Jaypee Institute of Information Technology

B.Tech. Biotechnology

Semester IV

Course Descriptions

Detailed Syllabus
Lecture-wise Breakup

Course Code	**15B1NHS431**	**Semester : EVEN**	**Semester** IV **Session** 2019-2020 **Month from** January to June
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 "Hope" is the thing with feathers: Emily Dickinson A Prayer before Birth: Louis MacNeice Goodbye Party for Miss Pushpa T.S.: Nissim Ezekiel	6
3.	Prose & Short Stories	The Spectator Club: Richard Steele Evidence: Isaac Asimov Toba Tek Singh: Saadat Hasan Manto	6
4.	Plays & Drama	AndherNagariChaupat Raja: BhartenduHarishchandra	7

		The Characters of Macbeth & Lady Macbeth as Universal Characters. Arms & The Man: G B Shaw	
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, Seminar/Presentation, Oral Questions)
Total	**100**

Recommended Reading material:

1	M.H. Abrams, *'A Glossary of Literary Terms'*, 7th Edition, Hienle&Hienle: Thomson Learning, USA, 1999
2	Mark William Roche, *'Why Literature matters in the 21st Century'*, First Edition, Yale University Press, 2004.
3	E.R. Braithwaite, *'To Sir With Live'*, First Edition, Bodley Head, UK, 1959. Susie Thomas(Ed), "E. R. Braithwaite: 'To Sir, with Love' – 1959", Available at http://www.londonfictions.com
4	Khalid Hasan (Translator), *'Saadat Hasan Maanto : Toba Tek Singh'* 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.). *The Spectator Club. Sir Richard Steele. 1909-14. English....* [online] Available at: http://www.bartleby.com/27/7.html [Accessed 2018].
7	*All poems online: http://www.poetryfoundation .org*
8	WolfgangClemen, '*Shakespeare's Soliloquies'*, First Edition, Routledge, London, 1987.

Detailed syllabus
Lecture-wise Breakup

Subject Code	**15B1NHS432**	**Semester: Even**	**Semester IVSession 2019-2020** **Months from** January to June
Subject Name	**INTRODUCTION TO PSYCHOLOGY**		
Credits	**3**	**Contact Hours**	**(2-1-0)**
Faculty (Names)	**Coordinator(s)**	Dr. Badri Bajaj and Dr. RuchiGautam	
	Teacher(s) (Alphabetically)	Dr. Badri Bajaj Dr. RuchiGautam	

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Demonstrate a basic understanding of different perspectives and concepts of psychology	Understanding (Level 2)
CO2	Apply the concepts of psychology in day to day life	Applying (Level 3)
CO3	Examine the different theoretical perspectives and models of psychology	Analyzing (Level 4)
CO4	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 (Assignment, Quiz, Oral Questions)
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.	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, 5th Ed., 2017.

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B1NHS434	**Semester:** Even	**Semester** IV **Session** 2019 -2020 **Month from** January to June
Course Name	Principles of Management		
Credits	**3**	**Contact Hours**	2-1-0

Faculty (Names)	**Coordinator(s)**	Dr. Shirin Alavi
	Teacher(s) (Alphabetically)	Dr. Shirin Alavi

COURSE OUTCOMES		**COGNITIVE LEVELS**
C303-1.1	Describe the functions, roles and skills of managers and illustrate how the manager's job is evolving.	Understanding Level (C2)
C303-1.2	Examine the relevance of the political, legal, ethical, economic and cultural environments in global business.	Analyzing Level (C4)
C303-1.3	Evaluate approaches to goal setting, planning and organizing in a variety of circumstances.	Evaluating Level (C5)
C303-1.4	Evaluate contemporary approaches for staffing and leading in an organization.	Evaluating Level (C5)
C303-1.5	Analyze contemporary issues in controlling for measuring organizational performance.	Analyzing 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, Structures and techniques organizations use as they go international .	7
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	7

		Delegation of Authority Versus, Staffing, Managerial Effectiveness.	
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.	4
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**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Project, Class Test, Attendance)
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.	Koontz H, Weihrich H. Essentials of management: an international, innovation, and leadership perspective. McGraw-Hill Education; 10th Edition 2018.
2.	Tripathi PC. Principles of management. Tata McGraw-Hill Education; 6th Edition 2017.
3.	Principles of Management Text and Cases, Pravin Durai , Pearson ,2015
4.	Robbins, S.P. &Decenzo, David A. Fundamentals of Management,7th ed., Pearson, 2010
5.	Robbins, S.P. & Coulter, Mary Management; 14 ed.,Pearson , 2009

Detailed Syllabus
Lecture-wise Breakup

Course Code	**15B1NHS435**	**Semester Odd** **(specify Odd/Even)**	**Semester IV Session** 2019 - 2020 **Month from** January to June
Course Name	Financial Accounting		
Credits	3	**Contact Hours**	3 (2,1,0)

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

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 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	3
2.	Understanding Accounting Elements	Elements of Financial Statements- Assets, Current assets, Liabilities, Current liabilities, Equity, Income, Expenses, Accounting Equation	4
3.	Accounting Concepts	Business entity concept, Money measurement concept, Going concern, Consistency, Matching concept, Cost concept, Dual aspect concept, Materiality, Full disclosure Generally Accepted Accounting Principles (GAAP)	4
4.	Journal Transactions	Journal, Rules of Debit and Credit, Compound Journal entry, Opening entry	5

5.	Ledger Posting and Trial Balance	Ledger, Posting, relationship between Journal and Ledger, Rules regarding Posting, Trial balance	5
6.	Rectification of Errors	Different types of errors, their effect on trial balance, rectification and preparation of suspense account	3
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	2
		Total number of Lectures	**28**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz + Class test +Class Participation)
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.	**Text Books:** **Maheshwari S. N., Financial and Management Accounting, 5th Ed., S. Chand & Sons Publication, 2014. ISBN No.: 978-81-8054-529-0**
2.	**Reference Book:** **Ghosh, T.P., Financial Accounting for Managers, 4th Ed., Taxmann Publications, 2009**

Detailed Syllabus

Course Code	**15B11BT312**	**Semester :** Even	**Semester:** IV **Session:** 2019-2020 **Month from:** January to June
Course Name	Microbiology		
Credits	3-1	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Dr. Smriti Gaur
	Teacher(s) (Alphabetically)	Dr.GarimaMathur Dr.Smriti Gaur

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Explain history and scope of microbiology	**(C2)**
CO2	Summarize Microbial taxonomy and different forms of microorganisms	**(C2)**
CO3	Apply the concept of microbial nutrition, growth and control methods	**(C3)**
CO4	Identify the microbial metabolism, gene transfer methods and host pathogen interaction	**(C3)**
CO5	Examine the suitability of microorganism for industrial applications	**(C4)**

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
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 media and types (simple, complex, enriched, enrichment, selective & differential), replica plating techniques, preservation techniques ,growth of microorganisms, control of microbes	**6**
5.	Microbial metabolism	Photosynthetic mechanisms, CO_2 fixation mechanisms, fermentation, anaerobic respiration.	**6**
6.	Microbial genetics	Conjugation, Transformation, Transduction	**5**
7.	Host-pathogen	Defense mechanisms against microbes, Pathogenic microbes:	**7**

	interactions	Bacteria: (Pneumonia, Tuberculosis), Fungi: (Mycoses), Virus: (HIV), Protozoa (Malaria);	
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 (presentation, class test)
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.	M. J. Pelczar, E. C. S. Chan and N. R. Krieg. *Microbiology: Concepts and Applications.* 5th edition, India: Tata McGraw Hill, 2012.
2.	G. J. Tortora, B. R. Funke and C. L. Case. *Microbiology: An Introduction*, 13th Edition. San Francisco, USA: Pearson/Benjamin Cummings, 2019.
3.	L. M. Prescott, J. P. Harley and D. A. Klein. *Microbiology*, 10thedition. New York, USA: McGraw Hill, 2016.
4.	D.R. Arora and B.B. Arora. *Textbook of Microbiology*, New Delhi CBS Publishers and Distributors, 2016

Detailed Syllabus
Lecture-wise Breakup

Course Code	**15B11BT313**	**Semester** Even	**Semester: III Semester Session** 2019 -2020 **Month from:**January to June
Course Name	**Genetics and Developmental Biology**		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Dr. Sonam Chawla
	Teacher(s) (Alphabetically)	Dr. Sonam Chawla Dr. Priyadarshini

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

Module 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**	I. Cell – The unit of life, Cell cycle and its regulation II. Chromosomes and abnormalities III. Specialized Chromosomes IV. DNA - the hereditary material, Genetic code, Genotype and Phenotype	**06**
2.	Principles of Inheritance:Mendelism	I. Inheritance of characters/genes from parents to offspring II. Mendelian laws of inheritance: Genes and Alleles	02
3.	Principles of Inheritance:Beyond Mendelism and Extra-chromosomal	III. BeyondMendelism:Lethal and Multiple alleles, Gene-gene interaction, Pleiotropism, Penetrance and expressivity, IV. The Chromosome Theory of Heredity Extra-chromosomal inheritance: Overview of Mitochondrial and Chloroplast Genome	06
4.	Linkage & crossing-over	The Discovery of Linkage, Linkage &Recombination, Calculating Recombinant Frequencies, Linkage maps	04
5.	Population	I. Molecular Basis of Mutation and Recombination, their	06

	Genetics	role in Evolution, Somatic vs. germinal Mutation, Gene Mutations, Darwin's Revolution: Variation and Its Modulation, Sexual Reproduction and Variation, Polymorphism Behaviourof gene/genesin a population: Gene pool, Gene and genotype frequencies, Evolutionary forces in action: Migration, Recombination, Genetic drift Hardy-Weinberg Equilibrium	
6.	Sex determination	Sex determination and dosage compensation, Sex chromosomes in human	02
7.	Introduction to early developmental process & developmental mechanics of cell specification	Fertilization, Cleavage, gastrulation, axis formation and fate map. Autonomous Specification, Conditional specification, Syncytial specification, Mosaic and regulative development,	04
8	Early development: Invertebrates, Vertebrates and Plant embryo	I. Patterning and Axis specification in Xenopus II. Gastrulation in fish, Bird &*Mus musculus* III. Shoot and root meristem and leaf development	06
9	Organogenesis	Development of tetrapod limb, heart	04
10	Human Birth defects and genetic disorders	Discussion on various Human disorders, Symptoms and causes	2
		Total number of Lectures	**42**

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**

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.	Griffiths et al. *An Introduction to Genetic Analysis*, Ninth Edition ,2007, W. H. Freeman
2.	L.H. Hartwell et al.*Genetics: from Genes to Genomes*, 2nd Edition, 2004, McGraw-Hill
3.	J.D. Watson , A.B. Tania and P.B.Stephen, *Molecular Biology of the Gene*, 7th Edition, 2017, Pearson Education.
4.	E J Gardner, M J Simmons and D P Snustad, *Principles of Genetics*, 8th Edition, 2008, John Wiley and

	Sons. New York.
5.	Lewin, *Genes XII*,12t^{h} Edition, 2018, Prentice Hall.
6.	Daniel L. Hartl and Andrew G. Clark, *Principles of Population Genetics*, 4rd Edition, 2006, Sinauer Associates
7.	L. Wolpert, *Principles of Development*, 4th Edition, 2011, Oxford University Press.
8.	S.F. Gilbert, *Developmental Biology*,7th Edition, 2003, Snaeur Associates Inc.(eBook available)

Detailed Syllabus
Lab-wise Breakup

Course Code	**15B17BT373**	**Semester** EVEN	**Semester:**IV **Session** 2019 -2020 **Month from:**January to June
Course Name	Genetics and Developmental Biology Lab		
Credits	1	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Prof. Sujata Mohanty
	Teacher(s) (Alphabetically)	Dr. Manisha Singh, DrShalini Mani, Prof. Sujata Mohanty

COURSE OUTCOMES		**COGNITIVE LEVELS**
C272.1	Understand the different stages of cell division	Level 2 (Understand)
C272.2	Interpret the inheritance of human genetic traits.	Level 2 (Understand)
C272.3	Make use of Drosophila as model organism in genetics studies.	Level 3 (Applying)
C272.4	Compare the developmental stages of different organisms.	Level 4 (Analyze)

Module No.	**Title of the Module**	**List of Experiments**	**COs**
1.	Cell architecture and Division	Observation of cells undergoing mitotic phases of cell division, using permanent slides	**C272.1**
		Observation of cells undergoing meiotic phases of cell division using permanent slides	**C272.1**
		Calculating the mitotic index from onion root tip	**C272.1**
2.	Genotype vs. Phenotype	Introduction to Genetic model Drosophila, Study of life cycle,	**C272.3**
		Wild and mutant strains of Drosophila	**C272.3**
3.	Specialised Chromosome	Cytogenetic preparation of polytene chromosome	**C272.3**
		Study of banding pattern and puff region, distinguishing hetero and euchromatic region	**C272.3**
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	**C272.2**
		Study of inheritance pattern of common human genetic traits	**C272.2**
5.	Reproductive system	Dissection of reproductive organs in plants, pollen germination and pollen tube observation	**C272.4**
		Dissection of reproductive organs in Drosophila, No. of ovariole and sperm count	**C272.4**
6.	Development	Permanent slides of various stages of frog and chick embryo development.	**C272.4**

Evaluation Criteria	
Components	**Maximum Marks**
Mid Term lab exam	20
End term lab exam	20
Day to Day	60
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.	Monroe W Strickberger, *Genetics (IIIrd edition*), Prentice Hall, 2004.
2.	Love, Alan, "Developmental Biology", *The Stanford Encyclopedia of Philosophy* (Spring 2020 Revised Edition), Edward N. Zalta (ed.)
3	M Demerec, *Biology of Drosophila*, Cold Spring Harbour laboratory Press, 1994.
4	Christopher Blair, Genetics Laboratory Manual CUNY New York City, CUNY Academic Works,2018
	B N Behera, *Genetics through Problems*, Sarup and Sons, 2004
5.	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 (specify Odd/Even)**	**Semester:**IV **Session** 2019-2020 **Month from:**January to June
Course Name	Introduction to Bioinformatics		
Credits	4	**Contact Hours**	**LTP 3 1 0**

Faculty (Names)	**Coordinator(s)**	DrShaziaHaider
	Teacher(s) (Alphabetically)	DrShaziaHaider

COURSE OUTCOMES		**COGNITIVE LEVELS**
C213.1	Summarize biological databases, storage and retrieval methods, file formats	Remembering(C1)
C213.2	Explain Bioinformatics resources, computational tools and associated algorithms	Understand Level (C2)
C213.3	Apply the bioinformatics concepts in genomics, proteomics and Drug discovery.	Apply Level(C3)
C213.4	Analyze evolutionary tree to understand evolutionary genetics	Analyze Level(C4)
C213.5	Compare sequence alignment tools to predict structures & 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, submission and analysis)	String comparison (substring, subsequences) , Hamming and Levenshtein distance, Sequence alignment (pair wise, multiple) Dot plot method, Dynamic programming, Needleman–Wunsch *and* Smith–Waterman algorithm, BLAST algorithm ,FASTA algorithm comparison, PSI blast, gap penalty, e-value, statistical importance, PAM and BLOSUM matrices, log odd score, Sequence submission	10

		tools (Banklt, 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, Phyloegenetic 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 Phylogenic Reconstruction, Biological inferences.	5
7.	Tools for proteome studies	AAcompldent, 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

Subject Code	**15B11HS111**	**Semester: EVEN**	**Semester: IV Session 2019-2020** **Month from:**January to June
Subject Name	**LIFE SKILLS**		
Credits	**2(1-1-0)**	**Contact Hours**	**2**
Faculty (Names)	**Coordinator(s)**	Dr. Santosh Dev and Dr. Praveen Sharma	
	Teacher(s) (Alphabetically)	Dr.AkarshAroro,Dr. Amandeep, Dr. Kanupriya, Dr Praveen Sharma, Ms. PuneetPannu, Dr. Santosh Dev	

COURSE OUTCOMES: The students will be able to:		**COGNITIVE LEVELS**
C209.1	Understand Life Skill required to manage self and one's environment	Understand (C2)
C209.2	Apply comprehensive set of skills for life success for self and others	Apply (C3)
C209.3	Analyze group dynamics for its effective functioning	Analysing (C4)
C209.4	Evaluate the role of women leadership and gender issues	Evaluate (C5)

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Lectures for the module**
1.	Introduction	Introduction to Life Skills; basic Concepts and Relevance for Engineers	1
2.	Individual-1	Emotional Intelligence, Stress Management, Goal Setting	4
3.	Individual-II	Personality, Values and Attitudes, Assertiveness, Well being,	3
4.	Group Dynamics	Group, Group types, Group Relationship, Social Loafing, Social Facilitation	3
5.	Women Leadership	Gender Sensitization, Women Leadership.	3
Total number of Hours			14

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, Presentatons and class participation)
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.	Stephen P. Robbins, Organizational Behaviour, 9th Edition, Prentice-Hall India 2001
2.	Smith, E., Hoeksema, S., Fredrickson, B., & Loftus, G. Introduction to Psychology. Thompsons and Wadsworth Co, 2003
3.	Daniel Goleman, Working With Emotional Intelligence, Bantom Books 1998
4.	Sue Bishop, Assertiveness Skills Training, Viva Books, New Delhi, 2004
5.	Adele B. Lynn 50 Activities for Developing Emotional Intelligence, Ane Books, 2003
6.	SivasailamThiagarajan, Glenn M. Parker; Teamwork and Teamplay, Games and Activities for Building and Training Teams., Jossey-Bass, 1999
7.	Kaul A.& Singh M., *"New Paradigms for Gender Inclusivity*", PHI Pvt Ltd (2012

Detailed Syllabus
Lab-wise Breakup

Course Code	**15B17BT372**	**Semester** Even **(specify Odd/Even)**	**Semester: IV Session** 2019 -2020 **Month from:** January to June
Course Name	Microbiology Lab		
Credits	1	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	DrRachana
	Teacher(s) (Alphabetically)	Prof Krishna Sundari, Prof NeerajWadhwa, Dr. Priyradarshini, DrRachana, DrSmritiGaur,DrVibha Gupta.

COURSE OUTCOMES		**COGNITIVE LEVELS**
C372.1	Understand media preparation and sterilization techniques.	**(C2)**
C372.2	Understand culturing sub culturing.	**(C2)**
C372.3	Apply basic microbiological techniques to characterize microbes	**(C3)**
C372.4	Analyze enumeration techniques for microorganism and estimation of antimicrobial activity.	**(C4)**

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	Preparation of plates (pouring of culture media).	**C372.1**
3.	Culturing sub culturing.	To learn different methods of Streaking.	**C372.2**
4.	Culturing sub culturing.	Miniaturized assay for growth curve of bacteria and calculation of generation.	**C372.2**
5.	Culturing sub culturing..	Preparation of plates (pouring of culture media).	**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 voce	20
End term viva voce	20
Day to day evaluation	20
Attendance	10
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.	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	Rompre 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

Lab-wise Breakup

Course Code	15B17BT471	**Semester Even**	**Semester:**IV **Session** 2019-2020 **Month from:**January to June
Course Name	Bioinformatics Lab		
Credits	**1**	**Contact Hours**	**LTP 0 0 2**

Faculty (Names)	**Coordinator(s)**	DrChakresh Kumar Jain
	Teacher(s) (Alphabetically)	DrChakresh Kumar Jain, Dr. ShaziaHaider

COURSE OUTCOMES		**COGNITIVE LEVELS**
C273.1	Outline various computers hardware, operating system databases, storage and retrievals, file formats.	Understand Level (C2)
C273.2	Apply the bioinformatics tools in homology search, genome annotation, repeat masking, gene prediction, promoter analysis.	Understand Level (C2)
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 and its resources	**CO1**
2.	Bioinformatics Resources and databases	To use literature mining tool such as PubMed, Google Scholar & Citation Manager	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	Study the repeats, invert sequences and sequence alignment using alignment tools (Dotplot).	CO3

7.	Genomics	Global and Local alignment of two sequences using Needle N and Smith Waterman algorithm.	CO3
8.	Genomics	To perform pairwise and multiple sequence alignment using CLUSTAL W and BLAST.	CO3
9.	Genomics	To study the physiochemical properties of the residual sequences using computational method/Tools Prot-Param, CATH, Pfam.	CO4
10.	Phylogenetic	To find the evolutionary relationship and analyze changes in an organisms using PHYLIP.	CO3
11.	Proteomics	To perform structure modelling using Swiss Model	CO4
12.	Proteomics	To perform advance proteomics based (Mass spectrometry) experiment using computational tools.	CO4
13.	Proteomics and structural biology	To perform macromolecular structural analysis using RASMOL/ SWISS PDB viewer	CO5

Evaluation Criteria

Components	**Maximum Marks**
Mid Term Exam/Viva	20
End Term Exam/Viva	20
D2D (Report/Attendance/Experiment)	60
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.	**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.

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NHS332	**Semester : ODD (specify Odd/Even)**	**Semester:** IV **Session** 2019 -2020 **Month from:** January to June
Course Name	Quantitative Methods for Social Sciences		
Credits	**03**	**Contact Hours**	**2-1-0**

Faculty (Names)	**Coordinator(s)**	ManasRanjanBehera
	Teacher(s) (Alphabetically)	ManasRanjanBehera

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C206-3.1	*Demonstrate* the key concepts of different quantitative methods used in social sciences.	Understanding Level- (C2)
C206-3.2	*Classify and summarize the* data to be used for analysis.	Understanding Level- (C2)
C206-3.3	*Apply* the theoretical concept toperform basic data analysis in social sciences.	Apply Level –(C3)
C206-3.4	*Examine* different statistical methods and be able to discuss the merits and limitations of a particular method	Analyze Level –(C4)
C206-3.5	*Recommend* appropriate conclusions following empirical analysis	Evaluation Level- (C5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Introduction to Quantitative Methods, Classification & Presentation of Data: Tabulation-Types of Table, Diagrammatical and Graphical presentation.	3
2.	Mathematical Concepts	Mathematical basis of Managerial Decision-Concepts, Frequency Distribution and their Analysis	3
3.	Statistical Concepts	Measures of Central Tendency, Measures of Dispersion, Measures of Association, Sampling and sample size estimation, Point estimation, Statistical Intervals based on Single sample.	4
4.	Hypothesis Testing	Hypothesis Testing based on single sample, Inferences based on Two samples, t, Z and chi- square and F tests	8

5.	Regression Analysis	Simple Linear Regression and Correlation, Multiple Regression Model	3
6.	Time Series Analysis	Trend Projection, Moving averages and Exponential smoothing Techniques, Index Numbers	3
7.	Multivariate Analysis	ANOVA, MANOVA, Factor Analysis, Discriminant Analysis	4
		Total number of Lectures	**28**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz+ Assignment+Viva-voce)
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.	Sirkin, RM. Statistics for the Social sciences. 3rd ed. Thousand Oaks, Calif: Sage Publications; 2006.
2.	Montgomery, DC. , George C. Runger. Applied statistics and probability for engineers. 3rd ed. Hoboken, NJ: Wiley.,2007
3.	Healey, JF. Statistics: A Tool for Social Research. 9th ed. Calif: Wadsworth Cengage Learning; 2012.

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NHS431	Semester **Even** (specify Odd/Even)	**Semester: IV Session 2019-20** **Month from:**January to June
Course Name	HUMAN RESOURCE MANAGEMENT		
Credits	3(LTP: 2-1-0)	**Contact Hours**	3

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

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	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)
CO2	Apply various tools and techniques in making sound human resource decisions.	Apply level (C3)
CO3	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)
CO4	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**

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.	VSP Rao, Human Resource Management: Text and Cases, Excel Books, 2002, 2nd Edition
2.	K. Aswathappa, Human Resource Management: Text and Cases, 8th Edition, Published by Mc Graw-Hill
3.	Dessler, Gary and Varkkey, Biju., Human Resource Management, 14th Edition published by Pearson Education Ltd. 2017