Jaypee Institute of Information Technology

INTEGRATED M. TECH BIOTECHNOLOGY

Course Descriptions

SEMESTER 7

Course Code	10B1NBT735	Semester Odd	Semester 7th Session Month from July- Dec
Course Name	**Enzymes in food processing**		
Credits	3-0-1	**Contact Hours**	3+1
Faculty (Names)	**Coordinator(s)**	Prof. Neeraj Wadhwa	
	Teacher(s) (Alphabetically)	Neeraj Wadhwa	

COURSE OUTCOMES		COGNITIVE LEVELS
C431-2.1	Explain role of various enzymes in food processing	**Understand Level (C2)**
C431-2.2	Identify need for Technical enzymes	**Apply Level (C3)**
C431-2.3	Examine recent technology in Food processing Industries	Analyze Level (C4)
C431-2.4	List quality assurance protocol and economic consideration.	Analyze Level (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	General characteristics of Technical Enzymes	Enzyme analysis, technical Enzyme units Enzyme kinetics principles of enzyme assay and kinetic studies; techniques for enzyme extraction; high- throughput screening; statistical analysis of enzyme kinetic data; and relevance of active sites any one example .	4
2.	Description of Enzymes and their substrates	Carbohydrate Hydrolyzing Enzymes – amylases, cellulase, Hemicellulases, Isomerase, Pectin degradation	4
3.	Description of Enzymes and their substrates	Proteases: Plant, animal, microbial, Fat hydrolysis: Lipases , Phospholipases	4
4.	Application of Enzymes Preparation	Enzyme in Starch and Sugar Industry , Enzyme in Brewing Industry , Analytical monitoring of mashing Process, Cold stabilization Enzymatic Alcohol production - continuous process	6
5.	Commercial enzyme production,	Beverage Industry, Enzymes in Juice and	4

	and the processing	Wine making	
6.	Flour processing	Enzyme in Flour Processing and Baking – Flour component and enzymes	4
7.	Dairy Industry	Enzymes in Dairy Industry, cheese making and ripening aroma and flavor production, cold sterilization, Enzymes in product modification.	4
8.	Proteolysis	Debittering, Hydrolysis of Soy protein, fish protein, Milk protein, collagen, Blood protein	4
9.	Nutrition	Silage enzymes, Additives in fodder, Chicken feed, Pig husbandry,	4
10.	Legal and economic consideration	Regulatory requirements for enzyme preparation Economic consideration for the use of technical enzymes.	4
		Total number of Lectures	42

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment)
Total	**100**

Project Based Learning; Students 3 to 4 will form a group and pick up any food processing Industry. They will submit a technical and economic feasibility report which will focus on choice of technology, methodology of converting raw material to finished product, its storage, application .of technical food processing enzyme as well as report the projected sales revenue underlying cost and estimated profit.

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.	N. Tilak, T.Steve & R. Gerald, Enzymes in Food Processing 3rd Edition, USA: Academic Press, 1993.
2.	J.W. Robert. & V.O.Maarten *Enzymes in Food Technology*: John Wiley and Sons: 2009.

3.	U. Helmut,*Industrial enzymes and their applications* 3rd Edition, John Wiley and Sons: 1998.
4.	W.S. Dominic, *Food enzymes: structure and Mechanism, Chapman*&Hall, USA: 1995.
5.	E. Robert, D.J. Michael ,*Enzyme assays:* a practical approach, Oxford University Press: 2002
6.	P. S. Panesar, S. Marwaha, H.C.Chopra, *Enzymes in Food Processing Fundamentals and Potential Applications* , I.K. International Publishing House Pvt Ltd , 2010

Course Code	17B1NBT731	Semester : ODD	Semester: VII Session: Month from: **July**		
Course Name	Food biotechnology				
Credits	4		**Contact Hours**	4	
Faculty (Names)	**Coordinator(s)**	Dr. Smriti Gaur			
	Teacher(s) (Alphabetically)	Dr. Smriti Gaur			

COURSE OUTCOMES		COGNITIVE LEVELS
CO1	Explain fundamental principles of food science and chemistry.	**C2**
CO2	Outline beneficial and harmful effects of microorganisms related to food	**C2**
CO3	Utilize microbes for development of functional food	**C3**
CO4	Examine methods that increase shelf life and quality parameters of food	**C4**

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Food Science and Food Chemistry	Food Science and Food Chemistry Concepts, Proteins in food, Lipids in food, Carbohydrates in food, Vitamin and minerals, food flavors and colors.	08
2.	Food Fermentations	Microbiology of fermented food products, traditional fermented food items like beverages (cereal and fruit juice based), bakery, fermented Vegetables and dairy products	06
3.	Food Processing and Preservation	Food spoilage and food borne diseases, Principles of food preservation – methods of preservation; irradiation, drying, heat processing(high temperature), chilling and freezing(low temperature),preservation by food additives	10
4.	Functional Foods	Single Cell Protein, Probiotics and prebiotics, Yeast as a food supplement.	06
5.	Processed Food Industry	Enzymes in food industry, Current status of Indian processed food industry, key challenges	06
6.	Food safety and control	Food adulteration, Food safety regulations, Good manufacturing practices – HACCP, Regulations, GMO and GM Foods. International rules and regulations in	06

		export and import.			
		Total number of Lectures	42		

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (presentation and viva)
Total	**10**

Project based learning: Each student in a group of 2 will opt a food industry. They will discussthe various products manufactured by the industry, product processing, manufacturing applications, market information, job prospects etc. This will enhance the student's understanding about various food industries. This would help their employability into the food sector.

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.	Food Science & Food Biotechnology, G.F.G Lopez and GVB Canovas CRC Press, Florida(2003)
2.	Bioprocess and Biotechnology for functional foods and Nutraceuticals, J.R Neeser , J.Bruce German Marcel and Dekker , New York (2004)
3.	Food Microbiology, Frazier W C, Westoff DC, Vanitha NM, Mc Graham Hill Education (2013)
4.	Essentials of food science by. Vaclavik VA and Elizabeth WC., Springer (2008)
5.	Food processing and preservation by Sivasankar B., PHI Private Limited (2008)

Course Code	15B1NBT832	Semester Odd (specify Odd/Even)	Semester VIII Session Month from July to December
Course Name	Biostatistics and Its applications		
Credits	4	Contact Hours	4
Faculty (Names)	Coordinator(s)	Dr Shalini Mani	
	Teacher(s) (Alphabetically)	Dr Shalini Mani	

COURSE OUTCOMES		COGNITIVE LEVELS
C430-3.1	Explain the various statistical methods to design a biological studies and data representation.	Understanding (Level 2)
C430-3.2	Apply different statistical methods and approaches to study the significance of a study.	Apply (Level 3)
C430-3.3	Examine the relationship between different parameters of a study.	Analyze (Level 4)
C430-3.4	Choose appropriate statistical methods, tools and resources including prediction, validation and evaluation of the biological studies.	Evaluate (Level 5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Application and use of Biostatistics as a science, scope.	1
2.	Study design in various fields of research	general principles of study design and its implications for valid inference	1
3.	Sampling theory	Sampling scheme, simple/ systematic/ stratified/ cluster sampling, Sources of data collection	2
4.	Data presentation	Graphical, tabular, Mathematical, finding the central tendency, measure of variations	3
5.	Overview of different statistical methods used in the field of biological	Hypothesis testing, T-test, Chi square test, ANOVA, Sign Test, Wilcoxon Signed Rank Test, Wilcoxon Rank Sum Test, odds ratio, Binomial/normal/Poisson distribution of probabilities, determination of power of study	12

	sciences.	and sample size calculation, regression analysis, correlation analysis,	
6.	Analysis of data source	Assess data sources and data quality for the purpose of selecting appropriate data for specific research questions	4
7.	Selection of statistical methods	Identifying the appropriate statistical methods to be applied in a given research setting, applying the selected methods and analysis.	4
8.	Application of Biostatistical analysis.	Designing various studies of medical/ health/ Microbial/Agricultural/Genetics/Pharamaceutical science related studies. Data analysis using different methods Result interpretation	7
9.	Case studies	Based on various research studies and systematic reviews.	4
10.	SPSS, Stats at the bench	Introduction to SPSS, Entering data in SPSS editor. Solving the compatibility issues with different types of files. SPSS and working with descriptive statistics.	4
Total number of Lectures			**42**

Evaluation Criteria

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

Project Based learning: Students will learn to represent the data of various fields using various statistical methods. Students will also be able to select the appropriate statistical tool for analysis of different data set and interpret the outcome of any study.

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.	Marcello Pagano, Kinberlee Gauvreau, Principle of Biostatistics.

2.	Stephen W Looney, Biostatistical methods, Humana Press
3.	Alan J Cann, Maths from Scratch for Biologist, John Willey and Sons Limited Press.
4.	M Bremer, R W Doerge, Statistics at the Bench, Cold Spring harbor Lab Press.
5.	B K Mahajan, Methods in Biostatistics, VII edition, Jaypee Bothers Medical Publishers, 2010.

Course Code	**17B1NBT734** ELECTIVE	Semester Odd	**Semester VII Semester Session** 2021-20 22
			Month from July to December
Course Name	Stem Cells and Health Care		
Credits	4	**Contact Hours**	4
Faculty (Names)	**Coordinator(s)**	Prof. Sujata Mohanty	
	Teacher(s) (Alphabetically)	Prof. Sujata Mohanty	

COURSE OUTCOMES		COGNITIVE LEVELS
C430-1.1	Compare the unique properties of stem cells derived from different sources	Understand Level (C2)
C430-1.2	Select niche and various isolation and reprogramming methods of stem cells	Apply Level (C3)
C430-1.3	Apply the acquired knowledge in Regenerative medicines	Apply Level (C3)
C430-1.4	Analyze the guidelines, political and ethical issues for stem cell research	Analyze Level (C4)

Modu le No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to	Stem cells: the promising field of research, Unique Properties: Self-renewal, Potency and proliferation 2 Asymmetric Cell Division, History ofStem Cells	04
2.	Types and sources of Stem Cells: Embryonic Stem cells; hESCs	Characteristics of ES cells: Sources (IVF & SCNT), Isolation and Culture Techniques, Characterization, Unique features, Genetic Manipulation and Differentiation	06
3.	Types and sources of Stem Cells: Adult Stem cells; ASCs	Types of Adult Stem Cells: Umbilical Cord Blood, Placental, Hematopoietic, Cardiac, Neural, Pancreatic Stem Cells Adult Stem Cells vs Embryonic stem cells	06
4.	Cloning an d Reprogramming	Cloning strategy, Reprogramming of Cells to Stem cells, ipsc, Detail strategy and properties and application of ipsc	06

	of somatic cells: iPSCs		
5.	Therapeutic Applications of	Stem cell Research and application in Healthcare, Tissue Engineering, Regenerative Medicine, Opportunities and Challenges, Case studies	10
6.	Stem cell Banking	Vision, collection and storage procedure, Insurance against life threatening diseases, Existing Centres both in India and abroad	04
7.	Stem cell research: Indian and Global scenario: Ethical and legal issues	Stem cell research Centers in India and abroad and their valuable contribution, National and International guidelines for conducting stem cell research	06
		Total number of Lectures	**42**

PBL: Students after conceptualising the stem cell biology, therapeutic potential of various stem cells and the components of tissue engineering and regenerative medicines, will do projects based on clinical cases where stem cell therapy can be the best option. In individual and in team, they can find the suitable requirements of scaffold material, stem cells and growth molecules and justify their effectiveness and the best strategy for regenerative medicines. They will present their projects in the form of e-posters.

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment 1 and 2, Class Test, Presentation,)
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.	Robert Lanza et.al., Handbook of Stem Cells, Volume 1-Embryonic Stem Cells; 2006, Academic press
2.	Robert Lanza et.al. Handbook of Stem Cells Volume 2-Adult & Fetal Stem Cells
3.	M.J. Laughlin & H.M. Lazarus Allogeneic Stem cell Transplantation 2003 Humana Press, USA
4.	Mehmet R. TOPCUL and Idil CETIN Stem Cells in Cell Therapy and Regenerative Medicine, OMICS International, ebook, 2018
5.	Robert Paul. Essentials of Stem Cell Biology 2006 Elsevier Academic
6.	Jeanne F. Loring Human Stem Cell Manual: A Laboratory Guide, Elsevier Science& Technology, 2007
7.	Stewart Sell, Stem Cells Handbook 2003 Humana Press, USA

| 8. | **Recent research articles will be discussed in the class and same will be provided.** |
| 9. | Websites: http, www.isscr.org/, https://stemcells.nih.gov/ |

Course Code	15B19BT792	Semester Odd	Semester VII Semester Session 2021-20 22
			Month from July to December
Course Name	TERM PAPER		
Credits	3	**Contact Hours**	4
Faculty (Names)	**Coordinator(s)**	Dr. Sujata Mohanty	
	Teacher(s) (Alphabetically)	Dr. Sujata Mohanty	

S. No.		Course Outcome	Cognitive level	Assessment tool	
				Direct	**Indirect**
TERM PAPER (15B19BT792); Course coordinator: Dr. Manisha Singh					
1	C401-14.1	Conduct literature survey to identify the research problem	Apply Level (Level II)	(i) Midterm Seminar - 10 marks will include Literature survey (5) and Problem identification (5)

(ii) End term Seminar - 15 marks will include Literature survey (10) and critical reflection reflections on problem solution (5)

(iii) Supervisor's assessment of day to day work prior to Midterm - 15 marks will include regularity of interaction (5) and literature survey (content and number of research papers / technical articles/databases etc. referred (10)

(iv) Supervisor's assessment of day to day **after Midterm & upto End Term -** 20 marks will include regularity of interaction (5), literature survey (content and number of research papers / technical articles/databases etc. referred (10) and contribution to the topic (5) | Exit Survey |
2	C401-14.2	Identify the gaps/inadequacies in the existing literature based on a problem	Analyze Level (Level III)		Exit Survey
3	C401-14.3	Present an overview of the relevant literature for the specific research topic	Analyze Level (Level III)		Exit Survey
4	C401-14.4	Conclude on the findings and compile the term paper	Evaluate Level (Level IV)	Midterm and End term seminar presentations (5 + 5) will include content of the seminar, communication style, explanation and reasoning, conclusions	Exit survey

				Midterm Report (5 marks panel + 5 marks supervisor) and Term paper (10 marks panel + 10 marks supervisor) will include organization of the report, Reference style, Plagiarism and punctuality of submission)	

Viva- I / Mid Term Viva: 30 Marks
Viva-II / End Term Viva: 30 Marks
Day to Day Marks from Supervisor (Mid and End Term): 40

Project based learning: The students are given the topics and research area under which they have to do the systematic literature review and analysis to define the problem statement or research gaps related with the assigned topic/area. Then they identify and search the related research studies/reports/critically analysed literatures to answer the problem statements. Such knowledge helps student to develop independent thinking and inculcate the orientation about the research ethics and various types of scientific approaches to solve the problem statements. This helps them further to inculcate the good laboratory, scientific and ethical practices in their career.

S.No.		Course Outcome	Cognitive level
1	**Major Project Part-1 (10B19BT791)- Dr. Chakresh Kumar Jain**		
	C450.1	Interpret the given research problem.	Understanding Level Level II
	C450.2	Organize the existing literature data to formulate the hypothesis	Applying Level Level III
	C450.3	Identify the experimental methods to test for the selected research problem	Applying Level Level III
	C450.4	Prepare and conclude with technical report	Create Level Level VI

Major Project: Students research on topic of their interest and define problem statement, figure out probable solution by reviewing the current literature, Identify the experimental methods, perform all the experiment in lab and communicate their findings orally and by writing. This develops independent working and thinking ability, Experimental skills and other set of skills such as research, problem identification, problem solution, written and oral communication, etc.

Course Code	15B19BT793	Semester ODD	Semester VII Session Month from **July -December**
Course Name	Summer Training Viva		
Credits	2	**Contact Hours**	NA
Faculty (Names)	**Coordinator(s)**	Dr Sujata Mohanty	
	Teacher(s) (Alphabetically)	Dr Sujata Mohanty	

Course Outcomes:

At the completion of the course, students will be able to

Sl. No.	DESCRIPTION	COGNITIVE LEVEL (BLOOM's TAXONOMY)
C455.1	Extend theoretical knowledge to real time Industry and Institutes	Understanding Level Level II
C455.2	Demonstrate a capacity for critical reasoning and independent learning	Understanding Level Level II
C455.3	Make use of Industrial Training experience to prepare a scientific report	Applying Level Level III
C455.4	Develop greater clarity about academic and career goals	Applying Level Level III

Project Based Learning: Summer Training viva is an absolutely Project Based Learning. Students expose themselves to various working environment of Industry/Academic Institutes/ Health practising centres during the execution of their project work and this interface facilitate themincultivating the entrepreneurial culture, R&D aspect, innovation and also motivate them towards right Employability.

Course Code	18B12HS412	Semester Odd	Semester VII Session 2021-2022 Month from July - December
Course Name	**HUMAN RESOURCE ANALYTICS**		
Credits	**3**	**Contact Hours**	**3-0-0**
Faculty (Names)	**Coordinator(s)**	Dr Kanupriya Misra Bakhru	
	Teacher(s) (Alphabetically)	Dr Kanupriya Misra Bakhru	

COURSE OUTCOMES		COGNITIVE LEVELS
C401-20.1	Understand different analytical techniques used for solving HR related problems.	Understand Level (C 2)
C401-20.2	Apply descriptive and predictive analysis techniques to understand trends and indicators in human resource data.	Applying Level (C 3)
C401-20.3	Analyze key issues related to human resource management using analytical techniques.	Analyze Level (C 4)
C401-20.4	Critically asses and evaluate the outputs obtained from analytical tools and recommend HR related decisions.	Evaluate Level (C 5)
C401-20.5	Create hypotheses, propose solutions and validate using appropriate analytical techniques	Create Level (C6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Human Resource (HR) Analytics	Understanding the need for mastering and utilizing HR analytic techniques, Human capital data storage and 'big (HR) data' manipulation, Predictors, prediction and predictive modeling, Current state of HR analytic professional and academic training, HR's Contribution to Business Value, the Changing Nature of HR.	8
2.	Human Resource information systems and data	Understanding HR metrics and data, Data collection, tracking, entry, Data availability in the entire Employment Lifecycle, Approaches and costs of collecting HR related data, Analysis software options, Using SPSS, Preparing the data.	8
3.	Analysis Strategies	From descriptive reports to predictive analytics, Statistical significance, Data integrity, Types of data, Categorical variable types, Continuous variable types, Using group/team-level or individual-level data, Dependent variables and independent variables, Introduction of tools for HR data analysis: Correlation, Regression, Factor Analysis, Cluster Analysis, Structural equation modeling.	10

4.	Application of Human Resource Analytics	Workforce Planning Analytics, Diversity Analytics, Talent Sourcing Analytics, Talent Acquisition Analytics, Talent Engagement Analytics, Training and Intervention Analytics, Analytical Performance Management, Retention Analytics.	10
5.	Future of Human Resource Analytics	Rise of Employee Behavioral Data, Automated Big Data Analytics, Big Data Empowering Employee Development, Quantification of HR, Artificial Intelligence in HR.	6
Total number of Lectures			**42**

Project Based Learning:

Students, in groups of 5-6, are required to select a contemporary topic of HR. Further students are required to select a sector from where they will collect the data. Data should be collected from at least 50 respondents from the chosen sector. The information can be collected with the help of an interview or some kind of questionnaire pertaining to the HR topic chosen. Analysis of the collected data should be done using SPSS software. Findings should be discussed and recommendations should be suggested.

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.	Bhattacharyya, HR Analytics: Understanding Theories and Applications, Sage, 2017
2.	Pease, Byerly and Jac Fitz-enz, Human Capital Analytics: How to Harness the Potential of YourOrganization's Greatest Asset, Wiley, 2012
3.	Isson, Harriott and Jac Fitz-enz, People Analytics in the Era of Big Data: Changing the Way You Attract, Acquire, Develop, and Retain Talent, Wiley, 2016
4.	Guenole, Ferrar and Feinzig, The Power of People: How Successful Organizations Use WorkforceAnalytics To Improve Business Performance, First Edition, Pearson, 2017
5.	Sesil, Applying Advanced Analytics to HR Management Decisions: Methods for Selection, Developing, Incentive and Improving Collaboration, Pearson, 2014

Course Code:	21B12HS411	Semester: ODD	Semester: 7th Session: 2021-2022 Months: August to December
Course Name	Urban Sociology		
Credits	03	Contact Hours	3-0-0

Faculty (Names)	Coordinator(s)	Prof. Alka Sharma
	Teacher(s) (Alphabetically)	Prof. Alka Sharma Dr. Priyanka Chhaparia

COURSE OUTCOMES		COGNITIVE LEVELS
C401-25.1	Understand the concepts and theories of Urban Sociology	C2
C401-25.2	Apply an analytical framework to understand the structural characteristics of cities students are residing in	C3
C401-25.3	Analyze the role of agencies and actor in shaping the process of urbanisation	C4
C401-25.4	Evaluate the importance of good governance and urban planning	C5

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Urban Sociology	Basic Concepts and terminologies of Urban Sociology, Origin of urban societies, Rural-Urban Continuum	4
2.	Theories in Urban Sociology	The Classical Foundations of Simmel, Max Weber, Tonnies, Louis Wirth, Durkhiem and Friedrich Engels	5
3.	The Ecological View	The Chicago School,Concentric zone theory (Burgess), Sector theory (Hoyt), Multiple Nuclei theory (Harris and Ullman)	3
4.	Contemporary Urban Sociology	Political Economy of Cities, Henry Lefebvre, Class Conflict Theories, Accumulation Theory, Neoliberalism, Neo-Weberian, Neo- Marxism, Colonialism	4
5.	Mapping and Organisation	Social Area Analysis, Urban Social Divisions, Concentration and Centralization, Segregation, Cooperatives, Role of Cooperatives in Urban planning and development	4
6.	Urbanisation in India	Development of Urban Sociology in India, Evolution of and from different structures, Spatial Structures and classification of cities	4
7.	Urban Planning	Historical timeline of urban planning, Principles of Urban Planning, Need for planning,	5

		Governance, Agencies Involved, Urban local bodies	
8.	Urban Issues in India	Level, trends, and pattern, Issues (poverty, slum, and environment) and Implications, Lessons from a pandemic	4
9.	Technology and Urbanisation	Digitisation and expansion of cities, Impact of technology on Urbanisation, role of technology in governance	4
10.	Globalisation and Urban Development	Concept of globalisation and its impact on urbanisation, new perspectives on urbanisation, emergence of Mega cities	4
11.	Sustainable Urban Development	Challenges in current model of urbanisation, Need for sustainable urban development, Tenets of sustainable development, Introduction to SDGs and their relevance to urbanisation, sustainable structures	4
		Total number of Lectures	**45**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20/ (Project)
End Semester Examination	35
TA	25 (Assignment + Quiz)
Total	**100**

Project Based Learning: The students would be divided into a group of 4-5. They would be asked to map and discuss the different parts of their cities. The lectures and readings on the process of urbanization and models of urbanization will form the basis for this exercise. Students would be required to critically analyse the urban spaces using sociological perspectives and theories. The students would be needed to make a presentation and also submit a report.

Recommended Reading material:	
1.	Gottdiener, M., Budd, L., &Lehtovuori, P. *Key concepts in urban studies*. Sage. (2015)
2.	Lin Jan and Mele Christopher, ed. *The Urban Sociology Reader*. London: Routledge. (2005)
3.	Rao, M. S. A., ed. *Urban Sociology in India: Reader and Source Book*. New Delhi: Orient Longman. (1974)
4.	Savage, M., and Warde, A. *Urban sociology, capitalism and modernity*. Macmillan International Higher Education. (1993)
5.	Sivaramakrishnan, K.C., Kundu, Amitabh & Singh, B.N. *Handbook of Urbanization in India*. Oxford University Press (2007)
6.	Wirth, Louis. *Urbanism as a Way of Life*. American Journal of Sociology. (1938)
7.	Sharma, A.K. and Misra, B.D. *Urbanization in India: Issues &Challenges*.New Delhi: Ane Books Pvt. Ltd.(2018)

Course Code	16B1NHS831	Semester: Odd (specify Odd/Even)		Semester: VII Session 2021-2022 Month: July to December	
Course Name	Gender Studies				
Credits	3		Contact Hours	(3-0-0)	
Faculty (Names)	Coordinator(s)	Dr Parineeta Singh			
	Teacher(s) (Alphabetically)	Dr Parineeta Singh			

COURSE OUTCOMES		COGNITIVE LEVELS
C401-19.1	Demonstrate knowledge of the construct of gender and the way itintersects with other social and cultural identities of race, class, ethnicity and sexuality	Understand(C2)
C401 -19.2	Apply feminist and gender theory in an analysis of gender including an examination of the social construct of femininity and masculinity	Apply (C3)
C401-19.3	Analyze the ways in which societal institutions and power structures such as the family, workplace impact the material and social reality of women's lives	Analyze (C4)
C401-19.4	Assess the need for Gender Sensitization and Gender Inclusivity and its practice in contemporary settings	Evaluate (C5)
C401-19.5	Evaluate and interpret information from a variety of sources including print and electronic media, film, video and other information technologies	Evaluate (C5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introducing Gender Issues	● Sex and Gender ● Types of Gender ● Gender Roles and Gender Division of Labor ● Gender Stereotyping and Gender Discrimination ● The Other and Objectification	8
2.	Gender Perspectives of Body & Language	● Biological, Phenomenological and Socio-Cultural Perspectives of body ● Body as a Site and Articulation of Power Relations ● Cultural Meaning of Female Body and Women's Lived Experiences ● The Other and Objectification	8

3.	**Social Construction of Femininity & Feminism**	● Bio-Social Perspective of Gender ● Gender as Attributional Fact ● Feminine & Feminist ● Major Theorists of Feminism Challenging Cultural, Notions of Femininity ● Feminism Today: Radical, Liberal, Socialist, Cultural, Eco feminism & Cyber feminism ● Images of Women in Sports, Arts, Entertainment, Media and Fashion Industry ;Cultural Feminism & Celebrating Womanhood ● Analysis of role women have played across cultures	9
4.	**Social Construction of Masculinity**	● Definition and Understanding of Masculinities ● Sociology of Masculinity& its Types ● Social Organization of Masculinity and Privileged Position of Masculinity ● Politics of Masculinity and Power ● Major Theorists of Masculinity ● Masculine Identities in Literature, Cinema & Media.	9
5.	**Gender Sensitization Empowerment &Gender Inclusivity**	● Women , Law & Women Rights In India ● From Women's Studies to Gender Studies: A Paradigm Shift ● Gender Studies & Media: Creating New Paradigms in Gender & Culture	8
		Total number of Lectures	**42**

Evaluation Criteria Components Maximum Marks	
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, Viva)
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.	Davis K., et al, "*Handbook of Gender and Women's Studies*. London: Sage. (2006)
2.	Helgeson, Vicki S., "*The Psychology of Gender*", Pearson(2012)
3.	Friedan B., "*The Feminine Mystique*", Penguin. (1971/1992)

4.	Debeauvoir S. , "*The Second Sex*", Vintage (1953/1997)
5.	Wharton Amy S., "*The Sociology of Gender: An Introduction to Theory & Research*", Wiley-Blackwell (2005)
6.	Pachauri G.," *Gender, School & Society*", R.Lall Publishers(2013)
7.	Connell R.W, "*Masculinities*", Cambridge: Polity. (1985)
8.	MacInnes J., "The *End of Masculinity*". Buckingham: Open University Press. (1998)
9.	Kaul A.& Singh M., *"New Paradigms for Gender Inclusivity*", PHI Pvt Ltd (2012)

Project- Divide your life in different age brackets such as 0-5 years, 5-8 years, 8-12 years, 12-15 years, 15-18 years and 18-21 years and write about your experiences with gender. When was the
first time you experienced your gender? What was/is the process of gender construction for you? How does different institutions such as family, schools, media, religion etc. has shaped your gender? What kind of differentiations, discriminations (if any) you have faced on the basis of your gender. Also mention the differences you experienced in the second phase when you experienced the bodily changes? How has your gender identity is created during the course of your life? Please explain all these (not limited to these questions only) with the help of any gender theory that we have discussed in the course.

Course Code	10B1NPH732	Semester : Odd	Semester: VII Session: 2021-2022 Month from: July to December
Course Name	Nanoscience and Technology		
Credits	3	**Contact Hours**	3
Faculty (Names)	**Coordinator(s)**	Dr. Navendu Goswami and Dr. Sandeep Chhoker	
	Teacher(s) (Alphabetically)	Dr. Navendu Goswami and Dr. Sandeep Chhoker	

COURSE OUTCOMES		COGNITIVE LEVELS
C401-4.1	Define the Nanoscience and Technology and to know about various other terminologies and developments involved with Nanoscience and Technology	Remembering (C1)
C401-4.2	Classify the nanomaterials depending on the nature of dimensionalities, type of materials classes and explain the basic concepts of nanomaterials	Understanding (C2)
C401-4.3	Apply the concepts of Nanoscience for solving the theoretical and numerical problems	Applying (C3)
C401-4.4	Determine the properties of nanomaterials through suitable characterization tools	Analyzing (C4)

Modu le No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	Development of nanoscience and nanotechnology, naturally occurring nanomaterials, Crystallinity of nanomaterials, Metallic nanostructures, Semiconductor nanostructures Magnetic nanomaterials, Chemically assisted nanostructures, Growth in 2-D nanostructures, Carbon nanomaterials	10
2.	Properties of Nanomateri als	Surface to volume ratio, Surface states and energy, Nanoscale oscillators, Confinement in nanostructures, Density of States and number of states of 0-, 1-, 2-, 3-dimensional systems, Change in Band structure and gap, Energy levels, confinement energy and emission in nano, Fluorescence by QDs, Concept of Single electron transistor	5
3.	Nanomateri als Synthesis	Introduction to synthesis techniques, Top down and bottom up approach, Biological methods, Sol-gel method, Nucleation and growth, Ball Milling technique, Chemical vapor deposition, Physical Vapor deposition: Concept of Epitaxy and sputtering, Basics of Photolithography and its limitations, Soft	10

		Lithography and Nanolithography	
4.	Characterization of Nanomaterials	Resolving power (Rayleigh and other criteria) ofmicroscopes and their limitations for nanostructure measurements, Concept of Far and Near field and modification by NSOM, Basic principle, Design of setup, Theory and working, Characterization procedure, result analysis, Merits/demerits of SEM, TEM, STM, AFM	5
5.	Application of Nanomaterials	Nanoelectronics, Nanobiotechnology, Catalysis by nanoparticles, Quantum dot devices, Quantum well devices, High Tc nano-Superconductors, Nanomaterials for memory application, CNT based devices, MEMS and NEMS	10
		Total number of Lectures	**40**

Project based learning: Students would work on a project of their choice in the field of Nanoelectronics, Nanobiotechnology, Catalysis by nanoparticles, Quantum dot devices, Quantum well devices, High Tc nano-Superconductors, Nanomaterials for memory application, CNT based devices, MEMS and NEMS. In such projects students can apply the basic concepts of Nanoscience for solving theoretical and numerical problems. They can also work on analysis of a nanomaterial to determine its properties through suitable characterization tools such as SEM, TEM, AFM etc. The learning gained through this project would consolidate the understanding and provide skills of analysis and application in Nanoscience and Technology and thereby providing the employability prospects in the organizations and industries involved in the research and development of nanomaterials synthesis and characterizations, nanoelectronics, nanobiotechnology/nanomedicine etc.

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 [2 Quiz (10 M), Attendance (10 M) and Cass performance (5 M)]
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.	*Nanostructures and nanomaterials: synthesis properties and application*, Guozhong Cao, Imperial college press, London.
2.	*Introduction to nanotechnology,* Charles Poole *et al* J John Wiley & Sons, Singapore.

3.	*The Handbook of Nanotechnology: Nanometer Structures, Theory, Modeling, and Simulation*, A.Lakhtakia, Spie Press USA.
4.	*Springer Handbook of Nanotechnology,* Edited by B. Bhushan, Springer Verlag.

Subject Code	18B12HS211	Semester: ODD	Semester VII Session 2021-2022 Months: from Aug 2021 to Dec 2021
Subject Name	PSYCHOLOGY OF PERSONALITY		
Credits	3	Contact Hours	(3-0-0)

Faculty (Names)	Coordinator(s)	Dr. Badri Bajaj
	Teacher(s) (Alphabetically)	Dr. Badri Bajaj

COURSE OUTCOMES		COGNITIVE LEVELS
C401-9.1	Demonstrate a basic understanding of concepts of personality	Understanding (Level 2)
C401-9.2	Apply the concepts of personality in day to day life	Applying (Level 3)
C401-9.3	Examine the different theoretical perspectives and approachesof personality	Analyzing (Level 4)
C401-9.4	Develop solutions for handling problems and achieving goals using personality concepts, theories and approaches	Creating(Level 6)

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures forthe module
1.	Introduction to the Psychology of Personality	Definition and perspectives, Approaches, Research methods	6
2.	Determinants of Psychology of Personality	Motivation and Emotion, Interior selves and interior worlds, Mentalabilities	6
3.	Theories	Psychoanalytical Theory of Personality: Freud, Neo Freudians:Jung, Horney, Erikson	10
4.	Approaches	Trait Approach: Allport, Cattell, Biological Approach, Social learning , Humanistic approach	10

5.	**Assessment of Personality**	Interviews, Projective tests,Behavioral assessment, Personality inventories	10
		Total:	**42**

Project based learning: Students of Psychology of personality will choose any two theories from the syllabus and study these theories. Make group of 2-3 students. Write everyday applications of some aspects of these theories. Submit the report of the project through Google Classroom link. Make presentations in the respective tutorial classes.

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.	Schultz, D. P., and Schultz, S. E., *Theories of personality*. Cengage Learning11[th] Ed., 2016.
2.	Burger, Jerry M. *Personality: an introduction*. Cengage Learning, 10th Ed.,Cengage Learning, 2019.
3.	Mayer, John D. *Personality: A systems approach*. Rowman & Littlefield, 2017.

Course Code	**14M11BT111**	**Semester** Odd	**Semester** VII Integrated/MTech I **Session** 2021-2022 **Month from** July-December
Course name	**Biomolecules and Cell Communication**		
Credits	3	**Contact hours**	3

Faculty (Names)	**Coordinator(s)**	Prof. Reema Gabrani
	Teacher(s) (Alphabetically)	Prof. Reema Gabrani

COURSE OUTCOMES		COGNITIVE LEVELS
C110.1	Explain the signal molecules and major cell signaling pathways	Understand Level (C2)
C110.2	Analyze cell signaling pathways in normal and diseased conditions	Analyze Level (C4)
C110.3	Interpret the mechanisms and regulation of cell cycle and cell death	Understand Level(C2)
C110.4	Analyze the therapeutic drug targets for cancer	Analyze Level (C4)

Module No.	Title of the Module	Topics in the Module	No. of lectures for the module
1.	Signal molecules	Cytokines and Hormones, Growth factors, neurotransmitters, extracellular matrix components as signaling molecules; autocrine, paracrine, juxtracrine and endocrine signaling	3
2.	G-protein linked signaling pathways	G Protein-Coupled Receptors, Heterotrimeric G Proteins, second messengers, Effector enzymes, Mechanism of transduction, Switching Off and Desensitization of receptors, Visual transduction pathway	8
3.	Signaling mediated by enzyme-linked cell surface receptor	Photoreceptor development in Drosophila, Ras to MAP kinase, Phosphoinositide-3-kinase and signaling through insulin in receptor, JAK-STAT pathway, Signal	8

		Transduction via Integrins	
4.	Nuclear receptor-based signaling	Classification and Structure of Nuclear Receptors, Signaling by steroid hormones, Retinoids, Vitamin D3, and the T3-Hormone, Mechanisms of Transcriptional Regulation by Nuclear Receptors	4
5.	Bacterial Chemotaxis	Two-component signaling pathway, histidine kinase associated receptor, Adaptation, Chemotaxis pathogenicity, symbiotic associations and biofilm	3
6.	Cell cycle Regulation and cell death	Cyclin-CDK variation, Checkpoint signaling, Ubiquitin Proteasome proteolytic system, Intrinsic and Extrinsic Apoptotic pathways	8
7.	Malfunction of Signaling Pathways and Tumorigenesis	Hallmarks of cancer, Developmental pathways, and cancer : Notchsignalingg from Drosophila to humans, Wnt signaling, Hedgehog pathway; Epigenetic changes in cancer, Signalling pathways as therapeutic targets, Analysis of ssignalingevents via case studies	8

		Total number of Lectures	**42**
Evaluation Criteria			
Components	**Maximum Marks**		
T1	20		
T2	20		
End Semester Examination	35		
TA	25(Presentation, Assignments) PBL:7marks		
Total	**100**		
PBL: Students will be given project in groups on "Bench to bedside case study in cell signaling". The project will link the signaling molecule and its cascade to the associated disease and the development a of therapeutic molecule.			

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

1.	B. Gomperts, l. Kramer, P. Tatham "Signal transduction", 2nd Ed. Academic Press, 2009
2.	V W Rodwell, D Bender, K M Botham, P J Kennelly, P A Weil, "Harper's Illustrated Biochemistry", 31st Ed. McGraw-Hill Lange 2018
3.	Alberts, Johnson, Lewis, Morgan, Raff, Roberts and Walter, "Molecular Biology of the Cell" Sixth Edition, Garland Science Publication,2014
4.	Refereed papers from scientific journals for case studies

Course Code	17M11BT112	**Semester Odd** (specify Odd/Even)	**Semester** VII **Session** 2021-2022 **Month from** June to Dec
Course Name	**Molecular Modeling and Drug design**		
Credits	3	**Contact Hours**	**LTP 3 0 0**

Faculty (Names)	**Coordinator(s)**	Dr. Chakresh Kumar Jain
	Teacher(s) (Alphabetically)	Dr Shazia Haider

COURSE OUTCOMES		COGNITIVE LEVELS
C112.1	Explain macromolecular structures, their Mathematical representation and visualization	**Understanding** (C2)
C112.2	Explain structural modeling, simulation and dynamics	**Understanding** (C2)
C112.3	Apply computational drug designing and simulation approaches for drug discovery	**Applying**(C3)
C112.4	Compare *in-silico* ligand-target interaction methods	**Analyzing** (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Molecular Modeling	Introduction to structure of DNA, protein and RNA. Structure representation and visualization, Coordinate Systems, Potential Energy Surfaces, Software and Hardware for molecular modeling, Tools such as Swiss pdb viewer, Pymol, VMD etc.	5
2.	Quantum Mechanics and Force Fields	Electron methods and molecular orbital calculations, General Features of Molecular mechanics force field, Bond Stretching. Angle Bending. Introduction to Non-bonded Interactions. Electrostatic Interactions. Van der Waals Mechanics. Force Field Models for the Simulation of Liquid Water.	5

3.	Energy Minimization and computer simulations	Minimization and Related Methods for exploring the Energy Surface. Non-Derivative method, Minimization methods. Computer Simulation Methods. Simple Thermodynamic Properties and Phase Space. Boundaries. Analyzing the Results of a Simulation and Estimating Errors.	5
4.	Molecular Dynamics and simulations	Molecular Dynamics Simulation Methods. Molecular Dynamics Using Simple Models. Metropolis Method. Monte Carlo methods, Web Based Resources, Databases and tools such as GROMACS, AMBER, & CHARMM.	6
5.	Structure Prediction	Principles of structure prediction, comparative modeling and protein folding, Comparative and *ab-inito* modeling, CASP, validations, Projects such as ROSETTA, protein folding at home.	6
6.	Drug designing	Introduction to drug discovery and drug development, Rational approach to drug design, Approaches to lead optimization such as conformation restriction, pharmacophore etc. Designing drugs against enzymes and receptors, Computer Aided Drug Design methods. ADMET, QSAR Tools and databases such as AUTODOCK, MOLEGRO, Drug Bank etc.	16
		Total number of Lectures	**43**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment-1, MCQ, Project, Presentation, PBL)
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 and its associated complications

	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.	Andrew R leach, V.J Gillet, "An introduction to Chemoinformatic" Springer model of publication, 2007
2.	Gasteiger Johann, "Chemoinformatic A text book" John Wiley, 2008
3.	Andrew R. Leach, "Molecular Modeling principles and applications" Pearson Education, Second edition, 2001