GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT(GITAM)
(Deemed to be University)
VISAKHAPATNAM * HYDERABAD * BENGALURU

Accredited by NAAC with A^{++} Grade

CURRICULUM AND SYLLABUS

OF

UMFST03 B.Sc. Food Science & Technology

w.e.f. 2021-22 admitted batch

(Updated up to May 2024)

Academic Regulations

Applicable for the Undergraduate Programme in the Schools of Technology, Humanities & Social Sciences, Business and Sciences

https://www.gitam.edu/academic-regulations

VISION AND MISSION OF THE UNIVERSITY

VISION

To become a global leader in higher education.

MISSION

To impart futuristic and comprehensive education of global standards with a high sense of discipline and social relevance in a serene and invigorating environment.

UMFST03 B.Sc. Food Science & Technology

VISION AND MISSION OF THE SCHOOL

VISION

To develop science education in an intellectually vibrant atmosphere

MISSION

1. To transmit, expand and apply knowledge of science through teaching, interaction, research, and societal service.
2. Realising the full potential of science and attaining new heights in Science & Technology to impart quality scientific education.
3. To provide a flexible curriculum with more elective courses and allow a choice-based credit system for the students in a research-oriented teaching and learning environment.
4. To inculcate and create an environment of research and academic excellence by propagating the knowledge and cater the needs of the industry and society
5. To create excellent prospects for emerging entrepreneurs by disseminating the knowledge and tapping their potential skills

UMFST03 B.Sc. Food Science & Technology

(w.e.f. academic year 2021-22 admitted batch)

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1 To mould the students for successful careers in the industry and institutions of food technology.

PEO 2 To make students competent in Food Science and allied areas.

PEO 3 To motivate the young food technologists through professional, ethical development and research

PEO 4 Enable the graduates for becoming entrepreneurs

PEO 5 To introduce the students to societal needs and global food security challenges.

Mapping of the Mission of the School with the PEOs

	PEO1	PEO2	PEO3	PEO4	PE05
M1	3	3	3	2	3
M2	3	3	3	3	3
M3	3	3	3	3	3
M4	3	3	3	2	3
M5	3	3	3	3	2

PROGRAMME OUTCOMES(POs) AND PROGRAMME SPECIFIC OUTCOMES(PSOs):

At the end of the Programme the students would be able to:

PO1	Gain knowledge of food science and nutrition fundamentals and know the properties and reactions of various food components
PO2	Analyze appropriate analytical methods for quantitating the food sample.
PO3	Categorize the key pathogens and spoilage microorganisms in foods.
PO4	Define the unit operations in food engineering applications to yield a healthier food product.
PO5	Describe the basic principles and practices of food hygiene in food processing operations by
PO6	Study the food laws in food science and with the exploitation of food packaging materials and labelling methods.
PO7	Relate the principles of food science technology in practical, real-world situations and problems.
PSO1	Understand the composition of food, the role of each component and their interactions, their roles in food processing.
PSO2	Will apply the knowledge of various spectrophotometric methods to quantify the desired compound in the given solutions.
PSO3	Will be able to describe the importance of microbiology to food production and food safety.
PSO4	Will be able to design food plant, identify the instruments required for processing by understanding principles followed by preservation techniques, and successful packaging method employment with good marketing skills.

Curriculum Structure

(Choice Based Credit System)

UNIVERSITY CORE (UC)								
Course code	**Level**	**Course title**	**L**	**T**	**P**	**S**	**J**	**C**
CSEN1001	1	IT Productivity Tools^	0	0	2	0	0	1*
CLAD1001	1	Emotional Intelligence & Reasoning Skills (Soft Skills 1)	0	0	2	0	0	1
CLAD1011	1	Leadership Skills & Quantitative Aptitude (Soft Skills 2)	0	0	2	0	0	1
CLAD1021	1	Verbal Ability & Quantitative Ability (Soft Skills 3)	0	0	2	0	0	1
CLAD1031	1	Practicing Verbal Ability & Quantitative Aptitude (Soft Skills 4)	0	0	2	0	0	1
CLAD20XX	2	Soft skills 5A/5B/5C	0	0	2	0	0	1
CLAD20XX	2	Soft skills 6A/6B/6C	0	0	2	0	0	1
DOSP10XX	1	Sports 1#	0	0	0	2	0	2*
DOSL10XX	1	Club Activity#	0	0	0	2	0	2*
DOSL10XX	1	Community Service#	0	0	0	0	2	2*
ENVS1001	1	Environmental Studies^	3	0	0	0	0	3*
FINA3001	3	Personal Financial Planning#	0	0	2	0	0	1*
LANG1001	1	Communication Skills in English - Beginners	0	0	4	0	0	2*
LANG1011	1	Communication Skills in English	0	0	4	0	0	2
LANG1021	1	Advanced Communication Skills in English	0	0	4	0	0	2
POLS1001	1	Indian Constitution and History	2	0	0	0	0	2*
MFST1001	1	Health & Wellbeing	0	0	2	0	0	1*
PHPY1001	1	Gandhi for the 21st Century	2	0	0	0	0	2*
VEDC1001	1	Venture Development	0	0	0	2	0	2

* Pass/Fail courses
# Opt any three courses among the five
^ Online/Swayam/NPTEL Courses

Soft skills courses 5 and 6								
Course code	**Level**	**Course title**	**L**	**T**	**P**	**S**	**J**	**C**
CLAD2001	2	Preparation for Campus Placement-1 (Soft skills 5A)	0	0	2	0	0	1
CLAD2011	2	Preparation for Higher Education (GRE/ GMAT)-1 (Soft skills 5B)	0	0	2	0	0	1
CLAD2021	2	Preparation for CAT/ MAT - 1 (Soft skills 5C)	0	0	2	0	0	1

CLAD2031	2	Preparation for Campus Placement-2 (Soft skills 6A)	0	0	2	0	0	1
CLAD2041	2	Preparation for Higher Education (GRE/ GMAT)-2 (Soft skills 6B)	0	0	2	0	0	1
CLAD2051	2	Preparation for CAT/ MAT - 2 (Soft skills 6C)	0	0	2	0	0	1

Sports Courses								
Course code	**Level**	**Course title**	**L**	**T**	**P**	**S**	**J**	**C**
DOSP1001	1	Badminton	0	0	0	2	0	2
DOSP1011	1	Chess	0	0	0	2	0	2
DOSP1021	1	Carrom	0	0	0	2	0	2
DOSP1031	1	Football	0	0	0	2	0	2
DOSP1041	1	Volleyball	0	0	0	2	0	2
DOSP1051	1	Kabaddi	0	0	0	2	0	2
DOSP1061	1	Kho Kho	0	0	0	2	0	2
DOSP1071	1	Table Tennis	0	0	0	2	0	2
DOSP1081	1	Handball	0	0	0	2	0	2
DOSP1091	1	Basketball	0	0	0	2	0	2
DOSP1101	1	Tennis	0	0	0	2	0	2
DOSP1111	1	Throwball	0	0	0	2	0	2

Club Activity Courses								
Course code	**Level**	**Course title**	**L**	**T**	**P**	**S**	**J**	**C**
DOSL1001	1	Club Activity (Participant)	0	0	0	2	0	2
DOSL1011	1	Club Activity (Member of the Club)	0	0	0	2	0	2
DOSL1021	1	Club Activity (Leader of the Club)	0	0	0	2	0	2
DOSL1031	1	Club Activity (Competitor)	0	0	0	2	0	2
Community Service courses								
Course code	**Level**	**Course title**	**L**	**T**	**P**	**S**	**J**	**C**
DOSL1041	1	Community Services - Volunteer	0	0	0	0	2	2
DOSL1051	1	Community Services - Mobilizer	0	0	0	0	2	2

FACULTY CORE (FC)								
Course code	**Level**	**Course title**	**L**	**T**	**P**	**S**	**J**	**C**
CHEM1011	1	Chemistry I	3	0	0	0	0	3
CHEM1031	1	Chemistry II	3	0	0	0	0	3
CSCI1001	1	Basics of Information Technology	3	0	0	0	0	3
CHEM1021	1	Chemistry Lab I	0	0	2	0	0	1
CHEM1051	1	Chemistry III	3	0	0	0	0	3
PHYS1091	1	Biophysics	3	0	0	0	0	3
CHEM1041	1	Chemistry II Lab	0	0	2	0	0	1
PHYS1101	1	Biophysics Lab	0	0	2	0	0	1

Programme Core courses for B.Sc. Food Science Technology								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**J**	**S**	**C**
MFST1011	1	Principles of Food Science	3	0	0	0	0	3
MFST1021	1	Principles of Food Science Practical	0	0	2	0	0	1
MFST1031	1	Fundamentals of Food Technology	3	0	0	0	0	3
MFST1041	1	Fundamentals of Food Technology Practical	0	0	2	0	0	1
MFST2001	2	Technology of Plantation Crops	3	0	0	0	0	3
MFST2011	2	Food Processing and Preservation Technology	3	0	0	0	0	3
MFST2021	2	Technology of Plantation Crops Practical	0	0	2	0	0	1
MFST2031	2	Food Processing and Preservation Technology Practical	0	0	2	0	0	1
MFST2041	2	Food Microbiology	3	0	0	0	0	3
MFST2051	2	Food Microbiology Practical	0	0	2	0	0	1
MFST3001	3	Technology of Animal Foods	3	0	0	0	0	3
MFST3011	3	Food Biochemistry	3	0	0	0	0	3
MFST3021	3	Technology of Animal Foods Practical	0	0	2	0	0	1
MFST3031	3	Food Biochemistry Practical	0	0	2	0	0	1
MFST3041	3	Food Chemistry	3	0	0	0	0	3
MFST3051	3	Food Chemistry Practical	0	0	2	0	0	1

Program Elective courses for B.Sc. Food Science Technology								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**J**	**S**	**C**
MFST2201	2	Bakery and Confectionary	3	0	0	0	0	3
MFST2231	2	Bakery and Confectionary Practical	0	0	2	0	0	1
MFST2211	2	Technology of Spices	3	0	0	0	0	3
MFST2241	2	Technology of Spices Practical	0	0	2	0	0	1
MFST2221	2	Food & Nutrition	3	0	0	0	0	3
MFST2251	2	Food & Nutrition Practical	0	0	2	0	0	1
MFST2261	2	Applied Physiology	3	0	0	0	0	3
MFST2271	2	Instrumentation for Food Analysis	3	0	0	0	0	3
MFST2281	2	Food Quality and Sensory Evaluation	3	0	0	0	0	3
MFST2291	2	Fermentation Technology	3	0	0	0	0	3
MFST3181	3	Food Engineering	3	0	0	0	0	3
MFST3191	3	Food Packaging	3	0	0	0	0	3
MFST3201	3	Functional Foods and Nutraceuticals	3	0	0	0	0	3
MFST3211	3	Clinical Nutrition	3	0	0	0	0	3
Note 1: Students should acquire a minimum of 16 credits from the program elective courses								
Note 2: Theory and corresponding lab course are co-requisites (For example if a student opts to study MFST2201 OR 2211 must complete the corresponding lab course								
Open Elective (OE)* * opt eligible Programme Elective (PE) courses from other programmes as an open elective courses and earn 18 credits								

Stream	Major course	Minor course (Select one)
Life Sciences	Food Science and Technology	Biochemistry
		Bioinformatics
		Biotechnology
		Microbiology
		Environmental Science

Eligible MINOR courses to be offered to the students of B.Sc. Food Science Technology Program

Students pursuing 4th year of the B.Sc. Food Science & Technology programme need to choose either Honours or Honours with Research courses from the following tables respectively.

Honours Courses

Minimum number of credits to be earned is 40, out of which 8 credits must be earned through Minor Enhancement courses.

Minor Enhancement course to be chosen in the specialization the student has studied the Minor.

Course code	Level	Course Title	L	T	P	J	S	C
MFST4341	400	Milk and Dairy Technology	4	0	0	0	0	4
MFST4351	400	Milk and Dairy Technology (Practical)	0	0	4	0	0	2
MFST4361	400	Diet Therapy	4	0	0	0	0	4
MFST4371	400	Diet Therapy (Practical)	0	0	4	0	0	2
MFST4381	400	Applied Beverage Technology	4	0	0	0	0	4
MFST4391	400	Biowaste Utilization and Value Addition	4	0	0	0	0	4
MFST4401	400	Biowaste Utilization and Value Addition (Practical)	0	0	4	0	0	2
MFST4411	400	Food Product Development	4	0	0	0	0	4
MFST4421	400	Food Product Development (Practical)	0	0	4	0	0	2
MFST4431	400	Bioorganic Cultivation of Food Crops	4	0	0	0	0	4
		Total						**32**

Honours with Research Courses

Minimum number of credits to be earned is 40 out of which 20 credits must be earned through Research Project / Dissertation and 8 credit must be earned through Minor Enhancement course.

Minor Enhancement course to be chosen in the specialization the student has studied the Minor.

Course code	Level	Course Title	L	T	P	J	S	C
MFST4341	400	Milk and Dairy Technology	4	0	0	0	0	4
MFST4361	400	Diet Therapy	4	0	0	0	0	4
DIST4666	400	Dissertation - 1	0	0	0	16	0	8
MFST4441	400	# Microbial Products and Applications	4	0	0	0	0	4
MFST4411	400	# Food Product Development	4	0	0	0	0	4
MFST4391	400	# Biowaste Utilization and Value Addition	4	0	0	0	0	4
MFST4431	400	# Bioorganic Cultivation of Food Crops	4	0	0	0	0	4
DIST4777	400	Dissertation - II	0	0	0	24	0	12
		Total						**32**

Minor Enhancement Courses

Bioinformatics								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
BCBI4241	400	Statistics for Biology	4	0	0	0	0	4
BCBI4281	400	Omics Technologies	4	0	0	0	0	4

Biotechnology								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
BTSC4161	400	Genomes and Genomics	4	0	0	0	0	4
BTSC4211	400	Proteins and Proteomics	4	0	0	0	0	4

Chemistry (Opt Any Two Courses)								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
CHEM4001	400	Advanced Inorganic Chemistry-1	3	0	2	0	0	4
CHEM4011	400	Advanced Organic Chemistry -1	3	0	2	0	0	4
CHEM4021	400	Advanced Physical Chemistry -1	3	0	2	0	0	4
CHEM4031	400	Advanced Analytical Chemistry -1	3	0	2	0	0	4
CHEM4041	400	Advanced Inorganic Chemistry-2	3	0	2	0	0	4
CHEM4051	400	Advanced Organic Chemistry-2	3	0	2	0	0	4
CHEM4061	400	Advanced Physical Chemistry-2	3	0	2	0	0	4
CHEM4071	400	Advanced Analytical Chemistry-2	3	0	2	0	0	4
CHEM4081	400	Medicinal Chemistry	3	0	2	0	0	4
CHEM4131	400	Regulatory affairs and Quality assurance	3	1	0	0	0	4

Mathematics								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
MATH4521	400	General Operations Research	4	0	0	0	0	4
MATH4421	400	Optimization Techniques and Decision Modelling	4	0	0	0	0	4

Statistics								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
MATH4431	400	Advanced AI Techniques	4	0	0	0	0	4
MATH4451	400	Visual Analytics and Dashboard Design	4	0	0	0	0	4

Microbiology								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
MFST4441	400	Microbial Products and Applications	4	0	0	0	0	4
MFST4451	400	Air and Waterborne Diseases	4	0	0	0	0	4

Food Science and Technology								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
MFST4381	400	Applied Beverage Technology	4	0	0	0	0	4
MFST4431	400	Bioorganic Cultivation of Food Crops	4	0	0	0	0	4

Allocation of credits for 3-year and 4-year B.Sc. Program (added on May 2024)						
	3-year B.Sc. Program		**4-year B.Sc. Program (Honours)**		**4-year B.Sc. Program (Honours with Research)**	
Type of Course	Credits	% Of Program (in credits)	Credits	% Of Program (in credits)	Credits	% Of Program (in credits)
University Core	12	10%	12	7.5	12	7.5%
Faculty Core	18	15%	18	11.25	38	23.75%
Major Core	32	26%	64	40	40	25%
Major Electives	16	14%	16	10	20	12.5%
Program Minor	24	20%	32	20	32	20%
Open elective	18	15%	18	11.25	18	11.25%
Total	120	100%	160	100%	160	100%

Course PO Mapping

Course Code	Course Name	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CSEN1001	IT Productivity Tools^	1	1	1	1	1	1	1	1	1	1	1
CLAD1001	Emotional Intelligence & Reasoning Skills (Soft Skills 1)	1	1	1	2	1	1	1	1	1	1	1

CLAD1011	Leadership Skills & Quantitative	1	1	1	2	1	1	1	1	1	1	1
	Aptitude (Soft Skills 2)											
CLAD1021	Verbal Ability & Quantitative Ability (Soft Skills 3)	1	1	1	2	1	1	1	1	1	1	1
CLAD1031	Practicing Verbal Ability & Quantitative Aptitude (Soft Skills 4)	1	1	1	1	1	1	1	1	1	1	1
CLAD2001	Soft skills 5A	1	1	1	1	1	1	1	1	1	1	1
CLAD2011	Soft skills 5B	1	1	1	1	1	1	1	1	1	1	1
CLAD2021	Soft skills 5C	1	1	1	1	1	1	1	1	1	1	1
CLAD2031	Soft skills 6A	1	1	1	1	1	1	1	1	1	1	1
CLAD2041	Soft skills 6B	1	1	1	1	1	1	1	1	1	1	1
CLAD2051	Soft skills 6C	1	1	1	1	1	1	1	1	1	1	1
DOSP1001	Sports 1 Badminton	1	1	1	1	1	1	1	1	1	1	1
DOSP1011	Sports 2 Chess	1	1	1	1	1	1	1	1	1	1	1
DOSP1021	Sports 2 Carrom	1	1	1	1	1	1	1	1	1	1	1
DOSP1031	Sports 3 Football	1	1	1	1	1	1	1	1	1	1	1
DOSP1041	Sports 4 Volleyball	1	1	1	1	1	1	1	1	1	1	1

DOSP1051	Sports 5 Kabaddi	1	1	1	1	1	1	1	1	1	1	1
DOSP1061	Sports 6 Kho Kho	1	1	1	1	1	1	1	1	1	1	1
DOSP1071	Sports 7 Table Tennis	1	1	1	1	1	1	1	1	1	1	1
DOSP1081	Sports 8 Handball	1	1	1	1	1	1	1	1	1	1	1
DOSP1091	Sports 9 Basketball	1	1	1	1	1	1	1	1	1	1	1
DOSP1101	Sports 10 Tennis	1	1	1	1	1	1	1	1	1	1	1
DOSP1111	Sports 11 Throwball	1	1	1	1	1	1	1	1	1	1	1
DOSL1001	Club Activity-Participant	1	1	1	1	1	1	1	1	1	1	1
DOSL1011	Club Activity – Member of the Club	1	1	1	1	1	1	1	1	1	1	1
DOSL1021	Club Activity – Leader of the Club	1	1	1	1	1	1	1	1	1	1	1
DOSL1031	Club Activity – Competitor	1	1	1	1	1	1	1	1	1	1	1
DOSL1041	Community Services - Volunteer	1	1	1	1	1	1	1	1	1	1	1

DOSL1051	Community Services - Mobilizer	1	1	1	1	1	1	1	1	1	1	1
ENVS1001	Environmental Studies^	2	1	1	1	1	1	1	1	1	1	1
FINA3001	Personal Financial Planning#	1	1	1	3	1	1	1	1	1	1	1
LANG1001	Communication Skills in English - Beginners	1	1	1	1	1	1	1	1	1	1	1
LANG1011	Communication Skills in English	1	1	1	1	1	1	1	1	1	1	1
LANG1021	Advanced Communication Skills in English	1	1	1	1	1	1	1	1	1	1	1
MFST1001	Health and Wellbeing#	1	1	1	1	1	1	1	1	1	1	1
POLS1001	Indian Constitution and History	1	1	1	1	1	3	1	1	1	1	1
PHPY1001	Gandhi for the 21st Century	1	1	1	1	1	1	1	1	1	1	3
VEDC1001	Venture Development	2	2	2	2	2	3	3	2	3	2	3
CHEM1011	Chemistry-I	2	2	3	3	2	2	1	2	2	2	2

CHEM1031	Chemistry-II	2	2	3	3	2	2	1	2	2	2	2
CSCI1001	Basics of Information Technology	2	2	3	3	2	2	1	2	2	2	2
CHEM1021	Chemistry- 1-LaB	2	2	2	1	1	2	1	2	1	2	1
CHEM1051	Chemistry-III	2	2	2	1	1	2	1	2	1	2	1
PHYS1091	Biophysics	2	2	2	1	1	2	1	2	1	2	1
CHEM1041	Chemistry-II Lab	2	2	2	2	3	2	1	2	1	2	3
PHYS1101	Biophysics Lab	2	2	2	1	1	2	1	2	1	2	1
MFST1011	Principles of Food Science	3	3	2	2	3	2	2	3	2	2	2
MFST1021	Principles of Food Science Lab	3	3	2	2	2	2	2	1	2	2	2
MSFT1031	Fundamentals of Food Technology	3	2	3	3	2	2	2	2	3	2	2
MSFT1041	Fundamentals of Food Technology Lab	3	3	2	2	2	3	1	2	2	3	1
MSFT2001	Technology of Plantation Crops	3	2	3	2	2	3	1	3	2	2	2
MSFT2011	Food Processing and Preservation Technology	2	3	2	2	3	2	1	3	2	2	3
MSFT2021	Technology of Plantation Crops Lab	3	3	2	2	2	2	1	3	2	2	2
MFST2031	Food Processing and Preservation Technology Lab	3	2	2	3	1	2	2	3	2	2	2

MFST2041	Food Microbiology	3	3	2	2	2	3	2	3	2	1	2
MFST2051	Food Microbiology Lab	3	2	2	2	3	3	2	3	2	2	3
MFST3001	Technology of Animal Foods	3	2	2	3	2	3	2	2	2	3	2
MFST3011	Food Biochemistry	3	3	2	2	3	2	3	2	2	3	3
MFST3021	Technology of Animal Foods Lab	3	1	2	3	2	2	2	3	2	3	1
MFST3031	Food Biochemistry Lab	3	2	2	3	2	3	2	2	2	3	2
MFST3041	Food Chemistry	2	3	2	3	2	2	2	3	2	2	3
MFST3051	Food Chemistry Lab	3	3	2	3	2	2	2	2	2	2	2
MFST2201	Bakery and Confectionary	3	2	3	3	1	3	2	2	2	3	1
MFST2231	Bakery and Confectionary Lab	3	3	2	2	2	2	3	2	3	2	1
MFST2211	Technology of Spices	3	2	2	3	2	2	3	3	2	3	3
MFST2241	Technology of Spices Lab	2	2	2	3	1	3	2	1	2	3	2
MFST2221	Food & Nutrition	3	2	3	3	1	3	2	2	2	3	2
MFST2251	Food & Nutrition Lab	3	2	3	3	1	3	2	2	2	3	2

MFST2261	Applied Physiology	2	2	3	3	3	3	2	2	1	3	3
MFST2271	Instrumentation for Food Analysis	3	2	3	2	2	1	3	2	3	1	3
MFST2281	Food Quality and Sensory Evaluation	3	2	3	3	1	3	2	2	2	3	2
MFST2291	Fermentation Technology	3	2	2	3	2	3	2	2	2	3	2
MFST3181	Food Engineering	3	3	2	1	2	2	3	2	3	2	3
MFST3191	Food Packaging	3	2	3	2	2	3	1	3	2	2	2
MFST3201	Functional Foods and Nutraceuticals	3	2	3	2	3	2	2	3	1	2	2
MFST3211	Clinical Nutrition	3	2	2	2	3	3	3	2	2	2	2

Syllabus

University Core

CSEN1001	IT PRODUCTIVITY TOOLS	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	Familiarity with Computer system and its operation.						

Course Description:

This course introduces all software tools that improve the productivity of a student in enhancing his learning experience with all the activities taken up as part of his coursework.

Course Educational Objectives:

- to impart the skill in preparing technical documents of professional quality using docs, sheets and forms
- to involve the student in preparation of websites, analyzing data and acquaint the student with the skill of processing audio, images, documents etc.

10 hours

List of Experiments:

1. Create a typical document consisting of text, tables, pictures, multiple columns, with different page orientations.
2. Create a technical paper / technical report consisting of table of contents, table of figures, table of tables, bibilography, index, etc.
3. Compose and send customized mail / e-mail using mail-merge.
4. Create / modify a power point presentation with text, multimedia using templates with animation.
5. Create spreadsheet with basic calculations with relative reference, absolute reference and mixed reference methods.
6. Simple report preparation using filtering tool / advanced filtering commands / pivot tables in spreadsheet application.
7. Analyze the results of a examination student wise, teacher wise, course wise, institute-wise.
8. Collecting and consolidating data using collaborative tools like google docs, sheets, forms.
9. Create charts / pictures using online tools like: www.draw.io or smartdraw
10. Create a website of his interest.

Text Books:

1. Katherin Murray, 'Microsoft Office 365 Connect and collaborate virtually anywhere, anytime', Microsoft Press, ISBN: 978-0-7356-5694-9
2. EXCEL 2021 The Comprehensive Beginners to Advanced Users Guide to Master Microsoft Excel 2021. Learn the Essential Functions, New Features, Formulas, Tips and Tricks, and Many More

3. https://drawio-app.com/tutorials/video-tutorials/
   Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics Fourth Edition ISBN-13: 978-1449319274

References

1. https://www.coursera.org/learn/introduction-to-computers-and-office-productivity-software
2. https://www.coursera.org/projects/analyze-data-pivot-tables-crosstabs-google-sheets
3. https://www.coursera.org/learn/excel-advanced#syllabus
4. https://www.coursera.org/learn/how-to-create-a-website
5. https://support.microsoft.com/en-us/office
6. https://www.diagrams.net/
7. https://edu.google.com/

Course Outcomes:

1. Create / alter documents / Technical Paper / Project report with text, pictures, graphs of different styles.
2. Create / modify power point presentations with text, multimedia and to add animation using / creating templates.
3. Perform basic calculations / retrieve data / create pivot tables / chart using a spreadsheet application.
4. Create simple diagrams / charts using online tools like: www.draw.io .
5. Manage documents, presentations, spreadsheets and websites in collaborative mode.

Co-Po Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1					2				1	1	
CO2					2				1	1	
CO3	2	1	1		2				1	1	
CO4					2				1	1	
CO5					2				3	3	

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS :06-09-2021 **ACADEMIC COUNCIL:17-09-201**

SDG No. & Statement:4

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG Justification:

Emotional Intelligence and reasoning skills are essential for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

CLAD1001	EMOTIONAL INTELLIGENCE & REASONING SKILLS (SOFT SKILLS 1)	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

Emotional intelligence is a set of skills that are thought to contribute to the appraisal of emotions in oneself and others. It can also help contribute to the effective regulation of emotions as well as feelings (Salovey & Mayer, 1990). In terms of emotional intelligence, self-awareness and self- management have to do with our ability to relate to ourselves. Social awareness and relationship management have to do with our ability to relate to others. Similarly, the ability to solve questions on Analytical Reasoning and Data Sufficiency is a critical area tested in almost all competitive examinations and admission tests. Upon completion, students should be able (1) to deal with theirown emotions as well as the emotions of others and relate better with both. Using better knowledgeof EI, students will also be able to set more meaningful goals for themselves, choose suitable time management techniques that work best for them and work in teams more effectively. (2) to apply different concepts, ideas, and methods to solve questions in reasoning and data sufficiency

Course Educational Objectives:

- Use EI to relate more effectively to themselves, their colleagues and to others. Apply self-awareness and self-assessment (SWOT) to better understand and manage their own emotions. Apply social awareness to empathize with others and build stronger relationships with others.
- Set meaningful goals based on their strengths and weaknesses and apply time management techniques, such as Q4 organizing to put first things first.
- Manage conflicts and work in teams in an emotionally intelligent manner.
- Solve questions on non-verbal and analytical reasoning, data sufficiency and puzzles

List of Activities & Tasks for Assessment:

Unit	Topics	Hours
1	Self-Awareness & Self-Regulation: Introduction to Emotional Intelligence, *Self-Awareness:* Self-Motivation, Accurate Self-Assessment (SWOT Analysis),Self-Regulation: *Self Control, Trustworthiness & Adaptability*	3
2	Importance, Practising Social Awareness, Building Relationships, Healthy andUnhealthy Relationships, Relationship Management Competencies-	3

	Influence, Empathy, Communication, Types of Conflicts, Causes, Conflict Management	
3	Social Media: Creating a blog, use of messaging applications, creating awebsite to showcase individual talent, creation of a LinkedIn Profile	2
4	Goal Setting & Time Management: Setting SMART Goals, Time Wasters, Prioritization, Urgent Vs Important, Q2 Organization	3
5	Teamwork: Team Spirit, Difference Between Effective and Ineffective Teams, Characteristics of High Performance Teams, Team Bonding, Persuasion, Team Culture, Building Trust, Emotional Bank Account	4
6	Verbal Reasoning: Introduction, Coding-decoding, Blood relations, Ranking Directions, Group Reasoning	6
7	Analytical Reasoning: Cubes and Dices, Counting of Geometrical figures	3
8	Logical Deduction: Venn diagrams, Syllogisms, Data Sufficiency, Binary logic	4
9	Spatial Reasoning: Shapes, Paper Cutting/Folding, Mirror images, Water images and Rotation of figures	2

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, Career Launcher and IMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

Course Outcomes:

1. Students will be able to relate more effectively to themselves, their colleagues and to others
2. Students will be able to set their short term and long term goals and better manage their time
3. Students will be able to manage conflicts in an emotionally intelligent manner and work inteams effectively
4. Students will be able to solve questions based on non-verbal and analytical reasoning, datasufficiency and puzzle

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1		3	3				3				
CO2		3	3				3				
CO3		3	3				3				
CO4	3						3				
CO5											

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :17-09-2021 **ACADEMIC COUNCIL:17-09-201**

SDG No. & Statement:4
Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG Justification:
Emotional Intelligence and reasoning skills are essential for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

CLAD1011	LEADERSHIP SKILLS & QUANTITATIVE APTITUDE (SOFT SKILLS 2)	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

Communication Skills is having the ability to convey information to others so that messages are understood, and outcomes delivered. Some essential qualities of Communication Skills include understanding the needs of others, clearly communicating messages, adapting the communication style, and using a range of communication methods. Presentation Skills is having the ability to confidently deliver an engaging messageto a group of people which achieves the objectives. Some essential qualities of Presentation Skills include a thorough preparation of content, structuring content logically, managing nerves, engaging your audience, delivering presentation objectives, positively influencing the audience, and responding to audience needs.Tackling questions based on numbers, arithmetic, data interpretation and puzzles requires the application of different rules and concepts of numerical computation, numerical estimation, and data estimation.

Course Educational Objectives:

- Learn and apply, through different individual and group activities, different ideas, and skills tocommunicate in a positive and impressive manner.
- Apply the goal setting process (based on SWOT) and Q2 organizing for effective time management.
- Apply different concepts in numbers, numerical computation, and numerical estimation to solvequestions that often appear in various competitive examinations and admission tests.
- Apply different concepts for tackling questions based on data interpretation, progression and series thatare frequently given in various competitive examinations and admission tests.

List of Activities & Tasks for Assessment:

Unit	Topics	Hours
1	Communication Skills: The Communication Process, Elements of Interpersonal Communication, Non-Verbal Communication: Body Language, Posture, Eye Contact, Smile, Tone of Voice, Barriers to Communication. Effective Listening Skills: Active Listening, Passive	5

	Listening, Asking Questions, Empathizing, Being Non-Judgmental, Being Open Minded, Mass Communication: Design of Posters, Advertisements, notices, writing formal and informal invitations	
2	Focus on Audience Needs, focus on the Core Message, Use Body Language andVoice, Start Strongly, Organizing Ideas & Using Visual Aids: SPAM Model, EffectiveOpening and Closing Techniques, Guy Kawasaki's Rule (10-20-30 Rule), Overcoming Stage Fear, Story Telling	3
3	Problem Solving & Decision Making: Difference Between the Two, Steps in RationalApproach to Problem Solving: Defining the Problem, Identifying the Root Causes, Generating Alternative Solutions, Evaluating and Selecting Solutions, Implementingand Following-Up, Case Studies	3
4	Group Discussion: Understanding GD, Evaluation Criteria, Nine Essential Qualities for Success, Positive and Negative Roles, Mind Mapping, structuring a Response, Methods of Generating Fresh Ideas	4
5	Number Theory: Number System, Divisibility rules, Remainders and LCM & HCF	3
6	Numerical Computation and Estimation - I: Chain Rule, Ratio Proportions, Partnerships & Averages, Percentages, Profit-Loss & Discounts, Mixtures, Problem on Numbers & ages	6
7	Data Interpretation: Interpretation and analysis of data in Tables, Caselets, Line- graphs, Pie-graphs, Boxplots, Scatterplots and Data Sufficiency	3
8	Mental Ability: Series (Number, Letter and Alphanumeric), Analogy (Number, Letter and Alphanumeric) and Classifications	3

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, Career Launcher and IMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

Course Outcomes:

1. Students will be able to communicate 'one-on-one' and 'one-on-many' confidently using both verbal and non-verbal messages and deliver impressive talks/ presentations to a group both with and without the use of PPTs and create posters, advertisements, etc.
2. Students will be able to apply the rational model of problem solving and decision makingin their problem solving and decision-making efforts.
3. Students will be able to solve questions based on numbers and arithmetic given in various competitive examinations
4. Students will be able to solve questions based on data interpretation, progressions, and series.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1		3	3				3				
CO2		3	3				3				
CO3	3						2				
CO4	3						2				
CO5											

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :17-09-2021 **ACADEMIC COUNCIL:17-09-2021**

SDG No. & Statement:4
Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
SDG Justification:
Leadership and quantitative aptitude skills are essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

CLAD1021	VERBAL ABILITY & QUANTITATIVE ABILITY (SOFT SKILLS 3)	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

Vocabulary is an important part of verbal ability. An understanding of word formation, prefixes, suffixes, and roots is necessary to remember and use a vast repository of words. Approaching words through word families and other ways of groupings is an effective way of gaining mastery over vocabulary. Understanding and getting acquainted with the different rules and exceptions in the use of grammar and structure, especially from the relevant examination point of view, is crucial to cracking questions given in many competitive tests. Similarly, improving reading comprehension skills and test taking abilities in this area takes time and effort, especially given the fact that most students do not possess strong reading habits. In so far as quantitative aptitude is concerned, students need to develop a strong foundation on the basic mathematical concepts of numerical estimation, geometry, mensuration, data sufficiency, etc. to be able to crack different round 1 tests of major recruiters and admission tests of top Indian and foreign universities.

Course Educational Objectives:

- List and discuss the different word formation methods, word denotation, connotation, collocation, etc. and introduce selected high frequency words, their antonyms, synonyms, etc.
- Apply different advanced reading skills to solve questions based on author's tone, main ideas and sub-ideas, inferences, Para jumbles, etc. that are frequently asked in various competitive exams and admission tests.
- Solve different types of questions based on vocabulary, such as word analogy; structure, grammar, and verbal reasoning; introduce common errors and their detection and correction.
- Solve questions on numerical estimation, mensuration, data sufficiency based on quantitative aptitude. This includes questions on time and work, time and distance, pipes and cisterns, lines and angles, triangles, quadrilaterals, polygons and circles, 2- & 3-dimensional mensuration.

List of Activities & Tasks for Assessment:

1. **Vocabulary Builder:** Understanding Word Formation, Prefixes, Suffixes and Roots, Etymology, Word Denotation, Connotation and Collocation, Synonyms and Antonyms
2. **Reading Comprehension:** Advanced Reading Comprehension: Types of RC passages, Types of Text Structures, Types of RC Questions: Distinguishing Between Major Ideas and Sub Ideas, Identifying the Tone and Purpose of the Author, Reading Between the Lines and Beyond the Lines, Techniques for Answering Different Types of Questions
3. **Para Jumbles:** Coherence and Cohesion, Idea Organization Styles, Concept of Mandatory Pairs and Its Application: Transitional Words, Antecedent-Pronoun Reference, Article Reference, Cause and Effect, Chronological Order, General to Specify, Specify to General, Idea-Example, Idea-Explanation, Etc.
4. **Grammar Usage:** Rules Governing the Usage of Nouns, Pronouns, Adjectives, Adverbs, Conjunctions, Prepositions and Articles
5. **Numerical Computation and Estimation - II:** Time and Work, Pipes and Cisterns, Time and Distance, Problems on Trains, Boats and Streams, Races and Games of Skill, Simple Interest& Compound Interest
6. **Geometry:** Lines and Angles, Triangles, Quadrilaterals & Polygons, and Circles
7. **Mensuration:** 2-Dimensional Mensuration (Triangles, Quadrilaterals and Circles), 3-Dimensional Mensuration (Cubes, Cuboids, Cylinder, Cone, Sphere)

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, Career Launcher and IMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

Course Outcomes:

1. List and discuss word formation methods, selected high frequency words, their antonyms, synonyms, etc.
2. Analyze reading passages and quickly find out the correct responses to questions asked, including para jumbles, by using reading skills like skimming, scanning, reading between the lines, etc.
3. Solve different types of questions based on vocabulary, structure, grammar and verbal reasoning
4. Solve questions on numerical estimation, mensuration, data sufficiency based on quantitative aptitude

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1		2					2				
CO2		2					2				
CO3	3						2				
CO4	3						2				
CO5											

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :17-09-2021 **ACADEMIC COUNCIL:17-09-2021**

SDG No. & Statement:4
Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG Justification:
English language and quantitative aptitude skills are essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

CLAD1031	PRACTICING VERBAL ABILITY & QUANTITATIVE APTITUDE (SOFT SKILLS 4)	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

A sound knowledge of the rules of English grammar, structure and style and its application in detecting errors in writing are important areas of Verbal Ability frequently tested as a part of the written test in many competitive examinations and admission tests of major recruiters and universities respectively. This module focuses on all important areas of grammar and structure commonly asked in major tests, such as GMAT, CAT, XLRI, CRT, etc. Similarly, in the area of Quantitative Aptitude, different kinds of questions are asked from Combinatorics (Permutations & Combinations, Probability], Cryptarithmetic & Modular Arithmetic (Cryptarithmetic, Application of base system (7, 24), Clocks (Base 24), Calendars (Base 7), and Mental Ability (Number series, Letter series & Alpha numeric series, Analogies (Numbers, letters), Classifications, Algebra (Exponents, Logarithms, Problems related to Equations, Special Equations, and Statistics) . This module focuses on all these areas by building on what the students already learnt in their earlier studies.

Course Educational Objectives:

- Apply the rules of grammar to solve questions in Error Detection, Sentence Correction and Sentence Improvement.
- Apply the rules of structure to solve questions in Error Detection, Sentence Correction and Sentence Improvement, Fill-in-blanks and Cloze Passages.
- Explain methods of solving problems in Combinatorics (Permutations & Combinations, Probability], Cryptarithmetic & Modular Arithmetic (Cryptarithmetic, Application of basesystem (7, 24), Clocks (Base 24), Calendars (Base 7)]
- Explain how to solve questions in Mental Ability (Number series, Letter series & Alpha numeric series, Analogies, Numbers, letters, Classifications] and Algebra (Exponents, Logarithms, Problems related to Equations, Special Equations, Statistics)

List of Activities & Tasks for Assessment:

1. Error Detection: Pronouns, Conjunctions, Prepositions and Articles
2. Error Detection: Tenses and their Uses
3. Sentence Correction: Subject-Verb Agreement, Antecedent-Pronoun Agreement, Conditional Clauses
4. Sentence Correction: Modifiers (Misplaced and Dangling) & Determiners, Parallelism & WordOrder, and Degrees of Comparison

5. Combinatorics: Permutations & Combinations, Probability
6. Crypt arithmetic & Modular Arithmetic: Crypt arithmetic, Application of Base System (7, 24),Clocks (Base 24), Calendars (Base 7)
7. Algebra: Exponents, Logarithms, Word-problems related to equations, Special Equations,Progressions, Statistics

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, Career Launcher and IMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

Course Outcomes:

1. Identify and correct errors in English grammar and sentence construction
2. Identify and correct errors in Structure, Style and Composition
3. Solve problems in Combinatorics, Cryptarithmetic, and Modular Arithmetic
4. Solve problems in Mental Ability and Algebra

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1							3				
CO2							3				
CO3	3						3				
CO4	3						3				
CO5											

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS :17-09-2021 **ACADEMIC COUNCIL:17-09-2021**

SDG No. & Statement:4

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG Justification:

English language and quantitative aptitude skills are essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

CLAD2001	PREPARATION FOR CAMPUS PLACEMENT -1 (SOFT SKILLS 5A)	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

The course addresses all relevant areas related to campus placements and readies them to ace their upcoming/ ongoing recruitment drives. Specifically, it focuses on students' career preparedness, interview skills, test preparedness, etc.

Course Educational Objectives:

Prepare the students for their upcoming/ ongoing campus recruitment drives.

List of Activities & Tasks for Assessment:

1. Career Preparedness: Resume & Cover Letter Writing, Interview Skills: Elevator Pitch, Making the First Impression, Being Other-Oriented, Being Positive and Curious, communicating with Confidence and Poise, Frequently Asked Questions & How to Answer Them, Pitfalls to Avoid, Etc. Etiquette: Hygiene, Courtesy, Culture differences, Workplace, use of cell phone, Profanity, Slang, Protocol.
2. Verbal Ability: Practicing Reading Comprehension, Error Detection, Sentence Completion, MCQs, FIBs, Para jumbles, Cloze Test, Critical Reasoning.
3. Quantitative Aptitude: Number Systems, Algebra, Geometry, Data Handling, Data Sufficiency, Word Problems
4. Reasoning: Logical and Verbal Reasoning

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and MeenakshiUpadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMSetc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

Course Outcomes:

1. Write a power resume and covering letter
2. Answer interview questions with confidence and poise
3. Exhibit appropriate social mannerisms in interviews
4. Solve placement test questions on verbal ability, quantitative aptitude and reasoning

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1		1					3				
CO2		3					3				
CO3	3						3				
CO4	3						3				
CO5											

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :17-09-2021 **ACADEMIC COUNCIL:17-09-2021**

SDG No. & Statement:4
Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG Justification:
Quantitative aptitude, reasoning, verbal and language skills practiced during the preparation for campus placement tests provide essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

CLAD2011	PREPARATION FOR HIGHER EDUCATION (GRE/ GMAT)-1 (SOFT SKILLS 5B)	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

The course offers a special track for students who aspire to go abroad in pursuit of their higher education for which a GRE/ GMAT score is a prerequisite. It covers all four topical areas of these tests and includes fully solved mock tests as well.

Course Educational Objectives:

- Prepare the students to solve questions from all four broad areas of GRE/ GMAT
- Orient the students for GRE/ GMAT through mock tests

List of Activities & Tasks for Assessment:

1. Verbal Reasoning: Reading Comprehension, Sentence Equivalence, TextCompletion, Sentence Correction, Critical Reasoning
2. Quantitative Reasoning: Arithmetic, Algebra, Geometry, Data Analysis
3. Analytical Writing Assessment: Issue/ Argument
4. Integrated Reasoning

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and MeenakshiUpadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMSetc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

Course Outcomes:

1. Solve questions from all four broad areas of GRE/ GMAT
2. Practice answering several mock tests

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3			2			3				
CO2	3			2			3				
CO3											
CO4											
CO5											

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :17-09-2021 **ACADEMIC COUNCIL:17-09-2021**

SDG No. & Statement:4
Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG Justification:
Quantitative aptitude, reasoning, verbal and language skills practiced during the preparation for GRE/GMAT tests provide essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

CLAD2021	PREPARATION FOR CAT/ MAT – 1 (SOFT SKILLS 5C)	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

The course offers a special track for UG students who aspire to go for higher education in business management in India for which cracking CAT/ MAT/ other related test is mandatory. It covers all four topical areas of these tests and includes fully solved mock testsas well.

Course Educational Objectives:

- Prepare the students to solve questions from all four relevant areas of CAT/ XAT/MAT, etc.
- Orient the students for CAT/ XAT, etc. through mock tests

List of Activities & Tasks for Assessment:

1. Quantitative Ability: Arithmetic, Algebra, Geometry, Mensuration, Calculus, Trigonometry
2. Data Interpretation: Data Interpretation and Data Sufficiency
3. Logical Reasoning: Data Management, Deductions, Verbal Reasoning and Non-Verbal Reasoning
4. Verbal Ability: Critical Reasoning, Sentence Correction, Para Completion, Para Jumbles, Reading Comprehension

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, Career Launcher andIMS etc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

Course Outcomes:

1. Solve questions from all four relevant areas of CAT/ MAT as listed above
2. Practice test-cracking techniques through relevant mock tests

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3			2			3				
CO2	3			2			3				
CO3											
CO4											
CO5											

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :17-09-2021 **ACADEMIC COUNCIL:17-09-2021**

SDG No. & Statement:4
Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG Justification:
Quantitative aptitude, reasoning, verbal and language skills practiced during the preparation for CAT/ MAT tests provide essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

CLAD2031	PREPARATION FOR CAMPUS PLACEMENT-2 (SOFT SKILLS 6A)	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course builds on the previous course and focuses on all four major areas of campus placements, including career preparedness, mock interviews, verbal ability, quantitative aptitude, and logical reasoning.

Course Educational Objectives:

- To comprehensively prepare all eligible and aspiring students for landing their dream jobs.
- To sharpen the test-taking skills in all four major areas of all campus drives

List of Activities & Tasks for Assessment:

1. Career Preparedness II: Mock Interviews, Feedback and Placement Readiness
2. Verbal Ability II: Practising Reading Comprehension, Error Detection, Sentence Completion, MCQs, FIBs, Para jumbles, Cloze Test, Critical Reasoning
3. Quantitative Aptitude II: Number Systems, Algebra, Geometry, Data Handling,Data Sufficiency, Word Problems
4. Reasoning II: Logical and Verbal Reasoning

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and Meenakshi Upadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMSetc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

Course Outcomes:

1. Demonstrate career preparedness and confidence in tackling campus interviews
2. Solve placement test questions of a higher difficulty level in verbal ability, quantitative aptitude and logical reasoning.
3. Practice test-taking skills by solving relevant questions accurately and within time.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1		3	3				3				
CO2							3				
CO3							3				
CO4											
CO5											

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :17-09-2021 **ACADEMIC COUNCIL:17-09-2021**

SDG No. & Statement:4
Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG Justification:
Quantitative aptitude, reasoning, verbal and language skills practiced during the preparation for campus placement tests provide essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

CLAD2041	PREPARATION FOR HIGHER EDUCATION (GRE/GMAT)-2 (SOFT SKILLS 6B)	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

The course offers a special track for students who aspire to go abroad in pursuit of theirhigher education for which a GRE/ GMAT score is a prerequisite. It covers all four topical areas of these tests at a higher difficulty-level and includes fully solved mock tests as well.

Course Educational Objectives:

- Prepare the students to solve higher level questions from all four broad areas of GRE/ GMAT
- Orient the students for GRE/ GMAT through mock tests

List of Activities & Tasks for Assessment:

1. Verbal Reasoning II: Reading Comprehension, Sentence Equivalence, Text Completion, Sentence Correction, Critical Reasoning
2. Quantitative Reasoning II: Arithmetic, Algebra, Geometry, Data Analysis
3. Analytical Writing Assessment II: Issue/ Argument
4. Integrated Reasoning II

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and MeenakshiUpadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMSetc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

Course Outcomes:

1. Solve higher level questions from all four broad areas of GRE/ GMAT
2. Practice answering several mock tests

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2						3				
CO2	2						3				
CO3											
CO4											
CO5											

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :17-09-2021 **ACADEMIC COUNCIL:17-09-2021**

SDG No. & Statement:4
Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG Justification:
Quantitative aptitude, reasoning, verbal and language skills practiced during the preparation for GRE/GMAT tests provide essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

CLAD2051	PREPARATION FOR CAT/ MAT – 2 (SOFT SKILLS 6C)	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

The course offers a special track for UG students who aspire to go for higher education in business management in India for which cracking CAT/ MAT/ other related test is mandatory. It covers all four topical areas of these tests at a higher level of difficulty and includes fully solved mock tests as well.

Course Educational Objectives:

- Prepare the students to solve all types of questions from all four relevant areas of CAT/ XAT/ MAT, etc.

List of Activities & Tasks for Assessment:

1. Quantitative Ability II: Arithmetic, Algebra, Geometry, Mensuration, Calculus, Trigonometry
2. Data Interpretation II: Data Interpretation and Data Sufficiency
3. Logical Reasoning II: Data Management, Deductions, Verbal Reasoning and Non-Verbal Reasoning
4. Verbal Ability II: Critical Reasoning, Sentence Correction, Para Completion, Para Jumbles, Reading Comprehension

References:

1. Verbal Ability & Reading Comprehension by Arun Sharma and MeenakshiUpadhyay
2. Study material for CAT, SAT, GRE, GMAT by TIME, CareerLauncher and IMSetc.
3. Quantitative Aptitude by R S Agarwal S Chand Publications
4. Quantitative Aptitude by Pearson Publications

Course Outcomes:

1. Solve higher difficulty level questions from all four relevant areas of CAT/ MAT aslisted above
2. Practice test-cracking techniques through relevant mock tests

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2			2			3				
CO2	2			2			3				
CO3											
CO4											
CO5											

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :17-09-2021 **ACADEMIC COUNCIL:17-09-2021**

SDG No. & Statement:4
Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG Justification:
Quantitative aptitude, reasoning, verbal and language skills practiced during the preparation for CAT/ MAT tests provide essential skills for achieving inclusive and equitable education and lifelong learning opportunities for oneself and others.

DOSL1001	CLUB ACTIVITY – PARTICIPANT	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course recognizes student participation in multiple activities organized by various student organizations that pursue specific co-curricular and extra-curricular interests. These activities allow students to engage in and identify and pursue their personal interests and hobbies.

Course Educational Objectives:

- Create opportunities for students to participate in a variety of non-academic experiences
- Interact with and learn from peers in a setting without an external performance pressure
- Allow exploration of interesting activities and reflection about these experiences
- Learn to manage time effectively

List of Student Club Activities:

1. Music (vocals, instruments, technical, recording, mixing, production, management)
2. Dance (Indian classical, western, jazz, latin, contemporary, folk, production, event management)
3. Theatre (classical, experimental, one-act, street, production, direction, casting, etc.)
4. Arts (fine arts, painting, calligraphy, sketching, caricaturing, etc)
5. Craft (origami, model making, sculpture, pottery, etc)
6. Cooking (home-style, baking, confectionery, Indian, intercontinental, etc.)
7. Graffiti (street, mural, collage, multi media, etc)
8. Workshops, quizzes, debates, elocution, etc
9. Filmmaking (adventure, drama, film appreciation, documentary, etc)
10. Photography (conventional, immersive (360), landscape, portrait, technical, editing, etc.)
11. College Fests
12. Designing (graphic design, landscape, interior, etc)
13. Competitive coding
14. Recreational sports activities
15. Other club activities organized by student clubs

List of Activities:

1. Participation in various club-based activities
2. Weekly reflection paper
3. Portfolio (on social media using an Instagram account)
4. Two learning papers (one per semester)

Textbooks:

1. Small move: big Change (Caroline Arnold)
2. How to Win at College: Surprising Secrets for Success from the Country's Top Students (Cal Newport)

References:

1. Making the most of college: Students speak their minds (author - Richard Light)
2. Failing Forward: Turning Mistakes into Stepping Stones for Success (John C Maxwell)
3. The Last Lecture (Randy Pausch)
4. Lean in (Sheryl Sandberg)
5. YouTube- Introduction to various club activities

Course Outcomes:

Upon successful completion of the course, student will be able to

1. Identify personal interest areas
2. Learn from diverse perspectives and experiences
3. Gain exposure to various activities and opportunities for extra-curicular activities
4. Learn to manage time effectively
5. gain confidence

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	2		2				
CO2	3		3		2		2				
CO3		3	2		3	2					
CO4		3	3		2		3				
CO5	3		3		2		3				

Note: 1 - Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:
SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG Justification:
This course recognizes student participation in non-academic events and activities which focus on inclusive partnerships and collaborations with all stakeholders by using all sustainable means to promote lifelong learning.

DOSL1011	CLUB ACTIVITY – MEMBER OF THE CLUB	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course encourages and acknowledges student members' work in organizing events and activities organized by various student organizations that pursue specific co-curricular and extra- curricular interests. These activities allow students to actively learn from the process of conceptualizing and organizing such activities as part of a team.

Course Educational Objectives:

- Create opportunities for students to learn from organizing club activities
- Learn teamwork, leadership, planning and management of events and activities
- Learn to appreciate multiple perspectives, cultures, and individual capabilities
- Learn to manage time effectively

List of Student Club Activities:

1. Music (vocals, instruments, technical, recording, mixing, production, management)
2. Dance (Indian classical, western, jazz, latin, contemporary, folk, production, event management)
3. Theatre (classical, experimental, one-act, street, production, direction, casting, etc.)
4. Arts (fine arts, painting, calligraphy, sketching, caricaturing, etc)
5. Craft (origami, model making, sculpture, pottery, etc)
6. Cooking (home-style, baking, confectionery, Indian, intercontinental, etc.)
7. Graffiti (street, mural, collage, multi media, etc)
8. Workshops, quizzes, debates, elocution, etc
9. Filmmaking (adventure, drama, film appreciation, documentary, etc)
10. Photography (conventional, immersive (360), landscape, portrait, technical, editing, etc.)
11. College Fests
12. Designing (graphic design, landscape, interior, etc)
13. Competitive coding
14. Recreational sports activities
15. Other club activities organized by student clubs

List of Activities:

1. Be a member of a club and organize activities in that particular interest area
2. Learn from diverse perspectives and experiences
3. Learn to design and execute extra-curricular activities
4. Develop management skills through hands on experience
5. Explore different managerial roles and develop competencies

Textbooks:

1. Small move: big Change (Caroline Arnold)
2. How to Win at College: Surprising Secrets for Success from the Country's Top Students (Cal Newport)

References:

1. Making the most of college: Students speak their minds (author - Richard Light)
2. Failing Forward: Turning Mistakes into Stepping Stones for Success (John C Maxwell)
3. The Last Lecture (Randy Pausch)
4. Lean in (Sheryl Sandberg)
5. Youtube- Introduction to various club activities

Course Outcomes:

Upon successful completion of the course, student will be able to

- Be a member of a club and organize activities in that particular interest area
- Learn from diverse perspectives and experiences
- Learn to design and execute extra-curricular activities
- Develop management skills through hands on experience
- Explore different managerial roles and develop competencies

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	2		2				
CO2	3		3		2		2				
CO3		3	2		3	2					
CO4		3	3		2		3				
CO5	3		3		2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:
SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
SDG17 : Strengthen the means of implementation and revitalize the global partnership for sustainable development

SDG Justification:
This course recognizes student participation in community service endeavours focussing on sustainable development, service to communities. This allows students to develop empathy, citizenship behaviour and inclusive community values.

DOSL1021	CLUB ACTIVITY – LEADER OF THE CLUB	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course encourages and recognizes student members' work in leading the student organizationsthrough various leadership roles. As leaders they work not just to organize events and activities in specific co-curricular and extra-curricular interests, but also lead the teams that form the core members of the clubs. These activities allow students to learn and practice leadership and management skills through real world experience.

Course Educational Objectives:

- Create opportunities for students to learn from organizing club activities
- Learn teamwork, leadership, planning and management of events and activities
- Learn to appreciate multiple perspectives, cultures, and individual capabilities
- Learn to manage time effectively

List of Student Club Activities:

1. Music (vocals, instruments, technical, recording, mixing, production, management)
2. Dance (Indian classical, western, jazz, latin, contemporary, folk, production, event management)
3. Theatre (classical, experimental, one-act, street, production, direction, casting, etc.)
4. Arts (fine arts, painting, calligraphy, sketching, caricaturing, etc)
5. Craft (origami, model making, sculpture, pottery, etc)
6. Cooking (home-style, baking, confectionery, Indian, intercontinental, etc.)
7. Graffiti (street, mural, collage, multimedia, etc)
8. Workshops, quizzes, debates, elocution, etc
9. Filmmaking (adventure, drama, film appreciation, documentary, etc)
10. Photography (conventional, immersive (360), landscape, portrait, technical, editing, etc.)
11. College Fests
12. Designing (graphic design, landscape, interior, etc)
13. Competitive coding
14. Recreational sports activities
15. Other club activities organized by student clubs

List of Activities:

1. Be the leader of the club and implement the charter, vision and mission of the club
2. Learn from diverse perspectives and experiences
3. Learn to lead the team, design and execute extra-curricular activities
4. Develop management skills through hands on experience
5. Explore different managerial roles and develop competencies

Textbooks:

1. Small move: big Change (Caroline Arnold)
2. How to Win at College: Surprising Secrets for Success from the Country's Top Students(Cal Newport)

References:

1. Making the most of college: Students speak their minds (author - Richard Light)
2. Failing Forward: Turning Mistakes into Stepping Stones for Success (John C Maxwell)
3. The Last Lecture (Randy Pausch)
4. Lean in (Sheryl Sandberg)
5. Youtube- Introduction to various club activities

Course Outcomes:

Upon successful completion of the course, student will be able to

- Be the leader of the club and implement the charter, vision and mission of the club
- Learn from diverse perspectives and experiences
- Learn to lead the team, design and execute extra-curricular activities
- Develop management skills through hands on experience
- Explore different managerial roles and develop competencies

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	2		2				
CO2	3		3		2		2				
CO3		3	2		3	2					
CO4		3	3		2		3				
CO5	3		3		2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:
SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
SDG17 : Strengthen the means of implementation and revitalize the global partnership for sustainable development

SDG Justification:
This course recognizes student participation in community service endeavours focussing on sustainable development, service to communities. This allows students to develop empathy, citizenship behaviour and inclusive community values.

DOSL1031	CLUB ACTIVITY – COMPETITOR	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course encourages and recognizes student members' work in leading the student organizationsthrough various leadership roles. As leaders they work not just to organize events and activities in specific co-curricular and extra-curricular interests, but also lead the teams that form the core members of the clubs. These activities allow students to learn and practice leadership and management skills through real world experience.

Course Educational Objectives:

- Create opportunities for students to learn from organizing club activities
- Learn teamwork, leadership, planning and management of events and activities
- Learn to appreciate multiple perspectives, cultures, and individual capabilities
- Learn to manage time effectively

List of Student Club Activities:

1. Music (vocals, instruments, technical, recording, mixing, production, management)
2. Dance (Indian classical, western, jazz, latin, contemporary, folk, production, event management)
3. Theatre (classical, experimental, one-act, street, production, direction, casting, etc.)
4. Arts (fine arts, painting, calligraphy, sketching, caricaturing, etc)
5. Craft (origami, model making, sculpture, pottery, etc)
6. Cooking (home-style, baking, confectionery, Indian, intercontinental, etc.)
7. Graffiti (street, mural, collage, multimedia, etc)
8. Workshops, quizzes, debates, elocution, etc
9. Filmmaking (adventure, drama, film appreciation, documentary, etc)
10. Photography (conventional, immersive (360), landscape, portrait, technical, editing, etc.)
11. College Fests
12. Designing (graphic design, landscape, interior, etc)
13. Competitive coding
14. Recreational sports activities
15. Other club activities organized by student clubs

List of Activities:

1. Be the leader of the club and implement the charter, vision and mission of the club
2. Learn from diverse perspectives and experiences
3. Learn to lead the team, design and execute extra-curicular activities
4. Develop management skills through hands on experience
5. Explore different managerial roles and develop competencies

Textbooks:

1. Small move: big Change (Caroline Arnold)
2. How to Win at College: Surprising Secrets for Success from the Country's Top Students (Cal Newport)

References:

1. Making the most of college: Students speak their minds (author - Richard Light)
2. Failing Forward: Turning Mistakes into Stepping Stones for Success (John C Maxwell)
3. The Last Lecture (Randy Pausch)
4. Lean in (Sheryl Sandberg)
5. Youtube- Introduction to various club activities

Course Outcomes:

Upon successful completion of the course, student will be able to

1. Be the leader of the club and implement the charter, vision and mission of the club
2. Learn from diverse perspectives and experiences
3. Learn to lead the team, design and execute extra-curricular activities
4. Develop management skills through hands on experience
5. Explore different managerial roles and develop competencies

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3	2		2				
CO2	3		3		2		2				
CO3		3	2		3	2					
CO4		3	3		2		3				
CO5	3		3		2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:
SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
SDG17 : Strengthen the means of implementation and revitalize the global partnership for sustainable development

SDG Justification:
This course recognizes student participation in community service endeavours focussing on sustainable development, service to communities. This allows students to develop empathy, citizenship behaviour and inclusive community values.

DOSL1041	COMMUNITY SERVICES - VOLUNTEER	L	T	P	S	J	C
		0	0	0	0	2	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course recognizes student participation in Community service activities organized by various student organizations and other Government and non-government organizations that exist for providing service to communities. These activities allow students to develop empathy, citizenship behaviour and community values.

Course Educational Objectives:

- To help students develop empathy and citizenship behavior
- Enable students to develop an altruistic attitude and community development sensibility
- Allow exploration of community service activities and reflect about these experiences
- Learn to work in small and large teams for achieving community objectives

List of Community Service Activities:

1. Community Health Services
2. Swachh Bharat Abhiyan and other Cleanliness drives
3. Tree Plantation and similar environmental conservation initiatives
4. Rain water harvesting awareness and implementation
5. Fundraising and visits to Orphanages, Old-age homes, etc.
6. Health and disease awareness programs
7. Working with NGOs
8. Disaster mitigation and management training and relief work
9. Rural Upliftment projects
10. Campus awareness and action projects (cleanliness, anti-ragging, blood donation, etc)
11. Community investigations and surveys for development research
12. Educational support for underprivileged (remedial classes, coaching, training, etc)
13. Service camps
14. Advocacy and information literacy initiatives
15. Other activities serving local communities

List of Activities:

1. Participation in various community service activities
2. Weekly reflection paper
3. Portfolio (on social media using an instagram account)
4. Two learning papers (one per semester)

Text Books:

1. Soul of a citizen: living with conviction in Challenging times (author: Paul Rogat Loeb)
2. Community Services intervention: Vera Lloyd

References:

1. A path appears: Transforming lives, creating opportunities (Nicholas Kristof and SherylWuDunn)
2. The story of My Experiments with Truth (author: M. K. Gandhi)

Course Outcomes:

1. Experience of volunteering in a variety of Community service activities
2. Gaining empathy for lesser privileged sections of society by experience
3. Understanding the process of generating community awareness
4. Understanding Disaster management and relief through training and experience
5. Developing environmental and sustainability awareness

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	3					2				
CO2		3	3				2				
CO3				3	3	2	2				
CO4		3	3								
CO5	3		3				3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:
SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
SDG17 : Strengthen the means of implementation and revitalize the global partnership for sustainable development

SDG Justification:
This course recognizes student participation in community service endeavours focussing on sustainable development, service to communities. This allows students to develop empathy, citizenship behaviour and inclusive community values.

DOSL1051	COMMUNITY SERVICES - MOBILIZER	L	T	P	S	J	C
		0	0	0	0	2	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course recognizes student leadership in mobilizing community service activities as members of various student organizations or other Government and non-government organizations that existfor providing service to communities. These activities allow students to develop leadership, management skills, empathy, citizenship behavior and community values.

Course Educational Objectives:

- To help students understand leadership in a community environment
- Enable students to develop an altruistic attitude and community development sensibility
- Allow deep understanding of community service through practical experience
- Learn to lead small and large teams for achieving community objectives

List of Community Service Activities:

1. Community Health Services
2. Swachh Bharat Abhiyan and other Cleanliness drives
3. Tree Plantation and similar environmental conservation initiatives
4. Rain water harvesting awareness and implementation
5. Fundraising and visits to Orphanages, Old-age homes, etc.
6. Health and disease awareness programs
7. Working with NGOs
8. Disaster mitigation and management training and relief work
9. Rural Upliftment projects
10. Campus awareness and action projects (cleanliness, anti-ragging, blood donation, etc)
11. Community investigations and surveys for development research
12. Educational support for underprivileged (remedial classes, coaching, training, etc)
13. Service camps
14. Advocacy and information literacy initiatives
15. Other activities serving local communities

List of Activities:

1. Organizing and leading teams in various community service activities
2. Fortnightly reflection paper
3. Portfolio (on social media using an 44nstagram account)
4. Two learning papers (one per semester)

Textbooks:

1. Soul of a citizen: living with conviction in Challenging times (author: Paul Rogat Loeb)
2. Community Services intervention: Vera Lloyd

References:

1. A path appears: Transforming lives, creating opportunities (Nicholas Kristof and SherylWuDunn)
2. The story of My Experiments with Truth (author: M. K. Gandhi)
3. List of student run and other Government and non- government community service organizations

Course Outcomes:

1. Experience of mobilizing and executing Community service activities
2. Providing opportunities for community service volunteering for other fellowstudents
3. Understanding the process of mobilizing cash, kind and volunteer support
4. Building leadership and management skills
5. Building empathy and citizenship behavior

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	3					2				
CO2		3	3				2				
CO3				3	3	2	2				
CO4		3	3								
CO5	3		3				3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:
SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
SDG17 : Strengthen the means of implementation and revitalize the global partnership for sustainable development

SDG Justification:
This course recognizes student participation in community service endeavours focussing on sustainable development, service to communities. This allows students to develop empathy, citizenship behaviour and inclusive community values.

DOSP1001	BADMINTON	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Educational Objectives:

- Understand training principles used in the sport
- Demonstrate knowledge of the game in a recreational /competitive play setting
- Organize an event around the sport
- Demonstrate concepts of warm up, game conditioning, training plans

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Badminton - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Badminton: Grips - Racket, shuttle
4. Sports Specific fitness and warmup drills
5. Stances and footwork
6. Badminton Gameplay: Service, Forehand, Backhand
7. Preparatory Drills and Fun Games
8. Game Variations: Singles/ Doubles/ Mixed

References:

1. Handbook of the Badminton World Federation (BWF)

Course Outcomes:

1. Learn to play Badminton
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2				3				
CO2							2				
CO3							2				
CO4		3	3		2		2				
CO5				3	2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:4
Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.
SDG Justification:
The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

DOSP1011	CHESS	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Educational Objectives:

- Understand training principles used in the sport
- Demonstrate knowledge of the game in a recreational /competitive play setting
- Organize an event around the sport
- Demonstrate concepts of warm up, game conditioning, training plans

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Chess - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Chess: Pieces & functions, basic play
4. Chess board moves & terminology
5. Chess Gameplay: Openings, castling, strategies & tactics
6. Preparatory Drills and Fun Games
7. Game Variations & Officiating

References:

1. International Chess Federation (FIDE) Handbook

Course Outcomes:

1. Learn to play Chess
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2				3				
CO2							2				
CO3							2				
CO4		3	3		2		2				
CO5				3	2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:4
Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.
SDG Justification:
The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

DOSP1021	CARROM	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Educational Objectives:

- Understand training principles used in the sport
- Demonstrate knowledge of the game in a recreational /competitive play setting
- Organize an event around the sport
- Demonstrate concepts of warm up, game conditioning, training plans

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Carrom - History and development
2. Rules of the Game, Board components & dimensions
3. Fundamental Skills - Carrom: - Striking
4. Gameplay – General
5. Preparatory Drills and Fun Games
6. Game Variations: Singles/ Doubles/ Mixed
7. Preparatory Drills and Fun Games

References:

1. Indian Carrom Federation Handbook - Laws

Course Outcomes:

1. Learn to play Carrom
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2				3				
CO2							2				
CO3							2				
CO4		3	3		2		2				
CO5				3	2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:4
Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.
SDG Justification:
The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

DOSP1031	FOOTBALL	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Educational Objectives:

- Understand training principles used in the sport
- Demonstrate knowledge of the game in a recreational /competitive play setting
- Organize an event around the sport
- Demonstrate concepts of warm up, game conditioning, training plans

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Football - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Kicking, heading, ball control, Keeping
4. Movement, throwins, tackling, defense, scoring, defense
5. Gameplay- Formations, passing, FKs, CKs, PK, tactics
6. Preparatory Drills and Fun Games
7. Game Variations: Small sided games, 7v7, 11v11

References:

1. FIFA Laws of the Game

Course Outcomes:

1. Learn to play Football
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2				3				
CO2							2				
CO3							2				
CO4		3	3		2		2				
CO5				3	2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:4
Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.
SDG Justification:
The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

DOSP1041	VOLLEYBALL	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Educational Objectives:

- Understand training principles used in the sport
- Demonstrate knowledge of the game in a recreational /competitive play setting
- Organize an event around the sport
- Demonstrate concepts of warm up, game conditioning, training plans

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Volley - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Striking, Ball control, Lifting
4. Sports Specific fitness and warmup drills
5. Stances and footwork
6. Preparatory Drills and Fun Games
7. Gameplay: Jumps, strikes, layoffs, attack, defense

References:

1. FIVB - Official Volleyball Rules

Course Outcomes:

1. Learn to play Volleyball
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2				3				
CO2							2				
CO3							2				
CO4		3	3		2		2				
CO5				3	2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:4

Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.

SDG Justification:

The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

DOSP1051	KABADDI	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Educational Objectives:

- Understand training principles used in the sport
- Demonstrate knowledge of the game in a recreational /competitive play setting
- Organize an event around the sport
- Demonstrate concepts of warm up, game conditioning, training plans

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Kabaddi - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Raiding, catching
4. Sports Specific fitness and warmup drills
5. Stances and footwork
6. Preparatory Drills and Fun Games
7. Gameplay: Chain system movement

References:

1. Amateur Kabaddi Federation of India (AKFI) - Official Rules
2. Rules of Kabaddi - International Kabaddi Federation

Course Outcomes:

1. Learn to play Kabaddi
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2				3				
CO2							2				
CO3							2				
CO4		3	3		2		2				
CO5				3	2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:4
Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.
SDG Justification:
The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

DOSP1061	KHO KHO	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Educational Objectives:

- Understand training principles used in the sport
- Demonstrate knowledge of the game in a recreational /competitive play setting
- Organize an event around the sport
- Demonstrate concepts of warm up, game conditioning, training plans

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Kho Kho - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills: Sitting, giving Kho, Pole dive
4. Sports Specific fitness and warmup drills
5. Stances and footwork: Running, sitting
6. Gameplay: Running strategies, ring method, chain method
7. Preparatory Drills and Fun Games

References:

1. Khelo India Official Rulebook of Kho Kho

Course Outcomes:

1. Learn to play Kho Kho
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2				3				
CO2							2				
CO3							2				
CO4		3	3		2		2				
CO5				3	2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:4
Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.
SDG Justification:
The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

DOSP1071	TABLE TENNIS	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Educational Objectives:

- Understand training principles used in the sport
- Demonstrate knowledge of the game in a recreational /competitive play setting
- Organize an event around the sport
- Demonstrate concepts of warm up, game conditioning, training plans

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Table Tennis - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - TT: Grips - Racket, ball
4. Stances and footwork
5. TT Gameplay- Forehand, Backhand, Side Spin, High Toss. Strokes-Push, Chop, Drive, Half Volley, Smash, Drop-shot, Balloon, Flick, Loop Drive.
6. Preparatory Drills and Fun Games
7. Game Variations: Singles/ Doubles/ Mixed

References:

1. Handbook of the International Table Tennis Federation (ITTF)

Course Outcomes:

1. Learn to play Table Tennis
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PS01	PSO2	PSO3	PSO4
CO1	3	2	2				3				
CO2							2				
CO3							2				
CO4		3	3		2		2				
CO5				3	2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:4
Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.
SDG Justification:
The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

DOSP1081	HANDBALL	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Educational Objectives:

- Understand training principles used in the sport
- Demonstrate knowledge of the game in a recreational /competitive play setting
- Organize an event around the sport
- Demonstrate concepts of warm up, game conditioning, training plans

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Handball - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Handball: Throwing, Ball control, Movement
4. Sports Specific fitness and warmup drills
5. Stances and footwork: Jumps, dribbles, catching, throws
6. Gameplay: Shots, throws, movements, attack, defense
7. Preparatory Drills and Fun Games

References:

1. International Handball Federation - Rules of the Game & Regulations

Course Outcomes:

1. Learn to play Handball
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2				3				
CO2							2				
CO3							2				
CO4		3	3		2		2				
CO5				3	2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:4
Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.
SDG Justification:
The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

DOSP1091	BASKETBALL	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Educational Objectives:

- Understand training principles used in the sport
- Demonstrate knowledge of the game in a recreational /competitive play setting
- Organize an event around the sport
- Demonstrate concepts of warm up, game conditioning, training plans

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Basketball - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Passing, Receiving, Dribbling
4. Sports Specific fitness and warmup drills
5. Stances and footwork: Jumps, dribbles, catching, throws
6. Preparatory Drills and Fun Games
7. Gameplay: Shots, throws, movements, attack, defense

References:

1. FIBA Basketball Official Rules

Course Outcomes:

1. Learn to play Basketball
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2				3				
CO2							2				
CO3							2				
CO4		3	3		2		2				
CO5				3	2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:4
Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.
SDG Justification:
The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

DOSP1101	TENNIS	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Educational Objectives:

- Understand training principles used in the sport
- Demonstrate knowledge of the game in a recreational /competitive play setting
- Organize an event around the sport
- Demonstrate concepts of warm up, game conditioning, training plans

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Tennis - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Tennis: Grips - Racket, ball
4. Stances and footwork
5. Gameplay- Forehand, Backhand, Service, volley, smash
6. Preparatory Drills and Fun Games
7. Game Variations: Singles/ Doubles/ Mixed

References:

1. Handbook of the International Tennis Federation (ITF)

Course Outcomes:

1. Learn to play Tennis
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2				3				
CO2							2				
CO3							2				
CO4		3	3		2		2				
CO5				3	2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:4
Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.
SDG Justification:
The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

DOSP1111	THROWBALL	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course provides instruction and the opportunity for participation in sports and physical fitness activities. Skills, strategies, rules, and personal wellness goals are included as appropriate. This course will provide students with an understanding of the fundamental concepts of the physiological functions and training principles associated with the chosen sport.

Course Educational Objectives:

- Understand training principles used in the sport
- Demonstrate knowledge of the game in a recreational /competitive play setting
- Organize an event around the sport
- Demonstrate concepts of warm up, game conditioning, training plans

List of Activities:

1. Watch a sport documentary / training video / game history
2. On field coaching and demonstration session
3. Guided practice and play
4. Event management & game officiating
5. Friendly competitions and structured matches

Instructional Plan:

1. Introduction to Throwball - History and development
2. Rules of the Game, Play Area & dimensions
3. Fundamental Skills - Throwing, Receiving
4. Sports Specific fitness and warmup drills
5. Stances and footwork
6. Preparatory Drills and Fun Games
7. Gameplay: Shots, throws, movements, control

References:

1. World Throwball Federation - Rules of the Game

Course Outcomes:

1. Learn to play Throwball
2. Understanding of the fundamental concepts such as rules of play, game variations
3. Understanding of the governing structure and administration of the sport
4. Understand the event management of the sport
5. Apply sport concepts into an active physical lifestyle

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2				3				
CO2							2				
CO3		3	3				2				
CO4					2		2				
CO5				3	2		3				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :19-07-2021 **ACADEMIC COUNCIL:19-07-2021**

SDG No. & Statement:4
Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages.
SDG Justification:
The nature of the course facilitates students to engage in various forms of fitness activities and sports-related movements that work on their overall health and wellness. The course focuses on inculcating active living as a lifestyle by making sports fun, engaging and meaningful.

ENVS1001	ENVIRONMENTAL STUDIES	L	T	P	S	J	C
		3	0	0	0	0	3*
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

The course enables the students to adapt eco-centric thinking and actions rather than human-centric thinking on natural resources, their utilization and conservation. The course also focuses on the importance of ecosystems, biodiversity and their degradation led to pollution. This course helps in finding solutions through application of control measures to combat pollution and legal measures to achieve sustainable development.

Course Educational Objectives:

- To impart knowledge on natural resources and its associated problems.
- To familiarize learners about ecosystem, biodiversity, and their conservation.
- To introduce learners about environment pollution.
- To acquaint learners on different social issues such as conservation of water, green buildingconcept.
- To make learners understand about the present population scenario, its impacts and role ofinformational technology on environment and human health.
- To make learners understand about the importance of field visit.

UNIT 1 Multidisciplinary nature of environmental studies & Natural Resources **10 hours**

Multidisciplinary nature of environmental studies Definition, scope and importance. Need for public awareness. Natural resources and associated problems. Uses and over exploitation of Forest resources, Water resources, Mineral resources, Food resources, Energy resources. Role of an individual in conservation of natural resources.

Activity:

1. Planting tree saplings
2. Identification of water leakage in house and institute-Rectify or report
3. Observing any one day of a week as Car/bike/vehicle free day.

UNIT 2 Ecosystem and biodiversity 10 hours

Ecosystem: Structure components of ecosystem: Biotic and Abiotic components. Functional components of an ecosystem: Food chains, Food webs, Ecological pyramids, Energy flow in the ecosystem (10% law), Ecological succession.

Biodiversity: Definition, Biogeographical classification of India, Values of biodiversity: consumptive use, productive use, social, ethical, aesthetic. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching, man wildlife conflicts. Conservation of biodiversity: In – situ and Ex-situ

Activity:

1. Visit to Zoological Park-Noting different ecosystem
2. Biodiversity register- Flora and fauna in the campus

UNIT 3 Environmental Pollution 10 hours

Definition Causes, effects, and control measures of: -Air pollution. Water pollution. Soil pollution. Marine pollution. Noise pollution. Nuclear hazards. Solid waste Management: Causes, effects, and control measures. Role of an individual in prevention of pollution. Pollution case studies.

Activity:

1. Visit to treatment plant and documentation.
2. Documentation of segregation of solid waste-Dry and Wet

UNIT 4 Social Issues and the Environment 10 hours

From Unsustainable to Sustainable development Urban problems related to energy. Water conservation, rainwater harvesting, watershed management. Environmental ethics: Issues and possible solutions. Green building concept.

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.

Activity:

1. Observing zero hour at individual level-documentation.
2. Eco friendly idols.
3. Rainwater harvesting-creating storage pits in nearby area.

UNIT 5 Human Population and the Environment and Environment Protection Act and Field work 10 hours

Population growth, variation among nations. Environment and human health. HIV/AIDS, Human rights. Value Education. Women and Child Welfare. Role of Information Technology in Environment and human health. Environment Legislation. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Environmental Protection Act, Issues involved in enforcement of environmental legislation.

Activity:

1. Visit to a local polluted site-industry/agriculture
2. Identifying diseases due to inappropriate environmental conditions

Text Book(s):

1. Erach Bharucha. Textbook of environmental studies for undergraduates courses-Universities Press,India Private Limited. 2019.
2. Kaushik A and Kaushik C.P. Perspectives in Environmental Studies. New Age InternationalPublishers Edition-VI. 2018.
3. Dave D Katewa S.S. Textbook of Environmental Studies, 2nd Edition. Cengage Learning India. 2012.

Additional Reading:

1. Benny Joseph. Textbook of Environmental Studies 3rd edition, McGraw Hill Publishing company limited. 2017.

Reference Book(s):

1. McKinney M.L., Schoch R.M., Yonavjak L. Mincy G. Environmental Science: Systems andSolutions. Jones and Bartlett Publishers. 6th Edition. 2017.
2. Botkin D.B. Environmental Science: Earth as a Living Planet. John Wiley and Sons. 5th edition. 2005.

Journal(s):

1. https://www.tandfonline.com/loi/genv20
2. https://library.lclark.edu/envs/corejournals

Website(s):

https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf From Climate Science to Action | Coursera

Course Outcomes:

After the completion of the course student will be able to

1. List different natural resources and their uses
2. Summarize the structure and function of terrestrial and aquatic ecosystems.
3. Identify causes, effects, and control measures of pollution (air, water & soil).
4. Function of green building concept.
5. Adapt value education

CO-PO Mapping:

	PO2	PO1	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	2							2		
CO2		2				1		2		
CO3			1						1	
CO4				2						1
CO5	1								1	
CO6					2					1

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN: BOS

BOS: 04-07-22 **ACADEMIC COUNCIL:14-07-22**

SDG No. & Statement:

1. SDG-6-Clean water and Sanitation
2. SDG-7-Affordable and clean energy
3. SDG-13 - Climate change
4. SDG-14 - Life below water
5. SDG-15 - Life on Land

SDG Justification:

1. The learner will understand the importance of clean water and sanitation through this course and apply in their daily activities – SDG-6
2. The learner will make use of renewable resources to reduce pollution achieves SDG-7
3. The learner will understand present situation in climate change and takes appropriate steps to combat climate change – SDG-13
4. The learner will understand the existence of life below water – SDG-14
5. The learner will understand to promote sustainable terrestrial ecosystem – SDG15

FINA3001	PERSONAL FINANCIAL PLANNING	L	T	P	S	J	C
		0	0	2	0	0	1*
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	Risk Management in personal financing Fundamentals of Investing Personal and Family Financial Planning Introduction to Personal Finance Portfolio Selection and Risk Management						

Course Description:

Personal Financial Planning is one of the most significant factors in our lives. It is essential that funds are available as and when required at various stages of life. Unavailability of funds at critical stages of our life leads to financial distress and leads to many medical and non- medical problems. There are certain planned and unplanned events in our life. On the one hand, education of our children, their marriage, our retirement etc. are some of the planned events ofour life, but at the same time, some medical urgency, accident or death of an earning member might be some unplanned events. Many of these events are beyond our control, but the availability of funds can be planned to avoid any financial distress. In other words, we cannot stop the rain but can plan for an umbrella.
This course looks at the many challenges an individual faces in a complex financial environment and the rising uncertainties of one's life. It focuses on achieving long-term financial comfort of individual and family through goal setting, developing financial and life strategies, acquiring personal financial planning knowledge and managing risk throughout one's life.

Course Educational Objectives:

- To build students' ability to plan for long-term financial comfort of individual and family through goal setting, developing financial and life strategies.
- To provide students with knowledge on terms, techniques to evaluate investment avenues.
- To build the skill set of the student to enable them to file their tax returns.

UNIT 1 Basics of Financial Planning

Financial Planning Meaning, Need, Objectives, Financial Planning Process, Time Value of Money and its application using excel (NP)

UNIT 2

Risk and Insurance Management

Need for insurance, Requirement of insurance interest, Role of insurance in personal finance, Steps in insurance planning, Life and Non-life insurance products, Life insurance needs analysis (NP)

UNIT 3

Investment Products and Measuring Investment Returns

Investment Products: Small Saving Instruments, Fixed Income Instruments, Alternate Investments, Direct Equity

Measuring Investment Returns: Understanding Return and its concept, Compounding concept, Real vs Nominal Rate of Return, Tax Adjusted Return, Risk-Adjusted Return (NP)

UNIT 4 Retirement Planning

Introduction to the retirement planning process, estimating retirement corpus, Determining the retirement corpus, Retirement Products (NP)

UNIT 5 Tax Planning

Income Tax: Income tax principles: Heads of Incomes, Exemptions and Deductions, Types of Assesses, Rates of Taxation, Obligations for Filing and Reporting, Tax aspects of Investment Products, Wealth Tax

Textbooks:

1. **National Institute of Securities Management (NISM) Module 1 & XA**
2. **Madhu Sinha, Financial Planning, 2 Edition, McGraw Hill India**
3. **Simplified Financial Management by Vinay Bhagwat, The Times Group**

References:

1. Personal Financial Planning (Wealth Management) by S Murali and K R Subbakrishna, Himalaya Publishing House.
2. Mishra K.C., Doss S, (2009). Basics of Personal Financial Planning 1e. National Insurance Academy, New Delhi: Cengage Learning.
3. Risk Analysis, Insurance and Retirement Planning by Indian Institute of Banking and Finance.

Course Outcomes:

1. Describe the financial planning process and application of time value of money
2. Application of life and non-life insurance products in financial planning
3. Understand the investment avenues and analysis of investment returns
4. Understand the retirement planning and its application
5. Describe and analysis the Tax Planning

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	0	0	1	0	0	3	1	1	3
CO2	2	2	0	0	1	1	1	3	1	1	2
CO3	3	2	1	0	1	0	0	3	2	2	3
CO4	3	2	0	1	1	0	1	2	2	3	2
CO5	3	3	0	1	1	1	2	1	2	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS : 01-02-2022 **ACADEMIC COUNCIL: 01-04-2022**

SDG No. & Statement:

SDG Justification:

LANG1001	COMMUNICATION SKILLS IN ENGLISH - BEGINNERS	L	T	P	S	J	C
		0	0	4	0	0	2*
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

Communication Skills in English (Beginner) is the first of the three-level courses for a developmental enhancement of learners' communication skills in English. This course focuses on giving learners exposure to factual level of comprehension (listening and reading) and application of the learning (Speaking/Writing) with an awareness for social and personality-based variationsin communication. In addition to the LSRW skills, the focus of the course is on schematic thinking skills. This course is activity-based and practice-oriented in terms of procedural knowledge of vocabulary and grammatical structure. This syllabus is carefully developed to enable learners to engage in communication in English avoiding errors and be prepared for next level of learning English.

Course Educational Objectives:

- Train learners to listen actively, follow what is spoken in standard English, and answer questions to demonstrate their understanding of the main points of the speech, repeat part of what someone has said to confirm mutual understanding, though occasionally, there may be a need to ask for repetition or clarification. (Bloom's Taxonomy Level/s: 2 & 3)
- Equip learners with the skills to read and comprehend straightforward texts and simple argumentative writing to identify the topic, the desired/relevant information, the main points of the argument, and the major conclusion/s. (Bloom's Taxonomy Level/s: 2 & 4)
- Help learners apply their knowledge and language skills to make mini oral presentations and produce short coherent written texts using appropriate cohesive devices, suitable vocabulary, and grammatical structures. (Bloom's Taxonomy Level/s:3)
- Enable learners to communicate with reasonable accuracy in familiar contexts with adequate fluency and generally good control by equipping them with a repertoire of frequently used vocabulary, structures, and speech patterns. (Bloom's Taxonomy Level/s: 2 & 3)

List of Activities & Tasks for Assessment:

1. Listening to others and getting to know their experiences, interests and opinions
2. Introducing oneself: Salutation, basic information, relating to the context
3. Starting a conversation: Salutation, expressing purpose, expressing gratitude
4. Sharing one's experiences, interests and opinions
5. Reading short newspaper articles for gist
6. Picking new words from an article and working on them to know the meaning and usage
7. Using the new (unknown) words in own sentences
8. Sharing news with others - initiate, sustain and conclude
9. Understanding the relevance of intonation to meaning from recorded conversations, and applying the learning in pair work (role play)
10. Writing a summary of a story/personal narrative after listening to it twice and making individual notes
11. Reading graphs, charts and maps for specific information, making note of the important information and talking briefly about it within a small peer group
12. Writing a paragraph about oneself: a brief profile including major successes, failures, and goals. Giving compliments/gratitude to others
13. Writing a paragraph (descriptive, complimentary) about others (Family, friends, role model, etc.)
14. Correcting each other's' drafts: errors in language - word choice, structure, and conventions/etiquette
15. Writing a short structured descriptive/narrative essay in 3 paragraphs, reading others' essays, and sharing feedback

References:

1. V. Sasikumar, P. Kiranmayi Dutt, Geetha Rajeevan. (2007). Listening and Speaking - Foundation Books Cunninhum, S. & Moor, P. (nd). New Cutting Hedge (Intermediate). Longman
2. Cambrdige Academic English: An Integrated Skills Course for EAP (Intermediate) By Craig Thaine, CUP (2012)
3. Rutherford, Andrea J. (2007). Basic Communication Skills for Technology: Second Edition. Delhi: Pearson Education.
4. McCarthy, M., O'Dell, F., Mark, G. (2005). English Vocabulary in Use. Spain: Cambridge University Press.
5. New Headway Academic Skills: Reading, Writing, and Study Skills Student's Book, Level-1 by Sarah Philpot. OUP

6. Philpot, S. & Curnick, L. (2017). Headway: Academic Skills: Reaing, Writing, and Study Skills. Introductory Level. OUP.
7. Thaine, C. (2012). Cambridge Academic English: An Integrated Skills for EAP. Intermediate. CUP.

Online References:

- www.teachingenglish.org.uk
- learnenglishteens.britishcouncil.org
- https://eslflow.com/
- https://www.englishclub.com/
- https://www.oxfordlearnersdictionaries.com/
- https://dictionary.cambridge.org/
- learnenglishteens.britishcouncil.org
- https://freerice.com/categories/english-vocabulary

Course Outcomes:

1. Listen actively, understand and extract the essential information from short talks/conversations/discussions that are delivered in clear, standard speech. (Bloom's Taxonomy Level/s: 2 & 3)
2. Read, understand, and extract specific information from straightforward factual and simple argumentative texts on general topics and subjects of interest. (Bloom's Taxonomy Level/s: 2 & 3)
3. Speak clearly with some confidence on matters related to his/her interests and academic work and make short structured oral presentations on topics of personal interest. (Bloom's Taxonomy Level/s: 3)
4. Write short straightforward connected texts on a range of familiar/general topics using appropriate linking devices to achieve a clear sequence of ideas. (Bloom's Taxonomy Level/s: 3)
5. Acquire sufficient language competency to express oneself in speech and writing with some confidence, using appropriate vocabulary and simple grammatical structures though lexical limitations and/or difficulty with formulation might be evident at times. (Bloom's Taxonomy Level/s: 2 & 4)

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	0	2	2	3	0	0	0				
CO2	0	2	2	3	0	0	0				
CO3	0	0	0	3	0	0	0				
CO4	0	0	0	3	0	0	0				
CO5	0	4	2	0	2	2	4				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS :30-04-2021 **ACADEMIC COUNCIL: 17-09-2021**

SDG No. & Statement:

SDG No. 4: Statement: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG Justification:

The course aims to remove inequalities among admitted students with regard to basic communication skills in English and provide them communication as well as learning skills that are useful throughout their lives.

LANG1011	COMMUNICATION SKILLS IN ENGLISH	L	T	P	S	J	C
		0	0	4	0	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

Communication Skills in English (Intermediate) is the second of the three-level graded courses for a developmental enhancement of communication skills in English. Based on the learning outcomes set in the beginner level syllabus, this course focuses on giving learners more exposure to the use of language for communicative purposes and equip them with next level skills (ref. Bloom's taxonomy) and practice in terms of complexity and cognitive engagement. This course also includes inferential level of comprehension (listening and reading) that involves analysis and application of the language skills and decision-making skills while speaking/writing with an awareness for social and personality-based variations in communication. This course emphasizes guided writing through adequate tasks with pre and post context building. The focus is on stimulation and application of critical thinking in addition to schematic thinking for communication in real-life situations.

Course Educational Objectives:

- Train learners to actively listen to short audio texts with familiar content; guided activity like question-making and responding to others' questions based on the audio text would help learners engage in transactional dialogue; extended activities like extrapolating/critiquing the responses would help learners enhance their schematic thinking. (Bloom's Taxonomy Level/s: 2 & 4)
- Equip learners with strategies to read actively and critically and understand the writers' viewpoints and attitude by providing reading comprehension tasks using authentic texts such as op-ed articles from newspapers, and reports on contemporary problems. (Bloom's Taxonomy Level/s: 4 & 5)
- Help learners understand various aspects and techniques of effective presentations (group/individual) through demonstration and modelling, and enabling them to develop their presentation skills by providing training in using the tips and strategies given. Learners would be encouraged to observe and express opinion on teacher-modelling. Reflection on issues like anxiety, stage-fear, confidence, and levels of familiarity with topic and audience would be addressed. Practice would be given on tone, pitch, clarity and other speech aspects. Detailed peer feedback and instructor's feedback would cover all the significant aspects. (Bloom's Taxonomy Level/s: 2 & 4)
- Enable learners to become aware of the structure and conventions of academic writing through reading, demonstration, scaffolding activities, and discussion. Corrective individual feedback would be given to the learners on their writing. (Bloom

List of Tasks and Activities:

S.No.	Tasks	Activities
1	Listening to subject related short discussions/explanations/ speech for comprehension	Pre-reading group discussion, Silent reading (Note-making), Modelling (questioning), Post-reading reflection / Presentation
2	Asking for information: asking questions related to the content, context maintaining modalities	Group role-play in a con text (i.e. Identifying the situation and different roles and enacting theirroles)
3	Information transfer: Verbal to visual (familiar context), demonstration by teacher, learners' task (guided with scaffolding), learners' task (free), presentation and feedback	Pair work for discussion & feedback, Presentations, question-answer
4	Information transfer: Visual to verbal (unfamiliar context); demonstration by teacher, learners' task (guided with scaffolding), learners' task (free), presentation and feedback	Pre-reading game/modelling, discussion in small groups, individual writing, and feedback
5	Introducing officials to peers and vice versa -Formal context	AV support, noticing, individual performance (3-4), pair work (in context), teacher modelling, group work for Introducing self and others in a formal context
6	Introducing friends to family and vice versa -Informal context	Teacher modelling/AV support, noticing structure & note-taking, Introducing friends andfamily in an informal context
7	Vocabulary in context: Find clues in a text and use them to guess the meaning of words/ phrases. Apply the newly learnt vocabulary in communication (speaking and writing).	Comprehending verbal communication: Identifying the contextual clues in oral and written texts; guessing the meaning of words/phrases in context while reading texts and listening to discussions/talks
8	A five-day journal (diary) writing based on learners reading from newspaper on a single relevant/ current social issue. Individual oral presentation and feedback from peers andinstructor.	Note-making (group work), Discussion, Feedback
9	Follow the essentials of lectures, talks, discussions, reports and other forms of academicpresentations and	Making power point presentation aided with images, audio, video, etc. with a

	mak2 individual and group presentations aided with images, audio, video, tabular data, etc.	small group by listening to academic lectures/talks/ discussions,etc.
10	Self-reflection: Re-reading one's own drafts, identifying errors, correcting the errors, and givingrationalize the changes	Pre-task discussion/modelling, Editing the texts by careful reading and identifying the errors, peer-exchange (Pair work),feedback/consolidation
11	Collaborative work (speaking and writing) in small groups of 3 or 4 learners: discussing a general/ discipline-specific topic: creating outline, assigning specific roles to members of the group; and group presentation followed by peer and instructor feedback	Pre-task modelling (peer/teacher), general discussion on structure, group work (collaboration), feedback
12	Independent reading of different text types using appropriate reference sources by adapting suitable reading styles and speed. Focus on active reading for vocabulary: low-frequency collocations and idiomatic expressions.	Brain-storming, mapping of key terms (content specific), reading and note-making (individual), oral questioning, discussion
13	Role-play (specific social and academic situations): planning (making notes), understanding nuances of speaking in context, coordinating with situational clues and fellowspeakers/participants	Peer discussion for outline, A-V support, observing (teacher modelling), role play (guided), role-play (free), feedback
14	Writing instructions: Guidelines - Flowcharts - Procedures to be followed	Pre-task reading, pair work, teacher/peer-discussion, feedback
15	Speaking spontaneously on topics of interest and writing short structured essays on the same topics adopting appropriate academic conventions andgrammatical accuracy.	Reading for task preparation, note-making, speaking, reflection and corrective peer and teacher feedback

Reference Books:

1. P. Kiranmayi Dutt, Geetha Rajeevan. (2007). Basic Communication Skills. FoundationBooks. CUP
2. Harmer, J. (1998). How to teach English. Longman
3. Sanjay Kumar & Pushp Lata. (2018). Communication Skills: A Workbook. OUP.
4. Cambridge IGCSE: English as a Second Language Teacher's Book Fourth Edition.By

Peter Lucantoni. CUP (2014).

5. Cambrdige Academic English: An Integrated Skills Course for EAP (Upper Intermediate) By Martin Hewings, CUP (2012)
6. Richards, J.C. and Bohlke, D. (2012). Four Corners-3. Cambridge: CUP.
7. Headway Academic Skills: Reading, Writing, and Study Skills Student's Book, Level-2 bySarah Philpot. OUP
8. Latham-Koenig, C. & Oxenden, C. (2014). American English File. Oxfor: OUP.
9. McCarthy, M. & O' Dell. F. (2016). Academic Vocabulary in Use. Cambridge: CUP

Online Resources:

1. https://www.grammarly.com/blog/
2. https://www.nationalgeographic.org/education/
3. https://www.bbc.co.uk/teach/skillswise/english/zjg4scw
4. https://www.englishclub.com/
5. https://www.oxfordlearnersdictionaries.com/
6. https://dictionary.cambridge.org/
7. learnenglishteens.britishcouncil.org
8. https://freerice.com/categories/english-vocabulary
9. http://www.5minuteenglish.com/
10. https://breakingnewsenglish.com/
11. https://www.digitalbook.io/
12. https://librivox.org/

Course Outcomes:

1. Understand the speaker's point of view in fairly extended talks on general or discipline-specifictopics, and follow simple lines of argument in discussions on familiar contemporary issues. (Bloom's Taxonomy Level/s: 3)
2. "Read and demonstrate understanding of articles and reports on limited range of contemporary issues in which the writers adopt particular stances. Also provide samples of written communication containing fairly complex information and reasons for choices/opinions/stances. (Bloom's Taxonomy Level/s: 2 & 3)"
3. Make short presentations on a limited range of general topics using slides, and engage in smallgroup discussions sharing experiences/views on familiar contemporary issues and give reasonsfor choices/opinions/plans. (Bloom's Taxonomy Level/s: 3 & 4)
4. Write clear, fairly detailed text (a short essay) on a limited range of general topics, and subjectsof interest, and communicate clearly through email/letter to seek/pass on information or give reasons for choices/opinions/plans/actions. (Bloom's Taxonomy Level/s: 3)
5. Reflect on others' performance, give peer feedback on fellow learners' presentations, responsesto writing tasks and reading comprehension questions. (Bloom's Taxonomy Level/s: 5)

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	0	3	0	3	0	3	0				
CO2	0	2	0	3	2	2	0				
CO3	4	3	3	3	3	3	4				
CO4	0	3	3	3	3	3	0				
CO5	5	0	5	0	0	0	0				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :30-04-2021 **ACADEMIC COUNCIL: 17-09-2021**

SDG No. & Statement:
SDG No. 4: Statement: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG Justification:
The course aims to remove inequalities among admitted students with regard to basic communication skills in English and provide them communication as well as learning skills that are useful throughout their lives.

LANG1021	ADVANCED COMMUNICATION SKILLS IN ENGLISH	L	T	P	S	J	C
		0	0	4	0	0	2
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

Communication Skills in English (Advanced) is the third of the three-level graded courses for a developmental enhancement of communication skills in English. Based on the learning outcomes set in the upper-intermediate syllabus, this course focuses on giving learners exposure to higher level of skills/input processing (ref. Bloom's taxonomy) and practice in terms of complexity and cognitive engagement. This course includes advanced level of comprehension i.e. anaytical, evaluative and extra-polative processing (listening and reading) and involves problem-solving, logical reasoning and decision-making skills in terms of application of the learning (speaking/writing) with an awareness for social and personality based variations in communication. This course provides opportunities with activity-based practice of advanced oral and written communicative skills besides building awareness on the finer nuances of language use for various purposes. This course emhasizes free writing through meaningfully engaging tasks witha pre and post context building. There is ample scope for application of critical thinking through simulated activities for effective communication in real life situations.

Course Educational Objectives:

- Enable learners to listen actively become aware of tone and attitude in speech, and demonstrate their comprehension of fairly complex lines of argument presented by a variety of speakers in talks/presentations/discussions. (Bloom's Taxonomy Level/s: 2 & 4)
- Enable learners to become aware of tone and attitude in written texts, and demonstrate theircomprehension of fairly complex lines of argument and points of view presented in a variety of texts by equipping them with upper intermediate to advanced level reading skillsand strategies. (Bloom's Taxonomy Level/s:2 & 3)
- Make effective presentations, engage in formal group discussions, and write structured essays/ short reports to highlight the significance of actions/decisions/experiences, and sustain views by providing relevant evidence and argument. (Bloom's Taxonomy Level/s:3 & 4)
- Equip learners with the skills and strategies to communicate effectively in speech and writing using the language with a degree of fluency, accuracy and spontaneity, and fairly good grammatical control adopting a level of formality appropriate to the context. Encourage learners to apply their knowledge of language and their communication skills in real life situations. (Bloom's Taxonomy Level/s:3 & 5)

List of Activities & Tasks for Assessment:

S.No.	Tasks	Activities	CO
1	Evaluative and extrapolative reading of a longtext/short texts on a current topic related to technology and society, identifying and questioning the author's intention, post- reading discussion in small groups, maintaining group dynamics, arriving at a consensus	Pre-reading group discussion, silent reading (Note-making), modelling (questioning), post-reading reflection and brief presentation of thoughts/ideas/opinions on the themeof the text	3
2	Debate in pairs based on listening to two recorded contemporary speeches by well- known leaders in different fields. Peer feedback and instructor feedback.	Pre-recorded audio/video for listening, student checklist for noticing key words/concepts, pre-task orientation (by teacher), pair work, feedback	1
3	Information transfer: Verbal to visual (unfamiliar context); demonstration by teacher, learners' task (guided with scaffolding), learners' task (free), presentation, question-answer (among students), modification and feedback before the final version is done	Pair work for discussion and feedback, presentations, question-answer	2
4	Information transfer: Visual to verbal (unfamiliar context); demonstration by teacher, learners' task (guided with scaffolding), learners' task (free), presentation, question-answer(among students), modification, editing, proofreading, and feedback before the final version is done	Pre-reading game/ modelling, discussion in small groups, independent writing and feedback	4
5	Expressing opinion on a short argumentative text (e.g. a journal article or a newspaper editorial) and justifying one's opinion/stance; focus on the use of appropriate conventions of formal and polite speech, and managing bias	Listening to group discussions/ debates, reading news-paper articles on the current issues and expressing opinions in favour or against the topic (in GDs, debates or writing argumentativeessays).	3
6	Role-play (complex social and academic/professional situations): Focus on significant aspects of delivery including clarity, tone, and use of contextually appropriate	Reading newspaper/ magazine articles/ blog posts on current social issues, listening to talks/ discussions/ debates etc. and participating in role-plays using	1

	vocabulary and conventions, observation, reflective discussion, and self-reflective writing	expressions appropriate to the context.	
7	Collaborative writing in groups of 3 - 4 on topics that would require data collection and reading followed by recorded peer-reflection and peer-feedback, group presentation and feedback	Pre-task modelling (peer), general discussion on structure, group work (collaboration), presnetation, peer feedback, Open-class discussion	5
8	Formal Group Discussion on topics of currentinterest and relevance; focus on effective participation, reflection on control over argument/ counter argument, and adherence to the conventions of formal GD	Noticing strategies from AV modelling, teacher scafolding though open-house discussion, Note-making (Group work), Group Discussion (free), post perfromance discussion, Feedback	2
9	Mind-mapping for advanced reading, making correlations across texts, extending author's point of view	Reading texts on abstract topics and comprehending the author's perspective by inferring the unknown words' meaning in the context and making notes using mind-map strategy and presenting it orally.	3
10	Handling question and answer sessions after presentations: justifying arguments, taking counter-arguments, agreeing and disgreeing with rationale	Listening to some lectures, talks, and presentations in the academic seminars and adapting some strategies to handle the Q&A sessions using polite and formal expressions to agree or disagree with the statements.	1
11	Modelling an interview: with a panel of fourjudges (peers)	Pre-task activity for orientation/ strategies (controlled/guided), Model interview (AV support), Group work (role play), interview in pair (one-to-one), Interview in group (many -to-one), oral corrective feedback (peer/ teacher)	2
12	Writing a short reflective report of an event - incident/ meeting/ celebration	Writing a report on meetings/ celebrations/ events etc. by actively involving in such events and giving a short oral presentation on the same.	4
13	Speaking on abstract and complex topics beyond his/her own area of interest/field of study, using the language flexibly and effectively.	Reading texts on abstract topics and comprehending the author's perspectives. Similarly, listening to talks and discussions on an abstract	3

		topic of other discipline and making short oral presentation by sharing views and opinions.	
14	Self-relfection on own speech in context(recorded): tone, pitch, relevance, content; extending the reflections/ideas toothers	Listening to selected general discussions (audios and videos) and observing the language production. Recording own speech on some general topic and providing a critical review (self-reflection) on it by focusing on the tone, expressions and relevance of the content, etc.	1
15	Collaborative and individual task: planning, preparing (preparing an outline, structure, setting objectives and presenting the plan of action) and executing a mini-project, and submitting a brief report on the same peer and instructor feedback after the planning stage and on completion of the mini project	Pre-task modelling (peer/teacher), general discussion on structure, group work (collaboration), oral corrective, task distribution, presentation, feedback	5

Reference Books:

1. Latham-Koenig, C. & Oxenden, C. (2014). American English File-5. Oxford: OUPRichards,
2. J.C. and Bohlke, D. (2012). Four Corners-4. Cambridge: CUP.
3. Cambrdige Academic English: An Integrated Skills Course for EAP (Advanced) By MartinHewings and Craig Thaine, CUP (2012)
4. Berlin, A. (2016). 50 Conversation Classes: 50 Sets of Conversation Cards with an Accompanying Activity Sheet Containing Vocabulary, Idioms and Grammar. Poland: CreateSpace Independent Publishing Platform
5. Zemach, D. E., Islam, C. (2011). Writing Paragraphs: From Sentence to Paragraph. Germany: Macmillan Education.
6. Stewart, J. P., Fulop, D. (2019). Mastering the Art of Oral Presentations: Winning Orals, Speeches, and Stand-Up Presentations. United Kingdom: Wiley.
7. Kroehnert, Gary. (2010). Basic Presentation Skills. Sidney: McGraw Hill.
8. Cunninghum, S. & Moor, P. (nd). Cutting Edge (Advanced) With Phrase Builder. Longman Publishers. CUP
9. McCarthy, M & O'Dell, F. (2017). English Idioms in Use (Advanced). Cambridge: CUP.

Online Resources:

1. https://www.grammarly.com/blog/
2. https://www.nationalgeographic.org/education/
3. https://www.bbc.co.uk/teach/skillswise/english/zjg4scw
4. https://www.englishclub.com/
5. https://www.oxfordlearnersdictionaries.com/
6. https://dictionary.cambridge.org/
7. learnenglishteens.britishcouncil.org
8. https://freerice.com/categories/english-vocabulary
9. http://www.5minuteenglish.com/
10. https://breakingnewsenglish.com/
11. https://www.digitalbook.io/
12. https://librivox.org/

Course Outcomes:

1. Listen to extended lectures, presentations, and discussions on a wide range of contemporary issues and demonstrate understanding of relatively complex lines of argument. (Bloom's Taxonomy Level/s: 2)
2. Make presentations using suitable AV aids and engage in formal group discussions on a wide range of topics of contemporary interest, demonstrating awareness of standard/widelyaccepted conventions. (Bloom's Taxonomy Level/s: 3)
3. Read and demonstrate understanding of the writer's stance/viewpoint in articles and reports on a wide range of contemporary issues and discipline-specific subjects. (Bloom's Taxonomy Level/s: 2 & 4)
4. Write analytical essays on a wide range of general topics/subjects of interest, and engage in written communication (emails/concise reports) to exchange relatively complex information, giving reasons in support of or against a particular stance/point of view. (Bloom's Taxonomy Level/s: 3 & 4)
5. Complete a mini project that necessitates the use of fairly advanced communication skills to accomplish a variety of tasks and submit a report in the given format. (Bloom's Taxonomy Level/s: 4 & 5)

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	0	2	2	0	2	2	0				
CO2	3	3	0	3	0	0	3				
CO3	2	4	0	4	2	2	0				
CO4	3	4	0	4	0	0	3				
CO5	0	4	0	4	0	0	0				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS :30-04-2021 **ACADEMIC COUNCIL: 17-09-2021**

SDG No. & Statement:
SDG No. 4: Statement: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

SDG Justification:
The course aims to remove inequalities among admitted students with regard to basic communication skills in English and provide them communication as well as learning skills that are useful throughout their lives.

MFST1001	HEALTH & WELLBEING	L	T	P	S	J	C
		0	0	2	0	0	1*
Pre-requisite	**None**						
Co-requisite	**None**						
Preferable exposure	**None**						

Course Description:

The course provides the students a better understanding of the role of a proper diet in maintenance of human health. This course emphasizes the composition of the food, and will help to understand how to exercise, the role of sports and physical fitness in development of a good health. The course also focuses on the importance of emotional well-being and mindfulness. This course helps in teaching the role of yoga in maintenance of physical balance.

Course Educational Objectives:

- To provide an understanding of the relationship between food and nutrition
- To emphasize the role of exercise, sports and physical fitness in obtaining a good health
- To explain about the mindfulness and emotional well being
- To teach the role of yoga and meditation in maintaining the body balance

UNIT 1

Understand the relationship between Food and Nutrition and how food composition affects nutritional characteristics. Knowledge about regulatory principles in determining diets and recommended daily allowances. Understand how to create personalised diet/nutrition plans.

UNIT 2

Understand how exercise, activity and sports helps in developing good health. Experiential exposure to the role of proper, specific nutritional interventions along with structured activities on developing proper physical health. Practical exercises and assignments in sports and exercise regimes.

UNIT 3

Introduction to emotional wellbeing and mindfulness. Teaching of mindfulness practices to reduce stress, increase relaxation and improve mental wellbeing.

UNIT 4

Introduction to Yoga theory and how Yoga helps in maintaining balance in the body. Practice

of Yoga and meditation to improve overall emotional and physical balance. Practical yoga exercises and meditation techniques

Course Outcomes:

By the end of the course, student will

1. Learn the role of nutrition and diet in maintaining a good health
2. understand how the exercise, sports and physical activities will improve health
3. learn mindfulness practices for reducing stress
4. know the importance of yoga and meditation

APPROVED IN:

BOS :30-04-2021 **ACADEMIC COUNCIL: 17-09-2021**

SDG No. & Statement:

SDG Justification:

PHPY1001	GANDHI FOR THE 21ST CENTURY	L	T	P	S	J	C
		2	0	0	0	0	2*
Pre-requisite	**None**						
Co-requisite	**None**						
Preferable exposure	**None**						

Course Description:

This course provides the students with basic knowledge on Gandhi's early life, transformations in South Africa and his entry into India's national movement. While going through the social-political, economic, and educational philosophies of Gandhi, the course analyses how his ideologies are relevant even in the 21st century.

Course Educational Objectives:

The objectives of the course are;

- To provide the students with the basic knowledge on Gandhi's life and his philosophies
- To understand the early influences and transformations in Gandhi
- To analyze the role of Gandhi in India's national movement
- To apply Gandhian Ethics while analyzing the contemporary social/political issues
- To appreciate the conflict resolution techniques put forward by Gandhi and its significance in the current scenario.

UNIT 1 MK Gandhi: Childhood and Education

M K Gandhi, Formative Years (1869-1893): Early childhood – study in England – Indian influences, early Western influences.

UNIT 2 From Mohan to Mahatma-South African Experiences

Gandhi in South Africa (1893-1914): South African Experiences – civil right movements in South Africa – invention of Satyagraha – Phoenix settlement- Tolstoy Farm – experiments in Sarvodaya, education, and sustainable livelihood.

UNIT 3 Gandhi and Indian National Movement

Gandhi and Indian National Movement (1915-1947): Introduction of Satyagraha in Indian soil -non- cooperation movement – call for women's participation – social boycott – Quit-India movement – fighting against un-touch ability – Partition of India- independence.

UNIT 4 Gandhi and Sustainable Development

Gandhian Constructive Programs-Eleven Vows-Sarvodaya-Seven Social Sins-Gandhian Economics and Sustainable Development

UNIT 5 Gandhi and Contemporary Issues

Conflict Resolution Techniques of Gandhi-Ecological Challenges and Gandhian solutions-Gandhian Ethics-An Analysis

References:

1. Gandhi, M K. (1941). *Constructive Programme*. Ahmadabad: Navjivan Publishing House
2. Gandhi, M. K. (1948). *The Story of My Experiments with Truth*. Ahmadabad: Navjivan Publishing House
3. Gandhi, M K. (1968). *Satyagraha in South Africa*. Ahmadabad: Navjivan Publishing House.
4. Khoshoo, T N (1995). *Mahatma Gandhi: An Apostle of Applied Human Ecology*. New Delhi:TERI
5. Kripalani, J.B. (1970). *Gandhi: His Life and Thought*. New Delhi: Publications Division.
6. Narayan, Rajdeva (2011). *Ecological Perceptions in Gandhism and Marxism*. Muzaffarpur: NISLS
7. Pandey, J. (1998). *Gandhi and 21st Century*. New Delhi: Concept.
8. Weber, Thomas (2007).Gandhi as Disciple and Mentor. New Delhi: CUP

Course Outcomes:

After the successful completion of the course the students will be able to;

1. Understand the life of Gandhi
2. Appreciate the role of Gandhian non-violence and Satyagraha in India's freedom struggle.
3. Critically examine the philosophy of Gandhi on Education, Sarvodaya, and Satyagraha
4. Analyse the contemporary significance of Gandhian constructive programmes and eleven vows
5. Examine the possible solutions for some of the contemporary challenges like environmental issues, moral degradation and ethical dilemmas.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	3	3	3	3	3	3	2	2
CO2	3	3	2	3	2	3	3	3	3	2	3
CO3	3	3	3	2	3	2	2	3	3	2	2
CO4	3	2	2	3	3	2	2	3	3	2	3
CO5	3	3	2	2	3	3	3	3	3	3	2

Note: 1 – Low Correlation 2 – Medium Correlation 3 – High Correlation

APPROVED IN:

BOS :30-04-2021 **ACADEMIC COUNCIL: 17-09-2021**

SDG No. & Statement:

SDG Justification:

POLS1001	INDIAN CONSTITUTION AND HISTORY	L	T	P	S	J	C
		2	0	0	0	0	2*
Pre-requisite	**None**						
Co-requisite	**None**						
Preferable exposure	**None**						

Course Description:

This course analyses the basic structure and operative dimensions of the Indian Constitution. It explores various aspects of the Indian political and legal system from a historical perspective highlighting the various events that led to the making of the Indian Constitution. The course also deals with various challenges faced by the constitution and its coping mechanisms. Broadly, the students would understand and explain the working of different institutions and political debates ensuing from the operation of the Indian constitution in action.

Course Educational Objectives:

- To introduce constitutional history of India.
- To explain the process of making Indian constitution
- To analyze Fundamental of Rights, Duties and other principles in constitution
- To create familiarity with political developments which shaped the constitution.

UNIT 1 **India as a Nation** **6 hours**

Khilani, S. (2004). *Introduction, The Idea of India*, Chapter 1. New Delhi: Penguin Books,

pp. 1-15.

Rowat, D. (1950). 'India: The Making of a Nation', International Journal, 5(2), 95-108. Doi:10.2307/40194264

Brass, P. (2018). 'Continuities and Discontinuities between pre- and post-Independence India', Chapter 1.

The Politics of Idea since independence, New Delhi: Cambridge University Press. Pp. 1-30.

UNIT 2 **Understanding the Constitution** **6 hours**

Mehta, U.S. (2011). 'Constitutionalism' in *The Oxford Companion to Politics in India*, (ed) by Nirja Gopal Jayal, and Pratap Bhanu Mehta, New Delhi: Oxford University Press. Pp. 15-27.

Austin, G. (2016), 'The Constituent Assembly: Microcosm in Action' *in The Indian Constitution: Cornerstone of a Nation*, New Delhi: Oxford University Press, pp. 1-25.

Beteille, Andre (2008): "Constitutional Morality," *Economic and Political Weekly*, Vol 43, Issue No 40

Prahladan, Vivek (2012): "Emergence of the Indian Constitution," *Economic and Political Weekly*, Vol 47, Issue No 07.

UNIT 3 The Preamble, Fundamental Rights and Directive Principles of State Policy **6 hours**

Bhakshi, P.M. (2011). 'Preamble' in *The Constitution of India*, New Delhi: Universal Law. Pp. 1-5. Laxmikanth, M. (2017). 'Chapter IV: Preamble of the Constitution' in *Indian Polity*, Chennai: McGraw Hills.

Kumar, Virendra (2007): "Basic Structure of The Indian Constitution: Doctrine of Constitutionally Controlled Governance [From Kesavananda Bharati to I.R. Coelho]" *Journal of the Indian Law Institute*, Vol 49, No 3, pp 365-398.

Austin, G (2016), ' ' in *The Indian Constitution: Cornerstone of a Nation*, New Delhi: Oxford University Press, pp.63-105.

Reddy, S (1980). Fundamental Ness of Fundamental Rights and Directive Principles in the Indian Constitution. *Journal of the Indian Law Institute*, 22(3), pp. 399-407.

Bhatia, Gautam (2017): "The Supreme Court's Right to Privacy Judgement," *Economic and Political Weekly*, Vol 52, Issue No 44

UNIT 4 Citizenship **6 hours**

Jayal, N.G. (2019). 'Reconfiguring citizenship in contemporary India' in *South Asia Journal of South Asian Studies*, pp.33-58.

Roy, Anupama. (2010). 'Chapter I: Enframing the citizen in contemporary times' in *Mapping Citizenship in India*, New Delhi: Oxford University Press.

Das, Veena (2010): "State, Citizenship and the Urban Poor," *Citizenship Studies,* Vol 15, pp 319- 333.Valerian Rodrigue

UNIT 5 Separation and Distribution of Powers **6 hours**

Pal, Ruma. (2016). 'Separation of Powers' in *The Oxford Handbook of the Indian Constitution*, (ed) by Sujit Choudhry, Madhav Khosla, and Pratap Bhanu Mehta, Delhi: Oxford University Press.

Bakshi, P. (1956). 'Comparative Law: Separation of Powers in India'. *American Bar Association Journal, 42*(6), 553-595.

Rao, P. (2005). 'Separation of Powers in a Democracy: The Indian Experience'. *Peace Research, 37*(1), 113-122.

Kumar, Ashwani (2019): "Constitutional Rights, Judicial Review and Parliamentary Democracy,"

Economic and Political Weekly, Vol 51, Issue 15

Tillin, Louise. (2015). 'Introduction' in *Indian Federalism*. New Delhi: Oxford University Press. Pp. 1-30.

Chakrabarty, Bidyut and Rajendra Kumar Pandey. (2008). *Federalism' in Indian Government and Politics*, New Delhi: Sage Publications. Pp. 35-53.

Arora, B. and Kailash, K. K. (2018). 'Beyond Quasi Federalism: Change and Continuity in Indian Federalism', in *Studies in Indian Politics*, pp. 1-7.

Agrawal, Pankhuri (2020): "COVID-19 and dwindling Indian Federalism," *Economic and Political Weekly,* Vol 55, Issue No 26

Recommended Readings:

De, Rohit. (2018). *A People's Constitution – The Everyday Life of Law in the Indian Republic*, USA: Princeton University Press.

Granville Austin, *The Indian Constitution: Cornerstone of a Nation*, Oxford University Press, Oxford, 1966.

Lahoti, R.C. (2004). *Preamble: The Spirit and Backbone of the Constitution of India*. Delhi: Eastern Book Company.

Rajeev Bhargava (ed), *Ethics and Politics of the Indian Constitution*, Oxford University Press, New Delhi, 2008.

Subhash C. Kashyap, *Our Constitution*, National Book Trust, New Delhi, 2011. Tillin, Louise. (2015). *Indian Federalism*. New Delhi: Oxford University Press.

Zoya Hassan, E. Sridharan and R. Sudarshan (eds), *India's Living Constitution: Ideas, Practices, Controversies*, Permanent Black, New Delhi, 2002.

Course Outcomes:

On the successful completion of the course students would be able to:

1. Demonstrate an understanding of the Constitution of India and how constitutional governance is carried out in India
2. Interpret knowledge of the Fundamental Rights and Duties of the Citizens as well as the Obligation of the state towards its citizens
3. Correlate familiarity with key political developments that have shaped the Constitution and amended it from time to time.
4. Equip themselves to take up other courses in law after having done a foundation course on Indian Constitution

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	2	2	3	3	2	3	1	2
CO2	1	1	2	1	2	2	3	2	3	1	2
CO3	1	2	1	2	2	2	3	1	3	1	1
CO4	1	1	1	2	2	2	3	1	3	1	1
CO5	1	1	1	2	2	2	3	2	3	1	2

Note: 1 – Low Correlation 2 – Medium Correlation 3 – High Correlation

APPROVED IN:

BOS :30-04-2021 **ACADEMIC COUNCIL: 17-09-2021**

SDG No. & Statement:

SDG Justification:

VEDC1001	VENTURE DEVELOPMENT	L	T	P	S	J	C
		0	0	0	2	0	2
Pre-requisite	**None**						
Co-requisite	**None**						
Preferable exposure	**None**						

Course Description:

India as part of its "Make in India" initiative has been focusing on creating incubation centers within educational institutions, with an aim to generate successful start-ups. These start-ups will become employment creators than employment seekers, which is the need of the hour for our country. This common course (university core) for all the disciplines is a foundation on venture development. It is an experiential course that starts with students discovering their deeper self in terms of how they might contribute to society by creating exciting new products and services that can become the basis of real businesses. The students learn about the emerging areas of knowledge that are the foundations of any successful company. They will learn how to develop insight into the problems and desires of different types of target customers, and from this, to identify the design drivers for a specific innovation. Students will learn specific design methods for new products and services. The students will learn that as important as the product or service itself, is a strategy for monetizing the innovation – for generating revenue, structuring the operating costs, and creating the operating profit needed to support the business, hire new employees, and expand forward. This course is aimed to be the beginning of what might be the most important journey of personal and career discovery so far in a student's life, one with lasting impact. This is not just a course, but potentially, an important milestone in life that a student remembers warmly in the years to come.

Course Educational Objectives:

Students have the opportunity to:

- Discover who they are – Values, Skills, and Contribution to Society
- Understand how creativity works and permeates the innovation process
- Learn the basic processes and frameworks for successful innovation.
- Gain experience in going through the innovation process.
- Conduct field research to test or validate innovation concepts with target customers.

UNIT 1 **PERSONAL DISCOVERY** **4 hours**

Personal Values, Excite & Excel, Build a Team, Define Purpose, Mission Statement

UNIT 2	IDEATION	10 hours

Ideation & Impact, User Insights - Frameworks, Customer Interviews, Interpreting Results

UNIT 3	SOLUTION DISCOVERY	8 hours

Concept Design, Competitive Analysis, Product Line Strategy, Prototyping Solutions, Reality Check

UNIT 4	BUSINESS MODEL DISCOVERY	4 hours

Understand the Industry, Types of Business Model, Define Revenue Models, Define Operating Models, Define Customer Journey, Validate Business Model

UNIT 5	DISCOVERY INTEGRATION	4 hours

Define Company Impact, Create Value, Tell Your Story

Textbooks:

1. Meyer and Lee, "Personal Discovery through Entrepreneurship", The Institute for Enterprise Growth, LLC. Boston, MA., USA.

References:

1. Adi Ignatius (Editor-in-Chief), "Harvard Business Review", Harvard Business Publishing, Brighton, Massachusetts,2021

Course Outcomes:

1. Identify one's values, strengths and weaknesses and their will to contribute to the society
2. Formulate an idea and validate it with customers
3. Demonstrate prototyping and analyse the competition for the product
4. Create business models for revenue generation and sustainability of their business
5. Come up with a pitch that can used as the basis for actually starting a company based on an impactful innovation and societal impact

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1						3	1				
CO2		3		3	1	3	2				
CO3	1	3	3		3		3				
CO4					1	1	3				
CO5					3	3					

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS :30-04-2021 **ACADEMIC COUNCIL: 17-09-2021**

SDG No. & Statement:

4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

SDG Justification:

4. The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

17. The course is developed in collaboration with North-eastern University, USA and the training for the champions is being by North-eastern University.

FACULTY CORE

CHEM1011	CHEMISTRY-I	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

The students of undergraduate program in science studying chemistry course need to be conversant with the various fields of chemistry. Therefore, one module each on in general, physical and organic chemistry is introduced which helps the student familiarize with the concepts of chemistry essential for allied and interdisciplinary fields of science.

Course Educational Objectives:

To introduce the concepts of general chemistry. The students will be conversant with the chemistry of all the elements that is closely knitted with analytical chemistry, physical chemistry and organic chemistry.

1. To introduce the concepts of atomic theory and arrangement of electrons in orbital level
2. To understand about bonding and energy calculations in molecules
3. To know about the reaction mechanism, reactive species in organic chemistry and concept of aromaticity.
4. To expose the students to concepts of chirality, configuration, isomerism in organic chemistry.
5. To discuss synthetic reactions, mechanism and properties of aromatic alcohol, aromatic and aliphatic ether, aldehydes, and ketones

Section A: Inorganic Chemistry-1

Unit-I **9 Hours**

Atomic Structure: Review of: Bohr's theory and its limitations, dual behavior of matter and

radiation, de Broglie's relation, Heisenberg Uncertainty principle. What is Quantum mechanics? Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ2, Schrödinger equation for hydrogen atom. Graphical representation of 1s, 2s, 2p, 3s, 3p and 3d orbitals. Rules for filling electrons in various orbitals, Electronic

configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy.

Unit-II **9 Hours**

Chemical Bonding and Molecular Structure

Ionic Bonding: General characteristics of ionic bonding. Energy considerations in Ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation

of lattice energy. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.

Covalent bonding: VB Approach: Shapes of some inorganic molecules and ions on the Basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements.

Unit-III **9 Hours**

Section B: Organic Chemistry-1

Fundamentals of Organic Chemistry

Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance

and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals. Aromaticity: Benzenoids and Hückel's rule.

Unit-IV **9 Hours**

Stereochemistry

Conformations with respect to ethane, butane and cyclohexane. Inter conversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). Threo and erythro; D and L; cis – trans nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for

upto two C=C systems).

Unit- V **9 Hours**

Aliphatic Hydrocarbons

Functional group approach for the following reactions (preparations & reactions) to be studied.

Alkanes: (Upto 5 Carbons). Preparation: Catalytic hydrogenation, Wurtz reaction. Reactions: Free radical Substitution: Halogenation.

Alkenes: (Upto 5 Carbons) Preparation: Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). Addition of HX (Markownikoff's and anti-Markownikoff's addition.

Alkynes: (Upto 5 Carbons) Preparation: Acetylene from CaC2and conversion into Higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal dihalides.

Reactions: formation of metal acetylides, addition of bromine.

Learning Outcomes

The students will learn synthetic reactions, mechanism and properties of aromatic alcohol,

aromatic and aliphatic ether, aldehydes and ketones.

Reference Books:

1. Lee, J.D. Concise Inorganic Chemistry ELBS, 1991.
2. Cotton, F.A., Wilkinson, G. & Gaus, P.L. Basic Inorganic Chemistry, 3rd ed., Wiley.
3. Huheey, J.E., Keiter, E.A., Keiter, R.L. & Medhi, O.K. Inorganic Chemistry:Principles of Structure and Reactivity, Pearson Education India, 2006.
4. McMurry, J.E. Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Edition, 2013.
5. Sykes, P. A Guidebook to Mechanism in Organic Chemistry, Orient Longman, New Delhi (1988).
6. Eliel, E.L. Stereochemistry of Carbon Compounds, Tata McGraw Hill education, 2000.
7. Finar, I.L. Organic Chemistry (Vol. I & II), E.L.B.S.
8. Morrison, R.T. & Boyd, R.N. Organic Chemistry, Pearson, 2010.
9. Bahl, A. & Bahl, B.S. Advanced Organic Chemistry, S. Chand, 2010.

ourse Outcomes:

On successful completion of this course, students will be able to:

1. Explain the concepts of atomic theory and arrangement of electrons in orbital level
2. Compare/contrast the properties of molecular and ionic compounds.
3. Write the various reaction mechanisms in organic chemistry and concept of aromaticity.
4. Differentiate the properties of aromatic alcohol, aromatic and aliphatic ether, aldehydes and ketones.
5. To discuss synthetic reactions, mechanism and properties of aromatic alcohol, aromatic and aliphatic ether, aldehydes, and ketones

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	2	2	2	3	1	3	2	2
CO2	3	2	1	1	3	3	3	1	3	3	1
CO3	3	2	1	1	2	3	2	3	1	2	2
CO4	3	2	2	1	2	3	3	3	2	2	2
CO5	2	2	1	2	3	3	2	3	1	2	1

3 - High Correlation, 2 – Medium Correlation, 1- Low Correlation

APPROVED IN:

BOS : 27/08/2021 **ACADEMIC COUNCIL: 17/09/2021**

SDG 3: Ensure healthy lives and promote well-being for all at all ages.

Statement: The given modules and topics included in this course to design and development of new organic molecules as drugs to combat against diseases to establish sustainable health

CHEM1031	CHEMISTRY-II	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

The students of undergraduate program in science need to be conversant with the various aspects of solution chemistry, phase equilibrium, electrochemistry and Functional group chemistry forms the foundation for training a undergraduate students as analytical and synthetic chemist.

Course Educational Objectives:

- To introduce the concept of solution and phase chemistry in physical chemistry
- To introduce functional group chemistry in organic chemistry
- To impart knowledge on the essential functional groups in organic chemistry.
- To impart knowledge on the essential functional groups reactions
- To impart knowledge on the essential functional groups properties

Unit-I **9 Hours**

Section A: Physical Chemistry-1

Solutions

Thermodynamics of ideal solutions: Ideal solutions and Raoult's law, deviations from Raoult's law – non-ideal solutions. Vapour pressure-composition and temperature composition curves of ideal and non-ideal solutions. Distillation of solutions. Leverrule. Azeotropes.

Phase Equilibrium

Phases, components, and degrees of freedom of a system, criteria of phase equilibrium. Gibbs

Phase Rule and its thermodynamic derivation. Derivation of Clausius – Clapeyron equation

and its importance in phase equilibria.

Unit-II **9 Hours**

Conductance

Conductivity, equivalent and molar conductivity and their variation with dilution for weak and strong electrolytes. Kohlrausch law of independent migration of ions. Transference number and its experimental determination using Hittorf and Moving boundary methods. Ionic mobility. Applications of conductance measurements: determination of degree

of ionization of weak electrolyte, solubility and solubility products of sparingly soluble salts, ionic product of water, hydrolysis constant of a salt. Conductometric titrations (only acid base).

Unit-III **9 Hours**

Section B: Organic Chemistry-2

Carboxylic acids and their derivatives: Carboxylic acids (aliphatic and aromatic) Preparation: Acidic and Alkaline hydrolysis of esters. Reactions: Hell – Vohlard - Zelinsky Reaction. Carboxylic acid derivatives (aliphatic): (Upto 5 carbons) Preparation: Acid chlorides, Anhydrides, Esters and Amides from acids and their inter conversion. Reactions: Reformatsky Reaction. Amines (Aliphatic and Aromatic): (Upto 5 carbons), Preparation: from alkyl halides, Hofmann Bromamide reaction. Reactions: Carbylamine test, Hinsberg test. Electrophilic substitution (case aniline): nitration, bromination, sulphonation.

Unit-IV **9 Hours**

Amino Acids, Peptides and Proteins:

Preparation of Amino Acids: Strecker synthesis using Gabriel's phthalimide synthesis. Zwitterion, Isoelectric point and Electrophoresis. Reactions of Amino acids: ester of –COOH group, acetylation of –NH2group, ninhydrin test. Overview of Primary, Secondary, Tertiary and Quaternary Structure of proteins. Synthesis of simple peptides (upto dipeptides) by N-protection (t-butyloxycarbonyl and phthaloyl) & C-activating groups and Merrifield solid-phase synthesis.

Unit-V **9 Hours**

Carbohydrates: Classification, and General Properties, Glucose and Fructose (open chain and cyclic structure), Determination of configuration of monosaccharides, absolute configuration of Glucose and Fructose, Mutarotation, ascending and descending in monosaccharides. Structure of disacharrides (sucrose, cellobiose, maltose, lactose) and polysacharrides (starch and cellulose) excluding their structure elucidation.

Course Outcomes

On successful completion of this course, students will be able to:

1. Apply phase rule to one component and two component systems
2. Use the thermodynamic properties: G, H and S from EMF data.
3. Explain the synthesis and reactions carboxyl Functional group and derivatives.
4. Select correct method aminao acid preparation and differentiate the primary, secondary and tertiary amino acids
5. Classify the different carbohydrates

Text Books:

1. Barrow, G.M. Physical Chemistry Tata McGraw-Hill (2007).
2. Morrison, R. T. & Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Finar, I. L. Organic Chemistry (Volume 1), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
4. Finar, I. L. Organic Chemistry (Volume 2), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
5. Nelson, D. L. & Cox, M. M. Lehninger's Principles of Biochemistry 7th Ed., W. H. Freeman.
6. Berg, J.M., Tymoczko, J.L. & Stryer, L. Biochemistry, W.H. Freeman, 2002.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	1	3	3	3	1	3	2	1
CO2	3	1	1	2	2	2	3	1	3	2	1
CO3	3	2	1	1	2	3	3	3	2	1	2
CO4	2	2	1	2	2	2	3	3	1	3	3
CO5	2	2	1	1	3	3	3	3	1	2	3

3 - High Correlation, 2 – Medium Correlation, 1- Low Correlation

APPROVED IN:

BOS : 27/08/2021 **ACADEMIC COUNCIL: 17/09/2021**

SDG 4: Ensuring an inclusive and equitable quality education for all persons and promoting lifelong learning opportunities.

Statement: The modules and topics mentioned in this course are designed to ensure all-inclusive and thorough education with equity to all persons and promote learning opportunities at all times.

CHEM1021	CHEMISTRY-I LAB	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

The students of undergraduate program in science in Chemistry need to be conversant with the various basic methodologies of chemistry. Therefore, one module each on in inorganic, physical and organic chemistry is introduced which helps the student familiarize with the techniques essential for developing the foundation of practical chemistry

Course Educational Objectives:

- To know about the practical idea about Estimations of unknown concentrations of acids or bases using neutralization reactions
- To learn about principle involved in different redox reactions like permanganometry, dichrometry and Iodometry
- To understand the method of detection of extra elements in organic compounds
- To demonstrate the practical concepts involved in working of chromatography
- To expose the methods to separate mixture of aminoacids using paper chromatography

Section A: Inorganic Chemistry - Volumetric Analysis

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture.

2. Estimation of oxalic acid by titrating it with KMnO4.

3. Estimation of water of crystallization in Mohr's salt by titrating with KMnO4.

4. Estimation of Fe (II) ions by titrating it with K2Cr2O7 using internal indicator.

5. Estimation of Cu (II) ions iodometrically using Na2S2O3.

Section B: Organic Chemistry

1. Detection of extra elements (N, S, Cl, Br, I) in organic compounds (containing upto two extra elements)

2. Separation of mixtures by Chromatography: Measure the Rf value in each case (combination of two compounds to be given)

Identify and separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography

Identify and separate the sugars present in the given mixture by paper chromatography.

Course Outcomes:

On successful completion of this course, students will be able to:

- Estimations of unknown concentrations of acids or bases using neutralization reactions
- Distinguish the permanganometry, dichrometry and Iodometry
- Choose the method of detection of extra elements in organic compounds
- To separate mixture of aminoacids using paper chromatography

Reference Books:

1. Svehla, G. Vogel's Qualitative Inorganic Analysis, Pearson Education, 2012.

2. Mendham, J. Vogel's Quantitative Chemical Analysis, Pearson, 2009.

3. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., Textbookof Practical Organic Chemistry, Prentice-Hall, 5th edition, 1996.

4. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry Orient-Longman, 1960.

B.Sc. Physical Science

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	1	3	3	3	1	3	3	1
CO2	3	1	1	2	2	3	3	1	3	3	1
CO3	2	2	1	2	2	3	3	3	2	1	2
CO4	3	2	1	2	2	2	3	3	1	3	3
CO5	3	2	1	1	3	2	3	3	1	3	3

3 - High Correlation, 2 – Medium Correlation, 1- Low Correlation

APPROVED IN:

BOS : 27/08/2021 **ACADEMIC COUNCIL: 17/09/2021**

SDG 3: Ensure healthy lives and promote well-being for all at all ages.

Statement: The given modules and topics included in this course to design and development of new organic molecules as drugs to combat against diseases to establish sustainable health

CHEM1051	CHEMISTRY-III	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

The students of undergraduate program in science need to be conversant with the various instrumental and analytical techniques in analytical chemistry for training undergraduate students as analytical chemist.

Course Objectives:

1. To familiarize the students with various types of basic statistical tools.
2. To study about the basic principles of atomic, molecular techniques and separation methods.
3. To emphasize the importance of UV Vis spectroscopy and atomic spectroscopy in quantitative determination of Metal ions.
4. To impart knowledge on the basic concepts of pH metry and conductometry.
5. To compare the different separation methods like chromatography and solvent extraction.

Unit -I **9 Hours**

Qualitative and quantitative aspects of analysis

Evaluation of analytical data, errors, accuracy and precision, methods of their expression, statistical test of data; F, Q and t test, rejection of data, and confidence intervals. Optical methods of analysis Origin of spectra, interaction of radiation with matter, fundamental laws of spectroscopy and selection rules, validity of Beer-Lambert's law.

Unit -II **9 Hours**

UV-Visible Spectrometry: Basic principles of instrumentation (choice of source, monochromator and detector) for single and double beam instrument; Infrared Spectrometry: Basic principles of instrumentation (choice of source, monochromator& detector) for single and double beam instrument.

Unit-III **9 Hours**

Flame Atomic Absorption and Emission Spectrometry: Basic principles of Instrumentation (choice of source, monochromator, detector, choice of flame and Burner designs. Techniques for the quantitative estimation of trace level of metal ions from water samples.

Unit-IV **9 Hours**

Thermal methods of analysis Theory of thermogravimetry (TG), basic principle of instrumentation. Electroanalytical methods Classification of electroanalytical methods, basic principle of pH metric, potentiometric and conductometric titrations.

Unit-V **9 Hours**

Separation techniques

Solvent extraction: Classification, principle and efficiency of the technique. Mechanism of extraction: extraction by solvation and chelation. Technique of extraction: batch, continuous

and counter current extractions. Chromatography: Classification, principle, and efficiency of the technique. Mechanism of separation: adsorption, partition & ion exchange. Development of chromatograms: frontal, elution and displacement methods.

Text Books:

1. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6thEd., Pearson, 2009.
2. Willard, H.H. et al.: Instrumental Methods of Analysis, 7th Ed. Wardsworth Publishing Company, Belmont, California, USA, 1988.
3. Christian, G.D. Analytical Chemistry, 6th Ed. John Wiley & Sons, New York, 2004.
4. Harris, D.C.: Exploring Chemical Analysis, 9th Ed. New York, W.H. Freeman, 2016.
5. Khopkar, S.M. Basic Concepts of Analytical Chemistry. New Age International Publisher, 2009.\
6. Skoog, D.A. Holler F.J. & Nieman, T.A. Principles of Instrumental Analysis, Cengage Learning India Ed.
7. Mikes, O. Laboratory HandBook of Chromatographic & Allied Methods, Elles Harwood Series on Analytical Chemistry, John Wiley & Sons, 1979.
8. Ditts, R.V. Analytical Chemistry; Methods of separation, van Nostrand, 1974

Course Outcomes:

After the completion of the course, the student will be able to

- list various types of statistical tools and the instruments for chemical analysis.
- explain the role of various parts of instrumentation of atomic and molecular techniques
- identify suitable analytical technique for chemical analysis.
- distinguish atomic and molecular techniques.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3				2		1				3
CO2	3				3		1			1	3
CO3	3				2		1			1	3
CO4	3				3		1			2	3
CO5	3				2		1				3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 27/08/2021 **ACADEMIC COUNCIL: 17/09/2021**

SDG No. & Statement:

SDG Justification:

Statement: The modules and topics mentioned in this course are designed to ensure all-inclusive and thorough education with equity to all persons and promote learning opportunities at all times.

CHEM1041	CHEMISTRY-II LAB	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

The students of undergraduate program in science in Chemistry need to be conversant with the various basic methodologies of chemistry. Therefore, one module each on in inorganic, physical and organic chemistry is introduced which helps the student familiarize with the techniques essential for developing the foundation of practical chemistry

Course Educational Objectives:

1. To make student learn the practical application of solution, phase and electrochemistry for quantitative analysis
2. To estimate the unknown concentrations of acids using conductometer and potentiometer.
3. To understand the method of functional group detection of an organic compound.
4. To expose the methods to separate mixture of aminoacids using paper chromatography
5. The students also learn to differentiate between reducing and non-reducing sugars by qualitative analysis.

Section A: Physical Chemistry

Distribution

Study of the equilibrium of one of the following reactions by the distribution method:

I2(aq) + I-(aq) I3-(aq)

Cu2+(aq) + xNH2(aq) [Cu(NH3)x]2+

Conductance

I. Determination of cell constant

II. Determination of equivalent conductance, degree of dissociation and dissociation

constant of a weak acid.

III. Perform the following conductometric titrations:

i. Strong acid vs. strong base

ii. Weak acid vs. strong base

Potentiometry

Perform the following potentiometric titrations:

i. Strong acid vs. strong base

ii. Weak acid vs. strong base

iii. Potassium dichromate vs. Mohr's salt

Section B: Organic Chemistry I

Systematic Qualitative Organic Analysis of Organic Compounds possessing mono functional groups (-COOH, phenolic, aldehydic, ketonic, amide, nitro, amines) and preparation of one derivative.

Organic Chemistry II

1. Separation of amino acids by paper chromatography

2. Determination of the concentration of glycine solution by formylation method.

3. Titration curve of glycine

4. Action of salivary amylase on starch

5. Effect of temperature on the action of salivary amylase on starch.

6. Differentiation between a reducing and a nonreducing sugar.

Reference Books:

1. Vogel, A.I., Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., Textbook ofactical Organic Chemistry, Prentice-Hall, 5th edition, 1996.
2. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry Orient-Longman, 1960.
3. Khosla, B. D.; Garg, V. C. & Gulati, Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
4. Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry, Universities Press

Course Outcomes

On successful completion of this course, students will be able to:

1. Select the correct the practical application of solution, phase and electrochemistry for quantitative analysis
2. Estimate the unknown concentrations of acids using conductometer and potentiometer.
3. Choose the correct method to detect the functional group of an organic compound.
4. Separate mixture of aminoacids using paper chromatography
5. Differentiate between reducing and non-reducing sugars by qualitative analysis.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	2	1	1	1	3	1	3	3
CO2	3	2	1	1	3	3	3	1	3	3	1
CO3	2	2	1	2	2	3	3	3	2	1	2
CO4	3	2	1	1	3	2	3	3	1	3	3
CO5	3	3	3	1	2	1	1	3	2	3	3

3 - High Correlation, 2 – Medium Correlation, 1- Low Correlation

APPROVED IN:

BOS : 27/08/2021 **ACADEMIC COUNCIL: 17/09/2021**

SDG 4: Ensuring an inclusive and equitable quality education for all persons and promoting lifelong learning opportunities.

Statement: The modules and topics mentioned in this course are designed to ensure all-inclusive and thorough education with equity to all persons and promote learning opportunities at all times.

CSCI1001	BASICS OF INFORMATION TECHNOLOGY	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	None						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course features about the technology of computer and understanding the prerequisites for learning signals converting to output data. This course helps students learn about network and how the data can be retrieved and also understand operating systems types, and applications

Course Educational Objectives:

- To learn computer data processing
- To understand audio-video and data storage
- To gain knowledge on computer memory
- To learn about operating systems types
- To gain knowledge on internet

UNIT 1 Data and Information, Acquisition of Numbers and Textual Data and Acquiring Image Data **8 hours**

Data and Information: Introduction, Types of data, Simple model of a computer, Data processing using a computer, Desktop computer.

Acquisition of Numbers and Textual Data: Introduction, input units, internal representation of numeric data, Representation of characters in computers, Error Detecting codes.

Acquiring Image Data: Introduction, acquisition of textual data, acquisition of pictures, storage formats for pictures, Image compression fundamentals, Image acquisition with a digital camera.

UNIT 2 Acquiring Audio Data, Acquisition of Video and Data storage **8 hours**

Acquiring Audio Data - Basics of Audio Signals, Acquiring and storing Audio Signals, Compression of Audio Signals.

Acquisition of Video: Computing a moving Scene with a video camera, Compression of Video Data, MPEG Compression standard.

Data storage: Introduction, Storage cell, Physical devices used as storage cells, Random access memory, Read only memory, Secondary storage, Compact disk read only memory (CDROM), Archival store.

UNIT 3 Central Processing Unit and Output Devices 8 hours

Central Processing Unit: Introduction, Structure of a central processing unit, Specifications of a CPU, Interconnection of CPU with memory and I/O units, Embedded processors.

Output Devices: Video Display Devices, Touch Screen, E-ink display, Printers, Audio Output.

UNIT 4 Computer Networks and Computer Software 8 hours

Computer Networks: Introduction, Local Area Network (LAN), Applications of LAN, Wide Area Network (WAN), Internet, Naming computers connected to Internet, Future of Internet Technology.

Computer Software: Introduction, Operating system, Programming languages, Classification of programming languages, Classification of Programming Languages based on applications.

UNIT 5 Data organization and Some Internet Applications 8 hours

Data organization: Introduction, Organizing a database, Structure of a database, Database Management System, Example of database design, Non-text databases, Archiving databases. Processing Numerical Data: Introduction, Use of spreadsheets, Numerical computation examples.

Some Internet Applications: Introduction, Email, World Wide Web, Information Retrieval from the WWW, Other facilities provided by Browsers, Audio on the internet, Accessing pictures and video via internet

Textbooks:

1. Introduction to Information Technology by V. Rajaraman, PHI Learning Pvt.Ltd. 2013.

References:

2. Computing Fundamentals by Peter Norton, Tata Mc. Graw Hill, 6th edition, 2006.
3. Fundamentals of Computers by E.Balagurusamy, Tata McGraw Hill, 2009

Course Outcomes:

On successful completion of this course, students will be able to:

1. To learn computer data processing
2. To understand audio-video and data storage
3. To gain knowledge on computer memory
4. To learn about operating systems types
5. To gain knowledge on internet-www

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	3	3	2	2	1	2	2	2	2
CO2	2	2	2	3	2	1	2	2	2	2	2
CO3	1	2	2	2	3	2	1	2	2	1	3
CO4	3	3	3	3	2	2	2	2	2	2	3
CO5	3	3	3	3	2	2	2	2	2	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

PHYS1091	BIOPHYSICS	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	None						
Co-requisite	None						
Preferable exposure							

Course Description:

The subject of Biophysics is one of the important interdisciplinary areas in teaching, training and learning which is considered to be important in terms of human resource development and National development. The main emphasis of biophysics is on the quantitative analysis of the physical and chemical aspects of the functions of biological molecules, organisms and entities. The techniques and methodologies that biophysics relies on are closer to Physics and Chemistry, but areas of application are in the biological, medical and related sciences.

Course Educational Objectives:

1. To learn about radiation biophysics
2. To understand transport phenomenon
3. To study UV-visible, and other important techniques like NMR, ESR etc.
4. To gain knowledge on microscopic techniques
5. To understand the concepts of thermodynamics

UNIT 1 Radiation Biophysics 8 hours

Ionising radiation, Interaction of radiation with matter, Measurement of Radiation, Radioactive isotopes. Types of Radioactivity-Natural, Artificial and induced Radioactivity and radioactive decay law. Measurement of Radioactivity -Geiger Muller counter, proportional counter and scintillation counter. Biological effects of radiation and radiation protection and therapy.

UNIT 2 Transport process 8 hours

Light scattering, Diffusion –factors effecting diffusion, Fick's law, diffusion of electrolytes, accelerated diffusion and biological significance sedimentation, osmosis, viscosity, chromatography and electrophoresis and optical activity .Biophysical phenomena in biochemical studies-pH meter - principle, electrode system and factors effecting in its measurement.

UNIT 3 Physical Techniques in structure determination 8 hours

Ultraviolet and Visible spectroscopy, fluorescence and phosphorescence methods, Infrared spectroscopy- bending, near, mid and far infrared region. Raman spectra- principle and instrumentation. NMR, ESR Instrumentation.

UNIT 4 Microscopies 8 hours

Optical microscope, Electron microscopy, emerging trends in microscopy. X ray diffraction-diffraction of x rays, structure determination, phase determination procedures. Laser-characteristics, population inversion, stimulated and spontaneous and relation (no derivation) and Holography

UNIT 5 Biomolecular structures, Bioenergetics and Biological systems 8 hours

Biomolecular structures-Concepts of classical physics and limitations, quantum principles of atomic
Structure. Bioenergetics-Thermodynamics-reversible thermodynamics and irreversible thermodynamics. Photo bioenergetics and chemo bioenergetics. Biological systems: Neuro biophysics-Molecular transport across cell membrane and nerve impulse generation.

Textbooks:

1. Essentials of Biophysics: P.Narayanan. New Age India Intl.
2. Handbook of Radiobiology by KT Jaypee Brothers, Medical Publishers Pvt. Ltd.

References:

1. An Introduction to radiation protection by A Martin & SA Harbison, 4th Edition, Springer Publishers.
2. Laser Tissue Interactions: Fundamentals and Applications by MH Niemz, Springer Publishers.
3. Understanding biophotonics- Fundamentals, Advances and Applications by K Tsia, 1st Edition, CRC press.

Course Outcomes:

On successful completion of this course, students will be able to:

1. To learn about radiation biophysics
2. To understand transport phenomenon
3. To study UV-visible, and other important techniques like NMR, ESR etc.
4. To gain knowledge on microscopic techniques
5. To understand the concepts of thermodynamics

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	1	1	2	1	2	1	2	1
CO2	2	2	2	1	1	2	1	3	2	1	1
CO3	2	2	2	1	1	2	1	2	2	2	1
CO4	3	3	3	3	2	2	3	3	2	3	3
CO5	2	2	2	1	1	2	1	2	1	2	1

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-2022 **ACADEMIC COUNCIL: 22-08-2022**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

PHYS1101	BIOPHYSICS LAB	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	None						
Preferable exposure							

Course Description:

The subject of Biophysics is one of the important interdisciplinary areas in teaching, training and learning which is considered to be important in terms of human resource development and National development. The main emphasis of biophysics is on the quantitative analysis of the physical and chemical aspects of the functions of biological molecules, organisms and entities. The techniques and methodologies that biophysics relies on are closer to Physics and Chemistry, but areas of application are in the biological, medical and related sciences.

Course Educational Objectives:

1. To learn about radiation biophysics
2. To understand transport phenomenon
3. To study UV-visible, and other important techniques like NMR, XRD etc.
4. To gain knowledge on microscopic techniques
5. To understand the concepts of thermodynamics

List of experiments:

1. Plateau characteristics of radioactive source
2. Intensity variation of radioactive material
3. Wavelength of colors using spectrometer
4. Determination of wavelength of LASER
5. Optical activity
6. X-ray diffraction – determination of interplanar spacing from X-ray spectra
7. Analysis of infrared spectra - Identification of various groups
8. Analysis of UV spectra -Identification wavelength corresponding to absorption

Textbooks:

1. Radiation Biophysics, Second Edition - by Edward L. Alpen
2. Physical Chemistry: Principles and Applications in Biological Sciences by Tinoco. I. et al..

References:

1. Physics of the Life Sciences by Newman, J.
2. Drenth, J. (2010) Principles of Protein X-ray Crystallography, Spri

Course Outcomes:

1. To learn about radiation biophysics
2. To understand transport phenomenon
3. To study UV-visible, IR, and other important techniques like NMR, XRD etc.
4. To gain knowledge on microscopic techniques
5. To understand the concepts of thermodynamics

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	1	1	2	1	2	1	2	1
CO2	2	2	2	1	1	2	1	3	2	1	1
CO3	2	2	2	1	1	2	1	2	2	2	1
CO4	3	3	3	3	2	2	3	3	2	3	3
CO5	2	2	2	1	1	2	1	2	1	2	1

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:
BOS : 22-08-2022 **ACADEMIC COUNCIL: 22-08-2022**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

PROGRAMME CORE

MFST1011	PRINCIPLES OF FOOD SCIENCE	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	Basic background in biology/Chemistry						
Co-requisite	None						
Preferable exposure	None						

Course Description:

Food science is an application of the basic sciences and engineering to study the fundamental physical, chemical and biochemical nature of foods and the and the concepts underlying food processing. Food science involves many specializations such as food microbiology, food engineering, and food chemistry in an attempt to better understand food processes and ultimately improve food products for the general public.

Course Educational Objectives:

- To impart basic knowledge of Food Dispersions
- To learn the basic concepts and applications of Sensory science
- To understand the importance of food sanitation
- To understand the role of food Packaging in protecting food

UNIT 1 **8 hours**

Characteristics, sols, gels, pectin gels, colloidal sols, stabilization of colloidal system, emulsions, properties of emulsions, formation of emulsion, emulsifying agent, food foams, formation stability and destruction of foam, application of colloidal chemistry to food preparation.

UNIT 2 **8 hours**

Objectives, type of food panels, characteristics of panel member, layout of sensory evaluation laboratory, sensitivity tests, threshold value, paired comparison test, duo- trio test, triangle test, hedonic scale, chemical dimension of basic tastes, Amoore's classification of odorous compounds. Sherman and Sczezniak classification of food texture. Food as a substrate for microorganism, factors affecting growth of microbes: pH, water activity, O-R potential, nutrient contents, inhibitory substance and biological structure.

UNIT 3 **8 hours**

Principles and applications, Hurdle effect in fermented foods, shelf stable products, intermediate moisture foods, application of hurdle technology. Minimal processing of foods with thermal methods and non-thermal methods-safety criteria in minimally processed foods-Minimal processing in practice-fruits and vegetables-seafood-effect on quality-Future developments.

UNIT 4 **8 hours**

Principles, equipment and processing, effect on food.Waste water, hardness of water, break point chlorination, physical and chemical of impurities, BOD, COD, waste water treatment, milk plant sanitation, CIP system, sanitizers used in food industry.

UNIT 5 **8 hours**

Objectives of packaging, flexible packaging, properties of the following packaging materials-low density polyethylene, high density polyethylene, polypropylene, polyvinyl chloride, polyvinylidene chloride, ethylene vinyl alcohol, polystyrene, polyethylene terepthalate, nylon, ethylene vinyl acetate, ethylene acrylic acid, ethylene methacrylic acid, ionomers.

Textbooks:

1. Coles R, McDowell D and Kirwan MJ, Food Packaging Technology, CRC Press,2003
2. De S, Outlines of Dairy Technology, Oxford Publishers,1980
3. Deman JM, Principles of Food Chemistry, 2nd ed. Van Nostrand Reinhold, NY1990
4. Frazier WC and Westhoff DC, Food Microbiology, TMH Publication, New Delhi,2004
5. Jenkins WA and Harrington JP, Packaging Foods with Plastics, Technomic Publishing Company Inc., USA,1991

References:

1. Manay NS and Shadaksharaswamy M, Food-Facts and Principles, New AgeInternational(P) Ltd. Publishers, New Delhi, 1987
2. Meyer LH, Food Chemistry, CBS Publication, New Delhi,1987
3. Potter NH, Food Science, CBS Publication, New Delhi,1998
4. Ramaswamy H and MarcottM,Food Processing Principles and Applications CRC Press, 2006
5. Ranganna S, Handbook of Analysis and Quality Control for Fruits and Vegetable Products, 2nded.
6. TMH Education Pvt. Ltd,1986

Course Outcomes:

By the end of the course, the student will be able to:

1. Describe the characteristics of sols, gels, pectin gels, colloidal sols
2. Identify the conditions under which microbes can be inactivated, killed or made harmless
3. Identify and examine the method of packaging and packaging materials in shelf life extension of foods
4. Use sensory evaluation in food product development
5. Explain the objectives of food packaging

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	2	2	2	2	1	3	3
CO2	2	3	2	2	2	3	2	2	2	1	2
CO3	3	3	2	2	3	2	2	3	2	2	2
CO4	2	2	2	3	1	2	2	1	2	2	3
CO5	2	2	1	3	3	2	2	2	2	2	2

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS :22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST1021	PRINCIPLES OF FOOD SCIENCE LAB	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	MFST1011 Principles of Food Science						
Preferable exposure	None						

Course Description:

Food science is an application of the basic sciences and engineering to study the fundamental physical, chemical and biochemical nature of foods and the and the concepts underlying food processing. Food science involves many specializations such as food microbiology, food engineering, and food chemistry in an attempt to better understand food processes and ultimately improve food products for the general public.

Course Educational Objectives:

- To impart basic knowledge of reducing sugar estimations
- To learn the basic concepts and applications of salt content
- To understand the importance of estimation of total solids and acidity
- To understand the role of estimation of protein content and hardness of water

List of Experiments:

1. Estimation of reducing sugar by Fehling's procedure
2. Estimation of salt content in brine
3. Estimation of salt content in butter
4. Preparation of brix solution and checking by hand refractometer
5. Application of colloidal chemistry to food preparation
6. Demonstration of the Soxhlet method for determination of fat content
7. Determination of acidity of water
8. Determination of alkalinity/ hardness of water
9. Demonstration of the Kjeldahl's method for estimation of protein content

Textbooks:

1. Coles R, McDowell D and Kirwan MJ, Food Packaging Technology, CRC Press,2003
2. De S, Outlines of Dairy Technology, Oxford Publishers,1980
3. Deman JM, Principles of Food Chemistry, 2nd ed. Van Nostrand Reinhold, NY1990
4. Frazier WC and Westhoff DC, Food Microbiology, TMH Publication, New Delhi,2004
5. Jenkins WA and Harrington JP, Packaging Foods with Plastics, Technomic Publishing Company Inc., USA,1991

References:

7. Manay NS and Shadaksharaswamy M, Food-Facts and Principles, New AgeInternational(P) Ltd. Publishers, New Delhi, 1987
8. Meyer LH, Food Chemistry, CBS Publication, New Delhi,1987
9. Potter NH, Food Science, CBS Publication, New Delhi,1998
10. Ramaswamy H and MarcottM,Food Processing Principles and Applications CRC Press, 2006
11. Ranganna S, Handbook of Analysis and Quality Control for Fruits and Vegetable Products, 2nded.
12. TMH Education Pvt. Ltd,1986

Course Outcomes:

By the end of the practicals, the student will be able to

1. Differentiate between thermal methods and non-thermal methods of food processing
2. Understand various application of colloidal chemistry to food preparation
3. Classify the physical and chemical of impurities in waste water
4. Evaluate the safety criteria in minimally processed foods
5. Evaluate food products that meet the various food regulations and laws

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	2	1	2	2	2	3	2
CO2	2	2	1	3	2	2	2	2	3	2	2
CO3	3	3	2	2	2	2	1	3	2	2	2
CO4	2	2	2	3	2	2	2	3	1	2	2
CO5	3	3	2	2	2	2	2	1	2	2	2

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS: 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MSFT1031	FUNDAMENTALS OF FOOD TECHNOLOGY	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST1011Principles of Food Science						
Co-requisite	None						
Preferable exposure	MFST1011Principles of Food Science						

Course Description:

Food Technology deals with the techniques involved in production, processing, preservation, packaging, labeling, quality management, and distribution of food products. The course also involves techniques and processes that are used to transform raw materials into food. Extensive research goes behind making food items edible as well as nutritious. Food technology greatly contributes to the manufacturing and supply of safe, wholesome and nutritious food products.

Course Educational Objectives:

- To understand the history and evolution of food processing.
- To study the structure, composition, nutritional quality and post harvest changes of various plant foods.
- To study the structure and composition of various animal foods.

UNIT 1 **8 hours**

Introduction-historical evolution of food processing technology. Cereals and millets-Structure and composition, properties and nutritional attributes of rice, wheat, maize, barley, millet and oats, malting, gelatinization of starch, types of browning- Maillard & caramelization, rice-parboiling of rice- advantages and disadvantages.

UNIT 2 **8 hours**

Pulses- Structure and composition of pulses, toxic constituents in pulses, processing of pulses-soaking, germination, decortications, cooking and fermentation. Fats and Oils-classification of lipids, types of fatty acids - saturated fatty acids, unsaturated fatty acids, essential fatty acids, trans fatty acids. Refining of oils, types- steam refining, alkali refining, bleaching, steam deodorization, and hydrogenation. Rancidity –Types- hydrolytic and oxidative rancidity and its prevention.

UNIT 3 **8 hours**

Fruits and Vegetables-Classification of fruits and vegetables, general composition, enzymatic browning, names and sources of pigments, Dietary fibre. Post-harvest changes in fruits and vegetables – Climacteric rise, horticultural maturity, physiological maturity, physiological changes, physical changes, chemical changes, pathological changes during the storage of fruits and vegetables.

UNIT 4 **8 hours**

Compositional, Nutritional and Technological aspects of Animal foods. Flesh Foods-Meat - Definition of carcass, concept of red meat and white meat, composition of meat, marbling, post-mortem changes in meat- rigor mortis, tenderization of meat, ageing of meat. Fish - Classification of fish (fresh water and marine), aquaculture , - microbiological, physiological, biochemical.

UNIT 5

Poultry - Structure of hen's egg, composition and nutritive value, egg proteins, characteristics of fresh egg, deterioration of egg quality, difference between broiler and layers. Milk and Milk Products-Definition of milk, chemical composition of milk, its constituents, processing of milk, pasteurization, homogenization.An overview of types of market milk and milk products.

Textbooks:

1. Bawa. A.S, O.P Chauhan etal. Food Science. New India Publishing agency, 2013

2. Roday, S. Food Science, Oxford publication, 2011.

3. B. Srilakshmi, Food science, New Age Publishers, 2002

References:

1. Meyer, Food Chemistry, New Age, 2004

2. De Sukumar., Outlines of Dairy Technology, Oxford University Press, 2007

Course Outcomes:

By the end of the course, the student will be able to:

- Understand various advantages and disadvantages of parboiled rice
- Describe the structure and composition of various pulses
- Illustrate the concepts of egg structure, composition and nutritive value
- Gain Knowledge on the post-mortem changes in meat
- Gain knowledge on types of market milk and milk products

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	2	2	2	2	2	1	3
CO2	2	2	2	3	2	3	2	2	2	2	1
CO3	2	2	2	2	3	2	3	1	2	2	2
CO4	3	2	3	3	2	2	2	2	3	2	2
CO5	2	2	3	3	3	1	2	2	2	3	1

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS :<< date >> 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MSFT1041	FUNDAMENTALS OF FOOD TECHNOLOGY LAB	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	MFST1021 Principles of Food Science Practical						
Co-requisite	MFST1031 Fundamentals of Food Technology						
Preferable exposure	MFST1011Principles of Food Science						

Course Description:

Food Technology deals with the techniques involved in production, processing, preservation, packaging, labeling, quality management, and distribution of food products. The course also involves techniques and processes that are used to transform raw materials into food. Extensive research goes behind making food items edible as well as nutritious. Food technology greatly contributes to the manufacturing and supply of safe, wholesome and nutritious food products.

Course Educational Objectives:

- To understand the enzymatic and non-enzymatic.
- To study the structure, composition, nutritional quality and post harvest changes of various plant foods.
- To study the structure and composition of various animal foods.
- To study the process of malting and germination

List of Experiments:

1. Study different types of browning reactions: enzymatic and non-enzymatic.
2. To study gelatinization behavior of various starches
3. To study the concept of gluten formation of various flours.
4. To study malting and germination.
5. To study dextrinization in foods.
6. Identification of pigments in fruits and vegetables and influence of pH on them.
7. Quality inspection of animal foods.

Textbooks:

1. Bawa. A.S, O.P Chauhan etal. Food Science. New India Publishing agency, 2013

2. Roday, S. Food Science, Oxford publication, 2011.

3. B. Srilakshmi, Food science, New Age Publishers, 2002

References:

1. Meyer, Food Chemistry, New Age, 2004

2. De Sukumar., Outlines of Dairy Technology, Oxford University Press, 2007

Course Outcomes:

By the end of the practicals, the student will be able to

1. List the concepts of conventional and modern food processing methods
2. Understand various concepts of Compositional, Nutritional and Technological aspects of animal foods
3. Identify various Post-harvest changes during storage of plant foods
4. Evaluate the toxic constituents in pulses
5. Quality inspection of animal foods.
6.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	3	3	3	1	2	3	2	2	2	3
CO2	3	3	2	2	2	3	1	2	2	3	1
CO3	2	2	3	2	3	2	3	1	2	2	2
CO4	3	2	2	3	1	2	2	2	3	2	2
CO5	1	3	2	2	2	3	3	2	2	2	1

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MSFT2001	TECHNOLOGY OF PLANTATION CROPS	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST1031 Fundamentals of Food Technology						
Co-requisite	None						
Preferable exposure	MFST1031 Fundamentals of Food Technology						

Course Description:

India has been bestowed with wide range of climate and physic-geographical conditions and as such is most suitable for growing various kinds of horticultural crops such as fruits, vegetables, flowers, nuts, spices and plantation crops. Fruits and vegetables are an important supplement to the human diet as they provide the essential minerals, vitamins and fiber required for maintaining health. India is now the second largest producer of fruits and vegetables in the world and is the leader in several horticultural crops.

Course Educational Objectives:

- To impart knowledge of different methods of fruits and vegetable processing.
- To learn about processing of various spices, tea, coffee and cocoa.

UNIT 1 **8 hours**

Importance of fruits and vegetable, history and need of preservation, reasons of spoilage, method of preservation (short &long term). Canning and bottling of fruits and vegetables. Fruits beverages: Processing of fruit juices, preservation of fruit juices, processing of squashes, cordials, nectars, concentrates and powder. Jams, jellies, and marmalades.

UNIT 2 **8 hours**

Pickles, chutneys, and sauces: processing, types, causes of spoilage pickling. Dehydration of foods and vegetables: Sun drying & mechanical dehydration, process variation for fruits and vegetables, packing and storage.

UNIT 3 **8 hours**

Milling technology: Wheat-Types, milling, flour grade, flour treatments (bleaching, maturing), flour for various purposes, Products and By-products. Rice – Physicochemical properties, milling (mechanical & solvent extraction), parboiling, ageing of rice, utilization of byproducts. Corn–Milling (wet & dry), cornflakes, corn flour. Barley- Milling (pearl barley, barley flakes & flour) Oats–Milling (oatmeal, oat flour & oat flakes) Sorghum and millets – Traditional & commercial milling (dry &wet).

UNIT 4 **8 hours**

Legume technology: Classification of legumes, chemical composition and nutritional value. Methods of dehulling-. Home, cottage, and commercial scale. Modern techniques of dehulling. Milling of legumes: Dal milling principles, methods, equipments and effect on quality. Principle products, fermented products of legumes.

UNIT 5 **8 hours**

Technology of Oil seeds: Sources, Composition, Processing of oil seeds – Soya bean, coconut. Hydrogenation. Refining of fats & oils, bleaching, de-odourising, hydroxylation, Protein isolates, Sources of protein (defatted flour, protein concentrates and isolates), properties and uses, protein texturization, fibre spinning.

Textbooks:

1. Kent, N.L. 2003. Technology of Cereal, 5th Ed. PergamonPress.

2. Chakraverty. 1988. Post-Harvest Technology of Cereals, Pulses and Oilseeds, revisedEd.,

Oxford & IBH Publishing Co. PvtLtd.

References:

1. Marshall, Rice Science and Technology. 1994. Wadsworth Ed., Marcel Dekker,NewYork.

2. Manay, S. and Sharaswamy, M. 1987. Food Facts and Priniciples. Wiley EasternLimited

Course Outcomes:

By the end of the course, the student will be able to:

1. Know about the various processing steps of major cereals after harvesting.
2. Know about equipment used in production and storage of alcohol.
3. Learn about the various processing steps and methods of major legumes after harvesting.
4. To impart knowledge of different methods of fruits and vegetable processing.
5. Understand the detailed account on canning process and bottling.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	2	2	2	3	2	3	2
CO2	2	2	2	3	2	3	2	1	3	2	2
CO3	3	2	3	2	2	3	1	3	2	2	2
CO4	2	2	3	2	3	3	2	3	1	2	2
CO5	2	2	3	3	2	2	3	1	2	2	2

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS :<< date >> 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MSFT2011	FOOD PROCESSING AND PRESERVATION TECHNOLOGY	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST1011 Principles of Food Science						
Co-requisite	None						
Preferable exposure	MFST1031 Fundamentals of Food Technology						

Course Description:

Food Preservation is defined as a method of maintaining foods at a desired level of properties for their maximum benefit for as long as possible. The subject lies in the core of food science and technology and it is the main purpose of food processing. Food preservation uses many techniques that range from too simple to highly sophisticated

Course Educational Objectives:

- To study the importance and need of food preservation
- To introduce the basics of various food processing and preservation technologies.
- To introduce the concepts of novel food preservation methods
- To familiarize the pros and cons of various food preservation techniques

UNIT 1 **8 hours**

Principles of Food Preservation, microorganisms associated with foods- bacteria, yeast and mold, Importance of bacteria, yeast and molds in foods. Classification of microorganisms based on temperature, pH, water activity, nutrient and oxygen requirements, typical growth curve of microorganisms. Classification of food based on pH, definition of shelf life, perishable foods, semi perishable foods, and shelf stable foods.

UNIT 2 **8 hours**

Thermal Processing- Classification of thermal treatments, Mode of action, Commercial heat preservation, methods: Sterilization, commercial sterilization, Pasteurization and blanching- objectives, types. Pros and cons of high temperature preservation.

UNIT 3 **8 hours**

Freezing and Refrigeration: Introduction to cool storage, refrigeration, and freezing, principle of freezing, freezing curve, changes occurring during freezing, types of freezing- slow freezing, quick freezing, introduction to thawing, changes during thawing and its effect on food.

UNIT 4 **8 hours**

Drying and Dehydration - Definition, drying as a means of preservation, heat and mass transfer, factors affecting rate of drying, normal drying curve, types of driers used in the food industry. Evaporation – Definition, factors affecting evaporation, names of evaporators used in food industry.

UNIT 5 **8 hours**

Irradiation - Introduction, units of radiation, kinds of ionizing radiations used in food irradiation, mechanism of action, application and benefits of irradiation processing in food industry. Quality and safety of irradiated foods

Textbooks:

1. Text Book on Food Storage and Preservation (2004) by Vijayakhader.

2. Food Science (2002) by B. Srilakshmi.

3. Food Processing and Preservation (2010) by B.SivaShakar.

References:

1. Food Processing and Preservation (2007) by G. Subbalakshmi

2. Food preservation and processing (2007) by ManoranjanKalia

Course Outcomes:

By the end of the course, the student will be able to:

1. Identify the important pathogens and spoilage microorganisms in foods
2. Discuss the Pros and cons of high temperature preservation
3. Apply the concept of heat and mass transfer in dehydration
4. Analyze the Quality and safety of irradiated foods
5. Classify various thermal treatments based on temperature

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	3	2	3	2	1	2	3	2
CO2	2	2	1	3	2	2	2	3	2	1	2
CO3	2	3	2	2	3	2	1	3	2	2	3
CO4	1	2	2	3	2	2	2	3	1	2	2
CO5	2	3	2	2	2	2	3	1	2	2	1

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MSFT2021	TECHNOLOGY OF PLANTATION CROPS LAB	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	MFST1031Fundamentals of Food Technology						
Co-requisite	MFST2001 Technology of Plantation Crops						
Preferable exposure	MFST1031Fundamentals of Food Technology						

Course Description:

India has been bestowed with wide range of climate and physic-geographical conditions and as such is most suitable for growing various kinds of horticultural crops such as fruits, vegetables, flowers, nuts, spices and plantation crops. Fruits and vegetables are an important supplement to the human diet as they provide the essential minerals, vitamins and fiber required for maintaining health. India is now the second largest producer of fruits and vegetables in the world and is the leader in several horticultural crops.

Course Educational Objectives:

- To impart knowledge of different methods of fruits and vegetable processing.
- To learn about dehydration and rehydration of vegetables.

List of Experiments:

1. Estimation of ascorbic acid and effect of heat treatment on it.
2. Estimation of total soluble solids (TSS).
3. Estimation of pH and acidity of products
4. Estimation of brix: acidity ratio
5. Estimation of Gluten Content of flour
6. Estimation of Pelenshke Value of flour
7. Determination of sedimentation power of flour
8. Dehydration of fruits and vegetables.
9. Rehydration of fruits and vegetables

Textbooks:

1. Girdharilal, Siddappaa, G.S and Tandon, G.L.1998. Preservation of fruits & vegetables, ICAR, NewDelhi

2. W B Crusess.2004. Commercial Unit and Vegetable Products, W.V. Special Indian Edition, Pub: AgrobiosIndia

3. Manay, S. &Shadaksharaswami, M.2004. Foods: Facts and Principles, New AgePublishers

References:

1. Ranganna S.1986. Handbook of analysis and quality control for fruits and vegetable products, Tata Mc Graw-Hill publishing company limited, Secondedition.

2. Srivastava, R.P. and Kumar, S. 2006 .Fruits and Vegetables Preservation- Principles and Practices.3rd Ed. International Book DistributingCo.

Course Outcomes:

1. To impart knowledge of different methods of fruits and vegetable processing.
2. To understand the detailed account on canning process and bottling
3. To detailed learning on the processing of fruits and vegetables in making different products like juices, jam and jellies and marmalade
4. Understand the different methods of processing of spices, oil production, tea and coffee beans.
5. To evaluate the quality of raw fruits and vegetables

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	2	1	2	2	2	3	2
CO2	2	2	1	3	2	2	2	2	3	2	2
CO3	3	3	2	2	2	2	1	3	2	2	2
CO4	2	2	2	3	2	2	2	3	1	2	2
CO5	3	3	2	2	2	2	2	1	2	2	2

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST2031	FOOD PROCESSING AND PRESERVATION TECHNOLOGY LAB	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	MFST1011 Principles of Food Science						
Co-requisite	MFST2011 Food Processing and Preservation Technology						
Preferable exposure	MFST2001 Technology of Plantation Crops						

Course Description:

Food Preservation is defined as a method of maintaining foods at a desired level of properties for their maximum benefit for as long as possible. The subject lies in the core of food science and technology and it is the main purpose of food processing. Food preservation uses many techniques that range from too simple to highly sophisticated

Course Educational Objectives:

- To study the importance and need of food preservation
- To introduce the basics of various food processing and preservation technologies.
- To introduce the concepts of novel food preservation methods

List of Experiments:

1. Methods of Sampling.
2. Concept of shelf life of different foods
3. To study the concept of Asepsis and sterilization
4. Determination of pH of different foods using pH meter.
5. Study quality characteristics of foods preserved by drying/dehydration/freezing.
6. To perform pasteurization of fluids using different methods.
7. To perform blanching of different plant foods.

Textbooks:

1. Text Book on Food Storage and Preservation (2004) by Vijayakhader.
2. Food Science (2002) by B. Srilakshmi.
3. Food Processing and Preservation (2010) by B.SivaShakar.

References:

1. Food Processing and Preservation (2007) by G. Subbalakshmi

2. Food preservation and processing (2007) by ManoranjanKalia

Course Outcomes:

By the end of the course, the student will be able to

1. Compare conventional methods of food preservation with novel methods of food preservation(food irradiation, biosensors, microwave)
2. Apply principles of food preservation to pilot scale production of processed food and evaluate variation in processing parameters on product properties
3. Evaluate the effect of processing upon the nutritional properties of foodstuffs.
4. An understanding of the principles and application of food processing and preservation technologies
5. Understand and evaluate the implications of processing and preservation methodologies on the physical, chemical, microbiological and nutritional quality of foods

CO-PO Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	2	2	3	1	2	2	3	2	2
CO2	3	2	2	3	1	2	2	3	2	2	2
CO3	2	3	3	2	2	3	2	1	2	3	2
CO4	2	2	3	2	2	2	3	2	2	2	1
CO5	2	2	2	3	2	3	2	1	2	3	2

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST2041	FOOD MICROBIOLOGY	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST1011 Principles of Food Science						
Co-requisite	None						
Preferable exposure	MFST2011 Food Processing and Preservation Technology						

Course Description:

Food microbiology is the scientific study of microorganisms, both in food and used for the production of food. This includes microorganisms that contaminate food, as well as those used in its production; for example to produce yoghurt, cheese, beer and wine.

Course Educational Objectives:

- To know the important genera of microorganisms associated with food and their characteristics.
- To understand the role of microbes in fermentation, spoilage and food borne diseases.

UNIT 1 **8 hours**

Food microbiology- definition and importance, Microbial growth in food- intrinsic and extrinsic factors affecting the growth of microorganisms in food, bacterial growth curve. Beneficial role of microorganisms in food.Probiotics, prebiotics and synbiotics.

UNIT 2 **8 hours**

Microorganisms associated with food- Bacteria, molds, yeast, virus- General characteristics, structure, morphological characteristics, growth and cultural characteristics. Endospore - structure and significance in food microbiology

UNIT 3 **8 hours**

Microbial food spoilage - sources of microorganisms in foods, spoilage of different food groups- milk and dairy products, meat, poultry and sea foods, cereal and cereal products, fruits and vegetables and canned products.

UNIT 4 **8 hours**

Sterilization methods-physical and chemical. Pure culture techniques, methods of isolation. Enumeration of Microorganisms- qualitative and quantitative. Control of Microorganisms in Foods- Principle and methods. Preservation and maintenance of microbial cultures.

UNIT 5 **8 hours**

Food infection and food intoxication. Food and water borne diseases by – Salmonella, E. coli, Clostridium, Listeria, Shigella, Bacillus, Campylobacter, Vibrio. Trends in Food Microbiology-rapid methods of detection, recent Advances

Textbooks:

1. Food Microbiology (4thedition) by W. C Frazier.
2. Modern Food Microbiology (7th edition) by J.M. Jay .
3. Food Microbiology (2006) by M.R. Adams.

References:

1. Basic Food Microbiology (2004) by G.J. Banwart.
2. Food Microbiology (2007) by K.Vijaya Ramesh.
3. Fundamentals of Food Microbiology (5thEdition) by B. Ray and A. Bhunia

Course Outcomes:

By the end of the course, the student will be able to:

1. Learn about the morphological characteristics important in food bacteriology.
2. Understand about the sources of contamination of food, mycotoxins, toxin production and physiological action, sources of infection of food by pathogenic organisms.
3. Know procedures of identification of microorganisms
4. Learn about water, soil and air borne diseases.
5. Understand about sterilization methods, pure culture techniques, methods of isolation

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	3	2	3	1	2	2	3	3	2
CO2	2	2	2	3	2	2	3	2	3	2	1
CO3	3	3	2	2	2	3	2	3	2	1	2
CO4	2	2	3	2	2	2	1	3	1	2	2
CO5	3	3	2	2	3	2	2	1	2	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST2051	FOOD MICROBIOLOGY LAB	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	MFST1011 Principles of Food Science						
Co-requisite	MFST2041 Food Microbiology						
Preferable exposure	MFST1011 Principles of Food Science						

Course Description:

Food microbiology is the scientific study of microorganisms, both in food and used for the production of food. This includes microorganisms that contaminate food, as well as those used in its production; for example to produce yoghurt, cheese, beer and wine.

Course Educational Objectives:

- To know the important genera of microorganisms associated with food and their characteristics.
- To understand the importance of sterilization, and culturing of microbes
- To understand the role of microbes in fermentation, spoilage and food borne diseases.

List of Experiments:

1. Introduction to the Basic Microbiology Laboratory Practices and equipment
2. Functioning and use of compound microscope
3. Cleaning and sterilization of glassware
4. Preparation and sterilization of nutrient broth
5. Cultivation and sub-culturing of microbes
6. Preparation of slant, stab and plates using nutrient agar
7. Morphological study of bacteria and fungi using permanent slides
8. Simple staining
9. Gram's staining
10. Standard Plate Count Method
11. Introduction of culture procuring and depositing centers, ATCC, DSMZ, and IMTECH

Textbooks:

1. Food Microbiology (4th edition) by W. C Frazier.
2. Modern Food Microbiology (7th edition) by J.M. Jay .
3. Food Microbiology (2006) by M.R. Adams.

References:

1. Basic Food Microbiology (2004) by G.J. Banwart.
2. Food Microbiology (2007) by K.Vijaya Ramesh.
3. Fundamentals of Food Microbiology (5thEdition) by B. Ray and A. Bhunia.

Course Outcomes:

By the end of the practicals, the student will be able to

1. Learn about important pathogens and spoilage microorganisms in foods and the conditions under which they will grow, conditions under which the important pathogens are commonly inactivated, killed or made harmless in food, principles involving food preservation via fermentation processes
2. Understand about the role and significance of microbial inactivation, adaptation and environmental factors (i.e., Aw, pH, temperature) on growth
3. Know about the response of microorganisms in various environments, and conditions, including sanitation practices, under which the important pathogens and spoilage microorganisms are commonly inactivated, killed or made harmless in foods.
4. Compare various physical and chemical methods used in the control of microorganisms
5. Cultivate and enumerate microorganisms from various food samples

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	2	1	2	2	2	2	1
CO2	2	3	2	2	2	3	2	2	2	2	1
CO3	3	2	2	2	3	3	2	3	2	2	3
CO4	3	2	2	2	3	2	3	2	1	3	2
CO5	3	2	2	3	2	2	1	2	2	1	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST3001	TECHNOLOGY OF ANIMAL FOODS	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST1031 Fundamentals of Food Technology						
Co-requisite	None						
Preferable exposure	MFST2041 Food Microbiology						

Course Description:

The principle interests of the extension program at this time are in the area of dairy Technology deals with processing of milk and milk product. The meat industry topics deals total utilization of flesh foods, particularly poultry and fish, animal welfare, and the sustainability of animal agriculture. Issues of animal welfare are also presented to challenge simplistic, often anthropomorphic assumptions, especially with respect to egg layers. Seafood Processing: Technology, Quality and Safety covers the whole range of current processes which are applied to seafood, as well as quality and safety aspects

Course Educational Objectives:

- To understand need for and importance of livestock, dairy, egg, fishery and poultry industry
- To know the compositional and technological aspects of milk and fish.
- To study structure, composition and nutritional quality of animal products.
- To study processing and preservation of animal foods.
- To understand technology behind preparation of various animal food products and byproduct utilization

UNIT 1 **Milk** **8 hours**

Physical properties of milk, Composition of milk. Market milk industry: Systems of collection of milk Reception, Platform testing, Various stages of processing- Filtration, Clarification, Homogenization, Pasteurization. Receiving and storage of milk. Milk products–Butter, ghee, flavored milk, yoghurt, dahi, shrikhand, ice-cream, condensed milk, milk powder, channa, paneer, cheese (cheddar). Dairy plant sanitization.

UNIT 2 **Egg** **8 hours**

The egg industry, its techniques of working, General management, structure, composition and nutritive value of egg and its products. Preservation of eggs: Refrigeration and freezing, thermal processing, dehydration, coating. Quality identification of shell eggs- Factors affecting egg quality and measures of egg quality.

UNIT 3 Meat 8 hours

Development of meat and poultry industry in India and its need in nation's economy Meat quality: Effects of feed, breed and environment on production of meat animals and their quality. Slaughtering process, post mortem changes and examination, HACCP model.

UNIT 4 Fish 8 hours

Status of fishery industry in India. Chilling and freezing of fish: Relationship between chilling and storage life, MAP, general aspects of freezing, freezing systems (air blast freezing, plate or contact freezing spray or immersion freezing, freezing on board, onshore processing, changes in quality in chilled and frozen storage, thawing.

UNIT 5 Preservation of animal food 8 hours

Refrigeration and freezing, thermal processing- canning, dehydration/drying, smoking and irradiation of meat and fish. Curing -curing agents, meat and fish curing. RTE meat and fish products. Sausages-processing, types and defects. Fishery by-products: Surimi and fish mince products. Fish protein concentrates (FPC), fish protein extracts (FPE), fish protein hydrolysis (FPH), Fermented fish and products.

Textbooks:

1. Lawrie R A, Lawrie's Meat Science, 5th Ed, Woodhead Publisher, England, 1998
2. Parkhurst &Montney, Poultry Meat and Egg Production, CBS Publication, New Delhi, 1997
3. De Sukumar, Outlines of Dairy Technology, Oxford University Press, Oxford. 2007.

References:

1. Hall GM, Fish Processing Technology, VCH Publishers Inc., NY,1992
2. Sen DP, Advances in Fish Processing Technology, Allied Publishers Pvt. Limited 2005

4. Shahidi F and Botta JR, Seafoods: Chemistry, Processing, Technology and Quality, Blackie Academic &Professional,London,1994

Course Outcomes:

By the end of the course, the student will be able to:

1. Learn about egg structure, composition, nutritive value and quality characteristics.
2. Learn about poultry, meat and marine food industry, market and processing.
3. Understand about muscle structure, chemical composition and physico-chemical properties of meat muscle
4. Know procedures of Slaughtering of animals and poultry, post-mortem changes, post-mortem inspection and grading of meat properties and shelf life of meat.
5. Learn about factors affecting, processing of by curing agents, canning drying, smoking and salting of meat and fish.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	1	3	2	2	2	3	3	3
CO2	2	3	2	3	2	3	2	2	2	2	3
CO3	3	2	2	3	2	3	2	2	2	3	2
CO4	2	3	3	2	2	2	2	3	2	3	2
CO5	2	2	3	2	3	2	3	2	2	1	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST3011	FOOD BIOCHEMISTRY	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST1011 Principles of Food Science						
Co-requisite	None						
Preferable exposure	MFST1031 Fundamentals of Food Technology						

Course Description:

Food chemistry deals with the chemical processes and interactions of all biological and non-biological components of foods. The biological substances comprise items like poultry, lettuce, meat, milk and beer. It is parallel to biochemistry in its main components including water, carbohydrates, lipids, proteins and enzymes. Apart from this it also contains areas like vitamins, minerals, food additives, flavors, and colors. This subject also includes how products change under certain circumstances of food processing techniques and methods either to enhance or to prevent them from occurring.

Course Educational Objectives:

- To understand the chemistry of foods - composition of food, role of each component and their interaction.
- To understand the functional aspects of food components and to study their role in food processing.

UNIT 1 **8 hours**

Introduction to Food Chemistry – Definition, Composition of food. Water - Definition of water in food, Structure of water and ice, Types of water, Sorption phenomenon, Water activity and packaging, Water activity and shelf-life

UNIT 2 **8 hours**

Lipids - Classification of lipids, Physical properties-melting point, softening point, specific gravity, refractive index, smoke, flash and fire point, turbidity point. Chemical properties-reichert-meissel value, polenske value, iodine value, peroxide value, saponification value. Effect of frying on fats, Changes in fats and oils- rancidity, lipolysis, flavor reversion, Auto-oxidation and its prevention, Technology of edible fats and oils- Refining, Hydrogenation and Interesterification, Fat Mimetics

UNIT 3 **8 hours**

Proteins - classification and structure, Nature of food proteins (plant and animal proteins), Properties of proteins (electrophoresis, sedimentation, amphoterism and denaturation), Functional properties of proteins eg.organoleptic, solubility, viscosity, binding gelation / texturization, emulsification, foaming.

UNIT 4 **8 hours**

Carbohydrates – Classification (mono, oligo and poly saccharides), Structure of important polysaccharides (starch, glycogen, cellulose, pectin, hemicellulose, gums), Chemical reactions of carbohydrates –oxidation, reduction, with acid & alkali, Modified celluloses and starches, resistant starch.

UNIT 5 **8 hours**

Vitamins – Structure, Importance and Stability of Water soluble vitamins & Fat soluble vitamins Flavour - Definition and basic tastes, Chemical structure and taste, Description of food flavours, Flavour enhancers

Textbooks:

1. Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996

2. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002

3. Wong, Dominic WS, Food Enzymes, Chapman and Hall, New York, 1995

References:

1. Potter,N.N.and Hotchkiss,J.H, Food Science, 5th Ed., Chapman & Hall,1995

2. DeMan, J.M., Principles of Food Chemistry, AVI, NewYork, 1980

Course Outcomes:

By the end of the course, the student will be able to:

1. Understand the concept of micro and macro elements which constitutes the food
2. Understand the types of carbohydrates in food
3. Compare and contrast the water soluble and fat-soluble vitamins
4. Illustrate the deficiency disorder caused by lack of vitamins
5. Formulate low and high carbohydrate diet

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	2	2	2	3	2	1	1	3
CO2	2	2	3	3	3	2	2	2	2	2	3
CO3	1	3	3	2	3	3	2	2	2	3	2
CO4	2	2	3	2	2	3	2	3	1	2	2
CO5	3	3	2	2	3	2	3	2	2	3	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST3021	TECHNOLOGY OF ANIMAL FOODS LAB	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	MFST1031 Fundamentals of Food Technology						
Co-requisite	MFST3001 Technology of Animal Foods						
Preferable exposure	MFST1011 Principles of Food Science						

Course Description:

The principle interests of the extension program at this time are in the area of dairy Technology deals with processing of milk and milk product. The meat industry topic deals total utilization of flesh foods, particularly poultry and fish, animal welfare, and the sustainability of animal agriculture. Issues of animal welfare are also presented to challenge simplistic, often anthropomorphic assumptions, especially with respect to egg layers. Seafood Processing: Technology, Quality and Safety covers the whole range of current processes which are applied to seafood, as well as quality and safety aspects

Course Educational Objectives:

- To understand need for and importance of livestock, dairy, egg, fishery and poultry industry
- To know the compositional and technological aspects of milk and fish.
- To study structure, composition and nutritional quality of animal products.
- To study processing and preservation of animal foods.

List of Experiments:

1. To perform platform tests in milk (Acidity, COB, MBRT, specific gravity, SNF)
2. To estimate milk protein by Folin method.
3. To estimate milk fat by Gerber method.
4. To prepare casein and calculate its yield.
5. Estimation of moisture content of meat
6. Estimation of protein content of meat
7. Cutout analysis of canned meats/retort pouches
8. To study shelf-life of eggs by different methods of preservation
9. Evaluation of eggs for quality parameters (market eggs, branded eggs)

10. To perform freezing of yolk/albumen
11. Identification of different varieties of fish.
12. Fish product formulation/canning.

Textbooks:

1. Lawrie R A, Lawrie's Meat Science, 5th Ed, Woodhead Publisher, England, 1998
2. Parkhurst &Montney, Poultry Meat and Egg Production, CBS Publication, New Delhi, 1997
3. De Sukumar, Outlines of Dairy Technology, Oxford University Press, Oxford. 2007.
4. Hall GM, Fish Processing Technology, VCH Publishers Inc., NY,1992
5. Sen DP, Advances in Fish Processing Technology, Allied Publishers Pvt. Limited 2005 4. Shahidi F and Botta JR, Seafoods: Chemistry, Processing, Technology and Quality, Blackie Academic &Professional,London,1994

Course Outcomes:

By the end of the practical, the student will be able to

- Understand milk properties and standard processing methods.
- Know different milk products and its importance.
- Estimate milk protein and fat.
- Identify the different varieties of fish
- Evaluation of egg and its quality

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	3	2	1	2	2	3	2	3	2	3
CO2	2	3	3	3	2	3	3	2	3	2	3
CO3	3	1	2	3	2	2	2	3	2	3	1
CO4	2	3	3	3	2	3	2	3	3	2	2
CO5	3	2	2	2	1	2	2	3	2	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST3031	FOOD BIOCHEMISTRY LAB	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	MFST1011 Principles of Food Science						
Co-requisite	MFST3011 Food Biochemistry						
Preferable exposure	FST2011 Food Processing and Preservation Technology						

Course Description:

Food chemistry deals with the chemical processes and interactions of all biological and non-biological components of foods. The biological substances comprise items like poultry, lettuce, meat, milk and beer. It is parallel to biochemistry in its main components including water, carbohydrates, lipids, proteins and enzymes. Apart from this it also contains areas like vitamins, minerals, food additives, flavors, and colors. This subject also includes how products change under certain circumstances of food processing techniques and methods either to enhance or to prevent them from occurring.

Course Educational Objectives:

- To understand the chemistry of foods - composition of food, role of each component and their interaction.
- To understand the functional aspects of food components and to study their role in food processing.

List of Experiments:

1. Preparation of primary and secondary solutions
2. Estimation of moisture content
3. Determination of gelatinization temperature range (GTR) of different starches and effect of additives on GTR.
4. Determination of refractive index and specific gravity of fats and oils.
5. Determination of smoke point and percent fat absorption for different fat and oils.
6. Determination of percent free fatty acids
7. Estimation of saponification value
8. Estimation of reducing and non-reducing sugars using potassium ferricyanide method.

Textbooks:

1. Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996

2. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002

3. Wong, Dominic WS, Food Enzymes, Chapman and Hall, New York, 1995

4. Potter,N.N.and Hotchkiss,J.H, Food Science, 5th Ed., Chapman & Hall,1995

5. DeMan, J.M., Principles of Food Chemistry, AVI, NewYork, 1980

Course Outcomes:

By the end of the practicals, the student will be able to

- Prepare different types of solutions
- Differentiate between fats and oils and their adulterations
- Compare and contrast non-reducing and reducing sugars
- Determine the gelatinization temperature range (GTR) of different starches and effect of additives on GTR
- Determine the refractive index and specific gravity of fats and oils

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	1	3	2	2	2	3	3	3
CO2	2	3	2	3	2	3	2	2	2	2	3
CO3	3	2	2	3	2	3	2	2	2	3	2
CO4	2	3	3	2	2	2	2	3	2	3	2
CO5	2	2	3	2	3	2	3	2	2	1	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST3041	FOOD CHEMISTRY	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST1011 Principles of Food Science						
Co-requisite	None						
Preferable exposure	MFST1011 Principles of Food Science						

Course Description:

Food chemistry plays a key role in warranting that the food being processed is of high quality and safe for eating. Understanding food chemistry helps us develop proper ways of handling food and also develop good manufacturing practices. Chemical substances can play a significant role in food manufacture and safeguarding. Food additives can, for example, prolong the shelf life of foods or can make food more attractive, such as colors. Flavorings are used to make food tastier. Other chemicals can be used to fight diseases in farm animals or crops.

Course Educational Objectives:

- To understand the chemistry of food components and their interactions.
- To know about the role of enzymes and various processing treatments in food industry.
- To understand the concept of new product development.

UNIT 1 **8 hours**

Minerals - Major and minor minerals calcium, phosphorus, Sulphur, magnesium, sodium, potassium, chlorine; minor minerals - iron, Florine, zinc, copper, iodine, chromium, cobalt, Metal uptake in canned foods, Toxic metals.

UNIT 2 **8 hours**

Natural Food Pigments- Introduction and classification Food pigments (chlorophyll, carotenoids, anthocyanins and flavonoids, beet pigments, caramel). Browning Reactions In Food - Enzymatic browning, Non – Enzymatic browning, Maillard reaction, Caramelization reaction, Ascorbic acid oxidation

UNIT 3 **8 hours**

Enzymes - Introduction, classification, General characteristics, Enzymes in food processing, Industrial Uses of Enzymes, Immobilized enzymes

UNIT 4 **8 hours**

Physico-chemical and nutritional changes occurring during food processing treatments - Drying and dehydration, Irradiation, Freezing, Canning

UNIT 5 **8 hours**

New product development – Definition, Importance, Need of product development, Steps of product development- Product development tools, Reasons for failure.

Textbooks:

1. DeMan, John M., Principles of Food Chemistry ,3rd Ed., Springer 1999

2. Desrosier, Norman W. and Desrosier.,JamesN.,The technology of food preservation , 4th Ed.,Westport, Conn. : AVI Pub. Co., 1977.

3. Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996

4. Fuller, Gordon W, New Product Development From Concept to Marketplace, CRC Press, 2004.

5. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002

Course Outcomes:

By the end of the course, the student will be able to:

- Differentiate between trace elements and essential elements in food
- Illustrate the importance of food colors in maintain and improving the appearance
- Use immobilized enzymes for convenience, economy and stability of food in industries
- Understand that new products development is the life and blood of companies
- Reduce the loss and increase the food supply by improving the processing efficiency by enhancing the yield of usable product.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	2	3	2	2	1	2	3
CO2	3	2	2	2	3	2	1	3	3	3	2
CO3	2	3	2	3	2	2	2	3	2	2	3
CO4	2	2	2	3	2	3	2	3	2	3	2
CO5	2	3	2	2	3	3	2	2	3	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST3051	FOOD CHEMISTRY LAB	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	MFST1031 Fundamentals of Food Technology						
Co-requisite	MFST3041 Food Chemistry						
Preferable exposure	MFST1031 Fundamentals of Food Technology						

Course Description:

Food chemistry plays a key role in warranting that the food being processed is of high quality and safe for eating. Understanding food chemistry helps us develop proper ways of handling food and also develop good manufacturing practices. Chemical substances can play a significant role in food manufacture and safeguarding. Food additives can, for example, prolong the shelf life of foods or can make food more attractive, such as colors. Flavorings are used to make food tastier. Other chemicals can be used to fight diseases in farm animals or crops.

Course Educational Objectives:

- To understand the chemistry of food components and their interactions.
- To understand the concept of new product development.

List of Experiments:

1. Estimation of total ash
2. Estimation of minerals-demo
3. Determination of thermal inactivation time of enzymes in fruits and vegetables.
4. Estimation of iodine value
5. Estimation of peroxide value
6. Determination of carotenoids w.r.t flour pigments.
7. Extend of non-enzymatic browning by extraction methods.
8. Introduction of the concept of new product development

Textbooks:

1. DeMan, John M., Principles of Food Chemistry ,3rd Ed., Springer 1999

2. Desrosier, Norman W. and Desrosier.,JamesN.,The technology of food preservation , 4th Ed.,Westport, Conn. : AVI Pub. Co., 1977.

3. Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996

4. Fuller, Gordon W, New Product Development From Concept to Marketplace, CRC Press, 2004.

5. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002

Course Outcomes:

By the end of the practicals, the student will be able to

- Understand the concepts of enzymatic and non-enzymatic browning in food and improve the food quality
- Apply various enzymes in industry for improving the digestion of food and extending the shelf life of a product by preventing certain enzymes
- Develop a new product.
- Estimate the iodine value and peroxide value
- Understand the thermal inactivation time of enzymes in fruits and vegetables

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	3	2	2	2	3	2	2
CO2	2	3	3	2	2	3	3	2	3	3	2
CO3	3	3	2	3	2	2	2	2	2	2	2
CO4	1	2	3	2	3	2	1	3	3	2	2
CO5	2	3	2	1	3	2	2	1	2	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST2201	BAKERY AND CONFECTIONARY	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST1011 Principles of Food Science/ Basics of Biology						
Co-requisite	None						
Preferable exposure	None						

Course Description:

Baking is both an art and a science, and mastery in baking allows the baker to be creative in exploring new and quality products from inconsistent ingredients and process conditions. The course gives a wealth of information about making of various yeast-made products—bread, cakes, biscuits, desserts and pizza—their ingredients in bakery production. The course also allows us to understand the use of modern technology machines in bakery production, icings, decoration, bakery organization, and many other aspects.

Course Educational Objectives:

- To understand the fundamentals of baking
- To learn the technologies behind bakery products
- To understand industry trends

UNIT 1 **8 hours**

Bakery industry: Current status, growth rate, and economic importance. Product types, nutritional quality and safety of products, pertinent standards & regulations. Bread, buns and pizza base: Ingredients & processes for breads, buns, pizza base, equipments used, product quality characteristics, faults and corrective measures. Cakes: Ingredients & processes for cakes, Equipments used, product quality characteristics, faults and corrective measures. Different types of icings.

UNIT 2 **8 hours**

Biscuits, cookies & crackers: Ingredients & processes, Equipments used, product quality characteristics, faults and corrective measures. Modified bakery products: Modification of bakery products for people with special nutritional requirements e.g. High fibre, low sugar, low fat, gluten free bakery products. Breakfast cereals, macaroni products and malt: Production and quality of breakfast cereals, macaroni products and malt.

UNIT 3 **8 hours**

Chocolate processing - Different steps involved in chocolate processing - Ingredients, mixing, refining. General technical aspects of Industrial sugar confectionery, composition effects, changes, change of state.

UNIT 4 **8 hours**

Boiled sweets - classification - Ingredients used in the preparation - Caramel, toffee and fudge – Processing. Processing of liquorice paste, cream paste and aerated confectionery products - Ingredients- their function - Ingredients and Processing. Tablets, Lozenges, Sugar panni ng tablets, Granulated confectionery, medicated confectionery - Ingredients and Processing.

UNIT 5 **8 hours**

Chewing gums, fondants, Marzipan - Ingredients & Processing. Crystallized confectionery - Processing - Ingredients and their functions. Quality and standards/regulations to be followed in the confectionery Industry and packaging requirements

Textbooks:

1. Basic Baking 5th Ed. Dubey, S.C. (2007). ChanakyaMudrak Pvt. Ltd.

2. Industrial Chocolate Manufacture. Beckette S.T. (2009), Blackwell Publishing Ltd.

3. Chocolate, Cocoa and Confectionary, Minifie B.W. (1999). Aspen Publication.

References:

1. Text book of Food Science and Technology. Vijayakhader.. ICAR

2. Bakery Technology and Engineering. Samuel A. Matz (1999)., PAN-TECH International Incorporated

Course Outcomes:

By the end of the course, the student will be able to:

- Know nutritional quality and safety of bakery products
- Identify ingredients and making process of Biscuits, cookies & crackers
- Identify ingredients and making process of Boiled sweets
- Identify ingredients and making process of Chewing gums, fondants, Marzipan
- Know about ingredients and making process of granulated and medical confectionery

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	2	3	2	2	3	2	1
CO2	2	2	3	2	3	3	3	2	3	2	2
CO3	3	2	3	3	1	3	2	2	2	3	1
CO4	2	3	2	2	3	3	2	3	2	3	2
CO5	3	3	2	2	2	2	3	2	2	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST2231	BAKERY AND CONFECTIONARY LAB	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	MFST1011 Principles of Food Science						
Co-requisite	MFST2201 Bakery and Confectionary						
Preferable exposure	None						

Course Description:

Baking is both an art and a science, and mastery in baking allows the baker to be creative in exploring new and quality products from inconsistent ingredients and process conditions. The course gives a wealth of information about making of various yeast-made products—bread, cakes, biscuits, desserts and pizza—their ingredients in bakery production. The course also allows us to understand the use of modern technology machines in bakery production, icings, decoration, bakery organization, and many other aspects.

Course Educational Objectives:

- To understand the fundamentals of baking
- To learn the technologies behind bakery products
- To understand industry trends

List of Experiments

1. Preparation of sponge cake with icing and assessment of its quality.
2. Preparation of biscuits and assessment of quality
3. Determine the effect of heat on sugar solution and perform the thread and cold water test.
4. To study the process of inversion, melting and caramelization in sucrose.
5. Preparation of *Shakarpar a*and *Chhanamurki*.
6. Preparation of bread and assessment of its quality

Textbooks:

1. Basic Baking 5th Ed. Dubey, S.C. (2007). ChanakyaMudrak Pvt. Ltd.
2. Industrial Chocolate Manufacture. Beckette S.T. (2009), Blackwell Publishing Ltd.
3. Chocolate, Cocoa and Confectionary, Minifie B.W. (1999). Aspen Publication.
4. Text book of Food Science and Technology. Vijayakhader.. ICAR

5. Bakery Technology and Engineering. Samuel A. Matz (1999)., PAN-TECH International Incorporated

Course Outcomes:

By the end of the practicals, the student will be able to

- Learn about preparation and quality assessment of sponge cakes, biscuits
- Analyze study effect of heat on sugar solution and understand the levels of various sugar solutions
- Do preparation of bread and its assessment.
- Determine the effect of heat on sugar solutions.
- Understand the process of inversion, melting and caramelization in sucrose

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	3	1	3	3	3	2	1	2	2	3
CO2	2	1	3	2	2	3	3	2	3	2	2
CO3	3	2	3	3	1	3	2	2	2	3	3
CO4	2	2	3	2	3	1	2	3	1	3	2
CO5	3	3	2	2	2	2	3	2	3	2	1

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST2211	TECHNOLOGY OF SPICES	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST2001 Technology of Plantation Crops/Basics of Biology/Basics of Chemistry						
Co-requisite	None						
Preferable exposure	MFST2001 Technology of Plantation Crops/						

Course Description:

Spices are woven into the history of nations. Most of the spices are native of our country and hence India is known as the Land of Spices. Spices impart aroma, color and taste to food preparations. Most of the spices have potential medicinal values. Spices and spice products are also indirectly used as flavoring or coloring agents or as preservatives in many pharmaceutical preparations.

Course Educational Objectives:

- To introduce students to the world of plants and their products with an emphasis on the creative use of spices in enhancing the aroma and taste of many dishes.
- Understand the history of herbs, spices, and medicinal plants.
- Understand the important role of herbs and spices in human history
- Familiarize about the value added products of spices

UNIT 1 **8 hours**

Spices - Definition, Composition, classification. Spice production in India, role of spices in cookery, spice processing technology. Post processing treatment- steam sterilization, irradiation, and chemical fumigation. Nutritive value of spices. Application in food systems

UNIT 2 **8 hours**

Major spices –pepper, cardamom, chillies, ginger, turmeric composition, production, processing, uses, health benefits, active spice constituents. Minor spices –Asafoetida, ajwain, aniseed, bay leaves, caraway cinnamon, clove, coriander, cumin, fenugreek, garlic, nutmeg, mace, kokam, saffron- uses and active spice constituents.

UNIT 3 **8 hours**

Benefits of value added products. Primary and secondary functions of spices. Role of biotechnology in improvement of spice crops. Adulteration of spices. Economic uses of spices

UNIT 4 **8 hours**

Technology of manufacturing spice extractives - oleoresins and oils, advantages and applications of spice extractives. Spice contaminants- harmful effects, preventive measures, decontamination techniques, sterilization of spices. Spoilage of spices-factors affecting spice spoilage, Preservation of spices.

UNIT 5 **8 hours**

Packaging and storage of spices- packaging requirements, types and characteristics of packaging materials, labeling considerations of spice and spice products, storage stability. Quality control of spices, spice specific tests. Storage requirements of spice and spice products. Spice board of India.

Textbooks:

1. Handbook of Herbs and Spices (2006)Volume 3 by K. V. Peter

2. Chemistry of Spices (2008) by V. A. Parthasarathy

3. Handbook on Spices &Condiments (Cultivation, Processing and Extraction) 2010 by H. Panda

References:

1. The Complete Book on Spices & Condiments (2006) 2nd edition by NIIR Board

2. Cultivation of Spice Crops (2005) by Azhar Ali Farooqi

Course Outcomes:

By the end of the course, the student will be able to:

- Describe role of spices in cookery
- Describe various methods for manufacturing spice extracts
- Apply the concept of Quality control in spice processing
- Explain the need of proper packaging for spices
- Discuss the role of biotechnology in improvement of spice crops

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	3	2	2	2	3	2	2	3	2
CO2	2	2	2	3	2	3	2	2	3	3	2
CO3	3	2	2	3	3	2	2	3	2	1	3
CO4	2	2	3	2	3	2	2	3	2	3	2
CO5	3	2	2	3	2	2	3	3	2	3	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST2241	TECHNOLOGY OF SPICES LAB	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	None						
Co-requisite	MFST2211 Technology of Spices						
Preferable exposure	None						

Course Description:

Spices are woven into the history of nations. Most of the spices are native of our country and hence India is known as the Land of Spices. Spices impart aroma, color and taste to food preparations. Most of the spices have potential medicinal values. Spices and spice products are also indirectly used as flavoring or coloring agents or as preservatives in many pharmaceutical preparations.

Course Educational Objectives:

- To introduce students to the world of plants and their products with an emphasis on the creative use of spices in enhancing the aroma and taste of many dishes.
- Understand the history of herbs, spices, and medicinal plants, their processing and extraction
- Familiarize about the value added products of spices

List of Experiments

1. Testing for adulterants in spices
2. Processing of some spices
3. Extraction of various spices
4. Investigating the antimicrobial activity of various spices
5. Visit to commercial crop production and research centers
6. Value addition of spices

Textbooks:

1. Handbook of Herbs and Spices (2006)Volume 3 by K. V. Peter
2. Chemistry of Spices (2008) by V. A. Parthasarathy
3. Handbook on Spices &Condiments (Cultivation, Processing and Extraction) 2010 by H. Panda

4. The Complete Book on Spices & Condiments (2006) 2nd edition by NIIR Board

5. Cultivation of Spice Crops (2005) by Azhar Ali Farooqi

Course Outcomes:

By the end of the practicals, the student will be able to

- Understand the importance of spices and herbs in cooking
- List the value added products of various spices
- Summarize various applications of spices
- Differentiate major and minor spices
- Test and identify the adulterants in spices

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	2	2	3	2	3	3	2	2
CO2	2	3	3	2	2	3	3	3	3	2	2
CO3	2	2	2	3	1	3	2	1	2	3	2
CO4	1	3	3	2	2	3	2	3	2	3	2
CO5	2	2	3	2	2	3	3	1	3	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST2221	FOOD & NUTRITION	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST1031 Fundamentals of Food Technology/Basics of Biology/ Basics of chemistry						
Co-requisite	None						
Preferable exposure	None						

Course Description:

Food and nutrition are the way that we get fuel, providing energy for our bodies. We need to replace nutrients in our bodies with a new supply every day. A healthy diet includes a lot of natural foods. A sizeable portion of a healthy diet should consist of fruits and vegetables. Whole grains, such as whole wheat and brown rice, should also play a part in your diet. For adults, dairy products should be non-fat or low-fat. Protein can consist of lean meat and poultry, seafood, eggs, beans, legumes, and soy products such as tofu, as well as unsalted seeds and nuts.

Course Educational Objectives:

- Understand the relationship between food, nutrition and health.
- Understand the functions of food.
- Learn about various food groups and balanced diet.
- Understand digestion, absorption and function of various nutrients and their sources.

UNIT 1 **8 hours**

Functions of food-physiological, psychological and social, Concept of Balanced Diet, Food Groups- major nutrients, Food Pyramid, guidelines for good health. Food exchange list, basal metabolism, factors affecting BMR

UNIT 2 **8 hours**

Basic terms in study of food and nutrition- BMI, Nutritional Status, malnutrition, recommended daily allowances (RDA). Factors affecting RDA, uses of RDA. Relationship between food, nutrition and health

UNIT 3 **8 hours**

Meal planning-Factors affecting meal planning for different groups of people. Methods of cooking- Dry, moist, frying and microwave cooking, Advantages, disadvantages and effect on foods. Nutritional labeling- Importance, global trends, codex guidelines, nutritional labelling in India, FSSAI guidelines.

UNIT 4 **8 hours**

Classification, digestion, functions, dietary sources, Recommended Dietary Allowances, clinical manifestations of deficiency and excess and factors affecting absorption- Energy, lipids carbohydrates and proteins

UNIT 5 **8 hours**

Classification, digestion, functions, dietary sources, RDA, clinical manifestations of deficiency and excess and factors affecting absorption: Fat soluble vitamins-A, D, E and K. Water soluble vitamins – thiamin, riboflavin, niacin, pyridoxine, folate, vitamin B12 and vitamin C. Minerals – calcium, iron, iodine, fluorine, copper and zinc

Textbooks:

1. Dietetics (2007) by B. Srilakshmi.

2. ICMR (2010). Nutrient Requirements and Recommended Dietary Allowances for Indians

3. Text Book of Human Nutrition (2010) by Bamji

4. Essentials of Human Nutrition (2007) by A.S.Truswell.

5. Nutrition & Dietetics 3rd editionSubhangini Joshi

References:

1. Oxford Handbook of Nutrition and Dietetics (2012) Joan Webster

2. Srilakshmi (2007). Food Science, 4th Edition. New Age International Ltd.

3. IFCT (2017) Indian Food Composition Tables

Course Outcomes:

By the end of the course, the student will be able to:

- Understand the relationship between nutrition and human well-being.
- Know and understand the different methods of cooking.
- Learn about functions of foods, definition of nutrition, nutrients, adequate optimum and good nutrition, and malnutrition.
- Learn clinical manifestations of macromolecules
- Understand the planning of meal

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	3	2	3	2	3	3	2	3
CO2	2	2	3	2	2	3	3	1	3	2	2
CO3	3	2	3	3	1	3	2	2	2	3	2
CO4	3	3	2	1	3	2	2	3	2	2	3
CO5	2	1	2	3	2	2	3	3	2	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST2251	FOOD & NUTRITION LAB	L	T	P	S	J	C
		0	0	2	0	0	1
Pre-requisite	Basics of Biology/Basics of Chemistry						
Co-requisite	MFST2221 Food & Nutrition						
Preferable exposure	None						

Course Description:

Food and nutrition are the way that we get fuel, providing energy for our bodies. We need to replace nutrients in our bodies with a new supply every day. A healthy diet includes a lot of natural foods. A sizeable portion of a healthy diet should consist of fruits and vegetables. Whole grains, such as whole wheat and brown rice, should also play a part in your diet. For adults, dairy products should be non-fat or low-fat. Protein can consist of lean meat and poultry, seafood, eggs, beans, legumes, and soy products such as tofu, as well as unsalted seeds and nuts.

Course Educational Objectives:

- Understand the relationship between food, nutrition and health.
- Learn about various food groups and balanced diet.
- Understand digestion, absorption and function of various nutrients and their sources.

List of Experiments

1. Identification of food sources for various nutrients using food composition tables.
2. Record diet of self-using 24 hour dietary recall and its nutritional analysis.
3. Introduction to meal planning, concept of food exchange system.
4. Estimation of BMI and other nutritional status parameters.
5. Planning meals for adults of different activity levels for various income groups.
6. Survey of locally available foods and identifying the key nutrients
7. Estimation of BMR and other nutritional status parameters.
8. Formulation of weaning foods
9. Planning and preparation of diets for aged people

Textbooks:

1. Dietetics (2007) by B. Srilakshmi.

2. ICMR (2010). Nutrient Requirements and Recommended Dietary Allowances for Indians

3. Text Book of Human Nutrition (2010) by Bamji

4. Essentials of Human Nutrition (2007) by A.S.Truswell.

5. Nutrition & Dietetics 3rd editionSubhangini Joshi

6. Oxford Handbook of Nutrition and Dietetics (2012) Joan Webster

7. Srilakshmi (2007). Food Science, 4th Edition. New Age InternationalLtd

8. IFCT (2017) Indian Food Composition Tables

Course Outcomes:

By the end of the practicals, the student will be able to

- Understand various functions of foods
- Identify the nutritional requirements of various age groups
- Understand the problems associated with different age groups
- Understand the importance of breast feeding
- Plan and prepare the diets for aged people

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	2	3	2	2	3	2	2
CO2	2	2	3	2	2	3	3	2	3	2	2
CO3	3	2	3	3	1	3	2	2	2	3	2
CO4	2	2	2	2	3	3	2	3	2	3	2
CO5	3	3	2	2	2	2	3	2	2	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST2261	APPLIED PHYSIOLOGY	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST2221 Food & Nutrition						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course aims to provide an overview of fundamental human physiology. This course aims to explain about structure and functions of cells and organs in humans such as immune system, gastrointestinal system, renal system. Cardiovascular system, respiratory system, central nervous system and reproductive system.

Course Educational Objectives:

- To provide a thorough knowledge regarding human physiology
- To provide a thorough understanding of structure and functions of cells in human body
- To provide good knowledge about various systems in human body such as Cardiovascular, respiratory, central nervous, gastrointestinal and renal systems
- To teach our students about significance of endocrinology and sensory organs

UNIT 1 **8 hours**

Introduction to human physiology: Cell prokaryotic and eukaryotic cell, cell cycles- mitosis, meiosis, Tissues, Blood- composition of blood and their functions,

UNIT 2 **8 hours**

Immune system- innate and adaptive immune system, humeral and cell mediated immunity Endocrinology- hormones, endocrine glands-pituitary, thyroid, adrenal gland. Structure and functions of Special senses- Vision, hearing, taste and smell

UNIT 3 **8 hours**

Physiology of Cardiovascular system: design of CVS, Cardiac cycle, hypertension. Physiology of respiratory system- Organs of respiratory system and mechanism of respiration, regulation of respiration

UNIT 4 **8 hours**

Physiology of Gastrointestinal system –Description of GIT, organs, hormones, enzymes involved in GIT, Utilization and Absorption of Carbohydrates, proteins, fats. Physiology of renal system, organs of urinary system, structure of nephron

UNIT 5 **8 hours**

Structure and functions of Central Nervous System, nerve cell, Structure and organization of central and peripheral nervous system. Physiology of male and female reproductive system, growth and development during pregnancy

Textbooks:

1. Principles of Anatomy and Physiology – Gerard J. Tortora,, Bryan H Derrickson, 15th Edition, Willy publishers

2. Principles of human physiology-Cindy L. Stanfield and William J. Germann, 6th Edition, Pearson Publishers

References:

1. Essentials of Medical Physiology- K. Sembulingam, Prema Sembulingam, 6th Edition, Jaypee Publishers

Course Outcomes:

By the end of the course, the student will be able to:

- Understand the immune system and cells functions and types of immune system
- Learn cell functions and cell cycles
- Study organization of central and peripheral nervous system
- Learn the physiology of gastrointestinal system
- Understand the physiology of male and female reproductive system

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	3	3	3	2	2	3	2	3	3	2
CO2	2	3	2	2	3	3	2	1	3	3	2
CO3	2	2	3	3	3	3	2	2	1	3	3
CO4	2	2	2	2	3	3	2	3	2	3	2
CO5	3	3	2	3	2	3	3	2	2	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST2271	INSTRUMENTATION FOR FOOD ANALYSIS	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST1011 Principles of Food Science/ Basics of Biology/Basics of Chemistry						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This paper gives student an idea about principles and procedures in performing different chromatographic techniques like in purifying the proteins to homogeneity, testing the purity levels by different electrophoretic techniques, and quantitating the same by spectrophotometric methods. This paper also gives you brief idea about the different radioactive methods for measurement of radioactivity, electrochemical methods in determining the pH of the solution, and about importance of biosensors. This course also helps to quantitate the scientific data, importance of statistics and application of various statistical methods, importantly, standard deviation, correlation, and regression related to bioanalytical techniques.

Course Educational Objectives:

- To understand the detailed principles, procedures and applications of various chromatographic techniques for example in learning the purification of proteins by using ion exchange and affinity chromatography, and molecular weight determination by size exclusion chromatography.
- To learn the principles, procedures and applications of various electrophoretic techniques, importantly knowing the difference between SDS and native PAGE, and isoelectric focussing.
- To study the principles, procedures and applications of various spectrophotometric methods especially in quantitation of desired compound in the given solutions.
- To know the principles, procedures and applications of radioactive methods for measurement of radioactivity, electrochemical methods, and biosensors.
- To focus on the usage of different statistical methods learned with respect to bioanalytical techniques perspectives.

UNIT 1 **8 hours**

Principles and applications of chromatographic techniques: paper chromatography, thin layer chromatography, gel filtration, ion-exchange chromatography, affinity chromatography, gas chromatography, high performance liquid chromatography, fast protein liquid chromatography.

UNIT 2 **8 hours**

Principles and concepts of electrophoretic techniques: native polyacrylamide gel electrophoresis (PAGE), sodium dodecyl sulphate-PAGE, agarose gel electrophoresis, capillary electrophoresis, isoelectric focusing and two dimensional, pulse field and diagonal electrophoresis.

UNIT 3 **8 hours**

Principles and applications of UV-visible, infrared, fluorescence spectroscopy, AAS, ESR, NMR.

Principles and applications of preparative and analytical ultracentrifuges.

UNIT 4 **8 hours**

FTIR, XRF, Differential Scanning Calorimetry, XRD, SEM, TEM, water activity meter, textural analyzer, biosensors, nitrogen analyzers

UNIT 5 **8 hours**

Detection and measurement of radioactivity. Radioactive and non-radioactive tracer techniques and their applications in the field of biological sciences. Principles of electrochemical techniques –operation and applications of pH, oxygen, ion-selective and gas sensing electrodes.

Textbooks:

Recommended Readings:

1. Principles and Techniques of Biochemistry and Molecular Biology (7th edition) by K. Wilson and J. Walker.

2. A Biologists guide to Principles and Techniques of Practical Biochemistry (3rd edition) by B.D.Williams.

References:

1. Biophysical Chemistry: Principles and Techniques (2010) by Upadhyay, Upadhyay and Nath.

Course Outcomes:

By the end of the course, the student will be able to:

- Understand the detailed principles, procedures and applications of various chromatographic techniques.
- Understand the principles, components, and applications of various electrophoretic techniques.
- Know the principles, components, and applications of various spectrometry techniques.
- Understand the importance of techniques such as XRD for retrieving the structure of the protein with high resolution.
- Gain knowledge on various biosensors and their applications in many industries

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	2	2	3	2	2	3	2	1
CO2	2	2	2	3	2	3	2	3	2	3	2
CO3	3	2	3	2	2	1	3	2	3	1	3
CO4	2	2	2	2	3	3	2	3	2	2	3
CO5	2	2	3	3	2	2	1	1	2	2	2

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST2281	FOOD QUALITY AND SENSORY EVALUATION	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST2041 Food Microbiology/Basics of Biology						
Co-requisite	None						
Preferable exposure	None						

Course Description:

Food quality is the quality characteristics of food that is acceptable to consumers. This includes external factors as appearance (size, shape, colour, gloss, and consistency), texture, and flavor; factors such as federal grade standards and internal (chemical, physical, microbial). Sensory evaluation is a scientific discipline used to analyze reactions to stimuli perceived through the senses – Sight, Smell, Touch, Taste and Sound. Sensory Analysis is a vital tool for the Food Industry and can be used in several applications like new product development.

Course Educational Objectives:

- To understand quality attributes like appearance, flavor prepare our bodies for digestion
- To identify different tastes of the food
- To Identify different odors and classifications
- To recognize the color abnormalities

UNIT 1 **8 hours**

Introduction to quality attributes of food - Appearance, flavour, textural factors and additional quality factors.

UNIT 2 **8 hours**

Gustation- Introduction and importance of gustation, Structure and physiology of taste organs- tongue, papillae, taste buds, salivary glands. Mechanism of taste perception, Chemical dimensions of basic tastes- sweet, salt, sour, bitter and umami, Factors affecting taste quality, reaction time, taste modification, absolute and recognition threshold, Taste measurement- Electronic Tongue, Taste abnormalities

UNIT 3 **8 hours**

Olfaction - Introduction, definition and importance of odour and flavor, Anatomy of nose, physiology of odour perception, Mechanism of odour perception, Theories of odour classification, chemical specificity of odour. Odour measurement techniques – historical perspective and emphasis on recent techniques- e- nose etc. Olfactory abnormalities

UNIT 4 **8 hours**

Colour - Introduction and importance of colour, Dimensions of colour and attributes of colour; gloss etc. Perception of colour. Colour Measurement: Munsell colour system, CIE colour system, Hunter colour system. Colour abnormalities

UNIT 5 **8 hours**

Texture - Introduction, definition and importance of texture, Phases of oral processing, Texture perception, receptors involved in texture perception, Rheology of foods, Texture classification, Texture measurement – basic rheological models, forces involved in texture measurement and recent advances in texture evaluation. Application of texture measurement in cereals, fruits and vegetables, dairy, meat and meat products

Textbooks:

1. Rao E. S. (2013). Food Quality Evaluation. Variety Books.

2. Pomeranz Y and Meloan CE (2002). Food Analysis – Theory and Practice, CBS Publishers and Distributors, New Delhi.

3. deMan J. (2007). Principles of Food Chemistry, 3rd ed., Springer.

References:

1. Meilgard (1999). Sensory Evaluation Techniques, 3rd ed. CRC Press LLC, 1999.

2. Amerine, Pangborn & Roessler (1965). Principles of Sensory Evaluation of food, Academic Press, London.

Course Outcomes:

By the end of the course, the student will be able to:

1. Recognize that tasting and smelling food can trigger the salivary glands and secretion of digestive juices
2. Apprehend that food colors can maintain or improve the appearance of the food.
3. Apprehend that food texture can determine the eating quality of foods and can have a strong influence on food intake and nutrition.
4. Measure different colors and recognize the colour abnormalities
5. Measure chemical specificity of odour and recognize the olfactory abnormalities

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	2	3	2	2	3	2	2
CO2	2	2	3	2	2	3	3	2	3	2	2
CO3	3	2	3	3	1	3	2	2	2	3	2
CO4	2	2	2	2	3	3	2	3	2	3	2
CO5	3	3	2	2	2	2	3	2	2	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST2291	FERMENTATION TECHNOLOGY	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST2041 Food Microbiology/ Basics of Biology						
Co-requisite	None						
Preferable exposure	None						

Course Description:

Fermentation is a metabolic process that produces chemical changes in organic substrates through the action of enzymes. Industrial fermentation is the intentional use of fermentation by microorganisms such as bacteria and fungi to make products useful to humans. Fermentation technology is a valuable tool for future economic development. Fermented products have applications as food as well as in general industry.

Course Educational Objectives:

- To impart comprehensive overview of the scientific and technical aspects of fermentation technology
- To instill knowledge on regulated methodology in fermentation and process of production

UNIT 1 **8 hours**

Introduction to fermentation processes, microorganisms used in food fermentation. Isolation, primary and secondary screening methods. Preservation and strain improvement methods

UNIT 2 **8 hours**

Design of fermentor, types of fermentors: maintenance of aseptic conditions, instrumentation control, physical and chemical environment sensors, control of various physical parameters; fermentation economics.

UNIT 3 **8 hours**

Industrial media formulation; substrates for fermentation – carbon and nitrogen sources; antifoams; sterilization; inoculums development, Types of fermentations- batch, continuous, dual or multiple fermentations. Solid state, surface, submerged fermentations, scale up.

UNIT 4 **8 hours**

Industrial production: Industrial production of enzymes, proteolytic enzymes, pectinases, amylases, organic acids – acetic acid, lactic and citric acid. Production of vitamins (Vitamin B2, Vitamin B12), Baker's yeast, yoghurt.

UNIT 5 **8 hours**

Immobilization technology. Downstream processing- solid-liquid separation, Release of intracellular products, concentration, recovery and purification. Computer applications in fermentation technology.

Textbooks:

1. Industrial Microbiology (1984) by A.H. Patel.

2. Prescott and Dunn's Industrial Microbiology (2004) by G. Reed.

3. Solid State Fermentation in Biotechnology (2009) by Ashok Pandey.

4. Industrial Microbiology (2002) by Waites.

References:

1. Biotechnology: A Text Book of Industrial Microbiology (1991) by Cruger and Cruger.

2. Principles of Fermentation Technology (2008) by Stanbury.

3. Microbial Technology: Microbial Processes (2009) by H. J. Peppler.

Course Outcomes:

By the end of the course, the student will be able to:

- Know about microorganisms used in food fermentation
- Gain knowledge on industrial production of enzymes, vitamins, organic acids
- Discuss on the applications of computers in fermentation technology
- Summarize the screening methods
- Describe the design of fermentor

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	3	2	3	2	2	3	2	2
CO2	2	2	2	2	2	3	3	2	3	2	2
CO3	3	2	2	3	2	3	2	2	2	3	2
CO4	2	2	2	2	3	3	2	3	2	3	2
CO5	3	3	2	2	2	2	3	2	3	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST3181	FOOD ENGINEERING	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST2271 Instrumentation for Food Analysis/Basics of Biology						
Co-requisite	None						
Preferable exposure	None						

Course Description:

The amalgamation of food technology with engineering operations has given birth to the discipline of food engineering. This course covers the basic principles, materials and energy balance concepts that prepare a solid ground for easy comprehension of the technology involved. This course also emphasizes about unit operations in food processing, distillation, and several other mechanical operations. The student also learns about food industry management, and the peripheral and integrated food engineering operations.

Course Educational Objectives:

- To understand the principle of Unit operation
- To acquaint with fundamentals of food engineering and its process
- To understand the basics of designing of food plant and systems

UNIT 1 **8 hours**

Concept of unit operation, units and dimensions, unit conversions, dimensional analysis, mass and energy balance, related numericals. Important considerations for designing of food plants, types of layout. Principle and equipments used in food industry.

UNIT 2 **8 hours**

Liquid transport systems, properties of liquids, Newton's law of viscosity, principle of capillary tube and rotational viscometer, properties of Non-Newtonian fluids, flow characteristics, Reynolds number, Bernoulli's equation, concept of flow measurement devices, related basic numericals.

UNIT 3 **8 hours**

Concept and selection of a refrigerant, description of a refrigeration cycle, pressure enthalpy charts and tables, mathematical expressions useful in analysis of vapour compression refrigeration cycle, numericals based on VCR system, Freon 12 and R-717, superheating and sub cooling, freezing time calculation using Plank's Equation, frozen food storage, related basic numericals

UNIT 4 **8 hours**

Systems for heating and cooling food products, thermal properties of food, modes of heat transfer, application of steady state heat transfer-estimation of conductive, convective, overall heat transfer coefficient and design of tubular heat exchanger. Related basic numericals, Fick's law of diffusion, membrane separation systems-electrodialysis system, reverse osmosis, membrane System, and ultrafiltration membrane system, membrane devices used for RO and UF: plate and frame, tubular, spiral wound and hollow fiber devices.

UNIT 5 **8 hours**

Properties of dry air, properties of water vapour, properties of air vapour mixture, psychrometric chart, related basic numericals, generation of steam, construction and functions of fire tube and water tube boilers, thermodynamics of phase change, steam tables, boiling point elevation, types of evaporations, design of single effect evaporators, basic drying process, moisture content on wet basis and dry basis, dehydration systems, dehydration system design, related basic numericals

Textbooks:

1. Rao DG. 2010. Fundamentals of food engineering. PHI learning private ltd.

2. Singh RP and Heldman DR.1993, 2003, 2009.Introduction to food engineering. Academic press 2nd, 3rd, and 4th edition.

3. Rao C G 2006 Essentials of food process engineering. B S publications

4. Fellow P. 1988 Food processing technology

Course Outcomes:

By the end of this Course, the student will be able to:

1. Learn about the design of food plant with the learned layout and hygiene concepts.
2. Demonstrate the working of various equipments used in food industry
3. Understand about the importance of refrigeration, and principles and applications of conduction, convection, and rheology.
4. Learn about evaporators, types, and dehydration systems
5. Perform freezing time calculations, methods of frozen food storage.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	3	2	3	3	3	2	2	2	3
CO2	1	2	2	2	3	3	2	2	3	2	1
CO3	2	2	2	3	2	3	2	1	3	3	2
CO4	2	3	2	3	3	2	2	3	1	3	3
CO5	3	3	2	1	2	2	3	2	3	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST3191	FOOD PACKAGING	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST2011 Food Processing and Preservation Technology/ Basics microbiology						
Co-requisite	None						
Preferable exposure	None						

Course Description:

This course informs the student brief idea about food preservation processes and techniques, product quality and shelf life, and the in-depth knowledge about logistical packaging, packaging materials, machinery and processes, necessary for a wide range of packaging presentations. The course also teaches food packaging innovation have a thorough technical understanding of the requirements of a product for protection and preservation, together with a broad appreciation of the multi-dimensional role of packaging.

Course Educational Objectives:

- To impart comprehensive overview of the scientific and technical aspects of food packaging.
- To instill knowledge on packaging machinery, systems, testing and regulations of packaging.

UNIT 1 **8 hours**

Packaging functions and Requirements, printing of packages. Barcodes and other marking, Labeling Laws. Paper and paper-based materials, corrugated fiber board (CFB).Plastics, formation- molding, types of plastics, biodegradable plastics, edible packaging, environmental concerns.

UNIT 2 **8 hours**

Metal packaging- Metals: Tinplate, tinning process, components of tinplate, tin free can (TFC) types of can, metallic films, lacquers Glass: Composition, Properties, Methods of bottle making, and types of closures.

UNIT 3 **8 hours**

Package design for fresh horticultural produce and animal foods, dry and moisture sensitive foods, frozen foods, fats and oils, thermally processed foods and beverages.

UNIT 4 **8 hours**

Testing Procedures for Packaging Materials- thickness, tensile strength, puncture resistance, bursting strength, seal strength, water vapor permeability, CO2 permeability, oxygen permeability, grease resistance, Testing Procedures for Packaged Foods - Compatibility and shelf life studies, evaluation of transport worthiness of filled packages. Food Packaging Laws and Regulations.

UNIT 5 **8 hours**

Bottling machines, Cartoning systems, Seal and Shrink packaging machine; Form, Fill and Sealing machine (FFS).Vacuum, Controlled and Modified atmosphere packaging systems; Aseptic packaging systems; Retort packaging, Active and Intelligent packaging systems.

Textbooks:

1. Robertson GL, Food Packaging – Principles and Practice, CRC Press Taylor and Francis Group, 2012
2. Paine FA and Paine HY, A Handbook of Food Packaging, Blackie Academic andProfessional, 1992
3. Coles R, McDowell D, Kirwan MJ Food Packaging Technology. Blackwell, 2003

Course Outcomes:

By the end of the course, the student will be able to:

- Understand the idea of food packaging, importance of printings and barcoding
- Learn about appropriate suitable packaging designs for various foods
- Understand the principle and working of different packaging machinery and systems
- Know about food packaging laws and regulations
- Understand about food packaging materials such as glass packaging materials manufacture and types, and importance

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	2	2	2	2	3	2	3	2
CO2	2	2	2	3	2	3	2	1	3	2	2
CO3	3	2	3	2	2	3	1	3	2	2	2
CO4	2	2	3	2	3	3	2	3	1	2	2
CO5	2	2	3	3	2	2	3	1	2	2	2

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST3201	FUNCTIONAL FOODS AND NUTRACEUTICALS	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST2221 Food & Nutrition/Basics of Biology/Basics of Chemistry						
Co-requisite	None						
Preferable exposure	None						

Course Description:

Functional food or medicinal food is any fresh or processed food claimed to have a health-promoting and/or disease-preventing property beyond the basic nutritional function of supplying nutrients. This is an emerging field in food science, in which such foods are usually accompanied by health claims for marketing purposes. Functional foods are sometimes called nutraceuticals, a portmanteau of nutrition and pharmaceutical, and can include food that has been genetically modified. Fermented foods with live cultures are often also considered to be functional foods with probiotic benefits.

Course Educational Objectives:

- To develop comprehensive understanding of different nutraceuticals and functional foods
- To understand the potential of various functional foods in promoting human health

UNIT 1 **8 hours**

Functional foods and Nutraceuticals -Definitions, sources, Health benefits, bioactive components of functional foods. Development of functional foods, challenges and safety considerations, Future trends of functional foods. Dietary supplements and fortified foods-need, health benefits adverse effects.

UNIT 2 **8 hours**

Functional foods of animal origin: Diary products, sea foods, egg, Functional foods of plant origin: fruits, vegetables, nuts, spices, cereals, and beverages. Probiotics, prebiotics and synbiotics as functional foods, Effects of probiotics on health.

UNIT 3 **8 hours**

Types of functional foods**:** whole foods, enriched foods, enhanced foods, fortified foods, modified foods. Market of functional foods, Challenges for Functional food delivery, Factors affecting consumer interest.

UNIT 4 **8 hours**

Diet and disease relationship – nutrition and health claims, Food component – approved health claims, labeling considerations for functional ingredients, Permissible and impermissible functional claims, Role of biotechnology in the development of functional foods.

UNIT 5 **8 hours**

Nutraceutical compounds – Phytochemicals, phytosterols and other bioactive compounds, peptides and proteins, carbohydrates, prebiotics, probiotics and synbiotics, lipids, vitamins and minerals; their sources and role in promoting human health.

Textbooks:

1. Text Book of Human Nutrition (2010) by Bamji

2. Handbook of Nutraceuticals and Functional Foods, Second Edition Robert E C Wildman

3. Functional Foods and Nutraceuticals 2012 Rotimi E. Aluko

4. Functional Foods: Principles and Technology (2009) Mingro Guo CRC

5. Functional Foods: Designer Foods, Pharma foods, Nutraceuticals I. Goldberg

Course Outcomes:

By the end of the course, the student will be able to:

- Develop comprehensive understanding of different nutraceuticals and functional foods.
- Understand and acquire knowledge about the potential of various functional foods in promoting human health
- Understand nutritional benefits functional foods
- Know about diet and disease relationship and health claims
- Learn about probiotics, prebiotics and synbiotics effects on health

- Know about functional foods of animal origin and plant origin

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	3	2	3	2	3	2	3	1
CO2	3	2	2	3	2	3	2	3	2	2	2
CO3	2	3	3	2	3	3	3	1	2	3	2
CO4	3	2	3	2	3	2	2	3	1	2	2
CO5	2	1	3	3	2	2	3	1	2	2	2

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS: 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.

MFST3211	CLINICAL NUTRITION	L	T	P	S	J	C
		3	0	0	0	0	3
Pre-requisite	MFST2261Applied Physiology/Basics of Biology						
Co-requisite	None						
Preferable exposure	None						

Course Description:

Food is the basic necessity of life. Nutrition is the scientific study of food and its relation to health. Therapeutic nutrition refers to the use of food and the nutrients it contains to prevent or treat a disease or condition. Therapeutic nutrition brings awareness about the main etiological factors responsible for various ailments of the present day generation.

Course Educational Objectives:

- To provide an overview of fundamental knowledge in food and nutrition.
- To introduce students to clinical dietary and nutritional principles
- To translate basic concepts of medical nutrition therapy for the different diseases into practical menu planning application
- To familiarize the concept of lifestyle changes

UNIT 1 **8 hours**

Therapeutic diet-Principles of diet therapy. Factors to be considered during meal planning. Therapeutic modification of normal diet, assessment of patient needs, special feeding methods-tube feeding, parenteral feeding. Nutrition counseling, Risk factors of different nutritional and metabolic disorders.

UNIT 2 **8 hours**

Dietary management- Diabetes mellitus – etiology, prevalence, risk factors, symptoms, classification, diagnosis, complications, insulin. Obesity- etiology, types, theories, assessment, risk factors, complications, dietary and non- dietary treatment. Underweight- etiology, dietary modifications

UNIT 3 **8 hours**

Anatomy and functions of gastro intestinal tract, common gastro intestinal disorders – dyspepsia, diarrhoea, peptic ulcers, constipation- etiology symptoms and dietary treatment. Structure and functions of liver. Liver disorders - hepatitis, cirrhosis and hepatic coma- etiology, symptoms, diagnosis and dietary management

UNIT 4 **8 hours**

Cardiovascular system components, Anatomy and functions of heart, cardiovascular diseases: etiology, prevalence, modifiable and non-modifiable risk factors, symptoms, diagnosis, medications, Dietary management in atherosclerosis, hypertension, myocardial infarction.

UNIT 5 **8 hours**

Anatomy and functions of kidneys- symptoms, etiology, diagnosis Dietary management of kidney and urinary tract: Nephritis, renal calculi. Etiology, symptoms and dietary management – Anaemia, Inborn errors of metabolism- phenylketonuria, galactosemia, Lactose intolerance.

Textbooks:

1. Dietetics (2007) by B. Srilakshmi.

2. Nutrition and Diet Therapy (2005) by S.R.Williams.

3. Text Book of Human Nutrition (2010) by Bamji

4. Essentials of Human Nutrition (2007) by A.S.Truswell.

5. Advancing Dietitics and Clinical Nutrition (2011) by A. Payne and H.M.Barker.

Course Outcomes:

By the end of the course, the student will be able to:

1. Know about the status of nutraceuticals and functional food market
2. Learn about dietary management for Diabetes mellitus, Obesity, Underweight
3. Learn anatomy and functions of gastro intestinal tract, common gastro intestinal disorders
4. Learn about anatomy and functions of kidney
5. Understand about renal diseases and its dietary management

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	3	2	3	3	3	1	3	3
CO2	2	2	2	2	1	3	2	3	3	2	2
CO3	2	3	2	2	3	2	3	1	1	2	2
CO4	3	2	2	2	3	3	3	2	2	2	2
CO5	2	1	3	3	3	2	3	2	3	1	2

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

APPROVED IN:

BOS : 22-08-22 **ACADEMIC COUNCIL: <<date>>**

SDG No. & Statement: 4

4. Aims at ensuring inclusive and equitable quality education and promote lifelong learning opportunities for all

SDG Justification:

The course involves identifying one's personal values and working on real-life problems, thus forming the base to work on their passions even past the collegiate life.