOLEA, Transmembrane protein prediction tools	2
8.	Pharmacogenomics and comparative , Functional Genomics	Introduction of pharmacogenomics, comparative and functional genomics, microarray analysis, NGS and systems biology	4
Total number of Lectures			42

Evaluation Criteria	
Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, MCQ, Presentations, Project based Evaluation)
Total	100

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Attwood T.K. & Smith Parry., "Introduction to Bioinformatics", Benjamin Cummings, 2001
2.	BaxevanisA., D & Ouellette "Bioinformatics A practical guide to analysis of genes and protein", Wiley-Interscience, 1998.
3.	David Mount "Bioinformatics: Sequence and Genome analysis", Cold Spring Harbor Laboratory Press, 2001.
4.	Arthur M.Lesk " Introduction to Bioinformatics", Oxford University Press, 2004
5.	Harisha S." Fundamentals of Bioinformatics", I.K. International Publishing House, 2007

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B17BT471	Semester: Even	Semester: IV Session 2023-2024 Month from: Jan-June
Course Name	Bioinformatics Lab		
Credits	1	Contact Hours	LTP 0 0 2

Faculty (Names)	Coordinator(s)	Dr Nidhi Batra
	Teacher(s) (Alphabetically)	Dr. Nidhi Batra & Dr Chakresh Kumar Jain

COURSE OUTCOMES		COGNITIVE LEVELS
C273.1	Outline various computers hardware, operating system, databases, storage and retrievals, file formats.	Understand Level (C2)
C273.2	Apply bioinformatics tools in homology search, genome annotation, Expression analysis.	Apply Level(C3)
C273.3	Test for evolutionary relationship using sequence analysis and Phylogenetic tree.	Apply Level(C3)
C273.4	Predict structure and function of DNA, RNA and protein.	Analyze Level(C4)
C273.5	Compare the existing tools to address the biological problems.	Evaluate Level(C5)

Module No.	Title of the Module	List of Experiments	CO
1.	Bioinformatics Resources and databases	To explore NCBI, EMBL and its resources	CO1
2.	Bioinformatics Resources and databases	To explore and evaluate the EXPASY TOOLS	CO1
3.	Computer environment and network	To explore and understand the operating system (LINUX)	CO1
4.	Computer environment and network	To retrieve the sequences from FTP Sites. Perform Web-based Repeat Masker.	CO2
5.	Genomics	To identify the “open reading frames (ORF“s)” and genes in the given genomic sequence using ORF finder and Genscan.	CO2

6.	Genomics	Retrieve gene expression data from genomics data repository such as GEO	CO2
7.	Genomics	Global and Local alignment of two sequences to perform pairwise and multiple sequence alignment using CLUSTALW and BLAST.	CO3
8.	Genomics	To study the physiochemical properties of the residual sequences using computational method/Tools Prot-Param, CATH, Pfam.	CO4
9.	Phylogenetic	To find the evolutionary relationship and analyze changes in an organism using PHYLIP.	CO3
10.	Proteomics	Retrieving Motif information of a Protein using tool such as Prosite	CO4
11.	Proteomics	Retrieving structural data of a protein using PDB database	CO4
12.	Proteomics	To perform structure modelling using Swiss Model	CO4
13.	Proteomics and structural biology	To perform macromolecular structural analysis using PYMOL/SWISS PDB viewer and PDB SUM	CO5

Evaluation Criteria

Components

Maximum Marks

Mid Term Exam/Viva

20

End Term Exam/Viva

20

D2D (Report/Attendance/Experiment/PBL)

60

Total 100

PBL: Students will choose any protein linked to a particular disease. How is it commercially used as a therapeutic molecule or as a target to manage the disease?

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Baxevanis, Andreas D., and BF Francis Ouellette. Bioinformatics: a practical guide to the analysis of genes and proteins. Vol. 43. John Wiley & Sons, 2004.
2.	J. Dudley and A. Butte, "A Quick Guide for Developing Effective Bioinformatics Programming Skills", PLoS Computational Biology, vol. 5, no. 12, p. e1000589, 2009.
3.	http://vlab.amrita.edu/index.php?sub=3&brch=273

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NHS431	Semester Even (specify Odd/Even)	Semester IV Session 2023-24
Course Name	HUMAN RESOURCE MANAGEMENT		
Credits	3	Contact Hours	3(2-1-0)

Faculty (Names)	Coordinator(s)	Dr.Praveen Kumar Sharma
	Teacher(s) (Alphabetically)	Dr. Praveen Kumar Sharma

COURSE OUTCOMES		COGNITIVE LEVELS
C206-1.1	Demonstrate a basic understanding of different functions of human resource management: Employer Selection, Training and Learning, Performance Appraisal and Remuneration, Human Relations and Industrial Relations.	Understand Level (C2)
C206-1.2	Apply various tools and techniques in making sound human resource decisions.	Apply level (C3)
C206-1.3	Analyze the key issues related to administering the human resource management activities such as recruitment, selection, training, development, performance appraisal, compensation and industrial relation.	Analyze Level (C4)
C206-1.4	Critically assess and evaluate different human resource & industrial relation practices and techniques and recommend solutions to be followed by the organization	Evaluate Level (C5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Introduction to Human Resource Management and its definition, HRM functions and its relation to other managerial functions, Nature, Scope and Importance of Human Resource Management in Industry, Role & position of Personnel function in the organization. Human Resource Planning	3

2.	Employer Selection	Recruitment Process; Selection Process - Job and Worker Analyses, Matching Job with the Person; Selection Methods - Application Blank, Biographical Inventories, References and Recommendation Letters, Interviews	8
3.	Training and Learning	Need Identification; Psychological Factors in Learning; Training Methods in the Workplace; Effective Training Programme	6
4.	Performance Appraisal and Remuneration	Different methods of Performance Appraisal, Basic concepts in wage administration, company's wage policy, Job Evaluation, Issues in wage administration, Bonus & Incentives	6
5.	Human Relations and Industrial Relations, Trends in Human Resource Management	Factors influencing industrial relations - State Interventions and Legal Framework - Role of Trade unions - Collective Bargaining - Workers' participation in management. Trends in Human Resource Management: Analytics, Artificial Intelligence	5
Total number of Lectures			28
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25(Project, Quiz)	
Total		100	

Project-based learning: Each student in a group 4 to 5 will select a company which is registered in India. To make subject application based, the student will analyze Human Resource management policies and employed performing different functions at various levels related to recruitment, training, development, performance appraisal, compensation and industry relation.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	G. Dessler and B. Varrkey, <i>Human Resource Management, 15e</i> . Pearson Education India, 2005.
2.	V. S. P. Rao and V. H. Krishna, <i>Management: Text and cases</i> . Excel Books India, 2009.

3.	K. Aswathappa, <i>Human resource management: Text and cases</i> . Tata McGraw-Hill Education, 2013.
4.	P. M. Noe, R. A., Hollenbeck, J. R., Gerhart, B. A., & Wright, <i>Fundamentals of Human Resource Management</i> . Tata McGraw-Hill Education, 2019.
5.	B. Pattanayak, "Human Resource Management, PHI Learning Pvt,," Ltd., <i>New Delhi</i> , vol. 2, 2018.
6.	D. A. DeCenzo, S. P. Robbins, and S. L. Verhulst, <i>Fundamentals of human resource management</i> . John Wiley & Sons, 2016.

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B1NHS435	Semester: Even	Semester Session: 2023-24
Course Name	Financial Accounting		
Credits	3	Contact Hours	3 (2,1,0)

Faculty (Names)	Coordinator(s)	Dr. Mukta Mani (Sec-62), Dr. Sakshi Varshney (Sec-128)
	Teacher(s) (Alphabetically)	Dr. Mukta Mani, Dr. Sakshi Varshney

COURSE OUTCOMES		COGNITIVE LEVELS
C206-8.1	Understand the basic concepts of Accounting	Understanding level (C2)
C206-8.2	Apply accounting concepts for recording of business transactions.	Applying level (C3)
C206-8.3	Compare and reconcile the accounting records with other sources of information	Analyzing level (C4)
C206-8.4	Evaluate the accounting records to identify and rectify the errors made during accounting process.	Evaluating level (C5)
C206-8.5	Construct the final accounts and cash flow statement of a business	Creating (C6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Accounting	Meaning of Accounting, Objectives of Accounting, Understanding Company Management, Stakeholders versus Shareholders, Financial Reporting Standards, Financial Reporting	2
2.	Understanding Accounting Elements	Elements of Financial Statements- Assets, Current assets, Liabilities, Current liabilities, Equity, Income, Expenses, Accounting Equation	2
3.	Accounting Concepts	Business entity concept, Money measurement concept, Going concern, Consistency, Matching concept, Cost	2

		concept, Dual aspect concept, Materiality, Full disclosure, Generally Accepted Accounting Principles (GAAP)	
4.	Journal Transactions	Journal, Rules of Debit and Credit, Compound Journal entry, Opening entry	2
5.	Ledger Posting and Trial Balance	Ledger, Posting, relationship between Journal and Ledger, Rules regarding Posting, Trial balance	3
6.	Rectification of Errors	Different types of errors, their effect on trial balance, rectification and preparation of suspense account	5
7.	Bank Reconciliation Statement	Meaning of Bank Reconciliation Statement, technique of preparing BRS, Causes of difference	2
8.	Final Accounts	Trading account, Profit and Loss account, Balance sheet, Adjustment entries	6
9.	Cash Flow Statement	Introduction of Cash Flow Statement, Classification of Cash inflows and Cash Outflows Activities, prepare the statement of cash flows using direct and Indirect method	4
Total number of Lectures			28
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Project + Class test/Quiz +Class Participation)	
Total		100	

Project Based learning: Students form a group of 4-5 students. Each group is required to choose a company listed in Indian stock exchange and download its latest annual report. Students are required to describe the company, composition of board of directors, number of company's executives, independent directors, background of independent directors. They are required to find out financing, investing and operating activities and examines the change in total assets, sales and net profit of the company. As per auditor's report, company's position and future plans for growth of the company is also analyzed.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Maheshwari S. N., Financial and Management Accounting, 5 th Ed., S. Chand & Sons Publication, 2014. ISBN No.: 978-81-8054-529-0

2.	Ghosh, T.P., Financial Accounting for Managers, 4 th Ed., Taxmann Publications, 2009
3.	Tulsian, P., Financial Accounting, 1 st Ed., Pearson Education India, 2002
4.	Bhattacharya, A., Financial Accounting for Business Managers, 4 th Ed., Prentice Hall of India, 2012
5.	Weygandt, J., Kimmel, P., Kieso, D., Accounting Principles, 12th Edition, John Wiley & Sons, 2015
6.	Barton, M., Bhutta, P., S. O'Rourke, J., Satyam Computer Services Ltd: Accounting fraud in India, London, SAGE Publications Ltd, 2017,

Detailed Syllabus

Detailed Syllabus Lecture-wise Breakup

Course Code	15B1NHS433	Semester EVEN (specify Odd/Even)	Semester IV Session 2023-24	
Course Name	INTRODUCTION TO SOCIOLOGY			
Credits	3(2-1-0)	Contact Hours	3	
Faculty (Names)	Coordinator(s)	Prof Alka Sharma		
	Teacher(s) (Alphabetically)	Prof Alka Sharma		

COURSE OUTCOMES		COGNITIVE LEVELS
C206-7.1	Demonstrate an understanding of sociological perspectives and concepts.	Remembering (C1)
C206-7.2	Explain the concept of social stratification and types of stratification as class, caste and gender.	Understanding (C2)
C206-7.3	Apply the major sociological perspectives, social concepts and methods in the systematic study of society	Applying(C3)
C206-7.4	Analyze the relevance of various social Institutions and how it shapes and influences social interactions.	Analyzing (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Emergence of Sociology- forces and historical background, nature and scope, relationship with other social sciences, difference between common sense and sociology, Major sociological perspective and methods, the sociological imagination	5
2.	Basic Concepts of Sociology	Society, Culture, Groups, sub-groups, Communities, Association, Organization, social interaction and social structure: status and role	4

3.	Social stratification	Stratification-concept, theories and type. Basis of stratification caste, class, gender and race, status and Roles	4
4.	Sociology of Institutions	Kinship, Family ,Religion, Education &Economy in Society	5
5.	Process of Change and Mobility	Concept, theories and Agents of Social Change, Process of Social Change in Indian Society: Sanskritization, Westernization, Modernization, Urbanization	6
6.	Politics and Society	Power, Elite, Bureaucracy, Pressure groups, Political parties, nation, state and civil society, protest, agitation and Social Movements	4
Total number of Lectures			28
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20 (Project based)	
End Semester Examination		35	
TA		25 (Presentation, assignment, quiz and tutorial participation)	
Total		100	

Each student will be assigned a project based on primary data collection through in-depth interviews with their parents, grandparents and other relatives

Topic of the project the students will conduct a multidimensional analysis of their class with the Occupation, Education, Income, and Wealth variable, using their parents, grandparents, and themselves as examples to find out how do these variables relate to Social Class and social mobility? How has the Social Class of their family changed (or not) over the past three generations?

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1	Johnson, Harry M. <i>Sociology: a systematic introduction</i> . Routledge, 2013.
2	Rawat, H. K. <i>Sociology: basic concepts</i> . Rawat Publications, 2007.
3	Macionis, John J. <i>Society: the basics</i> . Pearson/Prentice Hall, 2009.

4	C. Wright. And Mills, <i>The Sociological Imagination</i> , Oxford: Oxford University Press, 1959.
5	Peter L Berger, <i>The Social Construction of Reality: a Treatise in the Sociology of Knowledge</i> . Garden City, New York: Anchor, 1966.
6	Conley and Dalton, <i>You May Ask Yourself: An Introduction to Thinking Like a Sociologist</i> , 2nd Ed, W. W. Norton & Company New York, 2011. ISBN: 0393935175 or 978-0393935172
7	Ballentine and Roberts, <i>Our Social World: Introduction to Sociology</i> , 4th Edition, Sage. 2013.
8	Robert Parkin and Linda Stone, (ed.). <i>Kinship and Family: An Anthropological Reader</i> , U.S.A.: Blackwell, 2000, selected chapters

Detailed syllabus
Lecture-wise Breakup

Subject Code	15B1NHS432	Semester: Even	Semester IV Session 2023-24
Subject Name	INTRODUCTION TO PSYCHOLOGY		
Credits	3	Contact Hours	(2-1-0)
Faculty (Names)	Coordinator(s)	Dr. Badri Bajaj	
	Teacher(s) (Alphabetically)	Dr. Badri Bajaj	

COURSE OUTCOMES		COGNITIVE LEVELS
C206-6.1	Demonstrate a basic understanding of different perspectives and concepts of psychology	Understanding (Level 2)
C206-6.2	Apply the concepts of psychology in day to day life	Applying (Level 3)
C206-6.3	Examine the different theoretical perspectives and models of psychology	Analyzing (Level 4)
C206-6.4	Develop solutions for problems related to psychology using appropriate tools/models	Creating (Level 6)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Introduction to Psychology	Definition, Nature, and Scope of Psychology; Approaches: Biological, Psychodynamic, Behaviorist, and Cognitive. Methods: Experimental, Observation and Case study; Fields of application.	3
2.	Basic Concepts	Person, Consciousness, Behavior and Experience, Perception and learning	5

3.	Memory	Process of Memory: Encoding, Storage, Retrieval; Stages of Memory: Sensory, Short term and Long term	3
4.	Motivation	Motives: Intrinsic and Extrinsic Frame Work, Theories of Motivation; Techniques of Assessment of Motivations; Frustration and Conflict.	3
5.	Emotions	Concept, Development, Expression, Theories of Emotions.	2
6.	Intelligence	Nature, Theories, Measurement and Approaches - Genetic and Environmental	3
7.	Personality	Nature, Approaches, Determinants and Theories; Techniques of Assessment: Psychometric and Projective Techniques.	5
8.	Psychology of Adjustment	Psychological Disorders: Anxiety, Stress, Depression; Psychotherapies.	4
Total:			28
Evaluation Criteria			
Components	Maximum Marks		
T1	20		
T2	20		
End Semester Examination	35		
TA	25 (Project, Assignment, Oral Questions)		
Total	100		

Project based learning: Students in a group will choose a research topic from the syllabi of psychology. Students will cover the following points to prepare project reports: Understanding of concept, related theories and perspectives; Describe the relevance of the chosen concept for personal growth; Discuss the application of chosen topic for your professional life; Elaborate the relevance of the topic at group level and societal level. Discussions on these practical aspects will enhance students' understanding & application of concepts of psychology in day to day life.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	R.A. Baron and G. Misra, Psychology, 5th Ed., Pearson, 2015
2.	S. Nolen-Hoeksema, B. L. Fredrickson, G. R. Loftus, and C. Luts, Introduction to Psychology, 16th Ed., Cengage Learning, 2014.
3.	S. K. Ciccarelli and G. E. Meyer, Psychology, Pearson, 5 th Ed., 2017.
4.	Clifford Morgan, Richard King, John Weisz, John Schopler, Introduction to Psychology, 7 th Ed., McGraw Hill Education, 2017.
5.	James W. Kalat, Introduction to Psychology, 9th Ed., Wadsworth Publishing; 2010
6.	Gregory Feist and Erika Rosenberg, Psychology: Perspectives and Connections, 5th Ed., McGraw-Hill Education, 2021

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B1NHS431	Semester : EVEN	Semester IV Session 2023-24
Course Name	Introduction to Literature		
Credits	3	Contact Hours	3 (2-1-0)

Faculty (Names)	Coordinator(s)	Dr. Monali Bhattacharya (Sector 62) & Dr. Ekta Srivastava (Sector 128)
	Teacher(s) (Alphabetically)	Dr. Ekta Srivastava , Dr. Monali Bhattacharya

COURSE OUTCOMES		COGNITIVE LEVELS
C206-5.1	Understand figurative language to demonstrate communication skills individually and in a group.	CL-2 Understanding
C206-5.2	Develop a critical appreciation of life and society through a close reading of select texts.	CL-3 Applying
C206-5.3	Analyse a literary text thematically and stylistically and examine it as representing different spectrum of life, human behavior and moral consciousness of society.	CL-4 Analysing
C206-5.4	To interpret Literature as reflection of cultural and moral values of life and society.	CL-5 Evaluating

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Literature & Genres	Introduction Literary Genres Literary Devices Learning Communication Skills through Literature	5
2.	Poems	On His Blindness: John Milton My Last Duchess: Robert Browning	6

		<p>“Hope” is the thing with feathers: Emily Dickinson</p> <p>A Prayer before Birth: Louis MacNeice</p> <p>Goodbye Party for Miss Pushpa T.S.: Nissim Ezekiel</p>	
3.	Prose & Short Stories	<p>The Spectator Club: Richard Steele</p> <p>Evidence: Isaac Asimov</p> <p>Toba Tek Singh: Saadat Hasan Manto</p>	6
4.	Plays & Drama	<p>Andher Nagari Chaupat Raja: Bhartendu Harishchandra</p> <p>The Characters of Macbeth & Lady Macbeth as Universal Characters.</p> <p>Arms & The Man: G B Shaw</p>	7
5.	Novel	To Sir With Love: E.R. Braithwaite	4
Total number of Lectures			28

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, Project, Class participation)
Total	100

Recommended Reading material:

1	M.H. Abrams, <i>'A Glossary of Literary Terms'</i> , 7 th Edition, Hienle & Hienle: Thomson Learning, USA, 1999
2	Mark William Roche, <i>'Why Literature matters in the 21st Century'</i> , First Edition, Yale University Press, 2004.
3	<p>E.R. Braithwaite, <i>'To Sir With Live'</i>, First Edition, Bodley Head, UK, 1959.</p> <p>Susie Thomas(Ed), "E. R. Braithwaite: 'To Sir, with Love' – 1959", Available at http://www.londonfictions.com</p>
4	Khalid Hasan (Translator), <i>'Saadat Hasan Maanto : Toba Tek Singh'</i> Reprint, Penguin Books, India, 2008.

5	G.B Shaw, 'Arms & The Man', Paperback, 2013 https://onemorelibrary.com/index.php/en/?option=com_djclassifieds&format=raw&view=download&task=download&fid=10428
6	Anon, (n.d.). <i>The Spectator Club. Sir Richard Steele. 1909-14. English....</i> [online] Available at: http://www.bartleby.com/27/7.html [Accessed 2018].
7	<i>All poems online: http://www.poetryfoundation.org</i>
8	Wolfgang Clemen, ' <i>Shakespeare's Soliloquies</i> ', First Edition, Routledge, London, 1987.

Probability and Random Processes (15B11MA301)

Conditional probability, Bayes theorem, random variables, probability and cumulative density functions, MGF and CF, joint, marginal and conditional distributions, probability distributions, Bernoulli, Binomial, Poisson, Negative binomial, Geometric distributions. Uniform, Exponential, Normal, Gamma, Erlang, Weibull distributions, reliability, MTTF, system reliability, random processes, averages, stationary processes, random walk, Wiener process, semi-random telegraph signal process, ergodic processes, PSDF, Poisson processes, Markov chains.

Course Description

Course Code	15B11MA301	Semester Even	Semester IV Session 2023-2024 Month from Jan 2024- May 2024
Course Name	Probability and Random Processes		
Credits	4	Contact Hours	3-1-0
Faculty (Names)	Coordinator(s)	Dr. Manish Kumar Bansal, Dr. Kamlesh Shukla	
	Teacher(s) (Alphabetically)	Dr. Bhagwati Prasad Chamola, Dr. Nisha Shukla, Dr. Aradhana Narang, Dr. Lakhveer Kaur, Dr. Kamlesh Shukla, Dr. Manish Kumar Bansal, Dr. Gaurav Agarwal, Dr. Shikha Pandey, Dr. Shashank Goel, Dr. Amita Bhagat, Dr. Sarfraz, Dr. Neha Ahlawat	
COURSE OUTCOMES:			COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:			
C201.1	recall the concepts of probability theory and probability distributions.	Remembering Level (C1)	
C201.2	explain random variables, probability distributions and reliability models.	Understanding Level (C2)	
C201.3	solve the problems concerning random variables, their distributions, reliability models and random processes.	Applying Level (C3)	
C201.4	examine random process models and solve the related problems.	Analyzing Level (C4)	
Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Probability	Three basic approaches to probability, conditional probability, total probability theorem, Bayes' theorem.	5

2.	Random Variables	One dimensional random variables (discrete and continuous), distribution of a random variable (density function and cdf). MGF and characteristic function of a random variable and its utility. Bivariate random variable, joint, marginal and conditional distributions, covariance and correlation.	8
3.	Probability Distributions	Bernoulli, binomial, Poisson, negative binomial, geometric distributions. Uniform, exponential, normal, gamma, Erlang and Weibull distributions.	8
4.	Reliability	Concept of reliability, reliability function, hazard rate function, mean time to failure (MTTF). Reliability of series, parallel, series-parallel, parallel-series systems.	6
5.	Random Processes I	Introduction, Statistical description of random processes, Markov processes, processes with independent increments. Average values of random processes. Strict sense and wide sense stationary processes, their averages. Random walk, Wiener process. Semi-random telegraph signal and random telegraph signal process. Properties of autocorrelation function.	7
6.	Random Processes II	Ergodic processes. Power spectral density function and its properties. Poisson processes. Markov chains and their transition probability matrix (TPM).	8
Total number of Lectures			42
Evaluation Criteria			
Components		Maximum Marks	
T1		20	
T2		20	
End Semester Examination		35	
TA		25 (Quiz, Assignments, Tutorials)	
Total		100	
Project based learning: Each student in a group of 4-6 will apply the concept of probability distributions of random variables and reliability models arising in different real-life situations.			
Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)			
1.	Veerarajan, T., Probability, Statistics and Random Processes, 3 rd Ed. Tata McGraw-Hill, 2008.		
2.	Papoulis, A. & Pillai, S.U., Probability, Random Variables and Stochastic Processes, Tata McGraw-Hill, 2002.		

3.	Ross, S. M. , Introduction to Probability and Statistics for Engineers and Scientists, 4th Ed., Elsevier, 2004.
4.	Palaniammal, S. , Probability and Random Processes, PHI Learning Private Limited, 2012.
5.	Prabha, B. and Sujata, R. , Statistics, Random Processes and Queuing Theory, 3rd Ed., Scitech, 2009.