



STUDENT handbook 2023-2024



DEPARTMENT of Food Technology

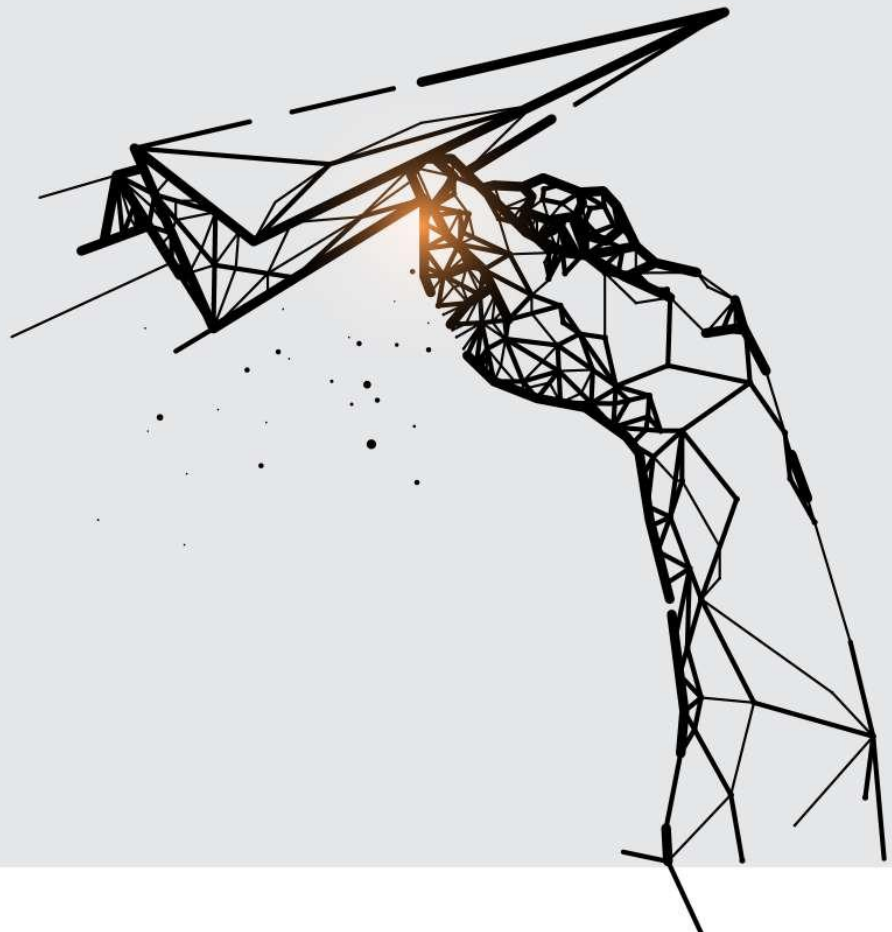
www.kluniversity.in

VISION

To be a globally renowned university.

MISSION

To impart quality higher education and to undertake research and extension with emphasis on application and innovation that cater to the emerging societal needs through all-round development of students of all sections enabling them to be globally competitive and socially responsible citizens with intrinsic values.





**CATEGORY 1
UNIVERSITY**

BY MHRD, Govt. of India

**KL ACCREDITED BY
NAAC WITH A++**

GRADE

nirf NATIONAL
INSTITUTIONAL
RANKING
FRAMEWORK
2023

RANKED 28
AMONG ALL
UNIVERSITIES

**43 YEARS OF
EDUCATIONAL
LEADERSHIP**



Koneru Satyanarayana,
Chancellor

Sri Koneru Satyanarayana, BE, FIE, FIETE, MIEEE graduated in Electronics and Communication Engineering in the year 1977. Along with Sri Koneru Lakshmaiah, he is the co-founder of the Institute which was established in the year 1980. He is an educationist of eminence and also an industrialist of great repute. He runs a number of industries in and around Vijayawada.

Dr. K. S. Jagannatha Rao
Pro-Chancellor

Prof. K. S. Jagannatha Rao was one of the leading scientists in neuroscience research in globe. He was the Director on Institute for Scientific Research and Technological Advances (INDICASAT AIP), Republic Panama and contributed lot in building innovation in higher education and research in Panama since 2010. He played a key role in building PRISM (Panamanian Research Institutes of Science and Medicine) in Latin America. Dr. Rao has his research area on Brain Research and established Alzheimer's Centre and published 165 papers in leading Biochemistry and Neuroscience Journals, supervised 19 Ph.D students. He is also adjunct faculty of Biomedical Informatics of UTHS, Houston, and Advisory Board Member of UT- El Paso Minority Health NIH program, USA and Adjunct Faculty, Methodist Research Institute, Houston, USA. He was elected Member of Panamanian Association for the Advancement of Science (APANAC) - Considered as National Science Academy of Panama. He received his undergraduate and Ph.D degrees from Sri Venkateswara University, Tirupati. Later, joined in Central Food Technological Research Institute, Mysore. He received Sir C. V. Raman Award by Karnataka State Council of Science and Technology, 2003.



Prof. G P S Varma
Vice-Chancellor



Prof. G P S Varma, Vice-Chancellor, KLEF, is one of the most widely experienced leaders in Indian higher education, known for his commitment to expanding student opportunity, catalyzing academic innovation, and encouraging university's civic engagement and service to society. He adorned the position of Chairman, ISTE (Indian Society for Technical Education)- AP State, TSEMCET Test Committee Member-2021 nominated By Telangana State Govt, APEAMCET Admission Committee Member in 2016 by Andhra Pradesh State Council of Higher Education, Govt. of Andhra Pradesh. He has been a very farsighted Peer Team Visit Member for National Assessment and Accreditation Council (NAAC), Expert Committee Member for University Grants Commission (UGC) Autonomous Visits. He has been an Advisory Council Member for (CEGR) Centre for Education Growth, and Research India International Centre, New Delhi, and Board Member for Big-Data Analytics Forum.



Dr. A. V. S. Prasad
Pro-Vice Chancellor

Dr. A. V. S. Prasad, M.E and Ph.D from JNTU, Hyderabad is a professor in Civil Engineering. He has a rich experience of 33 years in academics which includes 26 years in administration at various cadres ranging from Head of Department, Dean, Principal, Director and Pro-Vice Chancellor. He has served as Director of Audisankara group of institutions and Narayana Group of Institutions for 18 years and was instrumental in getting these institutions accredited by NAAC, NBA, Autonomous and gained many laurels from the State Government, JNTU etc. He has served as Pro-Vice Chancellor of KL University for 3 years.

He has extensive knowledge of administrative system, maintaining statutory norms of bodies like AICTE, UGC etc and has a good understanding of NBA, NAAC procedures and norms. He served as Member, Chairman of Board of Studies at JNTU(A), KLCE(Autonomous) and KL University.

Dr. Venkatram Nidumolu
Pro-Vice Chancellor

Dr. Venkatram Nidumolu, Pro-Vice Chancellor is High performing, strategic thinking professional with more than 15years of administration experience and 20 years of teaching experience in KLEF and 30 years overall experience in the higher education sector. He graduated in B.Tech (ECE) from Acharya Nagarjuna University, pursued M.S degree from BITS, PILANI in software Systems. He received Ph.D award from Acharya Nagarjuna University. He held the positions like HOD, Joint Register, Principal, and Dean-Academics before becoming Pro-Vice Chancellor. He was core member of all NBA, NAAC, & other accreditations since 2004 and he has good experience in handling of quality issues and assessment related practices.



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ACRONYMS

SI No	Acronyms	Full Form
1	KLEF	Koneru Lakshmaiah Education Foundation
2	CET	Common Entrance Test
3	KLEEE	KLEF Engineering Entrance Examination
4	JEE	Joint Entrance Examination
5	BT	Biotechnology
6	CE	Civil Engineering
7	CS	Computer Science & Engineering
8	EC	Electronics & Communication Engineering
9	EE	Electrical & Electronics Engineering
10	CM	Computer Engineering
11	ME	Mechanical Engineering
12	AD	Artificial Intelligence & Data Science
13	CI	Computer Science & Information Technology
14	CGPA	Cumulative Grade Point Average
15	SGPA	Semester Grade Point Average
16	LTPS	Lecture, Tutorial Practical, Skill
17	SEE	Semester-End Examinations
18	SIE	Semester-In Examinations
19	OJET	On-the-job Engineering Training
20	IRP	Industrial Relations and Placements
21	PS	Practice-School
22	OPAC	Online Public Access Catalog
23	QCM	Quality Circle Meeting
24	MOOC	Massive Open Online Course
25	MOU	Memorandum of Understanding
26	OD	On Duty
27	(A,B]	Between A and B excluding value A and including value B
28	COE	Controller of Examinations
29	VLSI	Very Large-Scale Integration
30	MTech	Master of Technology
31	COA	Council of Architecture

32	JEE	Joint Entrance Examination
33	NATA	National Aptitude in Architecture
34	PC	Professional Core
35	BSAE	Building Science and Applied Engineering
36	PE	Professional Elective
37	PAECC	Professional Ability Enhancement Compulsory Courses
38	SEC	Skill Enhancement Course
39	OE	Open Elective
40	CTIS	Cloud Technology and Information Security
41	DS	Data Science
42	IoT	Internet of Things
43	IPA	Intelligent Process Automation
44	PCI	Pharmacy Council of India
45	PY	Pharmacy
46	B. Com (H)	Bachelor of Commerce with Honors
47	ACCA	Association of Chartered Certified Accountants
48	HM	Hotel Management
49	BTK	Basic Training Kitchen
50	QTK	Quantitative Training Kitchen
51	ATK	Advanced Training Kitchen
52	MBA	Master of Business Administration
53	BBA	Bachelor of Business Administration
54	MSc (F&C)	Master of Science (Finance & Control)
55	BA	Bachelor of Arts
56	M.Sc.	Master of Science

CHAPTER 1: INTRODUCTION

About KL University

The President of Koneru Lakshmaiah Education foundation, Er. Koneru Satyanarayana, along with Late Sri. Koneru Lakshmaiah, founded the K L College of Engineering in the Academic year 1980-81. With the mighty vision and restless efforts of Er. Koneru Satyanarayana K L College of Engineering carved a niche for itself through excellence in engineering education, discipline and record numbers of placements and was the leading college in the state of AP. K L College of Engineering achieved NBA Accreditation for all its B.Tech. Programs in 2004 and later re-accredited in 2007. K L College of Engineering was transformed into an autonomous engineering college in the year 2006. In 2008 this college received a record grade of 3.76 on a 4 points scale with “A” Grade from NAAC; and in February 2009, the college, and Accredited by National Assessment and Accreditation Council (NAAC) of UGC as ‘A++’ with highest Grade of 3.57 CGPA on 4-point scale in 2018, through its founding society “Koneru Lakshmaiah Education Foundation” was recognized as Deemed to be University by the MHRD-Govt. of India, Under Section 3 of UGC Act 1956. This Deemed to be University is named as “KLEF”.

Location

KLEF is situated in a spacious 100-acre campus on the banks of Buckingham Canal of river Krishna, eight kilometers from Vijayawada city. Built within a rural setting of lush green fields, the institute is a virtual paradise of pristine nature and idyllic beauty. The campus has been aptly named "Green Fields" and the splendid avenue of trees and gardens bear testimony to the importance of ecology and environment. The campus ambience is most befitting for scholastic pursuits. The University is situated in a built-up area of around 15, 00,000 S.Ft.

Facilities

Central Library: E-Resources

The Central Library is the largest and holds materials to serve the whole University community.

It has materials relevant to the Engineering, Science & Humanities courses offered by the University.

The library system contains more than one lakh and fifty thousand books and periodicals on all subjects related to the teaching and research interests of the University staff and students. The library has over 36,000 electronic journal titles, academic databases and 32.98 lakhs eBooks. Access is available on campus on student computers and remotely.

The Data Centre

A State-of-the-Art Data center with advanced servers provides a highly interactive learning environment with full-fledged hardware and software training facilities.

Physical Education- Sports Facilities

KLEF encourages students to explore their latent talents by providing good games and sports facilities. The institute is equipped with the following.

Sport/Game	No.of Courts	Sport/Game	No.of Courts
Athletic track	1	Handball Court	1

Hockey Field	1	Netball Courts	2
Badminton Courts	4	Throw ball courts	2
Tennikoit Courts	2	Beach Volleyball Court	1
Cricket Field with Net practice	3	Football Field	1
Volleyball Courts	2	Basketball Courts	2
Tennis Courts	2	Kabaddi Courts	2
Kho Kho Court	1	Table Tennis	6
Soft Ball	1	Chess	20
Archery	1	Caroms	12

The University had a State-of- the - Art Indoor stadium of 30000 sq.ft with:

- 4 wooden Shuttle Courts/ Basketball Court
- Yoga and Meditation Centre
- Dramatics
- 8 Table Tennis Tables
- Hobby Centre
- Gymnasium for Girls
- Gymnasium for Boys
- Multipurpose room with Chess, Caroms etc.
- Power lifting/Weightlifting

Accommodation- Hostels

- KLEF has separate hostels for boys and girls with well furnished rooms and modern amenities.
- The overall atmosphere is very conducive for the students to concentrate on their studies.
- A state- of – the- art kitchen and spacious dining area has been provided for both the hostels.
- Generators have been provided as power backup. Emphasis has been laid on hygiene and cleanliness for healthy living. A customized menu caters to the student needs, it keeps changing according to their tastes.
- Teaching staff will have to address the academic and personal problems of the students. Round-the-clock security, communication, dispensary facilities are also available.

Facilities in the hostels

- Protected drinking water
- State of the art kitchen, dining hall
- Newspapers, telephones, toilets and bathrooms are well maintained.
- Every student in the hostel is provided with a cot, study table, chair and a rack.
- Fan and light are also provided in each room.
- Gas & Steam based hygienic food preparation.
- Palatable regional, national and international cuisines
- Cleanliness and Safety STD/ISD Facilities
- Medical Kits and First Aid Boxes Soft drinks, snacks, Fruits etc.
- Laundry Stationary shop

Hostel Rules and Regulations

- Students are hereby informed that while staying in the hostel, it is essential to be responsible for maintaining dignity by upholding discipline.
- They must be obedient to the hostel warden/floor in –charges. Valuable items like jewelry etc. should not be kept with students while staying in the hostel.
- It is student’s own responsibility to safeguard her/his Laptops, Money by locking suitcases and bags.
- If any loss is found, management will not take any responsibility. Students must intimate to the hostel authorities before giving police complaints against losses.
- Students are not allowed to indulge in smoking; consumption of Alcohol, Narcotic drugs etc., and defaulters will be strictly viewed upon.
- Students are directed that after locking their rooms they must hand over the keys to security and can collect them on returning to the hostel.
- Students must switch off Fans, Lights, Geysers, A/C’s etc., before leaving their rooms.
- Visitors are not allowed inside the hostel at any time; however, they are allowed into the visitor’s hall with the prior permission of the warden.
- Only family members listed by the parents are allowed to contact the student. Visiting hours are up to 7.30 pm only and after 7.30 pm visitors are required to leave the premises.
- Hostel students are not allowed to come into the hostel after 3.00 pm for morning shift students and 6.00pm for day shift students.
- Those students who are utilizing the computer lab, library etc., after the times specified must submit the permission slip to the security while entering the hostel.
- During public holiday outings, those who seek permission to leave the hostel will have to obtain written permission from the warden. Permission will be given only to those students who get permission from parents to leave the hostel during holidays/outings.
- Moving out of campus without permission is strictly prohibited. Strict study hours from 7.30 am to 10.30 pm shall be maintained in the hostel.
- The hostellers must be in their allotted rooms during study hours. The general complaints of any kind should be noted in the complaint register, which is available at the hostel office.
- Registered complaints will only be entertained. Any health problem should be brought to the notice of Warden/Floor In – charge for necessary treatment.

Transportation

The institution runs 80 buses covering all the important points in Vijayawada City, Mangalagiri, Guntur & Tenali towns with a total seating capacity of 4000 students in two shifts. Transport is available 24 hrs, In case of any emergency in the institute /hostels. Transportation is available for conducting industrial tours and visits etc. Regular transport facility available up to 10PM.

Healthcare

A full-fledged health center with all the facilities is established to cater the needs of the students, staff, Faculty and the public in the adopted villages. It consists of three doctors (Homoeopathy, Ayurvedic & Allopathy).

Cafeteria

KLEF has a spacious canteen with the latest equipment and hygienic environment which provides quality food and prompts service and caters to the needs of all the students and staff. A central cafeteria of 1500 Sq.m. is available on the campus. Mini cafes and fast-food centers are available in various blocks. The canteen is open from 6:30 a.m. to 8:30 p.m. There is a wide variety of North-

Indian and South-Indian cuisine and the students enjoy the pleasure of eating during the breaks. Cool aqua water for drinking is available.

Placements

KLEF has meticulously planned to make all its outgoing students employed. The University had installed the infrastructure, employed well experienced faculty, designed and delivered programs that help to enhance the communication and soft skills which are required for making the students employable. An excellent system is in place that considers all the issues that make a student employable. The University has been successful for the last 7 years in employing all the students who have registered and eligible for placement through its offices located across the country. About 50 trained personnel work extensively to make the students ready for recruitment by the industry.

Counselling & Career Guidance

A special Counseling Cell consisting of professional student counselors, psychologists, and Professors counsels/helps the students in preparing themselves to cope with studies, perform well in the tests & various competitions. This Cell provides its services to the students in getting the solutions for their personal problems and provides career guidance with the help of the Industrial Relations and Placements (IRP) department. A group of 20 students are allotted to each faculty member who counsels them regularly and acts as their mentor.

Social Service Wing

KLEF has a social service wing which is used to channelize the social service activities of the faculty, staff and students. It has adopted 5 nearby villages and conducts activities like medical camps, literacy camps and educates the villagers regarding hygiene and health care on a regular basis.

NSS/NCC wings

NCC/NSS is a credit course designed with an intent to transform NCC/NSS activities into curricular activities from an extracurricular thereby providing credits to students involved in NCC/NSS along with other attended advantages to the students in the university.

Hobby Clubs

Wholly and solely managed by the students, contributed much to the cultural life of the campus and to the cultural evolution of the students. Few student bodies and clubs operate in the campus like music society, dance club, drama society, literary and debating club, English press club, drawing club, painting club, mime club, computer club etc. Students manage entire activities and budget of the organization for the entire semester in advance. Around 4000 students are active members of the Hobby Clubs.

Life Skills and Inner Engineering

KLEF feels that it is its responsibility to mold the students as good human beings, contributing to the country and to society by producing responsible citizens. Along with the regular programs every student admitted into KLEF undergoes a one-week special life skills /orientation program. Through this program, KLEF is producing the students with clarity of thoughts and charity at heart. Strict regularity, implicit obedience, courtesy in speech and conduct, cleanliness in dress. Life skills and inner engineering teach a student his/her obligation towards GOD, himself /herself his/her country and fellow human beings. Every student is encouraged to practice his/her own religious faith and be tolerant and respectful towards other religions.

Technical Festival

KLEF organizes various programs for the all-round development of the students. The technical festival and project exhibition is organized in the odd semester (October) every year to elicit the innovative ideas and technical skills of the students.

Cultural Festival

The cultural festival in the even semester (February) of every year is the best platform for the students to exhibit their talents and creativity. Through these festivals KLEF is imparting organizational skills, leadership skills, competitive spirit, and team behavior skills to our students. Along with the knowledge, KLEF festivals provide recreation to the student community.

Center for Innovation, Incubation and Entrepreneurship (CIIE)

KLEF being a pioneering institute supporting Academics and Research in Engineering, Science and Technology is endowed with the entire infrastructure and highly experienced faculty, has a Centre for Innovation, Incubation and Entrepreneurship (CIIE) that comprises of: Innovation Centre which aims to inculcate a spirit of innovation. Incubation Centre which aims to incubate innovations through prototype product development. Entrepreneurship Development Centre (EDC) which aims at fostering entrepreneurial skills among the students.

About the Department of Food Technology

Situated near the historic city of Vijayawada, the department of Food Technology is a budding unit in Koneru Lakshmaiah Education Foundation (KLEF).

Infrastructure in the department includes high-tech academic labs namely food chemistry, bakery, microbiology and biochemistry labs. Equipment includes HPLC, GC, LC-MS, fermenter, freeze-drier, spray dryer, centrifuge, Muffle furnace, pH meter, Soxhlet extractor.

B.Sc. in Food Technology (B.Sc. FT) is a three-year undergraduate program streamlined with an aim to help students to understand the procedures of food production and how these can be improved to produce healthier products. The coursework focuses on imparting in-depth knowledge of both scientific and technical methodologies which help in understanding the nature of raw food materials. While studying B.Sc. Food Technology the students attain knowledge exuding the methods of maintaining and regulating hygiene and preservation to make food worthy of consumption. Students are trained to conduct experiments and detect the nutritional proportion of elements. Aspirants seeking to learn more about the Food Technology can enroll for higher studies such as M.Sc.

Vision of Department:

To nurture the graduates with a sense of basic knowledge, creativity, and innovation in Food Processing Technology.

Mission of the Department

To impart high quality education to build the students aptitude and argument their abilities to make them globally competitive Food Technologists To change state of the skill exploration facilities to provide cooperative environment that stimulates the chances to generate, investigate, smear and spread knowledge.

Mission statements:

M 1	To impart high quality education to build the students aptitude in Food Technology.
M 2	To impart high quality education to augment their abilities to make them globally competitive Food Technologist.
M 3	To change state of the skill exploration facilities to provide cooperative environment to generate and investigate knowledge.
M 4	To change state of the skill exploration facilities to stimulates the chances to smear and spread knowledge.

CHAPTER 2: PROGRAM EDUCATIONAL OBJECTIVES (PEOs) AND PROGRAM OUTCOMES (POs)

Program Educational Objectives (PEOs)

PEO 1	Mould the students into food technology professionals for successful career in academics and industry.
PEO 2	Make students competent in the core and allied areas of food science and technology.
PEO 3	Motivate the prospective food technologists to follow ethics and morals in their professional growth.
PEO 4	Equip the graduates for becoming entrepreneurs.
PEO 5	Prepare the students to serve the society and address global food security challenges through their profession.

Program Outcomes (POs)

PO1	Knowledge in Food Science & Nutrition: Illustrate the chemical and physical properties of major food components, and the role of food processing in altering the composition, structures and functions.
PO2	Biochemical composition of foods: Recognize and distinguish the components, molecular structures and properties of major food components, influencing the functional properties of food molecules.
PO3	Microbial investigation on food spoilage: Identify the important pathogens and spoilage microorganisms in foods and compare the role and significance of microbial inactivation, adaptation on growth and response of microorganisms in various environments.
PO4	Design new inventions: Apply principles of food technology to design solutions for real time problems in Food Industry.
PO5	Usage of Modern Tools: Create, select, and apply appropriate techniques, resources, and modern technologies and tools with an understanding of the limitations.
PO6	Entrepreneur: Demonstrate knowledge of entrepreneurship and innovation, start, run and finish on enterprise.
PO7	Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	The Hospitality and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.
PO10	Communication: Communicate effectively on complex technological activities with the food industry community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Life-long learning: Recognize the need of self-education and life-long learning process to keep abreast with the ongoing developments in the field of food technology.
PO12.	Analysis of food products: Ability to identify, formulate, conduct research literature, analyse complex cooking problems using principles of microbiology, biochemistry, and processing techniques.

Program Specific Outcomes (PSO's)

PSO1	Recognize the composition of food, the role of each component and their interactions, their roles in food processing.
PSO2	Will be able to illustrate the importance of microbiology to food production and food safety.
PSO3	Can 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.

CHAPTER 3: PROGRAMS LIST & ELIGIBILITY CRITERIA

S.NO	NAME OF THE PROGRAM	DURATION (Years)
1	BACHELOR OF FOOD TECHNOLOGY	3

Eligibility Criteria for Admission in B.Sc. Animation and Gaming

Candidates should have passed Intermediate or equivalent (10+2) Examination, from recognized school leaving certificate examination boards; with minimum of 50% marks or equivalent CGPA in any discipline.

CHAPTER 4: ACADEMIC REGULATIONS

Terminology

Academic Council: The Academic Council is the highest academic body of the University and is responsible for the maintenance of standards of instruction, education and examination within the University. The Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

Academic Year: It is the period necessary to complete an actual course of study within a year. It comprises of two consecutive semesters i.e., Even and Odd semester.

Academic Pathways: Students of all programs of study are given the opportunity to choose their career pathways viz. Employability, Innovation and Research. Each of these pathways prepares the students in a unique way, enabling them to achieve the heights of their career.

Acceleration: Enables advanced learners to overload themselves to create free time to concentrate on the work aligned with their career track. Internship semester, semester abroad program or prototype semester are the options available for the students.

Academic Bank of Credits (ABC): It helps the students to digitally store their academic credits from any higher education institute registered under ABC in order to award Certificate / Diploma / Degree / Honors based on the credits earned by the student. All the credits acquired by the students are stored digitally by registering into Academic Bank of Credits (ABC) portal. It also supports retaining the credits for a shelf period and continue their program study with multiple breakovers.

Audited Course: It is a course of study which has zero credits and has a “Satisfactory” or an “Unsatisfactory” grade.

Backlog Course: A course is considered to be a backlog if the student has obtained a failure grade (F).

Betterment: Betterment is a way that contributes towards improving the students’ grade in any course(s). It can be done by either (a) re-appearing or (b) re-registering for the course.

Board of Studies: Board of Studies (BOS) is an authority as defined in UGC regulations, constituted by Vice Chancellor for each of the department separately. They are responsible for curriculum design and update in respect of all the programs offered by a department.

Branch of Study: It is a branch of knowledge, an area of study or a specific program (like Civil Engineering, Mechanical Engineering, Electrical and Electronics Engineering etc.,)

Certificate course: It is a course that makes a student gain hands-on expertise and skills required for holistic development. It is a mandatory, non-credited course for the award of degree.

Change of Branch: Change of branch means transfer from one’s branch of study to another.

Compulsory course: Course required to be undertaken for the award of the degree as per the program.

Course: A course is a subject offered by the University for learning in a particular semester.

Course Handout: Course Handout is a document which gives a complete plan of the course. It contains the details of the course viz. Course title, Course code, Pre-requisite, Credit structure, team of instructors, Course objectives, Course rationale, Course Outcomes and the relevant syllabus,

textbook(s) and reference books, Course delivery plan and session plan, evaluation method, chamber consultation hour, course notices and other course related aspects. In essence, course handout is an agreement between students (learners) and the instructor.

Course Outcomes: The essential skills that need to be acquired by every student through a course.

Credit: A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture hour per week or two hours per week of tutorials/ self-learning/ practical/ field work during a semester.

Credit Point: It is the product of grade point and number of credits for a course.

Credit Transfer: The procedure of granting credit(s) to a student for course(s) undertaken at another institution.

Choice Based Credit System: The institute adopts Choice Based Credit System (CBCS) on all the programs offered by it which enables the students to choose their courses, teachers and timings during their registration. This enables the students to decide on the courses to be done by them in a specific semester according to their interests in other activities.

Cumulative Grade Point Average (CGPA): It is a measure of cumulative performance of a student over all the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

Curriculum: Curriculum is a standards-based sequence of planned experiences where students practice and achieve proficiency in content and applied learning skills. Curriculum is the central guide for all educators as to what is essential for teaching and learning, so that every student has access to rigorous academic experiences.

Course Withdrawal: Withdrawing from a Course means that a student can drop from a course within the first week of the odd or even Semester (there is no withdrawal for summer semester). However, s/he can choose a substitute course in place of it by exercising the option within 5 working days from the date of withdrawal.

Degree: A student who fulfills all the Program requirements is eligible to receive a degree.

Degree with Specialization: A student who fulfills all the Program requirements of her/his discipline and successfully completes a specified set of Professional elective courses in a specialized area is eligible to receive a degree with specialization.

Deceleration: Students may opt for a smaller number of courses in a semester or distribute the selection of courses across regular and summer semesters in order to cope up with their learning pace or to take part in other activities like innovative projects, pursuing their startups or doing research work.

Double degree: Students pursuing various programs in the university are given an opportunity to pursue two-degree programs in parallel. While B.Tech. program is pursued by physically attending classes on campus, the other program can be pursued on-campus (if timetable permits) or in the online mode provided either by KL Center for Distance & Online Education or any such external providers.

Department: An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff and other resources.

Detention in a course: Student who does not obtain minimum prescribed attendance in a course shall be detained in that course. Refer to Attendance & Detention Policy

Dropping from the Semester: A student who doesn't want to register for the semester should do so in writing in a prescribed format before commencement of the semester.

Elective Course: A course that can be chosen from a set of courses. An elective can be Professional Elective, Open Elective, Management Elective and Humanities Elective.

Evaluation: Evaluation is the process of judging the academic work done by the student in her/his courses. It is done through a combination of continuous in-semester assessment and semester end examinations.

ERP: ERP (Enterprise Resource Planning) system is a comprehensive software solution designed to streamline and automate various administrative, academic, and financial processes within the University. It manages student information, including admissions, registration, enrollment, attendance, grades, and academic records.

Grade: It is an index of the performance of the students in a said course. Grades are denoted by alphabets.

Grade Point: It is a numerical weight allotted to each letter grade on a 10 - point scale.

Honors Degree: A student who fulfills all the Program requirements of her/his discipline and successfully completes a specified set of additional courses within the same program is eligible to receive an Honors degree.

Humanities Elective: A course offered in the area of Liberal Arts.

Industrial Training: Training program undergone by the student as per the academic requirement in any company/firm. It is a credited course.

Industrial Visit: Visit to a company/firm as per the academic requirement.

In-Semester Evaluation: Summative assessments used to evaluate student learning, acquired skills, and academic attainment during a course.

LMS: LMS stands for Learning Management System. It is a platform used in the institution to manage and deliver courses. Students can access learning resources, participate in online discussions, submit assignments, take assessments, and communicate with their instructors and peers.

Make-up Test: An additional test scheduled on a date other than the originally scheduled date.

Management elective: A course that develops managerial skills and inculcates entrepreneurial skills.

Minor Degree: A student who fulfills all the Program requirements of her/his discipline and successfully completes a specified set of courses from another discipline is eligible to receive a minor degree in that discipline.

Multi-Section Course: Course taught for more than one section.

Open Elective: This is a course of interdisciplinary nature. It is offered across the University for All Programs.

Overloading: Registering for more number of credits than normally prescribed by the Program in a semester.

Practice School: It is a part of the total program and takes one full semester in a professional location, where the students and the faculty get involved in finding solutions to real-world problems. A student can choose Project/Practice School during his/her 7th or 8th semester of his/her Academic Year to meet the final requirements for the award of B.Tech. degree.

Pre-requisite: A course, the knowledge of which is required for registration into higher level course.

Professional Core: The courses that are essential constituents of each engineering discipline are categorized as Professional Core courses for that discipline.

Professional Elective: A course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

Program: A set of courses offered by the Department. A student can opt and complete the stipulated minimum credits to qualify for the award of a degree in that Program.

Program Outcomes: Program outcomes are statements that describe what students are expected to know or be able to do at the end of a program of study. They are often seen as the knowledge and skills students will have obtained by the time they have received their intended degree.

Program Educational Objectives: The broad career, professional, personal goals that every student will achieve through a strategic and sequential action plan.

Project: Course that a student has to undergo during his/her final year which involves the student to undertake a research or design, which is carefully planned to achieve a particular aim. It is a credit based course.

Supplementary: A student can reappear only in the semester end examination for the Theory component of a course, subject to the regulations contained herein.

Registration: Process of enrolling into a set of courses in a semester/ term of the Program.

Re-Registration: Student who are detained in courses due to attendance or marks criteria as per their regulation are given a chance to re-register for the same and complete it during the summer term.

Semester: It is a period of study consisting of 16±1 weeks of academic work equivalent to normally 90 working days including examination and preparation holidays. The odd Semester starts normally in July and even semester in December.

Semester End Examinations: It is an examination conducted at the end of a course of study.

Single Section Course: Course taught for a single section.

Social Service: An activity designed to promote social awareness and generate well-being; to improve the life and living conditions of the society.

Student Outcomes: The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioral.

Substitution of Elective course: Replacing an elective course with another elective course as opted by the student.

Summer term: The term during which courses are offered from May to July. Summer term is not a student's right and will be offered at the discretion of the University.

Term Paper: A 'term paper' is a research report written by students that evolves their course-based knowledge, accounting for a grade. Term paper is a written original research work discussing a topic in detail. It is a credit-based course.

Underloading: Registering for lesser number of credits than normally prescribed for a semester in that Program.

CHAPTER 5: PROGRAM CURRICULUM

For an academic program the curriculum is the basic framework that will stipulate the credits, category, course code, course title, course delivery (Lectures / Tutorials / Practice / Skill / Project/ Self Study / Capstone Design etc.), in the Choice Based Credit System. However, all such are essentially designed, implemented and assessed in Outcome Based Education Framework.

Program Structure:

- An Academic Year is made of two semesters each is of, approximately 16±1-week duration and each semester are classified as:
 - Odd Semester (July–December)
 - Even Semester (December–May).
- KLEF may offer summer term between May and June.
- Students have the flexibility to choose courses of their own choice prescribed by the institution.
- Student can register for a maximum of 26 credits, other than audited and certificate courses per semester. This is not applicable when student exercises the overloading option (while doing project work / practice school / Minor degree / Honors degree program / specialization).

Course Structure:

- Every course has a Lecture-Tutorial-Practice-Skill (L-T-P-S) component attached to it.
- Based upon the L-T-P-S structure the credits are allotted to a course using the following criteria.
 - Every 1 hour of Lecture / Tutorial session is equivalent to one credit.
 - Every 2 hours of Practical session is equivalent to one credit.
 - Every 4 hours of skill-based practice is equivalent to one credit.

Course Classification:

Any course offered under B.Sc. Animation and Gaming program is classified as:

Induction Courses: Student who gets admitted into B.Tech. program must complete a set of Induction courses for a minimum period of 1 weeks and obtain a “Satisfactory” result prior to registering into 1st Semester of the Program.

Humanities Arts & Social Science Courses (HAS): Humanities, arts, and social sciences (HAS) courses are a broad field of study that encompasses the study of human culture and society. These courses focus on developing students' critical thinking, problem-solving, and communication skills. These skills are valuable in a variety of careers, and they can also help students become more engaged citizens.

Basic Science Courses (BSC): Basic science courses are the foundation of all science education. They provide students with the knowledge and skills they need to understand the natural world. Basic science courses typically cover Mathematics, Physics, Chemistry, Biology etc., Basic science courses

are essential for students who want to pursue careers in science, engineering, medicine, and other STEM fields.

Professional Core Courses (PCC): Professional core courses are a set of courses that are essential for all B.Sc. students. These courses provide students with the knowledge and skills they need to be successful in their chosen discipline.

Professional Elective Courses (PEC): Professional electives are a set of courses that are chosen by students to supplement their education. Professional electives are a great way for students to customize their education and prepare for their future careers. By choosing electives that are relevant to their interests and goals, students can gain the knowledge and skills they need to be successful in their chosen field.

Open Elective Courses (OEC): Open electives are a set of courses that are not specifically related to Animation and Gaming, but that can provide students with knowledge and skills that are valuable in a variety of fields. Open electives are a great way for students to broaden their horizons and explore their interests outside of engineering. By choosing electives that are relevant to their interests and goals, students can gain the knowledge and skills they need to be successful in a variety of fields.

Skill Development Courses (SDC): Skill development courses can provide students with the knowledge and skills they need to use specific software or hardware. This can be especially important for students who are interested in pursuing a career in a particular field.

Project Research & Internships (PRI): Project, Research and Internships can help students gain a better understanding of their chosen field by giving them the opportunity to apply their knowledge and skills to real-world problems. These can help students explore their interests by giving them the opportunity to work on projects that they are passionate about.

Social Immersive Learning (SIL): Social immersive learning is a type of experiential learning that allows students to learn by interacting with others in a simulated environment. This type of learning can be especially beneficial for B.Sc. Animation and Gaming students because it can help them develop their soft skills, such as communication, teamwork, and problem-solving.

Audit Courses (AUC): Any course offered in the University that has no assessment of student performance and no grading. Though “Satisfactory” completion of audit courses doesn’t acquire any credit but they are part of the graduation requirements.

Value-Added Courses (VAC): Courses leading to certification and those which are conducted exclusively for employability are referred to as value added courses. Though “Satisfactory” completion of value-added courses doesn’t acquire any credit but they are part of the graduation requirements.

Course Precedence

The following are the guidelines for registering into courses with pre-requisites. · Every course may have one or more of its preceding course(s) as pre- requisite(s). · To register for a course, the student must successfully be promoted in these course(s) earmarked as pre-requisite(s) for that course.

- A student who has qualified in all the courses in the pre-requisite would be allowed to register in the course.
- In any course if a student appears for final exam or is successfully promoted (through internals etc.) deemed to have met the prerequisite for next higher-level course.

- The Dean Academics after consulting with Department concerned has the prerogative to waive the prerequisite (if it is satisfied through a test) if the student has gained sufficient proficiency to take up the course.

Summer Term Courses

KLEF offers summer term courses during May and June. The following are the guidelines to register in to courses offered in Summer Semester.

- A student may register for course/s in each summer term by paying the stipulated fee.
- Students registering for more than one (1) summer course must ensure that there is no clash in the time table.
- A student can register into a detained course or a not-registered course (course offered in regular semester, but student failed to register due to the non-compliance of pre-requisite condition but has paid the fee.) A student can also register for other than the above two mentioned categories of courses only if they are permitted for acceleration.
- In any case, a student can register only for a maximum of 12 credits during summer term.
- Attendance & Promotion policy for summer term is same as compared to the regular semester except for condonation policy. Condonation is not applicable for summer term courses.

Practice School

The Practice School (PS) program forms an important component of education at KLEF. It is an attempt to bridge the gap between an academic institution and the industry. The Program, which would be a simulation of real work environment, requires the students to undergo the rigor of professional environment, both in form and in substance. In the process, it provides an opportunity for the students to satisfy their inquisitiveness about the corporate world provides exposure to practicing professional skills and helps them acquire social skills by being in constant interaction with the professionals of an organization. During Practice School, some of the students may be offered stipend and/or job offer as per the discretion of the concerned industry. Practice School is offered usually for a period of one year, however, student must put a request through the organization and the Head of the Department to the Dean Academics requesting for extension of the duration after completion of first semester.

CHAPTER 6: ACADEMIC FLEXIBILITIES

Academic Flexibilities

- **Honors degree** can be awarded if students complete additional courses from their core program and earn 20 extra credits or Students may acquire 20 credits extra by doing advanced courses.
- **Honors through Research degree** offers students the chance to explore their chosen field of study in greater depth, cultivate valuable research skills, and make meaningful contributions to their specific area of interest. Students can be awarded this Degree upon fulfilling the requirement of earning an additional 20 credits through advanced coursework. The breakdown of these credits includes 10 credits from core courses, 4 credits from a skill development course, and 6 credits from project work.
- **Honors through Innovation** emphasize the exploration of innovative ideas, problem-solving, and creative thinking within a particular field of study. It may provide opportunities for students to engage in innovative projects, research, or entrepreneurial activities. Students can be awarded their degree upon successful completion of additional courses from their core program and earning an extra 20 credits through advanced coursework. Specifically, this entails completing 10 credits from core courses, 6 credits from a skill development course, and 4 credits from project work.
- **Honors through Experiential Learning** focuses on hands-on, practical experiences that complement and enhance traditional classroom learning. Students will be eligible for the degree upon the successful completion of additional courses from their core program and the attainment of 20 extra credits through advanced coursework. Specifically, this includes obtaining 10 credits from core courses, 6 credits from a skill development course, and 4 credits from project work.

For the above said categories, if a student fails to meet the CGPA and SGPA requirements, at any point after registration, s/he will be dropped from the list of students eligible for the specified Degree, then student will receive B.Sc. Degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

Program Add-ons:

- **Specialization:** Specialization degree can be awarded if Student completes five professional electives and one skill development course in the same track and/or earns minimum of 17 credits from the Professional elective courses.
- **Minor:** Minor degree can be awarded if student fulfills all the program requirements of their discipline and are successful in completing a specified set of courses from another discipline through which they earn an additional 20 credits are eligible to get minor degree in that discipline.
- **Double Major:** Double Major degree can be awarded if student earns 30 additional credits to meet the requirements of both majors.

Academic Flexibility Table

	No Major Flexibility	Major Flexibility Honors	Major Flexibility Honors through Research	Major Flexibility Honors through Innovation	Major Flexibility Honors through Experiential Learning
No Program Add-On	B.Sc. Food Technology	B.Sc. Food Technology (honors)	B.Sc. Food Technology (honors through Research)	B.Sc. Food Technology (honors through Innovation)	B.Sc. Food Technology (honors through Experiential Learning)
Program Add-On Specialization	B.Sc. Food Technology with Specialization	B.Sc. Food Technology (honors) with Specialization	B.Sc. Food Technology (honors through Research) with Specialization	B.Sc. Food Technology (honors through innovation) with Specialization	B.Sc. Food Technology (honors through Experiential Learning) with Specialization
Program Add-On Minor	B.Sc. Food Technology with Minor	B.Sc. Food Technology (honors) with Minor	B.Sc. Food Technology (honors through Research) with Minor	B.Sc. Food Technology (honors through Innovation) with Minor	B.Sc. Food Technology (honors through Experiential Learning) with Minor
Program Add-on Double Major	B.Sc. Food Technology with Second Major	B.Sc. Food Technology (honors) with Second Major	B.Sc. Food Technology (honors through Research) with Second Major	B.Sc. Food Technology (honors through innovation) with Second Major	B.Sc. Food Technology (honors through Experiential Learning) with Second Major

CHAPTER 7: REQUIREMENTS FOR THE AWARD OF DEGREE

Requirements for Award of Degree

The student is awarded a B.Sc. Animation and Gaming degree provided she/he

- Must successfully earn a minimum of 123 credits, as stipulated in the program structure.
- Must successfully complete Minimum two certificate courses.
- Must successfully complete Social Internship and Technical Internship.
- Must have successfully obtained a minimum CGPA of 5.25 at the end of the program.
- Must have finished all the above-mentioned requirements in less than twice the period mentioned in the Academic structure for each program, which includes deceleration period chosen by the student, deceleration imposed by KLEF or debarred from the KLEF.

The credits required for the award of degree for each category is given in the following PDFs.



Credit Requirement
Sheet.pdf



Credit Requirement
Sheet 2.pdf

Award of Degree

A student having cleared all the courses and met all the requirements for the award of degree with:

- $5.25 \leq \text{CGPA} < 5.75$ will be awarded Pass Class.
- $5.75 \leq \text{CGPA} < 6.75$ will be awarded Second-Class.
- $6.75 \leq \text{CGPA} < 7.75$ will be awarded First Class.
- $\text{CGPA} \geq 7.75$ will be awarded First class with Distinction, provided the student has cleared all the courses in first attempt and must have fulfilled all the program requirements within the specified minimum years duration.

Multiple Entry and Multiple Exit

Students have the flexibility to enroll in a degree program, and if they choose to exit the program at a certain point, they can still receive a formal qualification based on the completed coursework or credits. This enables students to have recognized certifications even if they are unable to complete the full program. It allows the students to gain formal qualifications at different stages while providing opportunities for further educational advancement as per their personal circumstances and goals. This offers students multiple exit options, so that they can rejoin the course after a break.

Students who opt to exit after completion of the first year and have secured 41 credits will be awarded a UG certificate if, in addition, they complete one vocational course of 4 credits during the summer vacation of the first year.

Students who opt to exit after completion of the second year and have secured 83 credits will be awarded the UG diploma if, in addition, they complete one vocational course of 4 credits during the summer vacation of the second year.

Students who wish to undergo a 3-year UG programme will be awarded UG Degree in the Major discipline after successful completion of three years, securing 123 credits and satisfying the minimum credit requirement as per the regulation.

An additional 40 credits leading to a total of 163 credits leads to an Honors degree. Students have the choice to focus their Honors degree additionally on “Research” or “Innovation” or “Experiential Learning”.

Exiting students will get a certificate upon completing one year, a diploma certificate after two years, a degree certificate after three years.

CHAPTER 8: ATTENDANCE RULES & DETENTION POLICY

Attendance policy for promotion in a course:

The student must maintain minimum 85% of attendance to be promoted in a course and to appear for Sem End Examination. In case of medical exigencies, the student/parent should inform the principal within a week by submitting necessary proofs and in such cases the attendance can be condoned up to an extent of 10% by Principal on the recommendation of the committee established for condonation.

Attendance in a course shall be counted from the date of commencement of the classwork only and not from the date of his/her registration.

Attendance for the students who are transferred from other institutes and for new admissions, attendance must be considered from the date of his/her admission.

In case of attendance falling marginally below 75% due to severe medical reasons or any other valid reasons, the Principal / Program chair may bring such cases, along with valid and adequate evidence to the notice of the Dean Academics. The condonation board formed by Vice-Chancellor under the chairmanship of Dean-Academics will consider any further relaxation in attendance from the minimum attendance percentage requirement condition after going through case by case.

Attendance based Marks:

There are no specific marks attached to attendance as such, however, if the Course Coordinator of a course desires to award certain marks, for attendance in a course, She/he can do so based on following guidelines, which thereby must be clearly reflected in the respective course handouts which should duly be approved by the Dean Academics. For any course, not more than 5% marks can be allotted for attendance.

The distribution of marks for attendance is [85,88]=1 mark, [89,91]=2marks, [92,94]=3marks, [95,97]=4marks and [98,100]=5marks, below 85%, even in case of condonation, "0" marks. The marks, if allotted for attendance will have to be considered for all L-T-P-S components of a course cumulatively but not specifically for theory component for any course.

Attendance Waiver:

Students maintaining a CGPA ≥ 9.00 and SGPA ≥ 9.00 in the latest completed semester get a waiver for attendance in the following semester. Students who thus utilize an attendance waiver will be awarded the marks allocated for attendance (if any) based on their performance in an advanced assignment specified by the course coordinator (emerging topics related to the course). S/he can appear in all assessments and evaluation components without being marked ineligible due to attendance-based regulations.

Attendance Condonation for Participation in KLEF / National / International Events:

Only those students nominated / sponsored by the KLEF to represent in various forums like seminars / conferences / workshops / competitions or taking part in co-curricular / extra-curricular events will be given compensatory attendance provided the student applies in writing for such a leave in advance and obtain sanction from the Principal basing on the recommendations of the Head of the Department (HoD) for academic related requests; or from the Dean Student Affairs for extracurricular related requests. For participation in the KLEF's placement process the names of students will be forwarded by the placement cell in-charge to the respective Heads of the Departments. Students participating in KLEF/National/International events like technical fests,

workshops, conferences etc., will be condoned for 10% of total classes conducted for each course in the semester. This condonation is not applicable for summer term.

Course Based Detention Policy:

In any course, a student must maintain a minimum attendance as per the attendance policy for promotion in a course, to be eligible for appearing in the Sem-End examination. Failing to fulfill this condition, will deem such student to be detained in that course and become ineligible to take semester end exam.

Eligibility for appearing Sem – End Examination:

A Student registered for a course and maintained minimum attendance of 85% is eligible to write the Semester-End Examination for that course unless found ineligible due to one or more of the following reasons:

- Shortfall of attendance
- Detained
- Acts of indiscipline
- Withdrawal from a course

CHAPTER 9: ASSESSMENT & EVALUATION PROCESS

The assessment is conducted in formative and summative modes with a weightage of 60% for Semester-In evaluation and 40% for Semester-End Evaluation.

The distribution of weightage for various components of formative and summative modes are decided and notified by the course coordinator through the course handout after approval by the Dean Academics, prior to the beginning of the semester. Students are advised to refer the course handout to get more detailed information on assessment.

Sem-In tests and the Semester-End Examinations will be conducted as per the Academic Calendar.

Students may have to take more than one examination in a day during Sem-In exams, Semester-End Examinations /Supplementary examinations.

Examinations may be conducted on consecutive days, beyond working hours and during holidays.

Semester-In Evaluation

The following are the guidelines for the Semester-In evaluation.

The process of evaluation is continuous throughout the semester.

The distribution of marks for Semester-In evaluation is 60% of aggregate marks of the courses.

To maintain transparency in evaluation, answer scripts are shown to the students for verification, within one week of conduct of exam. If there is any discrepancy in evaluation, the student can request the course-coordinator to re-evaluate.

The solution key and scheme of evaluation for all examinations are displayed by the Course-Coordinator in the appropriate web portal of the course, on the day of the conduct of examination.

In case the student is unable to appear for any evaluation component owing to hospitalization, participation in extra/ co-curricular activities representing KLEF/ state/ country; the Dean Academics can permit to conduct of re- examination for such students.

In case a student has missed any of the two in-semester evaluations, S/he is eligible for and will be provided with an opportunity of appearing for re- examination.

Semester End Examination

The distribution of marks for Semester-End evaluation is 40% of aggregate marks of the course

The pattern and duration of Sem End examination are decided and notified by the Course Coordinator through the Course handout, after approval from the Dean Academics.

To maintain transparency in evaluation, answer scripts are shown to the students for verification. If there is any discrepancy in evaluation, the student can request the Controller of Examinations to re-evaluate.

If a student earns 'F' grade in any of the courses of a semester, an instant supplementary exam (for only Semester End Exam component) will be provided within a fortnight of the declaration of the results.

Assessment of Project/Research-Based Subjects

All project or research-based subjects must have a defined time limit for completion. The specific time limits and schedule for monitoring and evaluating student performance will be announced each

term. The final project report, after obtaining a plagiarism certificate, will be considered, and evaluated by the panel of examiners. Student project reports must follow the guidelines prescribed by the Dean of Academics.

Absence in Assessment & Examination

If a student fails to take any formative assessment component (due to ill-health or any valid reason), no second chance will be given, and zero marks will be awarded for the same. In cases of excused absence, the instructor may provide an opportunity to the student to reappear in quizzes or assignments or any other internal assessment criteria based on the approval from the principal & the concerned Head of the Department in written. If a student fails to write Sem-In Exam-I or obtained less than 50% marks in Sem-In Exam-I, he must attend remedial classes and maintain a minimum 85% of attendance in remedial classes to be eligible for Make-up test for Sem-In exam-I. Further, the number of remedial classes to be conducted shall be 50% of regular classes held till the Sem-In exam-I. However, there is no make-up test for Sem-In Exam-II or for the Laboratory exams.

A student's absence for Sem-In exams under the following circumstances are only considered for makeup test.

Pre-approved participation in University/State/National/International co- curricular and extra-curricular activities

Ill health and medical emergencies for the student leading to hospitalization with certification by the doctor stating inability of student to attend Sem-In exams clearly within the necessary dates.

Death of immediate family member

Remedial Classes & Remedial Exam

The following categories of students are recommended to attend Remedial classes:

Students who did not attend or obtain a minimum of 50% marks in the Sem-In examination-1

Students for whom the learning objectives of CO1/CO2 are not attained in the Sem-In examination-1

Any other student may also be permitted to attend remedial classes as per the discretion of the Principal.

The following are the guidelines to conduct remedial classes:

Remedial classes are scheduled to be conducted usually one- or two- weeks after the conclusion of Sem-In exam-1.

The number of remedial classes to be conducted shall be 50% of regular classes held until the Sem-In exam-I.

Remedial classes MUST NOT be scheduled during regular class work hours.

The following are the guidelines for remedial exams:

Students attending remedial classes must maintain attendance of minimum 80% in classes conducted under remedial classes, without fail for being eligible for attending remedial exam.

After conduction of remedial test, the Sem-in exam-1 marks will be updated by considering the weightage of 75% of marks obtained by student in remedial exam, and 25 % of marks obtained by student in regular exam; with a CAP of 75% in overall marks.

Grading Process

At the end of all evaluation components based on the performance of the student, each student is awarded grade based on absolute/relative grading system. Relative grading is only applicable to a section of a course in which the number of registered students is greater than or equal to 25. Choice of grading system is decided by the Course-Coordinator with due approval of Dean Academics and is specified in the course handout.

Absolute Grading

The list of absolute grades and its connotation are given below

Performance	Letter Grade	Grade Point	Percentage of marks
Outstanding	O	10	90-100
Excellent	A+	9	80-89
Very Good	A	8	70-79
Good	B+	7	60-69
Above Average	B	6	50-59
Average	C	5	46-49
Pass	P	4	40-45
Fail	F	0	0-39
Absent	AB	0	Absent

8.6.2 Relative Grading

The following table lists the grades and its connotation for relative grading:

Letter Grade	Grade Point	Grade Calculation
O	10	total marks $\geq 90\%$ and total marks $\geq \text{mean} + 1.50\sigma$
A+	9	$\mu + 0.50\sigma \leq \text{total marks} < \mu + 1.50\sigma$
A	8	$\mu \leq \text{total marks} < \mu + 0.50\sigma$
B+	7	$\mu - 0.50\sigma \leq \text{total marks} < \mu$
B	6	$\mu - 1.00\sigma \leq \text{total marks} < \mu - 0.50\sigma$
C	5	$\mu - 1.25\sigma \leq \text{total marks} < \mu - 1.00\sigma$
P	4	$\mu - 1.50\sigma \leq \text{total marks} < \mu - 1.25\sigma$ or ≥ 40
F	0	total marks $< \mu - 1.50\sigma$ or total marks ≤ 39
AB	0	Absent

μ is the mean mark of the class excluding the marks of those students who scored $\geq 90\%$ and $\leq 40\%$ after rounding the percentages to the next highest integer. σ is the standard deviation of the marks.

8.7 SGPA & CGPA

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses and the sum of the number of credits of all the courses undergone by a student, in a semester.

Where ' C_i ' is the number of credits of the i^{th} course and ' G_i ' is the grade point scored by the student in the i^{th} course.

The CGPA is also calculated in the same manner considering all the courses undergone by a student over all the semesters of a program, where ' S_i ' is the SGPA of the i^{th} semester and ' C_i ' is the total number of credits in that semester.

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

CGPA can be converted to percentage of marks: $10 \times \text{CGPA} - 7.5$

A student appearing for a course having lab integrated with theory and in case obtains less than 40% in either of lab or theory component of semester end examination, and in such case the student must reappear for the component only in which he has secured less than 40%. Till successful attainment of minimum 40% of both components, the student remains in the F grade for that course.

Audit/Certificate courses are graded as satisfactory (S) or non-satisfactory (NS) only.

At the end of each semester, the KLEF issues a grade sheet indicating the SGPA and CGPA of the student. However, grade sheets will not be issued to the student if he/she has any outstanding dues.

8.8 Illustration of Computation of SGPA and CGPA

SGPA Computation

COURSE	CREDITS	GRADE LETTER	GRADE POINT	CREDIT POINT (Credit x Grade)
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X 10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			139

Thus, $\text{SGPA} = 139/20 = 6.95$

CGPA Computation

Item	Semester					
	I	II	III	IV	V	VI
Credits	20	22	25	26	26	25
SGPA	6.9	7.8	5.6	6.0	6.3	8.0

Thus,

$$CGPA = \frac{(20 \times 6.9 + 22 \times 7.8 + 25 \times 5.6 + 26 \times 6.0 + 26 \times 6.3 + 25 \times 8.0)}{(20 + 22 + 25 + 26 + 26 + 25)} = 6.73$$

Betterment

A student may reappear for semester end examination for betterment only in the theory part of the course for improving the grade, subject to the condition that, the student has passed the course, his/her CGPA is ≤ 6.75 and the grade in the respective course to be equal to or lower than "C". In the case of reappearing for a course, the best of the two grades will be considered. A Student can re-register in any course in any semester during the program for improvement of grade if the current grade in the course is lower than B+ and with due approval from Dean Academics in accordance with academic regulations. A student cannot reappear for semester end examination in courses like Industrial Training, courses with their L-T/ST-P-S Structure like O-O-X-X, Project, Practice School and Term Paper.

CHAPTER 10: PROMOTION

Change of Branch

A student admitted to a particular Branch of the B.Sc. Animation and Gaming Program will normally continue studying in that branch until the completion of the program. However, in special cases the KLEF may permit a student to change from one branch to another after the second semester, provided s/he has fulfilled admission requirement for the branch into which the change is requested.

The rules governing change of branch are as listed below:

Top 1% (based on CGPA until 2nd semester) students will be permitted to change to any branch of their choice within the program discipline.

Apart from students mentioned in above clause, those who have successfully completed all the first and second semester courses and with CGPA ≥ 8 are also eligible to apply, but the change of Branch in such case is purely at the discretion of the KLEF.

All changes of Branch will be effective from third semester. Change of branch shall not be permitted thereafter.

Change of branch once made will be final and binding on the student. No student will be permitted, under any circumstances, to refuse the change of branch offered.

Students in clause a and b may be permitted subject to the availability of seats in the desired branch.

Credit Transfer

Credit transfer between KLEF and other institution

Credit transfer from KLEF to other institutions: Student studying in KLEF can take transfer to another institution under the following conditions:

KLEF has signed MOU with the institution.

However, a student, after seeking transfer from KLEF can return to KLEF after a semester or year. Based on courses done in the other institution, equivalent credits shall be awarded to such students.

Credit transfer from another institution to KLEF: A student studying in another institution can take transfer to KLEF under the following conditions:

When a student seeks transfer, equivalent credits will be assigned to the student based on the courses studied by the student.

The student, when transferred from other institutions, has to stick to the rules and regulations of KLEF.

To graduate from KLEF, a student must study at least half of the minimum duration prescribed for a program at KLEF.

Credit Transfer Through MOOCs:

Undergraduate students can get credits for MOOCs courses recommended by KLEF up to a maximum of 20% of their minimum credits required for graduation. The discretion of allocation of MOOCs courses equivalent to the courses in the curriculum lies with the office of the Dean Academics.

A student may also be permitted to obtain 20 credits through MOOCs in addition to the minimum credits required for graduation. These 20 credits can also be utilized to acquire a Minor degree or an Honors degree if the courses are pronounced equivalent to those specified for the respective degrees by the office of the Dean Academics. These additional credits through MOOCs if to be considered for CGPA/Minor/Honors degree must be approved by Dean Academics prior to enrollment in the respective MOOCs.

Students acquiring additional credits for Honors / Minor degree must adhere to the rules governing the award of the respective degree, otherwise, a student applying for registering into additional credits through MOOCs must possess a minimum CGPA of 7.5 till that semester.

Rustication

A student may be rusticated from the KLEF on disciplinary grounds, based on the recommendations of any empowered committee, by the Vice Chancellor.

Award of Medals

KLEF awards Gold and Silver medals to the top two candidates in each program after successful completion of their study. The medals are awarded based on their CGPA during the Annual Convocation with the following constraints:

- a. The grade obtained through betterment/ supplementary will not be considered for this award.
- b. S/he must have obtained first class with distinction for the award of Gold or Silver-medal.

Academic Bank of Credits:

ABC helps the students to digitally store their academic credits from any higher education institute registered under ABC in order to award Certificate/Diploma/Degree/Honors based on the credits earned by the student. All the credits acquired by the students are stored digitally by registering into Academic Bank of Credits (ABC) portal. It also supports retaining the credits for a shelf period and continue their program study with multiple breakovers. Students may exit from their current program of study due to any unforeseen reasons or to focus on their chosen career path. In such cases, the student may break for a period of time (preferably not in the middle of an academic year) and may continue with the program of study at a later stage. Moreover, students must be able to complete their program by not exceeding the maximum duration of the program. If not, they may be issued with a Certificate, diploma, degree or honors based on the credits acquired over the period of time for all the programs approved by UGC.

CHAPTER 11: STUDENT COUNSELING & FEEDBACK

Student counselling / mentoring service ensures that every student gets to know the academic structure of the University and utilize maximum opportunities that the institute offers to fulfill their career and personal life goals. The objective of “Student Counselling /Mentoring Service” is to provide friendly support to the students for their well-being during their stay in the campus and for their holistic development. Counsellors offer individual counselling to help students resolve personal or interpersonal problems. They may also offer small group counselling to help students enhance listening and social skills, learn to empathize with others, and find social support through healthy peer relationships. Counsellors also provide support to faculty by assisting with classroom management techniques and the development of programs to improve quality or safety. When necessary, counsellors may also intervene in a disrupted learning environment. However, the benefits of counsellor student relationships are as follows:

- Maintain academic standards and set goals for academic success.
- Develop skills to improve organization, study habits, and time management.
- Work through personal problems that may affect academics or relationships.
- Improve social skills.
- Cope with university or community-related violence, accidents. Identify interests, strengths, and aptitudes through assessment.

Academic Counselling Board (ACB)

Academic Counselling Board is constituted by the Dean Academics. This board shall comprise of the Chairman, Convener, Principal/Director, HOD and Professor/Associate Professor. A student will be put under Academic Counselling Board in the following circumstances:

Has CGPA of less than 6.00.

Has 'F' grade or 'Detained' in multiple courses.

The first level of Counselling such students will be done by the Mentor of the student and the HoD followed by the ACB and the list of students who have to undergo the ACB counselling be forwarded by the HoD to the Office of Dean Academics.

The students undergoing the Academic Counselling Board process may be allowed to register only for a few courses based on the recommendation of Academic Counselling Board.

Counselling Policy

Student counselling takes great place in K L University. Counselling is designed to facilitate student achievement, improve student behavior, subject analysis levels, attendance, and help students develop socially, professionals with bachelor's, master's degrees or beyond. Faculty counsellors provide counselling and serve an educational role in K L University. We have Mentors, Academic, Career, Physiological, Co-Curricular & Extra Curricular activities counsellors in order to support students who are experiencing personal or academic challenges, help students choose careers and plan for university and intervene when students face behavioral, physical, or mental health challenges.

The duties of counsellors:

Mentoring: Plan and design a system for student behavior, mental health and academic challenges, define structural and functional characteristics of the system in detail, plan provisions for academic mentoring apart from classroom interaction.

Academic Counselling:

Develop a systematic and process-oriented mechanism to improve academic counselling in relation to student attendance, punctuality, performance of students in internal and semester examinations, course / program to be enrolled based on the strength and weakness of the student

Career Counselling: Conduct personality test (SWEAR) to find suitable career path, Create awareness on the job opportunities, career paths that exist in a specific discipline.

Psychological Counselling: Organize and strengthen the student counselling services, engage qualified and experienced mentors and advisories for each class of students for providing psychological guidance as required.

Guidance on Co-Curricular & Extra Curricular activities:

Form student clubs to give train and encourages the students to improve their skills, physical fitness and mental strength.

Early intervention:

Counsellors receive training about learning difficulties and psychological concerns that commonly manifest in children and adolescents. They may also provide referrals, recommendations, and suggestion to parents about mental health of their wards.

Special needs services:

Counsellors often support the special needs of students and may oversee programs that address requirements or learning difficulties.

Counselling Procedures:

The HOD will allot 20 Students once admitted into a program to a faculty with allocation priority commencing from professors and onwards. The faculty concerned will be called a counsellor/mentor. One hour per week will be allocated by the departments to enable the counsellors to counsel the students on various aspects. The counsellor will maintain a separate sheet to record student performance and also different kinds of counselling undertaken. Counsellor shall communicate with parents through mail, SMS and also through telephonic conversations. Student's attendance, marks, placement etc. data must inform to parents once in a month. The communication undertaken shall be recorded in a separate register. The following are the various aspects of counselling that the counsellors will address during their interaction.

Mentoring

1. Counsellor shall counsel the students regularly when the performance of the student is found be un-satisfactory
2. Form a Student-Teacher-Group to share regular updates and events.
3. Form a Parent-Teacher-Association to share regular updates and events.

4. Conduct the feedback on counselling.
5. The counselling data sheet shall be submitted to the principal for verification and approval.
6. At the end of the semester a summary report and recommendations will be sent to Dean Academics Office

Academic Counselling

1. Counsellor shall acquire backlog data and record the same into the counselling sheets
2. Counsellor will acquire data about the attendance and performance in the internal evaluation and record them into the counselling data sheet.
3. Counsellors shall counsel the students regularly to track the performance of the students
4. The counselling data sheet shall be submitted to the principal for verification and approval.
5. At the end of the semester a summary report will be sent to Dean Academics Office.

Career Counselling

1. Counsellor has to take SWEAR analysis data in first year.
2. Counsellor shall acquire the data related to performance of the students in all the soft skills and other courses that contributes towards employability/ entrepreneurship/ career advancement the career counselling data sheets.
3. Counsellor will acquire data about the attendance and performance of the students during all the placement drives conducted by KLU and records the same into the counselling sheet.
4. Counsellors shall counsel the students regularly when the performance of the student is found be un-satisfactory.
5. The counselling sheet shall be verified by principal and corrective actions if any will be recommended to the respective departments.
6. At the end of the semester a summary report will be sent to Dean Academics Office.

Psychological Counselling

1. Counsellor shall acquire data pertaining to psychological status of the students and record the same into the counselling sheets
2. Counsellor will acquire data about the attendance and performance in the internal evaluation and record them into the counselling sheet and see whether the performance is in any way related.
3. Counsellor shall counsel the students regularly when the performance of the student is found to be un-satisfactory
4. Counsellor should identify the need of any therapy required.
5. Once it is identified, the counsellor will arrange the treatment according to the psychological status of the student.
6. Counsellor should maintain the progression level of the student periodically.

7. The counselling sheet shall be verified by principal and corrective actions if any will be recommended to the respective departments.

8. At the end of the semester a summary report will be sent to Dean Academics Office.

HODs have to submit monthly /semester / Academic Year Counselling reports with necessary comments and proofs to Dean Academics office duly signed by concerned Principal/Director.

Visit following link <https://www.kluniversity.in/site/acadboard.htm>

Feedback System

At KLEF, monitoring of feedback is a continuous process. Feedback is obtained from students and parents on various aspects. Feedback is taken through personal interaction with students, interaction with parents in addition to mid-semester and end-semester feedback. The institution assesses the learning levels of the students, after admission and organizes special programs for advanced learners and slow learners. Feedback Types: In first year SWEAR analysis is done for every student in such a way it identifies their interests, pre-existing knowledge, aspects to improve technical and logical skills based on their career choice.

Feedback Types

The following are the different types of feedback taken at regular intervals:

- (i). Student General Feedback (Twice in a Sem.)
- (ii). Student Satisfaction Survey (Once in a Sem.)
- (iii). Student Exit Feedback (Once in a Year)
- (iv). Academic Peers Feedback on Curriculum (Once in a Sem.)
- (v). Parents Feedback on Curriculum (Once in a Sem.)
- (vi). Alumni Feedback on Curriculum (Once in a Sem.)
- (vii). Industry Personnel Feedback on Curriculum (Once in a Sem.)
- (viii). Student Feedback on Curriculum (Once in a Sem.)
- (ix). Faculty Satisfaction Survey (Once in a Sem.)
- (x). Parent Teacher Association (Once in a Sem.)

Feedback Procedure:

General Feedback to be taken from the students on the aspects like Course Contents, Teaching Learning Process, Outcomes, Resources and Evaluation twice in every semester (Mid semester and End Semester Feedback) in a structured format floated by dean academics office.

Student Satisfaction Survey (SSS) to all innovative methods and approaches should be recorded at appropriate intervals and the process should be refined based on that. Students should be sensitized on the process and methods and their understanding of the same should be assured.

Exit survey feedback to be taken from the final year students on the aspects like entrance test, admission process, Course Contents, Teaching Learning Process, Outcomes, Resources and Evaluation, placements etc.

Structured feedback for design and review of syllabus – semester wise / year wise is received from Students, Alumni, Peers, Parent, Industry Personnel. Satisfaction Survey to be taken from the existing faculty on Course Contents, Teaching Learning Process, Outcomes, Resources and Evaluation once in every semester in a structured format floated by dean academics office.

Parent Teacher Association (PTA) to develop the potential of parents and to strengthen their relationship with their children through planning and conducting a variety of developmental and recreational activities.

Online Feedback is collected from all the students once at the end of the semester using well designed questionnaire. Informal feedback will be collected in parallel from selected student representatives within 4-5 weeks of commencement of the semester by the Office of Dean Academics.

HODs have to submit monthly /semester / Academic Year Feedback reports with necessary comments and proofs to Dean Academics office duly signed by concerned Principal/Director.

Visit following link <https://www.kluniversity.in/site/feedsys.htm>

CHAPTER 12: PROGRAM STRUCTURE

DEPARTMENT OF FOOD TECHNOLOGY

Y23 REGULATION, Admitted Batch Category-wise Course Structure

SN	Course Code	Course Title	Short Name	Category	Mode	L	T	P	S	CR	CH	Pre-requisite
1	23UC1101	Integrated Professional English	IPE	HAS	R	0	0	4	0	2	4	Nil
2	23UC1202	English Proficiency	EP	HAS	R	0	0	4	0	2	4	Nil
3	22UC2103	Essential Skills for Employability	ESE	HAS	R	0	0	4	0	2	4	Nil
4	22UC2204	Corporate Readiness Skills	CRS	HAS	R	0	0	4	0	2	4	Nil
5	23UC0010	Universal Human Values & Professional Ethics	UHVPE	HAS	R	2	0	0	0	2	2	Nil
6	23UC1203	Design Thinking and Innovation	DTI	HAS	R	0	0	4	0	2	4	Nil
7	22FL3055	German	FLE	HAS	R	2	0	0	0	2	2	Nil
8	22UC0009	Ecology & Environment	EE	BSC	R	2	0	0	0	0	2	Nil
9	22FT1101	Information & Communication Technology	ICT	PCC	R	2	0	2	0	3	4	Nil
10	22FT1102	Food Chemistry	FC	PCC	R	3	0	2	0	4	5	Nil
11	22FT1103	Human Physiology and Nutrition	HPN	PCC	R	3	0	0	0	3	3	Nil
12	22FT1104	Introduction to Food Science and Technology	IFST	PCC	R	3	0	2	0	4	5	Nil
13	22FT1105	Food Biochemistry	FBC	PCC	R	3	0	2	0	4	5	Nil
14	22SDFT01	Principles of Food Preservation	PFP	SDC	R	3	0	0	4	4	7	Nil
15	22FT1206	Mathematics for Biologists	MFB	PCC	R	3	1	0	0	4	4	Nil
16	22FT1207	Food Microbiology	FM	PCC	R	3	0	2	0	4	5	Nil
17	22FT2108	Data and Statistical Analysis	DSA	PCC	R	3	1	0	0	4	4	Nil

18	22FT2109	Processing of Horticultural Produce	PHP	PCC	R	3	0	2	0	4	5	Nil
19	22FT2110	Food Engineering	FE	PCC	R	3	0	2	0	4	6	Nil
20	22SDFT02	Food Analysis and Quality Assurance	FAQA	SDC	R	2	0	2	4	4	8	Nil
21	22FT2211	Food Safety and Regulations	FSR	PCC	R	3	0	0	0	3	3	Nil
22	22FT2212	Processing of Aquatic Foods	PAF	PCC	R	3	0	2	0	4	5	Nil
23	22FT2213	Bakery, Confectionery & Snacks Technology	BCST	PCC	R	2	0	4	0	4	6	Nil
24	22FT3114	Bioethics and Bio safety	BEBS	PCC	R	3	0	0	0	3	3	Nil
25	22FT3215	Food Product Development and Sensory Evaluation	FPDSE	PCC	R	3	0	2	0	4	5	Nil
26	22SDFT03	Food Packaging Technology	FPT	SDC	R	2	0	0	4	3	6	Nil
27	22FT3216	Technology of Meat and Poultry	TMP	PCC	R	3	0	2	0	4	5	Nil
28	22FT12EX	Instrumentation in Food Analysis	PE-1	PEC	R	3	0	2	0	4	5	Nil
29	22FT12EX	Food Biotechnology										
30	22FT21EX	Indigenous Dairy Products	PE-2	PEC	R	3	0	2	0	4	5	Nil
31	22FT21EX	Ice Cream and Frozen Desserts										
32	22FT22EX	Nutraceuticals and Functional Foods	PE-3	PEC	R	3	1	0	0	4	5	Nil
33	22FT22EX	Fermented and Therapeutic Foods										
34	22FT22EX	Flavor Chemistry and Technology										
35	22FT31EX	Packaging Materials	PE-4	PEC	R	3	0	2	0	4	5	Nil
36	22FT31EX	Packaging Design & Converting Process										

37		Open Elective - 1	OE - 1	OE	R	3	0	0	0	3	3	Nil
38		Open Elective - 2	OE - 2	OE	R	3	0	0	0	3	3	Nil
39		Summer Internship	SI	PRI	R	0	0	0	16	4	16	Nil
40		Term Paper	LP	PRI	R	0	0	0	8	2	8	Nil
41		Industry Project	IP	PRI	R	0	0	0	20	5	20	Nil
42		Value added Course-1	VAC	VAC	R	0	0	0	4	1	4	Nil
43		Value added Course-1	VAC	VAC	R	0	0	0	4	1	4	Nil
44		Social Immersive Learning	SIL	SIL	R	0	0	0	4	1	4	Nil
45		Social Immersive Learning	SIL	SIL	R	0	0	0	4	1	4	Nil
46		Social Immersive Learning	SIL	SIL	R	0	0	0	4	1	4	Nil
Total Credits												

[Scan for Program Structure](#)



CHAPTER 13: ARTICULATION MATRIX

Program Articulation Matrix

PROGRAMME ARTICULATION MATRIX – B.Sc. FT 2023-24

S No	Course Code	Course Title	1	2	3	4	5	6	7	8	9	10	11	12	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5
1	23UC1101	Integrated Professional English									2	2			2				
2	23UC1202	English Proficiency									2	2			2				
3	22UC2103	Essential Skills for Employability					3	2											
4	22UC2204	Corporate Readiness Skills									2	2			2				
5	23UC0010	Universal Human Values & Professional Ethics	2			2	2					2							
6	23UC1203	Design Thinking and Innovation		2	3		2	3	2	2									
7	22FL3055	German Language	2	2	3	3	2		3	2	2								
8	22UC0009	Ecology & Environment						2	3										
9	22FT1101	Information & Communication Technology	3	3															3
10	22FT1102	Food Chemistry	3				2						3	2	3				
11	22FT1103	Human Physiology and Nutrition	3			2		3					2	2	2				
12	22FT1104	Introduction to Food Science and Technology	3				3		3						3				
13	22FT1105	Food Biochemistry			3									2		3			

14	22SDFT01	Principles of Food Preservation	3		3		3										3		
15	22FT1206	Mathematics for Biologists	3																
16	22FT1207	Food Microbiology	2		3								2				3		
17	22FT2108	Data and Statistical Analysis	3														3		
18	22FT2109	Processing of Horticultural Produce	3				2						3	2	3				
19	22FT2110	Food Engineering	3				3	3							3				
20	22SDFT02	Food Analysis and Quality Assurance	3		3									2			3		
21	22FT2211	Food Safety and Regulations	3				3	3								3			
22	22FT2212	Processing of Aquatic Foods	3				3	3								3			
23	22FT2213	Bakery, Confectionery & Snacks Technology	3				3	2						3			3		
24	22FT3114	Bioethics and Bio safety	3				3	3								3			
25	22FT3215	Food Product Development and Sensory Evaluation	3				3	3								3			
26	22SDFT03	Food Packaging Technology	3				2						3	2	3				
27	22FT3216	Technology of Meat and Poultry	3				3	3								3			
28	22FT12EX	Instrumentation in Food Analysis	3		2		3							3			2	2	
29	22FT12EX	Food Biotechnology	3				2	2	2				2	3	2		3		
30	22FT21EX	Indigenous Dairy Products	3		2	2		3					2	2	2		2		
31	22FT21EX	Ice Cream and Frozen Desserts	3				3	3								3			

			2	To understand and apply analytical methods for chemical, physico-chemical, and microbiological properties of foods.			3										3							
			3	To understand and apply analytical methods for thermal, rheological, and nutritional properties of foods.			3								2			3						
			4	To understand and apply quality assurance aspects of foods.			3											3						
			5	To be able to apply analytical methods to food components and food products.	3		3											3						
			6	To be able to do a Project on Quality analysis.	3		3											3						
21	22FT2211	Food Safety and Regulations	1	To understand the overall concept of food safety and related concerns.	3			3	3								3							
			2	To get acquainted to the food safety regulations such as ISO and safety management systems like HACCP.	3			3	3									3						
			3	To know the ways to ensure the food is safe for consumption.	3			3	3										3					
			4	To be able to determine if the given foodstuff is safe and hygienic.	3			3	3											3				
			5	To be able to demonstrate the knowledge of technological developments taken place in food production.	3			3	3											3				

			3	To know chromatography instruments.	3			3						3				
			4	To learn advanced instrumentation in food analysis – on-line and off-line.	3	2	3									2		
			5	To be able to demonstrate the knowledge of instruments and their utilization in food analysis.	3		3								2			
29	22FT12EX	Food Biotechnology	1	Understand the role of microorganisms in foods.	3										3			
			2	Understand the food processing and preservation.	3							3	3					
			3	Understand the concept of food quality.				2	2			3	3					
			4	Apply the advanced scientific principles in food industry.	3			2				3						
			5	To be able to apply biotechnology concepts in food Technology.	3			2			2	2						
30	22FT21EX	Indigenous Dairy Products	1	To get an overview of the indigenous dairy products.	3			3						2				
			2	To know to the classifications and starting raw material of each product available in Indian market.	3			3			2							
			3	To know the ways and methods to prepare the traditional Indian dairy products.	3		2	3										
			4	To know the ways and methods to prepare the modern Indian dairy products.	3						2	2						
			5	To be able to demonstrate the knowledge of characterization		2									2			

				of components of dairy products.																		
31	22FT21EX	Ice Cream and Frozen Desserts	1	To understand definition, classification, and composition of ice cream and frozen dessert.	3			3	3							3						
			2	To learn about manufacturing aspects of ice cream and frozen dessert and their characteristics.	3			3	3								3					
			3	To understand science and technology, supply chain, marketing, and regulatory aspects of such products.	3			3	3									3				
			4	To be able to develop the knowledge of ice cream and frozen dessert.	3			3	3									3				
			5	To be able to develop and prepare ice cream and frozen dessert preparation.	3			3	3									3				
32	22FT22EX	Nutraceuticals and Functional Foods	1	To be able to define Nutraceuticals and functional foods (NFF) and to understand basic concepts, terminology and necessity of nutraceuticals and functional foods.	3			3	3							3						
			2	To get acquainted to nutritional aspects of nutraceuticals and functional foods. To understand the chemistry and physiology effects of NCF.	3			3	3									3				
			3	To get acquainted to different nutraceutical products in the market.	3			3	3									3				

			4	To understand manufacturing and stability aspects of NCF.	3			3	3					3			
			5	To know the Effects of processing, storage and interactions of various environmental factors on the potentials of such foods. And to know the Nutraceuticals products and their constituents.	3	2									2		
33	22FT22EX	Fermented and Therapeutic Foods	1	To get acquainted to need for therapeutic foods.	2	3									3		
			2	To learn and apply principles of fermented foods.		3									3		
			3	To learn and apply principles of therapeutic foods.		3						2			3		
			4	To learn and apply wild food plants.		3						2			3		
			5	To be able to apply the knowledge of fermented and therapeutic foods	2	3									3		
34	22FT22EX	Flavor Chemistry and Technology	1	To get acquainted to the concepts of food flavor.	3								3	3			
			2	To learn and apply flavor chemistry and technology.	3							3			3		
			3	To learn and apply concepts of flavor generation.	3							3	2		3		
			4	To learn and apply concepts of flavor control and analysis.	3							3			3		
35	22FT31EX	Packaging Materials	1	To be able to have an overview of various materials used for packaging of foods.			3	3	3						3		3

			2	To be able to have an understanding of structure and properties of packaging materials.				3	3	3									3		3	
			3	To be able to have an understanding of testing of packaging materials.				3	3	3										3		3
			4	To be able to have an understanding of applications of packaging materials in foods.				3	3	3										3		3
			5	To be able to apply the knowledge of food packaging materials in testing their suitability for foods.				3	3	3										3		3
36	22FT31EX	Packaging Design and Converting Process	1	To be able to have an overview of various packaging design and materials converting aspects.				3	3	3									3		3	
			2	To be able to have an understanding of packaging design requirements.				3	3	3										3		3
			3	To be able to develop an understanding of converting processes for paper, glass, and metal packaging materials.				3	3	3										3		3
			4	To be able to develop an understanding of converting processes for plastic packaging materials.				3	3	3										3		3
			5	To be able to apply the knowledge of package designing and converting in real world scenario.				3	3	3										3		3

CHAPTER 14: SYLLABUS

Integrated Professional English (IPE)

COURSE CODE	23UC1101	MODE	R	LTPS	0-0-4-0	PRE-REQUISITE	NIL
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understanding the language Mechanics in Basic Grammar & Interactive Listening & Speaking	2	PO9 & PO10 PSO 1
CO2	Applying Integrated Reading skills & Techniques of Writing	3	PO9 & PO10 PSO 1

Syllabus

Module 1	<p>A. Discuss people you admire (review of tenses, Character adjectives) Discuss a challenge questions)</p> <p>B. Discuss a challenge (Questions, Trying and succeeding)</p> <p>C. Explain what to do and check understanding (Rapid Speech)</p> <p>D. Give advice on avoiding danger (Future time clauses and conditionals) Breaking off a conversation, Explaining and checking understanding.</p> <p>E. Discuss dangerous situations (Narrative tenses, Expressions with 'get')</p> <p>F. Give and respond to compliments (Intonation in Question Tags, Agreeing using question tags; giving compliments and responding)</p>
Module 2	<p>A. Discuss ability and achievement (Multi-word verbs, Ability and achievement).</p> <p>B. Discuss sports activities and issues (present perfect and present perfect continuous, words connected with sports).</p> <p>C. Make careful suggestions (Keeping to the topic of the conversation; Making careful suggestions).</p> <p>D. Discuss events that changed your life (used to and would, cause and result).</p>
Module 3	<p>A. Discuss choices, discuss changes (infinitives and ing forms, the passive).</p> <p>B. Introduce requests and say you are grateful (Consonant sounds).</p> <p>C. Discuss living in cities (too / enough; so / such, Describing life in cities).</p> <p>D. Discuss changes to a home (Causative have / get Film and TV; Houses).</p> <p>E. Imagine how things could be (Stress in compound nouns).</p> <p>F. Discuss personal finance (First and second conditionals)</p>
Module 4	<p>A. Discuss moral dilemmas and crime (Third conditional; should have + past participle), Stressed and unstressed words; Sound and spelling.</p> <p>B. Discuss new inventions (Relative clauses), Discuss people's lives and achievements Reported speech; Reporting verbs, verbs describing thought and knowledge.</p> <p>C. Express uncertainty (Linking and intrusion, Clarifying a misunderstanding).</p> <p>D. Speculate about the past (Past modals of deduction Adjectives with prefixes).</p> <p>E. Discuss life achievements (Wishes and regrets, Verbs of effort).</p> <p>F. Describe how you felt (Consonant clusters, describing how you felt; Interrupting and announcing news)</p>

Reference Books:

Sl no	Title	Author(s)	Publisher	Year
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1	Empower	Andrian Doff, Craig Thaine, Herbert Puchta, Jeff Stranks, Peter Lewis-Jones	Cambridge university press	2022
2	Practical English Usage, 4th Edn: Michael Swan's Guide To Problems In English (Practical English Usage, 4th Edition)	Michael Swan	Oxford	2022
3	Word Power Made Easy	Norman Lewis	Oxford	2022

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Linguaskills	Cambridge University	y	Online	Cambridge University	https://www.cambridgeenglish.org/exams-and-tests/linguaskill/

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Padlet		Open Source
2	Lexipedia		Open Source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Quiz	12.5	25
	Project Continuous Evaluation	12.5	
In-Sem Summative	Sem-in 1	17.5	35
	Sem-in 2	17.5	
End-Sem Summative	Closed Book Exam/Paper Based	40	40

English Proficiency (EP)

COURSE CODE	23UC1202	MODE	R	LTPS	0-0-4-0	PRE-REQUISITE	NIL
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understanding Language Mechanics in advanced Grammar and advanced Communicative Listening & Speaking	2	PO9,10 PSO 1
CO2	Applying the advanced Reading techniques and Advanced Techniques of Writing	3	PO9,10 PSO 1

Syllabus

Module 1	<p>A. Talk about learning a second language (adverbs and adverbial language learning noun forms, word stress and noun forms with – <i>tion</i> and <i>-ity</i>)</p> <p>B. Describe extreme sensory experiences (Comparison, multi-word verbs,</p> <p>C. Talk about crime and punishment (relative clauses)</p> <p>D. Talk about using instinct and reason (noun phrases); Express yourself in an inexact way.</p> <p>E. Describe photos and hobbies (simple and continuous verbs and adjectives)</p> <p>F. Idioms: body parts, movement, landscapes, crime and feelings</p>
Module 2	<p>A. Talk about plans, intentions, and arrangements (intentions and arrangements, verbs of movement); Give advice (advising a friend about a problem)</p> <p>B. Emphasis positive and negative experiences by describing journeys and landscapes; architecture and buildings (future in the past, narrative tenses, ellipsis, and substitutions)</p> <p>C. Listen to Job Profiles. Talk about job requirements and fair pay (obligation, necessity, and permission)</p> <p>D. Listen to/Tell a descriptive narrative – a personal story (participle clauses)</p> <p>E. Emphasis opinions about the digital age- explain how you would overcome a hypothetical problem.</p> <p>F. Describe sleeping habits, routines, lifestyles and life expectancy (gerunds, infinitives and conditionals)</p>
Module 3	<p>A. Paraphrasing and summarising.</p> <p>B. Read and talk about memories and remembering (structures with have and get).</p> <p>C. Speculate about inventions and technology (compound adjectives).</p> <p>D. City life and urban space (reflexive and reciprocal pronouns, verbs with re-).</p> <p>E. Superstitions and rituals (passive reporting verbs).</p> <p>F. Read a review, report, and recommendation of a committee.</p>
Module 4	<p>A. Write a web forum post (expressing opinions).</p> <p>B. Write a report and travel review.</p> <p>C. Write a profile article (read an Interview of a celebrity and write an article).</p> <p>D. Write an essay: opinion essay and discussion essay.</p> <p>E. Write an application e-mail.</p> <p>F. Write promotional material using persuasive language.</p>

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Empower 3rd Edition	Andrian Doff, Craig Thaine, Herbert Puchta,	Cambridge	2022

		Jeff Stranks, Peter Lewis-Jones		
2	The Cambridge Guide to English Usage	Pam Peters	Cambridge	2020
3	Academic English	Letty Chan	Hong Kong : Hong Kong University Press ; London : Eurospan distributor	2021

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Lingua Skills Business	Cambridge university	y	online	Cambridge university	https://www.cambridgeenglish.org/exams-and-tests/linguaskill/information-about-the-test/test-formats-and-task-types/

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Padlet		Open source
2	Lexipedia		Open source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Quiz	12.5	25
	Project continuous evaluation	12.5	
In-Sem Summative	Sem in 1	17.5	35
	Sem in 2	17.5	
End-Sem Summative	Closed book/paper-based exam	40	40

Essential Skills for Employability (ESE)

COURSE CODE	22UC2103	MODE	R	LTPS	0-0-4-0	PRE-REQUISITE	NA
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Developing basic grammar Identify and organize sentence structures based on grammar and apply in writing skills	3	PO5
CO2	Develop effective interpersonal skills, cultivate a positive attitude, apply positive self-talk techniques, and use SWOC analysis to enhance employability.	3	PO6
CO3	Develop drafting skills through Cloze Test, Passage completion, E-mail writing, Paragraph writing, Essay writing	3	PO5
CO4	Develop effective communication skills through JAM and extempore, describing products and processes through JAM and extempore, demonstrating proper email and phone etiquette, and improving listening skills to enhance personal and professional relationships.	3	PO 5

Syllabus

Module 1	Grammar:: Tenses, Voice, Reported Speech, Spotting Errors, Sentence Improvement, Sentence Rearrangement
Module 2	SWOC, Self-awareness, Attitude, Self-Confidence & Positive Self-Talk, Grooming, Intrapersonal skills, and Interpersonal Skills.
Module 3	Writing Skills: Cloze Test, Passage completion, E-mail writing, Paragraph writing, Essay writing
Module 4	Speaking from the script through JAM & Extempore, Product & Process Description through JAM & Extempore, Transactional Analysis, Persuasion & Negotiation, Etiquettes (E-Mail & Phone), Listening Skills.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Objective English for Competitive Examination	Hari Mohan Prasad and Uma Sinha.	McGraw Hill	2017
2	English Language Communication Skills, C	Y. Prabhavati	Cenage	2014
3	Bridging the Softskills Gap	Bruce Tulgan	Jossey-Bass	2015
4	The Soft Skills Book-The Key Difference to Becoming Highly Effective & Valued	Dan White	LID Publishing	2121

Global Certifications:

Mapped Global Certifications:						
Sl No	Titl e	Certificati on Provider	Proctor ed (Y/N)	Format of the Exam	Exam Provider	URL of the Certification

1	LINGUA SKILLS	yes	online	CAMBRIDGE UNIVERSITY	https://www.cambridgeenglish.org/exams-and-tests/qualifications/business/
2	IELTS	yes	online	BRITISH COUNCIL	https://www.britishcouncil.in/teach/teacher-training/masterclass-ielts-trainers

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Lingua Skills Intermediate	Cambridge University	https://www.cambridgeenglish.org/exams-and-tests/qualifications/business/
2	Lingua Skills Vantage	Cambridge University	https://www.cambridgeenglish.org/exams-and-tests/qualifications/business/

Evaluation Components:

Evaluation	Component	Weight age	Total
In-Sem Formative	ALM	12.5	20
	Group Discussion (CO2)	6.25	10
	Quiz (CO4)	6.25	10
In-Sem Summative	Project Evaluation	8.75	25
	Sem in -1 (Co1)	8.75	25
	Exercise (CO2)	8.75	25
	Semester In Exam II (CO4)	8.75	25
End-Sem Summative	End Semester Exam (online MCQ) CO1, CO2, CO3 & CO4)	40	100

Corporate Readiness Skills (CRS)

COURSE CODE	22UC2204	MODE	R	LTPS	0-0-4-0	PRE-REQUISITE	ESE
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Extend word power for developing effective speaking and writing skills	3	PO10, PO12
CO2	Apply Interpersonal Skills in day-to-day life	3	PO10, PO12
CO3	Differentiate and enhance critical and general reading skills	3	PO10, PO12
CO4	Demonstrate necessary skills to be employable	3	PO10, PO12

Syllabus

Module 1	Verbal Ability: Synonyms and Antonyms, Sentence Completion, Idioms & Phrases, One Word Substitutes, Analogies, Spellings, Selecting words, Sentence Formation.
Module 2	Life Skills: Goal Setting, Team Building, Leadership, Time Management, Managing Stress, Work Ethics.
Module 3	Reading Skills: Reading Comprehension and Types of Questions and Critical Reading .
Module 4	Employability Skills: Empathy, Assertiveness, Group Discussion, CV, Video Resume and Interview Skills.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	The 7 Habits of Highly Effective College Students: Succeeding in College...and in Life	Covey, Stephen R.	Franklin Covey	2014
2	The Complete Guide to Mastering Soft Skills for Workplace Success	Adams, John	Adams Media	2019
3	Objective English for Competitive Examination	Hari Mohan Prasad, Uma Sinha	McGraw Hill Education	2017
4	The Business Student's Handbook: Skills for Study and Employment	Fisher, Julie and Bailey, Peter	Cengage Learning	2017
5	Writing Tools: 55 Essential Strategies for Every Writer	Roy Peter Clark	Little, Brown and Company	2006

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification

1	Lingua Skills	Lingua Skills	Yes	Online	Cambridge University	https://www.cambridgeenglish.org/exams-and-tests/qualifications/business/
2	IELTS	IELTS	Yes	Online	British Council	https://www.britishcouncil.in/teach/teacher-training/masterclass-ielts-trainers

Tools used in Practical / Skill:

S. No.	Tool Name	Parent Industry	Open Source/ Commercial
1	Lingua Skills Intermediate	Cambridge University	https://www.cambridgeenglish.org/exams-and-tests/qualifications/business/
2	Lingua Skills Vantage	Cambridge University	https://www.cambridgeenglish.org/exams-and-tests/qualifications/business/

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Lab Weekly Exercise/ Continuous Evaluation	12.5	25
	Project Continuous Evaluation	12.5	
In-Sem Summative	Semester in Exam-I	17.5	35
	Semester in Exam-II	17.5	
End-Sem Summative	Viva	7	40
	Exercise	20	
	Report	5	

Universal Human Values & Professional Ethics (UHVPE)

COURSE CODE	22UC0010	MODE	R	LTPS	2-0-0-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand and analyze the essentials of human values and skills, self-exploration, happiness and prosperity.	2	PO1
CO2	Evaluate coexistence of the "I" with the body.	3	PO4
CO3	Identify and associate the holistic perception of harmony at all levels of existence.	4	PO5
CO4	Develop appropriate technologies and management patterns to create harmony in professional and personal lives.	4	PO10

Syllabus

Module 1	Introduction to Value Education: Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity - The Basic Human Aspirations, Right Understanding, Relationship and Physical Facilities, Happiness and Prosperity – Current Scenario, Method to fulfil the Basic Human Aspirations.
Module 2	Harmony in the Human Being: Understanding the Human Being as Co-existence of Self ('I') and Body, discriminating between the Needs of the Self and the Body, The Body as an Instrument of 'I', Understand Harmony in the Self ('I'), Harmony of the Self ('I') with the Body, Program to Ensure Sanyam and Svasthya.
Module 3	Harmony in the Family and Society: Harmony in the Family - the Basic Unit of Human Interaction, Values in Human-to-Human Relationships, 'Trust' – the Foundational Value in Relationships, 'Respect' – as the Right Evaluation, Understand Harmony in the Society, Vision for the Universal Human Order.
Module 4	Harmony in the Nature (Existence): Understand Harmony in the Nature, Interconnectedness, Self-regulation and Mutual Fulfillment among the Four Orders of Nature, realizing 'Existence is Co-existence' at All Levels, The Holistic Perception of Harmony in Existence.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	A Foundation Course In Human Values & Professional Ethics	R.R. Gaur, R. Sangal, G.P. Bagaria	Excel Books, New Delhi	1996
2	Universal Human Values And Professional Ethics	Dr. ARCHANA CHAUDHARY	Book Rivers	2001
3	Universal Human Values And Professional Ethics	Dr. Ritu Soryan	katson print	2001
4	Human Values and Professional Ethics	B.S.Raghavan	S. Chand	2004

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1		AICTE	Yes	Online	AICTE	https://www.uhv.org.in/

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	NA	NA	NA
2	NA	NA	NA

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	ALMs	10	20
	Home assignments	10	
In-Sem Summative	Sem in 1	20	40
	Sem in 2	20	
End-Sem Summative	End Sem Exam	40	40

Design Thinking and Innovation (DTI)

COURSE CODE	22UC1203	MODE	R	LTPS	0-0-4-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO/PSO Mapping
CO1	Understand the importance of Design thinking mindset for identifying contextualized problems	2	PO2, PO6
CO2	Analyze the problem statement by empathizing with user	4	PO3, PO7
CO3	Develop ideation and test the prototypes made	3	PO5, PO7
CO4	Explore the fundamentals of entrepreneurship skills for transforming the challenge into an opportunity	2	PO5, PO8

Syllabus

Module 1	<p>Introduction to Design Thinking and Innovation</p> <ul style="list-style-type: none"> • Introduction to design thinking and its principles • Learning, listening, observation, dialogue, and reading in the context of design thinking • Design definitions and stories: desirability, feasibility, viability, mystery, heuristics, algorithm, requirements, patterns, connect, blind spots • Laws of Design Thinking: less is more, last 2% equals 200%, theory of prioritization • Design mind: definitions, 5 forces of growth (SEPIA), 5 frictional forces (DCAFE), 3 capacity levers (VAL)
Module 2	<p>Design Thinking Process</p> <ul style="list-style-type: none"> • Overview of the design thinking process • Design thinking for contextualized problem-solving • Incorporating sustainable development goals into design thinking • Design framework (L0) • Empathy research: understanding user needs and perspectives • Persona development: creating user profiles • Customer journey mapping: visualizing user experiences • Define phase: asking the right questions and problem statement formulation
Module 3	<p>Ideation and Prototyping</p> <ul style="list-style-type: none"> • Ideation techniques: brainstorming and generating creative ideas • Identifying patterns and anti-patterns in ideation • Evaluation of ideas using different criteria (10/100/1000 gm) • Prototyping and testing: translating ideas into tangible prototypes
Module 4	<p>Entrepreneurial Innovation</p> <ul style="list-style-type: none"> • Introduction to innovation management • Basics of business models and their role in innovation • Financial estimation for innovation projects • Pitch decks: creating persuasive presentations for innovation • Considerations for intellectual property rights (IPR) in innovation

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
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1	Design Thinking in Classroom	David Lee	Ulysses Press	2018
2	The Art of Innovation Lessons in Creativity from IDEO	Tom Kelley	IDEO	2001
3	The Design Thinking <i>Play Book</i>	Michael Lewrick, Patrick Link & Larry Leifer	Wiley Press	2018
4	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation	Tim Brown	Harper Business	2009
5	Unmukt-Science and Art of Design Thinking	Arun Jain	Arun Jain and School of Design Thinking	2019

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Certified Design Thinking Professional (CDTP)	Global innovative Institute	Y	Written	Global innovative Institute	https://www.gini.org/cdtp
2	Design Thinking for Innovation	University of Virginia	Y	Online	Coursera	https://www.coursera.org/learn/uva-darden-design-thinking-innovation
3	IBM Enterprise Design thinking	IBM	N	Online	IBM	https://www.ibm.com/design/thinking/page/courses/Practitioner

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
	NA		

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Active Participation (Breakout Activities)	10	60
	Continuous Evaluation Project (Work in Progress)	30	
	Quiz	20	
End-Sem Summative	SEM-End Project	40	40

German (GRM)

COURSE CODE	23FL3055	MODE	R	LTPS	2-0-0-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand the German language Basic Proficiency: Students will develop and apply a solid foundation in German, allowing them to introduce themselves, engage in basic conversations, and understand everyday expressions.	3	PO1, PO3
CO2	Determine the German Vocabulary and Grammar: Students will learn essential vocabulary and grasp German grammar rules, enabling them to construct simple sentences accurately.	3	PO7, P8, PO5
CO3	Comprehensive Reading and Listening practices: Students will comprehend basic written and spoken German, understanding short texts, signs, and following straightforward conversations.	3	PO9
CO4	Examining and interpreting the German Cultural Awareness: Students will gain insights into German-speaking countries' culture, enhancing their ability to communicate respectfully and appreciate the customs and traditions.	3	PO2, PO4

Syllabus

Module 1	Begrüssing – Alfabet-die Zahlen- die Addition-die Subtraktion-die Division-die Multiplikation - Personal Pronomen - sein form - haben form - der Infinitiv - konjugation im Präsens
Module 2	Die Artikel – bestimmter Artikel – unbestimmter Artikel – Verneinung – Konjugation im Perfekt.. Partizip II -Future
Module 3	Präpositionen – W-Frage - possessiv Pronomen - deutsche 4 Fälle – wohnen – die Familie
Module 4	Orientierung - Farben – Wochen, Monaten, Jahren, Jahreszeiten, - Einkaufen, Urlaub machen, sport, Gesundheit

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Studio d A1, Deutsch als Fremdsprache	Cornelsen/Goyal SaaB	Goyal Publishers and Distributors(P) Ltd. New Delhi 110007	2004
2	Netzwerk for A1,	Stefanie Dengler Paul Rusch Helen Schmitz Tamka Siener	Goyal Publishers and Distributors(P) Ltd. New Delhi 110007	2018
3	Deutsch ganz leicht A1, A German selfstudy course for beginners	Huebner	Goyal Publishers and Distributors(P) Ltd. New Delhi 110007	2018

4	Collins, easy learning German Grammar & Practice	collins	Collins	2014
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Global Certifications:

Mapped Global Certifications:

Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1		NA				

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	NA		

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Quiz	5	25
	ALM	8	
	Attendance	5	
	Home Assignment and Textbook	7	
In-Sem Summative	Semester in Exam I	17.5	35
	Semester in Exam II	17.5	
End-Sem Summative	End Semester exam	40	40

Ecology & Environment (E&E)

COURSE CODE	22UC0009	MODE	R	LTPS	2-0-0-0	PRE-REQUISITE	NIL
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand the importance of Environmental education and conservation of natural resources. conservation of natural resources and Energy resources.	2	PO 7
CO2	Understand concepts of ecosystems and learn methods for conservation of habitats and biodiversity.	2	PO 7
CO3	Identify critically about individual roles in prevention of pollution. An Environmental Studies will be enabled to do independent research on human interactions with the environment.	2	PO 7
CO4	Recognize the knowledge on environmental legislation, disaster management and EIA process.	2	PO 6

Syllabus

Module 1	The Multidisciplinary nature of Environmental Studies: Introduction to Environment: Definition – scope – importance –Multidisciplinary nature of Environmental Studies, Need for public awareness. Institutions and people in Environment. Natural Resources: Renewable and Non-Renewable Resources: Forest resources: Uses – Deforestation–causes, effects and impacts, Afforestation Programmes-Socio-forestry, Agro-forestry, Vanasamrakshana programmes, Mining its impact on environment: mining, dams and their effects on forests and tribal people. . Water resources: Distribution of surface and ground water, Aquifers, – floods – drought – conflicts over water, dams - benefits and problems, Water conservation – rainwater harvesting – watershed management, Cloud seeding Mineral resources: Use – exploitation – environmental effects –. Food resources: Changes in agricultural methodologies, comparison between old and new methods of farming, Green Revolution, Environmental Impact Assessment of conversion of agricultural lands– effects of modern agriculture, Drip Irrigation – fertilizer-pesticide problems, Eutrophication, Vermicompost – waterlogging, Blue baby syndrome – Energy resources: Growing energy needs – renewable and non-renewable energy sources – Solar, wind, geothermal, tidal, bio energies . Land resources: Land as a resource – land degradation-. Soil erosion: Importance of soil, Types of soil erosion, Causes and effects of soil erosion. How to control soil erosion. Role of an individual in conservation of natural resources
Module 2	Ecosystems: Concept of an ecosystem: Structure and function of an ecosystem - Producers – consumers – decomposers with examples, Energy flow in the ecosystem – Ecological succession– Food chains – food webs and ecological pyramids. Types of ecosystems. characteristic features, structure and function of the following ecosystem a Forest ecosystem b. Grassland ecosystem c. Desert ecosystem e. Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity and its Conservation: Introduction – Introduction — Definition: genetic, species and

	ecosystem diversity. • Biogeographical classification of India • Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values Biodiversity at global, National, and local levels • India as a mega-diversity nation • Hotspots of biodiversity. • Threats to biodiversity: habitat loss, poaching of wildlife, man- wildlife conflicts. • Endangered and endemic species of India • Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
Module 3	Environmental Pollution: Definition •Causes, effects and control measures of - a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution. e. Noise pollution f. Thermal pollution g. Nuclear hazards • Solid waste Management Causes, effects and control measures of urban and industrial wastes. • Role of an individual in prevention of pollution. Pollution case studies. • Diaster management floods, earthquake, cyclone and landslides. Social Issues and the Environment • From Unsustainable to Sustainable development • Urban problems related to energy • Water conservation. rainwater harvesting, watershed management Resettlement and rehabilitation of people its problems and concerns. Case studies.
Module 4	Environmental ethics issues and possible solutions. Climate change. global warm acid rain, ozone layer depletion. nuclear accidents and holocaust. Case studies. Wasteland reclamation. •Environmental Protection Act, Air (Prevention and Control of Pollution) Act Water (Prevention and control of Pollution) Act • Wildlife Protection Act• Forest Conservation Act • Issues involved in enforcement of environmental legislation. • Public awareness. : Human Population and the Environment• Population growth, • Population explosion Family Welfare Programme. • Environment and human health. • Human Rights. Value Education. • HIV /AIDS. • Case Studies.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Textbook of Environmental Studies	Erach Bharucha	Universities Press (India) Pvt Ltd	2010
2	Environmental Studies	Benny Joseph	Tata McGraw Hill	2009
3	Textbook of Environmental Studies	Deeksha Deve and S.S. Kateswa	Cengage learning India pvt ltd	2009
4	Environmental Studies	Anubha Kaushik, C.P. Kaushik	New Age International	2007

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	NA	NA	NA	NA	NA	NA

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	NA	NA	NA

Evaluation Components:

Evaluation	Component	Weightage	Total
	Active Learning	10	20

In-Sem Formative	Home Assignment & Textbook	10	
In-Sem Summative	In-Sem 1	20	40
	In-Sem 2	20	
End-Sem Summative	End-Sem Exam (Paper Based)	40	40

Information & Communication Technology (ICT)

COURSE CODE	22FT11K1	MODE	R	LTPS	2-0-2-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand the basic use of computer hardware and software, networks, and the Internet in the workplace and apply the acquired skills and concepts in the professional assignments.	3	PO1,PO 2, PSO 5
CO2	Analyze and Manage Business Communication with effective usage of Microsoft Office tools: MS-Word and MS-PowerPoint.	3	PO1,PO 2, PSO 5
CO3	Understand the knowledge of networks for effective business operations expansions.	3	PO1,PO 2, PSO 5
CO4	Analyze Business Databases and Dashboards using MS-Excel and MS-Access applications.	3	PO1,PO 2, PSO 5
CO5	The practical application of MS Office.	4	PO1,PO 2, PSO 5

Syllabus

Module 1	Introduction to computers: - Overview, Computers for Individual users, Computers for organizations, Computers in society; Components of a Computer-Hardware: Processing Devices, Memory Devices, I/O Devices, Storage Devices; Operating System, Introduction to Operating Systems, an overview of various Computer OS & Application.
Module 2	MS Word: -Working with word document, Inserting, Bold, Underline, Font Size, style, Background colour, Text colour, Line spacing, Spell Check, Alignment, Header & Footer, insert pages and page numbers, Find and Replace. Design an invoice and Account sales by using the Drawing toolbar, Clip Art, Word Art, Symbols, Borders, and Shading Inserting the table, Data Entry, Alignment of Rows and Columns, Inserting and Deleting the Rows and Columns, and Change of Table Format. Mail Merge including linking with Access Database, Creating Macros, Sending Email from Word Import / Export of files Converting Word Document to Web Document, PDF files Hyperlinks Protection of Documents, Referencing, creating bibliography, manage sources and citations, review documents. MS PowerPoint: Preparing Presentations, Slides, Handouts, Speaker's Notes, Outlines, Media Clips, Charts, Graphs, Adding the Transitions to the Slide Show, Special effects, Setting Slide timings
Module 3	Networks: Introduction to Networks-Overview, Types of Networks; Networking Topologies and Networking Protocols. Concepts of Internet-Overview, Applications of Internet, E-Commerce.

Module 4	<p>MS-Excel Creating a work book, Rearranging Worksheet, Organizing Charts and graphs, Ranges and Functions & Formulae: Mathematical, Statistical Financial Functions such as NPV (Net present value), Future value, IRR (Internal Rate of Return), EMI (Equated Monthly Instalments, Compounding Yearly, periodic and monthly) PRICEMAT, PRICEDISC. Auto Calculate Using Names in a Formula, Formula Editing, Macros, Consolidation of Data & Data Analysis ,Sorting List, Filter & More Filtering Techniques , Consolidate data in multiple worksheets , if analysis, , Solver, Lookup Function , Sub Totals, Nested; IF, Statistical Analysis, Data Validation & Protection , Create a drop; down list from a range of cells , Apply data validation to cells , Copy data validation setting, remove data validation , Find cell that have data validation, protect cell data, using password to protect sheet and workbook. , Use validation to create dependent list, Pivot table Reports & Pivot Chart Reports.</p> <p>MS-Access Introduction to Access, Creating a New Database, Data Types Available for a Database, Constraints in a Database, Working with Tables, Creating a Table, Designing the Tables Effectively, Relationship between Tables, Editing and Deleting Records, Columns, Tables and Relationships, Working with Queries, Defining a Query, Creating a Query, Changing the Format of a Table Using Queries, Working with Expressions and the Expression Builder, Working with Forms, Creating a Form, Design the Form Effectively, Opening a Form in Design View, Working with Reports, Creating a Report, Saving and Executing Reports, Opening a Report.</p>
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Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Computer Fundamentals	Priti Sinha, Pradeep K., Sinha	BPB Publications in	2004
2	Introduction to Information Technology	V. Rajaraman	PHI	2018
3	E-Commerce: Fundamentals and Applications	Henry Chan , Raymond Lee , Tharam Dillon , Elizabeth Chang	Wiley	2007
4	Working in Microsoft Office	Ron Mansfield	McGraw Hill Education	2001
5	MS Office 2000 for Everyone	Sanjay Saxena	S Chand	2000

Global Certifications:

Mapped Global Certifications:						
S.No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	GLOBAL CERTIFICATE IN INFORMATION TECHNOLOGY (IT-101 (IT-101)	Rashtriya Computer Shaksharta Mission	N			https://rcsmindia.org/product/global-certificate-in-information-technology-it-10 M.S office suite 20071-3/

2	Microsoft 365 Fundamentals Specialization	Coursera	N		Microsoft 365 Fundamentals Specialization (Microsoft) Coursera
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Tools used in Practical / Skill:

S. No	Tool Name	Parent Industry	Open Source/ Commercial
1	Microsoft 2021	Microsoft	Commercial

Evaluation Components:

Evaluation	Component	Weightage	Total
End Semester Summative Evaluation Total= 40 %	Semester End Exam	24	40
	Lab End Semester Exam	16	
In Semester Summative Evaluation Total= 38 %	In-Sem Exam-I	15	38
	In-Sem Exam -II	15	
	Lab In Semester Exam	8	
In Semester Formative Evaluation Total= 22 %	ALM	8	22
	Lab Weekly exercise	7	
	Home Assignment and Textbook	7	

Food Chemistry (FC)

COURSE CODE	22FT11C1	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand the composition and chemistry of food.	2	PO1, PO11, PSO1
CO2	To know the role of each component in food processing.	3	PO1, PO11, PSO1
CO3	To understand the interactions between the components.	3	PO1, PO11, PO12, PSO1
CO4	To be able to determine structural and compositional properties of food components.	3	PO1, PO11, PSO1
CO5	To be able to apply the knowledge to estimating various properties of foods and their components.	5	PO1, PO5, PO11, PSO1

Syllabus

Module 1	Need for learning food chemistry. To study fundamentals of food chemistry. To study chemical composition of various foods. State of water in food. Structure of water and ice. Types of water. Interaction of water with solutes. Sorption phenomenon. Water activity and its relation with packaging and spoilage.
Module 2	Classification of vitamins. Structures of vitamins. Properties of vitamins. Functions of vitamins. Stability of vitamins. Major minerals in foods. Minor minerals in foods. Metal uptake. Toxic metals in foods.
Module 3	Food pigments - Introduction and classification. Structures and properties of food pigments. Browning Reactions in foods (Enzymatic). Browning Reactions in foods (Non-enzymatic, Maillard). Browning Reactions in foods (Caramelization, Ascorbic acid oxidation). Introduction to colloids. Colloids from proteins (classification and structure). Colloids from proteins (plant- and animal-based). Colloids from carbohydrates (classification and structure). Colloids from carbohydrates (chemical reactions, modifications). Stabilization of colloidal system and application of colloidal chemistry to food preparation.
Module 4	Introduction to dispersions. Characterization of dispersions. Types of dispersions and gels. Gels and syneresis. Emulsions and foams. Effects of processing on chemical composition (Physico-chemical changes). Effects of processing on chemical composition (Nutritional changes). Effects of processing on chemical composition (drying). Effects of processing on chemical composition (irradiation). Effects of processing on chemical composition (freezing, canning).

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Water Properties of Food, Pharmaceutical, and Biological Materials.	Maria del Pilar Buera, Jorge Welti-Chanes, Peter J. Lillford, Horacio R. Corti	Blackwell Publishing	2010
2	Water activity in foods: fundamentals and applications.	Gustavo V. Barbosa-Cánovas, Anthony J. Fontana Jr., Shelly J. Schmidt, Theodore P. Labuza	Blackwell Publishing & IFT	2007
3	Handbook of Water Analysis	Leo M.L. Nollet	CRC Press	2013
4	Microbiological Analysis of Food and Water	N.F. Lightfoot, E.A. Maier	Elsevier B.V.	1998
5	Food Colloids: Proteins, Lipids and Polysaccharides	E Dickinson, B Bergenstahl	Woodhead Publishing Series in Food Science, Technology and Nutrition	1997

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Food Chemistry	Technology Ed		Y	5 homework assignments, and 1 final exam	https://www.technologyed.com/courses/food-chemistry-online-course-certificate/

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Lab manual	Nil	Open Source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	5	32
	Quiz	8	
	Practical Continuous Evaluation	14	
	Attendance	5	
In-Sem Summative	Paper based	10	28
	Paper based	10	
	Paper based	8	
End-Sem Summative	End-Sem Exam (Paper Based)	24	40
	Lab End-Sem Exam	16	

Human Physiology and Nutrition (HPN)

COURSE CODE	22FT11C2	MODE	R	LTPS	3-0-0-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Acquiring knowledge about macro and micro nutrients and their functions.	2	PO1, PO6, PSO1
CO2	To know the consequences of deficiency of nutrients.	3	PO1, PO6, PO11
CO3	To apply the concepts of nutrition and food and its relation to health.	3	PO1, PO4, PO6
CO4	To gain the knowledge of nutrition for disease prevention in the real time.	4	PO12, PO1, PO11

Syllabus

Module 1	Introduction To Food and Nutrition - Introduction and scope of Nutrition, ICMR Basic Five Food Groups, Relationship between Food, Nutrition, Health and Disease. Functions of food-physiological, psychological and social, Concept of Balanced Diet, Food Groups, Food Pyramid, BMI.
Module 2	Nutrients - Classification, digestion, functions, dietary sources, RDA, clinical manifestations of deficiency and excess and factors affecting absorption of the following in brief: Energy, Carbohydrates, lipids and proteins, Fat soluble vitamins-A, D, E and K, Water soluble vitamins – thiamin, riboflavin, niacin, pyridoxine, folate, vitamin B12 and vitamin C and Minerals – calcium, iron, iodine, fluorine, copper and zinc
Module 3	Energy - Energy value of foods – Determination of gross energy value of foods using Bomb calorimeter and Oxy calorimeter. Physiological energy value of foods. Factors affecting Basal Metabolic Rate, Measurement of BMR by Direct and Indirect Calorimetry. Formulas for calculating BMR. RDA and sources of energy.
Module 4	Concepts of Meal Planning and Methods of Cooking - Factors affecting meal planning, understanding specific considerations for planning meal for different groups of people. Dry, moist, frying and microwave cooking, Advantages, disadvantages and the effect of various methods of cooking on foods. Physiology of Gastrointestinal system – Description, organs, hormones, enzymes involved, Utilization and Absorption of Carbohydrates, proteins, fats. Physiology of renal system, organs of urinary system, structure of nephron.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Food Science	B. Srilakshmi	New Age International Publishers	2021
2	Foods Facts and Principles	N. Shakuntala Manay (Author), M. Shadaksharaswamy (Author)	New Age International Private Limited	2008
3	Food Science and Nutrition 3E	Sunetra Roday (Author)	Oxford University Press	2018
4	Food Science	Norman N. Potter and Joseph H. Hotchkiss.	Springer	1995

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Nutrition Therapeutics and Health	NPTEL	N	OL	NPTEL	https://nptel.ac.in/courses/126104004

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	7	25
	Quiz	3	
	Active learning	10	
	Attendance	5	
In-Sem Summative	Paper based	17.5	35
	Paper based	17.5	
End-Sem Summative	End-Sem Exam (Paper Based)	40	40

Introduction to Food Science and Technology (IFST)

COURSE CODE	22FT11C3	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	NIL
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand the basic principles of food science and technology.	2	PO-1,5,7 PSO 1
CO2	To study the structure, composition, nutritional quality and postharvest changes of various plant foods.	3	PO-1,5,7, PSO 1
CO3	To study the structure and composition of various animal foods.	4	PO-1,5,7 PSO 1
CO4	To be able to use various basic food processing techniques with an aim to preserve the foods.	4	PO-1,5,7, PSO 1
CO5	To be able to understand about the knowledge of technological developments taken place in food production.	4	PO-1,5,7, PSO 1

Syllabus

Module 1	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.
Module 2	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.
Module 3	Fruits and Vegetables -Classification of fruits and vegetables, general composition, enzymatic browning, names and sources of pigments, Dietary fiber. 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.
Module 4	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. 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.
Module 5	<ol style="list-style-type: none"> 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.
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Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Food Science	Bawa. A.S, O.P Chauhan et al.	NEW INDIA PUBLISHING AGENCY (NIPA)	2013
2	Food Science	Roday, S	Oxford publication	2011
3	Food Chemistry	Meyer	New Age Publishers	2004
4	Food science	B. Srilakshmi	New Age Publishers	2002
5	Outlines of Dairy Technology	De Sukumar	Oxford University Press	2007

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Procto (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Food Analysis	Faculty of Food Safety and C (An Autonomous Body Recognized by Government of India)	Y	Written	Y	https://www.igmpiindconfectionery.html

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Lab based learning	-	-

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Active Learning	5	15
	Home Assignments	2	
	Quiz	3	
	Practical Continuous Evaluation	5	
In-Sem Summative	In-Sem 1	15	45
	In-Sem 2	15	
	Practical In-Sem	15	
End-Sem Summative	End-Sem Exam (Paper Based)	20	40
	Lab End-Sem Exam	20	

Food Biochemistry (FBC)

COURSE CODE	22FT11C4	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand the basic principles of biochemical nature of foods.	2	PO3, PSO2
CO2	To determine the structural and chemical nature of nutrients CHO & Proteins.	3	PSO2, PO3
CO3	To determine the structural and chemical nature of nutrients Lipids & Nucleic acids.	3	PO3, PO12, PSO2
CO4	To identify the metabolic changes of foods once it enters the human body.	3	PO3, PO12, PSO2
CO5	To be able to demonstrate the knowledge of characterization of food components.	5	PSO2, PO3

Syllabus

Module 1	Introduction To Biomolecules - Overview - Basic principles of Organic Chemistry, Types of Biomolecules, Chemical nature, biological roles, biological buffers, Water and its importance in Biochemistry.
Module 2	Structures & Properties Of Carbohydrates, Proteins - Carbohydrates (Mono, Di, Oligo) - forms of Isomerism, Physiological importance, Polysaccharides - Starch- glycogen- Cellulose and their derivatives- Chitin-Peptidoglycans- Glycosaminoglycan's- Glycoconjugates, Test for Carbohydrates. Classification of Amino acids and Proteins, Structure of Proteins- Primary-Secondary- Tertiary and Quaternary - Myoglobin & Hemoglobin, Test for Proteins.
Module 3	Structures & Properties Of Lipids, Nucleic Acids - Lipid - Classification (Fatty acids, Glycerolipids, Phospholipids, Glycolipids, Sphingolipids, Steroids) - Physiological importance, Significance of Cholesterol, Nucleic Acids - Structure of Purines – Pyrimidines - Nucleosides - Nucleotides - Ribonucleic acids - Deoxyribonucleic acids - Nucleoprotein complexes, Synthetic Nucleotide analogs, Functions of Nucleotides - Carrier of Chemical energy of cell- Enzyme Cofactor -Regulatory Molecules.
Module 4	Metabolic Activities of – Carbohydrates, Lipids, Proteins, Vitamins, Minerals, Vitamins - Biomedical importance, Classifications, Introduction to Biocatalysis by Enzymes and Pathways, Introduction to Biosynthesis and Breakdown of Carbohydrates- Lipids- Proteins and Nucleic Acids. TCA cycle - Glycolysis – Glyconeogenesis, Urea cycle, ATP cycle, Kreb's cycle, oxidative phosphorylation, pentose phosphate pathway, fatty acid β -oxidation, gluconeogenesis. Regulation of levels of High energy compounds and reducing equivalents inside the cell.
Module 5	Practicals: 1. Qualitative analysis of carbohydrates 2. Qualitative analysis of amino acids and Proteins 3. Qualitative analysis of lipids 4. Estimation of glucose by Benedict's test 5. Qualitative analysis of carbohydrates by anthrone method 6. Estimation of amino acids by Ninhydrin method

	7. Estimation of proteins by Biuret method 8. Estimation of proteins by Lowry's method 9. Estimation of DNA by diphenylamine method 10. Estimation of RNA by Orcinol method 11. Isolation of casein from milk
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Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Principles of Biochemistry	David L. Nelson and Michael M. Cox	Macmillan Worth publisher	2000
2	Biochemistry	WH. Freeman and co	Springer New York, NY	1998
3	Harper's Biochemistry	Murray, R.K., Granner, B.K., Mayes, P.A., Rodwell	Springer New York, NY	

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Food Bio Chemistry	Swayam	Y	MCQ	Swayam	https://onlinecourses.swayam2.ac.in/cec19_ag04/preview

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Practical Manual	Nil	Open Source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignment and Textbook	5	32
	ALM	8	
	Attendance	5	
	Lab Weekly exercise	14	
In-Sem Summative	Semester in Exam-I	10	28
	Semester in Exam-II	10	
	Lab In Semester Exam	8	
End-Sem Summative	End Semester Exam	24	40
	Lab End Semester Exam	16	

Bakery, Confectionery, and Snacks Technology (BCST)

COURSE CODE	22FT12C2	MODE	R	LTPS	2-0-4-0	PRE-REQUISITE	NIL
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To know science and technology behind bakery and confectionary products and their place in global market.	2	PO-1,5,12 PSO 2
CO2	To get acquainted to utilization of the role of various ingredients and technology in baking and confectionary.	3	PO-1,5,12, PSO 2
CO3	To gain knowledge regarding the production and regulatory aspects of bakery products.	4	PO-1,5,12, PSO 2
CO4	To identify importance of novelty and skills for a successful baking and confectionary professional.	4	PO-1,5,6, PSO 2
CO5	To be able to demonstrate the knowledge of baking and confectionary production.	4	PO-1,5,6, PSO 2

Syllabus

Module 1	Introduction to bakery products: Definition, classification, market, Ingredients and their functions; Machines & equipment for batch and continuous Processing of bakery products, major and minor equipment. Manufacturing of Breads, cakes, types of icings, pizza base, biscuits, cookies, rusk, pastry as per FSSAI standards.
Module 2	Introduction to Confectionary and chocolate Products: Types, specifications, compositions, role of ingredients, other aerating agents, cocoa powder, fruits, preserved fruits, dried fruits, nuts and chemical additives. Manufacturing of products - jam, gums, jellies, candies fondant, caramel, fudge, toffee, types of chocolate etc.
Module 3	Production of bakery foods: Formulation - Ingredients (flour, yeast, sugar, egg, butter, salt, baking powder, coloring and flavoring agents, starches) and their functions, methods, classification, standards. Equipment: Cleaning, operation, processes, quality checks, preservation (conventional and evolving preservatives), regulations. Baking processes, quality of baked products
Module 4	Safety Measures & Regulations: Food safety rules and regulations for bakery and confectionary products-Layout, hygienic conditions required for bakery plant, operation and maintenance of bakery equipment.
Module 5	<ol style="list-style-type: none"> 1. Identifications and composition of various ingredients for snacks, bakery and confectionery products 2. Preparation and quality assessment of pizza base 3. Preparation and quality assessment of bread 4. Preparation and quality assessment of different types of cakes. 5. Preparation and quality assessment of cookies and biscuits 6. Preparation of selected varieties of chocolates and toffees 7. Preparation, and quality assessment of selected snack items 8. Preparation of selected varieties of macaronis. 9. Visit to a baking industry and preparation of report

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Bakery technology - packaging, nutrition, product development, quality assurance	Samuel A. Matz	Chapman and Hall	1989
2	Textbook of Bakery and Confectionery	Yogambal Ashokkumar	Prentice Hall India Learning Private Limited	2012
3	Bakery products: science and technology	"Weibiao Zhou, Y. H. Hui, I. De Leyn, M. A. Pagani, C. M. Rosell, J. D. Selman, N. Therdthai"	Online	
4	Complete confectioner Whole art of confectionary made plain and easy	Glasse, Hannah, Elizabeth Robins Pennell Collection (Library of Congress)	Online	
5	Textbook of Bakery and Confectionary	Sivalingam, Yogambal	Online	

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Bakery and Confectionery Programmes	Faculty of Food Safety and Quality (An Autonomous Body Recognized by Ministry of Commerce & Industry, Government of India)	Y	Written	Y	https://www.igmpiindia.org/post-graduate-diploma-in-bakery-and-confectionery.html

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Lab based learning	-	-

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Active Learning	5	15
	Home Assignments	2	
	Quiz	3	
	Practical Continuous Evaluation	5	
In-Sem Summative	In-Sem 1	15	45
	In-Sem 2	15	
	Practical In-Sem	15	

End-Sem	End-Sem Exam (Paper Based)	20	40
Summative	Lab End-Sem Exam	20	

Food Microbiology (FM)

COURSE CODE	22FT12C3	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand the important microorganisms affecting food and human health.	2	PO1, PO3, PSO2
CO2	To learn the nature of different microorganisms associated with food and their growth.	3	PSO2, PO3, PSO2
CO3	To gain knowledge regarding the role of microbes in fermentation, spoilage and food-borne diseases.	3	PO3, PO12, PSO2
CO4	To be able to determine spoilage of foods by common microorganisms, and cultivation of microorganisms.	3	PO3, PO12, PSO2
CO5	To be able to demonstrate knowledge in terms of testing aspects of food microbiology.	4	PO1, 3, PSO2

Syllabus

Module 1	History of microbiology, differences between Prokaryotes and Eukaryotes, Contributions of Louis Pasteur classification of Microbes and Detailed structure of Prokaryotic cell, light and electron microscope, Staining techniques, Gram staining. Characteristics and classification of fungi yeast and molds.
Module 2	Types of Sterilization, Nutritional classification of microorganisms and types of media, microbial culture collection. Isolation of Microbes – plating's – spread, streak, pour & serial Dilution, Preservation of Microbes. Microbial Growth and Metabolism - Growth curve and different methods to quantitate bacterial growth, Factors affecting Growth of microorganisms in food.
Module 3	Importance of microorganisms in food – primary sources of microorganisms in food – intrinsic and extrinsic parameters of food affecting microbial growth – types of microorganisms in foods like meats, poultry, seafood, vegetables, dairy products, fruits and vegetables. Starter Cultures.
Module 4	principles and types of spoilage – microbial spoilage of foods Microbial spoilage of Fruits- Vegetables- Grains and grain products- Meat- Poultry Fish- Factors influencing the spoilage and control- Measures to prevent microbial food poisoning.
Module 5	Practical: 1. Microbiology laboratory practices and equipment. 2. Cleaning and sterilization of glassware. 3. Using compound microscope. 4. Preparation and sterilization of nutrient broth. 5. Cultivation and sub-culturing of microbes – Plating Methods & serial Dilution. 6. Preparation of slant, stab and plates using nutrient agar. 7. Morphological study of bacteria and fungi using permanent slides. 8. Simple staining, Gram's staining, Negative staining. 9. Endospore staining.

	10. Standard Plate Count Method.
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Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Fundamental Food Microbiology	Bibek Ray	CRC Press	2003
2	Food Safety Culture Creating a Behavior-Based Food Safety Management System	Frank Yiannas	Springer New York, NY	2009
3	Handbook of Culture Media for Food Microbiology.	Janet E.L. Corry, G.D.W. Curtis and Rosamund M. Baird (Eds.)	RSC Publishing	2003
4	Safety of Meat and Processed Meat.	Francis F. Busta , Bruce R. Cords	Springer New York, NY	2009

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Food Microbiology and Food Safety	Swayam	Y	OL	Swayam	https://onlinecourses.swayam2.ac.in/cec22_ag01/preview

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Practical Manual	Nil	Open Source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	5	32
	Quiz	8	
	Practical Continuous Evaluation	14	
	Attendance	5	
In-Sem Summative	Paper based	10	28
	Paper based	10	
	Paper based	8	
End-Sem Summative	End-Sem Exam (Paper Based)	24	40
	Lab End-Sem Exam	16	

Data and Statistical Analysis

COURSE CODE	22FT21C1	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	NIL
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Course Outcomes

CO#	CO Description	BTL	PO/PSO Mapping
CO1	Interpret numerical data through various graphs and determination of various constants of the data	3	PO1, PSO2
CO2	Measure and estimate the degree of linear relationship between two variables	3	PO1, PSO2
CO3	Identify the suitable probability distribution to the given experimental data and calculation of various characteristics of the respective probability distributions	3	PO1, PSO2
CO4	Draw the statistical inference of the given data through various tests of statistical hypothesis, viz., tests for means, Chi Square test and analysis of variance	3	PO1, PSO2

Syllabus

Module 1	Descriptive Statistics: Introduction to bio-statistics, construction of Frequency distribution, diagrammatical and graphical presentation of data, Mean, median, mode and their simple properties (without derivation), range, quartile deviation, standard deviation and coefficient of variation.
Module 2	Correlation and Regression: Correlation coefficient for grouped and ungrouped data, Rank correlation for tied and untied observations, simple correlation and regression their properties and relations. Linear regression and non-linear regression.
Module 3	Probability: Random Experiment, sample point, sample space, events; mutually exclusive and exhaustive events, frequency and classical definitions of probability. Axiomatic definition of probability, addition and multiplication theorems, conditional probability and independence; Discrete and continuous random variables; Standard Univariate Distributions: Standard univariate discrete and continuous distributions, binomial; Poisson; normal and their inter relations and applications.
Module 4	Statistical tests of hypothesis: population, sample, parameter, sample, standard error, types of hypothesis, errors in sampling, level of significance, p-value, confidence interval. Large sample tests: Test for an assumed mean and equality of two population means (with known and unknown S.D) and tests for proportions. Exact sampling tests: t-test for an assumed mean and equality of means of two populations, variance ratio test, Chi-square test for independence of attributes and Analysis of Variance.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Biostatistics- A Foundation for Analysis in the Health Sciences	Daniel, W. W.	Wiley Publishers	2007

2	Statistical Methods for Food Science: Introductory Procedures for the Food Practitioner	John A. Bower	Wiley Blackwell	2 nd Edition, 2013
3	Fundamentals of Mathematical Statistics	S. C. Gupta and V. K. Kapoor	S. Chand & Sons	2002, 11 th Edition
4	Biostatistics-A manual of Statistical Methods for Use in Health, Nutrition and Anthropology (Text Book)	K. Visweswara Rao	Jaypee Brothers	2007, 2 nd Edition

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	1	Biostatistics in Public Health Specialization	Y	Quiz	JOHNS HOPKINS UNIVERSITY	https://www.coursera.org
2	2	Introduction to Biostatistics	Y	Quiz	IIT, BOMBAY	https://onlinecourse.s.nptel.ac.in/noc19_bt19/preview

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	ALM	8	24
	Tutorials	8	
	Home Assignment & Text Book Reading	8	
In-Sem Summative	Sem-in-Examination-I	18	36
	Sem-in-Examination-II	18	
End-Sem Summative	Paper Based	40	40

Processing of Horticultural Produce (PHP)

COURSE CODE	22FT21C2	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To familiarize students with horticultural produce namely fruits and vegetables.	2	PO1, PO11, PSO1
CO2	To understand need and importance of processing the produce and market potential of the processed fruits and vegetables	3	PO1, PO11, PSO1
CO3	To learn processing techniques and methods for storage and preservation to improve shelf-life of produce	3	PO1, PO11, PO12, PSO1
CO4	To realize practical aspects of post-harvest processing of horticultural produce	3	PO1, PO11, PSO1
CO5	To be able to demonstrate knowledge in terms of testing aspects of food microbiology.	5	PO1, PO5, PO11, PSO1

Syllabus

Module 1	Introduction to the course – Different types and importance of horticultural produce, need and market potential for processing the produce, nutritional aspects.
Module 2	Spoilage and spoilage control – Reasons of spoilage, physical (moisture and temperature), chemical (browning, etc.), and biological (microbes, insects) factors of spoilage, physical and chemical methods of spoilage control: sanitation, fumigation, etc.
Module 3	Canning, bottling, and Storage: Process factors and parameters, equipment, containers used, advantages and limitations. Beverage making: Juice extraction, deaeration, straining, filtration and clarification; preservation of fruit juices (pasteurization, chemically preserved with sugars, freezing, drying, tetra-packing, carbonation). Underground and above ground storage, godowns, containers, storage conditions, sanitation requirements and methods.
Module 4	Processing and preservation – Squashes: Processing, cordials, nectors, concentrates and powder. Jams: Constituents, selection of fruits, processing & technology. Jellies: Essential constituents (Role of pectin, ratio), theory of jelly formation, processing technology, defects. Marmalades: Types, preparation, processing technology, defects. Pickles, chutneys and sauces: Processing, types, spoilage and preservation. Tomato products: Selection of tomatoes, preparing pulp, juice, puree, paste, ketchup, sauce and soup of tomatoes. Dehydration: Sun drying and mechanical dehydration, process variations, packing and storage. Additives: Preservatives, colorants, acidity regulators, etc.
Module 5	Estimation of total soluble solids (TSS). Estimation of pH and acidity of products. Estimation of brix/acidity ratio. Estimation of ascorbic acid and effect of heat treatment on it. To study the steps of can making process. Preparation and evaluation of pectin products. Dehydration of fruits and vegetables.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Preservation of fruits & Vegetables	Girdharilal, Siddappaa, G.S and Tandon, G.L.	ICAR, New Delhi,	1998
2	Commercial Unit and Vegetable Products, W.V. Special Indian Edition,	W B Crusess.	Agrobios India	1948
3	Foods: Facts and Principles, New	Manay, S. & Shadaksharaswami, M.,	Age Publishers	2004

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Postharvest Solutions for Small & Evolving Operations	UCDAVIS	Y			Virtual Crash Course: Postharvest Solutions for Small & Evolving Operations - UC Postharvest Technology Center (ucdavis.edu)

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Lab manual	Nil	Open Source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	5	32
	Quiz	8	
	Practical Continuous Evaluation	14	
	Attendance	5	
In-Sem Summative	Paper based	10	28
	Paper based	10	
	Paper based	8	
End-Sem Summative	End-Sem Exam (Paper Based)	24	40
	Lab End-Sem Exam	16	

Food Engineering (FE)

COURSE CODE	22FT21C3	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To get introduced to unit operations and plant design	2	PO 1, 5,7 PSO 1
CO2	To understand and apply principles of food plant design	3	PO 1, 5,7 PSO 1
CO3	To understand and apply post-harvest engineering	3	PO 1, 5,7 PSO 1
CO4	To understand and apply storage engineering	3	PO 1, 5,7 PSO 1
CO5	To get introduced to unit operations and plant design	3	

Syllabus

Module 1	Unit Operations and Food Plant Design: Concept of Unit operation. Units and dimensions, Unit conversions, dimensional analysis. Mass and Energy Balance. Important considerations for designing of food plants, types of layouts. Equipment used in food industry.
Module 2	Fluid Flow in Food Processing: 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 numerical problems.
Module 3	Heating and Cooling Systems: Heating – thermal properties of food, modes of heat transfer, application of steady state heat transfer, superheating. Heating equipment – heat exchangers (types, design characteristics). Refrigeration – Concept, selection of a refrigerant, refrigeration cycle, sub cooling, freezing time calculation using Plank's Equation, frozen food storage.
Module 4	Steam, Evaporation and Dehydration: Steam – Generation, construction and functions of fire tube and water tube boilers. Evaporations – types, design of single effect evaporators, basic drying process, moisture content on wet basis and dry basis, design of dehydration systems.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Introduction to Food Engineering	Paul Singh, R. and Dennis R. Heldman. 2009. Introduction to Food Engineering	Academic press, New York, USA.	fourth edition.
2	Unit Operations in Food Engineering	Albert Ibarz and Gustavo V. Barbosa-Cánovas. 2003. Unit Operations in Food Engineering.	CRC Press LLC, Florida.	2003

3	Food Process Engineering and Technology.	Zeki Berk. 2009. Food Process Engineering and Technology.	Academic press, New York, USA.	2009
4	Unit operations in Food Processing.	R.L. Earle. 1983. Unit operations in Food Processing.	Pergamon Press, New York, USA.	1983
5	Introduction to Food Engineering	Paul Singh, R. and Dennis R. Heldman. 2009. Introduction to Food Engineering	Academic press, New York, USA.	fourth edition.

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Certified Food Scientist	IFT	Y	online	IFT	https://www.ift.org/career-development/certification?gclid=EAlalQobChMIjre3u6LI_wIVjJJmAh19DQaXEAAAYyAAEgKViPD_BwE

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	NA		

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	ALM (LTC, in-class Quiz, etc.)	10	20
	Home Assignment and Book. (Min. 4 Assignments etc.)	3	
	Lab Weekly exercise	7	
In-Sem Summative	In-Sem Exam-I	20	40
	In-Sem Exam-II	20	
End Sem Summative	End Semester Exam	40	40

Food Safety and Regulations (FSR)

COURSE CODE	22FT22C2	MODE	R	LTPS	3-0-0-0	PRE-REQUISITE	NIL
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand the overall concept of food safety and related concerns	2	PO-1, 5, 7 PSO 1
CO2	To get acquainted to the food safety regulations such as ISO and safety management systems like HACCP	3	PO-1, 5, 7, PSO 1
CO3	To know the ways to ensure the food is safe for consumption	4	PO-1, 5, 7 PSO 1
CO4	To be able to determine if the given foodstuff is safe and hygienic	4	PO-1, 5, 7, PSO 1
CO5	To be able to demonstrate the knowledge of technological developments taken place in food production.	4	PO-1, 5, 7, PSO 1

Syllabus

Module 1	Introduction – Definitions, Types of hazards, biological, chemical, physical hazards, Factors affecting Food Safety, Importance of Safe Foods. Physical and Chemical Food Hazards – Introduction, Physical Hazards with common examples, Chemical Hazards (naturally occurring, environmental and intentionally added), Impact on health, Control measures.
Module 2	Biological Food Hazards – Introduction, Indicator Organisms, Food borne pathogens: bacteria, viruses, eukaryotes, Seafood and Shell fish poisoning, Mycotoxins. Dairy Byproducts – Status and utilization of dairy by-products i.e. whey, buttermilk and ghee residues, Availability & utilization of by-products of meat industry, poultry industry and fish processing units.
Module 3	Hazard Management – Need, Control of parameters, Temperature control, Food storage, Product design. Hygiene and Sanitation in Food Service Establishments – Introduction, Sources of contamination, Control methods using physical and chemical agents, Waste disposal, Pest and Rodent Control, Personal hygiene, Food Safety Measures.
Module 4	Food Safety Management Tools – Concept, Prerequisites- GHPs, GMPs, SSOPs etc., HACCP, ISO, TQM - concept and need for quality, components of TQM, Kaizen, Risk analysis, Accreditation and Auditing. Microbiological Hazards – Microbiological standards and limits (for processed food, water), Microbiological Assessment and categories of food based on microbial quality, Sampling, Basic steps in detection of food borne pathogens, Water analysis, Assessment of Surface Sanitation and Personal Hygiene Food laws and Standards – Food laws and regulations in India, Global Scenario, Other laws and standards related to food
Module 5	1. Preparation of different types of media 2. Enumeration of aerial microflora using PDA 3. Microbiological Examination of different food samples 4. Bacteriological Analysis of Water 5. Assessment of surface sanitation by swab/rinse method 6. Assessment of personal hygiene

7. Biochemical tests for identification of bacteria
8. Scheme for the detection of food borne pathogens

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	The microbiological safety and quality of food	Barbara M. Lund, Tony C. Baird-Parker, G. W. Gould	Aspen Publishers, Gaithersburg, Md.,	2000
2	Chemistry and Safety of Acrylamide in Food	Margareta Törnqvist (auth.), Mendel Friedman, Don Mottram	Springer Science & Business Media	2005
3	Food safety handbook	Ronald H. Schmidt, Gary E. Rodrick	Online	2003
4	HACCP	Sara E. Mortimore, Carol Wallace, Christos Cassianos	Online	2001
5	Food Plant Sanitation- Design, Maintenance, and Good Manufacturing Practices	Michael M Cramer	Taylor & Francis Group	2013

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Food Safety Training and Certification	Faculty of Food Safety and Quality (An Autonomous Body Recognized by Ministry of Commerce & Industry, Government of India)	Y	Written	Y	https://www.igmpindia.org/post-graduate-diploma-in-bakery-and-confectionery.html

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Lab based learning	-	-

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Active Learning	5	15
	Home Assignments	2	
	Quiz	3	
	Practical Continuous Evaluation	5	
In-Sem Summative	In-Sem 1	15	45
	In-Sem 2	15	
	Practical In-Sem	15	
	End-Sem Exam (Paper Based)	20	40

End-Sem Summative	Lab End-Sem Exam	20	
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Processing of Aquatic Foods (PAF)

COURSE CODE	22FT22C3	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To get acquainted with commercially important animals and plants used as food sources and their body structures.	2	PO 1, 5,7 PSO 1
CO2	To learn about edible and non-edible parts of aquatic animals and plants and nutritional attributes.	3	PO 1, 5,7 PSO 1
CO3	To understand processing, preservation, supply chain, and marketing aspects of such products.	3	PO 1, 5,7 PSO 1
CO4	To be able to execute preservation of select marine products.	3	PO 1, 5,7 PSO 1
CO5	To be able to analyze physico-chemical properties of raw aquatic animals and plants.	4	PO 1, 5,7 PSO 1

Syllabus

Module 1	Introduction – Overview of the aquatic animal industry, commercial importance, definitions, classification, glossary. Aquatic food sources – Various animals marketed in the aquatic (freshwater and seawater) food industry: fish of different kinds, crustaceans (crabs, shrimps, etc.), cephalopods (octopus, squid), mollusks (clams, sea snails, etc.); Plants: seaweed, water spinach; external anatomy, edible and non-edible parts, nutritional attributes, and nutritional advantages versus regular plant sources.
Module 2	Spoilage – Extrinsic factors (temperature, moisture, microbes, insects), intrinsic factors (physical, chemical, biochemical, physiological).
Module 3	Processing technology – Drying: sun drying, microwave drying, ohmic heating, IR heating, ultrasound processing, enzymatic processing; salting, canning or heat processing, freezing, smoking, high pressure processing (HPP), retort, pulsed light, irradiation, electromagnetic field, etc.; cold storage, refrigerated vans for transport.
Module 4	Fish byproducts – Fish liver oil, fish body oil, fish meal, fish manure, fish flour, fish silage, fish soluble, fish sausage, fish macaroni, fish biscuits, fish glue, gelatin, albumin, fish protein concentrate, fish cutlets, fish fingers. Quality attributes – Nutritional value. Sensory: appearance, color, flavor, odor, and texture.
Module 5	Practical: 1. Analyzing physico-chemical properties of select raw aquatic animals. 2. Analyzing physico-chemical properties of select raw aquatic plants. 3. Analyzing nutritional properties of select raw aquatic animals. 4. Analyzing nutritional properties of select raw aquatic plants. 5. Analyzing physico-chemical properties of select aquatic animals.

	6. Prepare fish pickle and test it for physico-chemical and nutritional properties.
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Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	"Seafood Processing Adding Value Through Quick Freezing, Retortable Packaging and Cook-Chilling"	Vazhiyil Venugopal	Boca Raton	2005
2	Quality Assurance in Seafood Processing: A Practical Guide	A. David Bonnell (Author)	Springer	2006
3	The Seafood Industry: Species, Products, Processing, and Safety	"Linda Ankenman Granata (Editor), George J. Flick Jr. (Editor), Roy E. Martin (Editor)"	Wiley-Blackwell	2006
4	Seafood Research from Fish to Dish: Quality, Safety and Processing of Wild and Farmed Fish	J. B. Luten, C. Jacobsen, K. Bekaert, A. Saebo, J. Oehlenschlager	Wageningen Academic Publishers	2006

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Advanced Aquaculture Technology	NPTEL	Y	OL	NPTEL	https://nptel.ac.in/courses/126105022

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Practical Manual	Nil	Open Source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	5	32
	Quiz	8	
	Practical Continuous Evaluation	14	
	Attendance	5	
In-Sem Summative	Paper based	10	28
	Paper based	10	
	Paper based	8	
End-Sem Summative	End-Sem Exam (Paper Based)	24	40
	Lab End-Sem Exam	16	

Bioethics and Bio safety (BEBS)

COURSE CODE	22FT31C1	MODE	R	LTPS	3-0-0-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Acquire the knowledge in biosafety concepts and issues.	2	PO 1, 5,7 PSO 1
CO2	Understand the biosafety principles and various levels of biosafety in the laboratory.	3	PO 1, 5,7 PSO 1
CO3	Develop the strategies for biosafety regulations and food safety assessments for biotechnology products.	3	PO 1, 5,7 PSO 1
CO4	Develop the strategies for biosafety regulations and food safety assessments for biotechnology products.	3	PO 1, 5,7 PSO 1

Syllabus

Module 1	Biosafety Concepts and Issues: Introduction to Biosafety, International dimensions in Biosafety, Cartagena protocol on biosafety, Rational Vs Subjective perceptions of risks and benefits, Relationship between risk, hazard, exposure and safeguards, Bioterrorism and conventions on biological weapons.
Module 2	Biosafety In The Laboratory: Biotechnology and biosafety concerns at the level of individuals, institutions, society, region, country and the world. Laboratory associated infections and other hazards, assessment of biological hazards and levels of biosafety, prudent biosafety practices in the laboratory institution.
Module 3	Biosafety Regulations, Food Safety and Assessment: Biosafety regulations in the handling of recombinant DNA processes and products in institutions and industries, Biosafety assessment procedures in India and abroad. The GM-food and biosafety assessment procedures for biotech foods & related products, including transgenic food crops, case studies of relevance (e.g.-cotton). Biosafety assessment of biotech pharmaceuticals products such as drugs/vaccines etc.
Module 4	Biotechnology and Society: Introduction to science, technology and society, biotechnology and social responsibility, public acceptance issues in biotechnology, issues of access, ownership, monopoly, traditional knowledge, biodiversity, benefit sharing, environmental sustainability, public vs private funding, biotechnology in international relations, globalization and development divide. Biotechnology and Bioethics: Ethics from biomedical practices to biotechnology, ethical conflicts in biotechnology- interference with nature, fear of unknown, unequal distribution of risks and benefits of biotechnology, bioethics vs business ethics, ethical dimensions of IPR, technology and other global biotech issues.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Biotechnology and Safety Assessment	John A. Thomas, Roy L. Fuchs (Editors)	Elsevier	2002
2	IPR, Biosafety and Bioethics	Deepa Goel, Shomini Parashar	Pearson Education India	2013

3	Encyclopedia of Bioethics	Stephen Garrard Post (Editor)	Macmillan Reference USA	2003
4	Biotechnology Safety Principles & Practices	Fleming D. A., Hunt D. L.	ASM Press	2006

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Certified Food Scientist	IFT	Y	online	IFT	https://www.ift.org/career-development/certification?gclid=EAlaIqObChMIjre3u6LI_wIVjJmAh19DQaXEAAyAAEgKViPD_BwE

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	NA		

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	ALM (LTC, in-class Quiz, etc.)	10	20
	Home Assignment and Book. (Min. 4 Assignments etc.)	10	
	Lab Weekly exercise	7	
In-Sem Summative	In-Sem Exam-I	20	40
	In-Sem Exam-II	20	
End Sem Summative	End Semester Exam	40	40

Food Product Development and Sensory Evaluation (FPDSE)

COURSE CODE	22FT32C1	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	NIL
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Acquire knowledge of the fundamentals of sensory and objective evaluation of food.	2	PO 1, 5, 7 PSO 1
CO2	Research, design and complete an independent research project on food evaluation.	3	PO 1, 5, 7 PSO 1
CO3	Enumerate the term sensory test and explain different sensory test used to evaluate the food acceptability.	4	PO 1, 5, 7 PSO 1
CO4	Apply this knowledge to food evaluation in the lab.	4	PO 1, 5, 7 PSO 1
CO5	To be able to demonstrate the knowledge of sensory analysis and product development.	4	PO 1, 5, 7 PSO 1

Syllabus

Module 1	Introduction – History, Definition of sensory evaluation, terms related to sensory evaluation, objectives of sensory evaluation, human senses: sight, smell, taste: basic components of taste, sound, touch, Basic taste: sweet, salty, sour, bitter, umami. Requirement of sensory analysis – Sensory evaluation panel: introduction, criteria for panel selection, pane list preparation: descriptive panel, consumer panel, other considerations, Threshold tests for basic tastes, Importance, and application for product formulation.
Module 2	Subjective and objective sensory evaluation – Different types of sensory tests: Difference test, Overall difference test, Attribute difference teat, Analytical descriptive test, Affective test, Preference test, Instrumental tests for sensory attributes: color, texture, and odor. Product Development – Introduction, definition, characterizing new product, customer and consumers, designing new product: introduction, new product development team, types, drawing forces, organizing for product development, phases of new product development, Need for product development, Stages of product development, Success in product development.
Module 3	Consumer research – Role of sensory evaluation in consumer product acceptance Consumer Behavior – Introduction, definition of consumer, understanding consumer behavior, consumption process: pre-consumption, consumption and post-consumption, consumer decision making process: habitual, limited, extensive, Factors influencing product acceptance and purchasing trends: internal influence, social influence: ritual, situational influence Concept of consumer involvement. Market place changes in processed foods: Introduction, application of marketing strategy: segmentation, targeting, positioning, Segmentation: geographic, demographic, psychographic, behavioral, targeting: introduction, developing target market segment, evaluating, Positioning.
Module 4	Special Food Processing Technologies and Novel Food Ingredients – Membrane technology, reverse osmosis, ultra-filtration, Agglomeration, Agitation, Air classification, Extrusion, Automation in food industries.
Module 5	1. Sensory analysis: Different types of sensory tests for basic tastes and sensory attributes of products.

	<p>2. Project on different sensory techniques and responses utilizing prepared food products, analysis, and presentation of sensory data.</p> <p>3. Stepwise development of a new food product, standardization, acceptability studies and submission of project report.</p> <p>4. Survey on types of convenience foods / consumer behavior / analysis of food labeling.</p>
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Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Sensory Evaluation of Food	Hildegard Heymann , Harry T. Lawless	Springer New York, NY	2010
2	Sensory Evaluation Techniques	Gail Vance Civile , B. Thomas Carr	Routledge Taylor & Francis group	2016
3	Food Science	B. Srilakshmi	New age international publishers	2018

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Food Sensory Analysis	Faculty of Food Safety and Quality (An Autonomous Body Recognized by Ministry of Commerce & Industry, Government of India)	Y	Written	Y	https://www.igmpiiindia.org/post-graduate-diploma-in-bakery-and-confectionery.html

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Lab based learning		

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Active Learning	5	15
	Home Assignments	2	
	Quiz	3	
	Practical Continuous Evaluation	5	
In-Sem Summative	In-Sem 1	15	45
	In-Sem 2	15	
	Practical In-Sem	15	
End-Sem Summative	End-Sem Exam (Paper Based)	20	40
	Lab End-Sem Exam	20	

Technology of Meat and Poultry (TMP)

COURSE CODE	22FT32C3	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO 1	To get introduced to meat and poultry market and technology.	2	PO 1, 5,7 PSO 1
CO 2	To understand and apply processing technology of meat.	3	PO 1, 5,7 PSO 1
CO 3	To understand and apply processing technology of poultry and eggs.	3	PO 1, 5,7 PSO 1
CO 4	To understand and apply principles of plant sanitation.	3	PO 1, 5,7 PSO 1
CO 5	To be able to apply principles of meat, poultry, and egg processing.	3	PO 1, 5,7 PSO 1

Syllabus

Module 1	Introduction to Meat and Poultry Technology: Current status of meat and poultry industry in Indian and global markets – preferences, demand, availability, market size, regulatory requirements. Sources – animals and birds and products derived from thereof. Structure of muscle – chemical composition and nutritive value of meat. Preservation requirements of meat, poultry, and egg – modes of deterioration, effect of deterioration on quality.
Module 2	Processing and Preservation of Meat and Poultry: Preslaughter and slaughter operations – plant conditions, post mortem changes influencing quality, grading, aging, mechanical deboning. Cutting, handling, and tenderization. Preservation – chilling, freezing, pickling, curing, cooking and smoking, canning, dehydration, radiation, chemical and biological preservatives, packing, and storage. Quality of raw and processed meat – parameters and evaluation. Utilization of by-products.
Module 3	Processing and Preservation of Egg: Structure of egg, chemical composition of egg, nutritive value and functional properties of egg. Grading and packing of eggs and egg products. Preservation of egg – preservation of shell egg and liquid egg. Whole egg powder, egg yolk, products, by-products, their packing and storage.
Module 4	Safety Requirements for meat, poultry, and egg: Safety requirements – Contamination of meat, poultry, and egg products in absence of sanitation; potential health effects on consumers, pathogenic outbreaks. Sanitation – methods, procedures. Standards – Regulations in some important markets (USA, EU, UK, etc.). Certifications – KOSHER, HALAL, etc.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Textbook on Meat, Poultry and Fish Technology	Jhari Sahoo and Manish Kumar Chatli	Daya Publishing House A Division of Astral International Pvt. Ltd. New Delhi – 110 002	2016
2	Meat, Egg and Poultry Science & Technology	Vikas Nanda	I. K. International Publishing House Pvt. Ltd., New Delhi	2014

3	Outlines of Meat Science and Technology	Sharma, B. D. and Kinshuki Sharma	Jaypee Brothers Medical Publishers Pvt. Ltd., New Delhi.	2011
4	Meat Cuts and Muscle	Howard J. Swatland	Foods, 2nd Ed. Nottingham Univ. Press, Nottingham.	2004
5	Meat And Meat Products: Technology, Chemistry And Microbiology	Varnam, A. H.	Chapman & Hall, London.	1995

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Certified Food Scientist	IFT	Y	online	IFT	https://www.ift.org/career-development/certification?gclid=EA1aIQobChMIjre3u6LL_wIVjJmAh19DQaXEAAAYAAEgKViPD_BwE

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	NA		

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	ALM (LTC, in-class Quiz, etc.)	8	22
	Home Assignment and Book. (Min. 4 Assignments etc.)	7	
	Lab Weekly exercise	7	
In-Sem Summative	In-Sem Exam-I	15	38
	In-Sem Exam-II	15	
	In Semester Exam	8	
End-Sem Summative	Lab End Exam	16	40
	End Semester Exam	24	

Instrumentation in Food Analysis - IFA

COURSE CODE	22FT12EX	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To get introduced to principles of instrumentation and basic instruments in food analysis.	2	PO 1, 5, 12
CO2	To know about optics-based instruments.	3	PO 1, 5, 12
CO3	To know chromatography instruments.	3	PO 1, 5, 12
CO4	To learn advanced instrumentation in food analysis – on-line and off-line.	3	PO 1, 3, 5 PSO 3
CO5	To be able to demonstrate the knowledge of instruments and their utilization in food analysis.	5	PO 1, 5, PSO 2

Syllabus

Module 1	Introduction to basic instruments: Instruments for sample preparation - Hot air oven, vacuum oven, muffle furnace, filtration, homogenizer, vacuum filtration, hygrometer, water activity meter, pH-meter, lactometer and other major and minor equipment used for food safety and quality control – thermal analysis, microbial analysis, texture analysis, etc.
Module 2	Optics-based instruments: Basic principles, types, and applications of optical techniques in food analysis – Colorimeter, UV-Visible spectrophotometer, infrared spectrophotometer (FTIR – KBR, ATR), fluorescence spectroscopy, atomic absorption spectrophotometer (AAS), electron spin resonance (ESR), nuclear magnetic resonance (NMR) spectrometer, refractometer (handheld, Abbey).
Module 3	Chromatographic Instruments: Basic principles, types, and applications of chromatographic techniques in food analysis, tools (materials, columns, detectors along with their accuracy, precision, sensitivity) – Paper chromatography, thin layer chromatography (TLC), high performance liquid chromatography (HPLC), gas chromatography (GC).
Module 4	Cutting-edge technologies for food analysis: inductively coupled plasma-mass spectrometry or optical emission spectroscopy (ICP-MS/OES), scanning electron microscope (SEM), transmission electron microscopy (TEM), X-ray diffraction (XRD), electrophoresis. Automation in food analysis – Robotics, vision systems for foreign body detection, e-nose, e-tongue, microplate readers (ELISA, etc.).
Module 5	Practicals: Utilization of basic instruments in sample preparation Demonstration for the working of UV-Visible spectrophotometer Demonstration for the working of FTIR spectrophotometer Demonstration for the working of AAS Demonstration for the working of HPLC and GC with appropriate detectors Demonstration for the working of texture analyzer Demonstration for the working of ICP with appropriate detectors Demonstration for the working of electrophoretic instrument Demonstration for the working of SEM or TEM

	Demonstration for the working of XRD Demonstration for the working of microplate readers
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Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Food Analysis and Quality Control	David L. Nelson and Michael M. Cox	Kalyani Publishers	First
2	Food Analysis	S. S. Nielsen	Aspen Publishers	3rd edition
3	Laboratory Manual in Biochemistry	J. Jayaraman	Wiley Eastern Publishers, New Delhi, 1980.	3rd edition

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Certificate in Analytical Instrumentation for Food Analysis	IGMPI	Y	Online assessment	IGMPI	https://www.igmpiindia.org/analytical-instrumentation-for-food-analysis.html

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Practical Manual	Nil	Open Source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	5	32
	Quiz	8	
	Practical Continuous Evaluation	14	
	Attendance	5	
In-Sem Summative	Paper based	10	28
	Paper based	10	
	Paper based	8	
End-Sem Summative	End-Sem Exam (Paper Based)	24	40
	Lab End-Sem Exam	16	

Food Biotechnology (FBT)

COURSE CODE	22FT12EX	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Understand the role of microorganisms in foods	2	PSO2, PO1
CO2	Understand the food processing and preservation	3	PO1, PO12, PSO2
CO3	Understand the concept of food quality	3	PSO2, PO6, PO7, PO12
CO4	Apply the advanced scientific principles in food industry.	3	PO12, PO1, PO6
CO5	To be able to apply biotechnology concepts in food technology.	5	PO1, PO5, PO11, PSO1

Syllabus

Module 1	Food associated Microbes History of microorganisms in food, historical developments. Biotechnology in relation to the food industry, nutritive value of food, types of microorganism's associated with food, its sources, types and behavior in foods. Role and significance of microorganisms in food. Intrinsic and extrinsic parameters of foods that affect microbial growth.
Module 2	Food processing Bioprocessing of meat, fisheries, vegetables, dairy product, enzymes and chemicals used in food processing, biochemical engineering for flavor and food productions. Emerging processing and preservation technologies for milk and dairy products.
Module 3	Food preservation Food preservation using irradiation, Characteristics of Radiations of interest in food preservation. Principles underlying the destruction of Microorganisms by irradiation, processing of foods for irradiation. Application of radiation, Radappertization, Radicidation, and Radurization of foods. Legal status of food irradiation. Effect of irradiation of food constituents.
Module 4	Storage of foods Stability of food preservation with low temperatures, high temperatures, drying. Indicator and food borne pathogens. Food borne illness, quality control, HFCS (High Fructose Corn Syrup) and mycoproteins. Air sampling, metabolically injured organisms, enumeration and detection of food-borne organisms.
Module 5	1. Nutritive values of foods; 2. Role of microorganisms in food nutrition; 3. Bioprocessing of meat, fisheries; 4. Bioprocessing of fruits and vegetables; 5. Bioprocessing of dairy products; 6. biochemical engineering for flavor and food productions; 7. Indicator and food borne pathogens; 8. Foodborne illnesses; 9. Quality control of HFCS and mycoproteins; 10. Metabolically injured organisms; 11. Spectrophotometric Determination (DNA quantification and purity); 12. RFLP & DNA Molecular Size Determination; 13. Quantitative determination of Total proteins by Bradford method; 14. Protein Molecular weight Determination.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Biotechnology: A Textbook of Industrial Microbiology,	Crueger and Crueger	Sinauer Associates Inc.,U.S.	2017
2	Frazier, W.S. and Weshoff, D.C.	Food Microbiology	McGraw Hill Book Co., New York	1988

3	Roger, A., Gordon, B. and John, T	Food Biotechnology	Cambridge University Press	1989
4	Prescott & Dunn	Industrial Microbiology	CBS Publishers and Distributors	2004

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	food fermentation and biotechnology	CAS-TWAS	Y		CAS-TWAS	Training courses in food biotechnology (twas.org)
2	Food biotechnology	EPFL	Y		EPFL	Food biotechnology - EPFL

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1			

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	7	25
	Quiz	3	
	Active learning	10	
	Attendance	5	
In-Sem Summative	Paper based	17.5	35
	Paper based	17.5	
End-Sem Summative	End-Sem Exam (Paper Based)	40	40

Indigenous Dairy Products (IDP)

COURSE CODE	22FT21EX	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To get an overview of the indigenous dairy products	2	PO1,PO6,PSO1
CO2	To know to the classifications and starting raw material of each product available in Indian market	3	PO1,PO6,PO11
CO3	To know the ways and methods to prepare the traditional Indian dairy products	3	PO1,PO4,PO6
CO4	To know the ways and methods to prepare the modern Indian dairy products	4	PO12,PO1,PO11
CO5	To be able to demonstrate the knowledge of characterization of components of dairy products.	5	PSO2,PO3

Syllabus

Module 1	Introduction – Classification of traditional dairy products. Indian indigenous milk products have different nomenclature in various regions because of the variation in the ingredients added and method of manufacture involved. For better understanding of the nature of the products, indigenous milk products can be conveniently classified into nine major categories.
Module 2	Skimming of milk – Cream & Cream characteristics, manufacture of yoghurt and other fermented milk products, Ice cream manufacture, Butter making technology, technology of cheese, processing of evaporated and concentrated milks and dried milk powder.
Module 3	Fermented milk products – Present status, Curd, yogurt etc., cheeses, butter milk, lassi etc.; method of manufacture of yoghurt, dahi.
Module 4	Other milk products – Khoa, casein, whey proteins, lactose etc., milk and milk products based sweetmeats (barfi, rasogolla, milk-cake, kalakand, rabdi, Shrikhand, etc.). Chhurpi (Hard, Soft, Dudh), chhenna, paneer, lassi etc; Chakka, probiotic milk products. Fat Rich Indigenous Milk Products – Malai, ghee, makkhan (India variety of butter). Frozen Milk Products – Kulfi, Malai ka baraf Cereal based puddings – Kheer, Payasam Khoa based sweets – Gulabjamun, Barfi, Kalakand, etc.
Module 5	Practical 1. Testing of Milk Powder <ul style="list-style-type: none"> • Moisture Content by IMA • Moisture Content by drying method • Titratable Acidity • Rosalic Acid Test • Scorched Particles • Ash Content • Insolubility Index • Fat Percent (WMP)

	<ul style="list-style-type: none"> • Fat percent (SMP) • Bulk Density <ol style="list-style-type: none"> 2. Testing of Butter <ul style="list-style-type: none"> • Determination of Moisture • Determination of Curd • Determination of Fat • Titratable Acidity • Analysis of Salt in Table Butter 3. Testing of Ice Cream <ul style="list-style-type: none"> • Determination of Fat • Determination of Protein • Titratable Acidity • Determination of Total Solids • Phosphatase Test • Titratable Acidity (Candy Mix) • Determination of Total Solids (Candy Mix) 4. Testing of Paneer <ul style="list-style-type: none"> • Determination of Moisture • Determination of Fat • Determination of Acidity 5. Testing of Ghee <ul style="list-style-type: none"> • Determination of Moisture • Free Fatty Acids Percent as Oleic Acid • Butyro Refractometer Reading • RM Test 6. Testing of Flavoured Milk (UHT Milk) <ul style="list-style-type: none"> • Determination of Fat • Determination of Total Solids • Determination of Acidity 7. Testing of Sterilized Cream <ul style="list-style-type: none"> • Determination of Fat • Determination of Acidity 8. Testing of Lassi <ul style="list-style-type: none"> • Determination of Fat • Determination of Total Solids • Determination of Acidity 9. Testing of Curd <ul style="list-style-type: none"> • Determination of Fat • Determination of Acidity 10. Testing of Water Hardness <ul style="list-style-type: none"> • PH • Sulphite Ions (For Boiler Water) • Phosphate Ions (For boiler water) • Residual Chlorine in Water by Tolidine Method • Residual Chlorine in Water by Chlorotex Method
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Reference Books:

Sl No	Title	Author(s)	Publisher	Year
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1	Technology of Indian Milk Products	B. Srilakshmi	New Age International Publishers	Seventh
2	Foods Facts And Principles	N. Shakuntala Manay (Author), M. Shadaksharaswamy (Author)	New Age International Private Limited	Fourth
3	Food Science And Nutrition 3E	Sunetra Roday (Author)	Oxford University Press	Third
4	Outlines of Dairy Technology	De Sukumar	Oxford University Press	First
5	Technology of Indian Milk Products	Aneja et al.	A Dairy India Publication	First

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Dairy and Food process and products technology	Swayam	Y	MCQ	Swayam	https://onlinecourses.nptel.ac.in/noc21_ag02/preview

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	7	25
	Quiz	3	
	Active learning	10	
	Attendance	5	
In-Sem Summative	Paper based	17.5	35
	Paper based	17.5	
End-Sem Summative	End-Sem Exam (Paper Based)	40	40

Ice-cream and Frozen Desserts (ICFD)

COURSE CODE	22FT21EX	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	NIL
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To understand definition, classification, and composition of ice cream and frozen dessert	2	PO-1,5,7 PSO 1
CO2	To learn about manufacturing aspects of ice cream and frozen dessert and their characteristics	3	PO-1,5,7, PSO 1
CO3	To understand science and technology, supply chain, marketing, and regulatory aspects of such products	4	PO-1,5,7 PSO 1
CO4	To be able to develop the knowledge of ice cream and frozen dessert.	4	PO-1,5,7, PSO 1
CO5	To be able to develop and prepare ice cream and frozen dessert preparation	4	PO-1,5,7, PSO 1

Syllabus

Module 1	Introduction – Concept and history of ice cream and frozen dessert; an overview of the industry.
Module 2	Definitions, classifications, and glossary – Definitions as per FSSAI. Classification of ice cream-I: plain, fruit and nut, chocolate, ice lollies, candies, and kulfi. Classification of ice cream-II: sherbets, mousses, gelato, bisque, custards, cassatta, variegated ice cream, novelties. Composition of ice cream: low-fat, good, average, premium; and frozen desserts: sherbets, ices, soft-serve.
Module 3	Ingredients – Dairy and non-dairy ingredients, stabilizers and emulsifiers: selection, action mechanisms, influence on the final product, proprietary stabilizer blends.
Module 4	Manufacturing technology – Preparation of ice cream mix: standardization, blending, homogenization. Processing: Pasteurization, cooling, ageing, flavor addition. Types of ice cream freezers: Batch, continuous, soft-serve freezers, home-made freezers. Freezing and control of overrun. Effect of processing on physico-chemical properties. Packaging techniques, hardening methods, storage, and shipment. Quality attributes – Nutritional value. Sensory: appearance, color, flavor, body, and texture. Melting quality. Methods of sensory evaluation.
Module 5	1. Preparation of plain ice cream using fresh ingredients and its evaluation for nutritional, sensory, and physico-chemical properties. 2. Preparation of plain ice cream using readymix and its evaluation for nutritional, sensory, and physico-chemical properties. Compare with the results of experiment #1. 3. Preparation of chocolate ice cream using fresh ingredients and its evaluation for nutritional, sensory, and physico-chemical properties. 4. Preparation of chocolate ice cream using readymix and its evaluation for nutritional, sensory, and physico-chemical properties. Compare with the results of experiment #3. 5. Preparation of plain frozen dessert and its evaluation for nutritional, sensory, and physico-chemical properties.

6. Physico-chemical properties: Melting quality, pH, titratable acidity, total solids. Nutritional properties: Protein, fat, dietary fiber, sugars, sodium, calories, cholesterol. Sensory properties: Melting, aroma, hardness, smoothness, iciness, pungency.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	The science of ice cream	Chris Clarke	Royal Society of Chemistry	2012
2	Ice Cream	H. Douglas Goff, Richard W Hartel	Springer US	2013
3	The Ultimate Ice Cream Book: Over 500 Ice Creams	Sorbets, Granitas, Drinks, And More. Bruce Weinstein	William Morrow	1999
4	The ultimate frozen dessert book: a complete guide	Bruce Weinstein Mark Scarbrough	William Morrow Cookbooks	2005

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Certificate in Ice-cream & Frozen Desserts	Faculty of Food Safety and Quality (An Autonomous Body Recognized by Ministry of Commerce & Industry, Government of India)	Y	Written	Y	https://www.igmpiindia.org/Industry-Certificate-in-Spices-and-Plantation-Product-Technology.html

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Lab based learning	-	-

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Active Learning	5	15
	Home Assignments	2	
	Quiz	3	
	Practical Continuous Evaluation	5	
In-Sem Summative	In-Sem 1	15	45
	In-Sem 2	15	
	Practical In-Sem	15	
End-Sem Summative	End-Sem Exam (Paper Based)	20	40
	Lab End-Sem Exam	20	

Nutraceuticals and Functional Foods (NCF)

COURSE CODE	22FT22EX	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To be able to define Nutraceuticals and functional foods (NFF) and to understand basic concepts, terminology and necessity of nutraceuticals and functional foods.	2	PO 1, 5,7 PSO 1
CO2	To get acquainted to nutritional aspects of nutraceuticals and functional foods. To understand the chemistry and physiology effects of NCF.	3	PO 1, 5,7 PSO 1
CO3	To get acquainted to different nutraceutical products in the market.	3	PO 1, 5,7 PSO 1
CO4	To understand manufacturing and stability aspects of NCF.	3	PO 1, 5,7 PSO 1
CO5	To know the Effects of processing, storage and interactions of various environmental factors on the potentials of such foods. And to know the Nutraceuticals products and their constituents	4	PO1, 3, PSO2

Syllabus

Module 1	Introduction: Concept and principles of Nutraceuticals and functional foods, types, nature, and scope for the new-age healthy products. Classification of Nutraceuticals based on chemical and biochemical nature.
Module 2	Physiological role of Nutraceuticals: Nutraceuticals for critical health conditions such as cancer, heart disease, stress, osteoarthritis, hypertension etc. Nutraceuticals products and their constituents. Functional vegetables products - Oil seeds and sea foods, Wild food plants (WFPs). Coffee, tea and other beverages as functional foods/drinks and their protective health effects. Adverse effects and toxicity of Nutraceuticals
Module 3	Nutraceutical products and Marketing: Various types of products available in the market - benefits, marketing claims, and labeling. Recent developments and advances in the areas of nutraceutical and functional foods.
Module 4	Manufacturing and Storage: Formulation of nutraceuticals - raw materials and additives. Manufacturing processes - equipment, materials handling, processing, storage. Stability - Effects of processing, storage and interactions of various environmental factors on the potentials of such foods.
Module 5	Tutorial: Nutraceuticals for critical health conditions such as cancer, heart disease, stress, osteoarthritis, hypertension etc, identifying the Nutraceuticals products and their constituents

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
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1	Functional Foods	R. Chadwick,S. Henson,B. Moseley,G.	CRC Press	1998
2	Methods of Analysis for Functional Foods and Nutraceuticals	W. Jeffrey Hurst	Elsevier,	1998
3	Functional Foods	Mazza	CRC	1998
4	Handbook of Nutraceuticals and Functional Foods	Robert E.C. Wildman	CRC Press	2016

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Functional Foods and Nutraceuticals	Swayam	Y	OL	Swayam	https://onlinecourses.swayam2.ac.in/cec22_ag02/preview

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Effects of processing, storage and interactions of various environmental factors on the potentials of such foods	Nil	Open source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	10	30
	Quiz	10	
	Tutorial	5	
	Attendance	5	
In-Sem Summative	Paper based	15	30
	Paper based	15	
End-Sem Summative	End-Sem Exam (Paper Based)	24	40
	Lab End-Sem Exam	16	

Mathematics for Biologists (MB)

COURSE CODE	2FT22EX	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	NIL
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Applying Basic Mathematical Concepts: Number systems and operations, Algebraic expressions and equations, Functions and graphs, Exponents and logarithms.	3	PO1
CO2	Applying concept of Limits and continuity, Derivatives and their applications in biology (e.g., rates of change, optimization) Integration and its applications (e.g., area under curves, accumulation in biological processes)	3	PO1
CO3	Applying the concept of Vectors and vector spaces, Matrices and matrix operations, Systems of linear equations, Eigenvalues and eigenvectors (relevant for modeling biological systems)	3	PO1
CO4	Applying First-order differential equations and their applications in biology (e.g., population dynamics, biochemical reactions), Higher-order linear and nonlinear differential equations, Systems of differential equations and their solutions. Solving first order differential equations by using numerical methods (Euler, RK method).	3	PO1

Syllabus

Module 1	Introduction to Basic Mathematical Concepts: Number systems and operations, Algebraic expressions and equations, Functions and graphs, Exponents and logarithms.
Module 2	Calculus: Limits and continuity, Derivatives and their applications in biology (e.g., rates of change, optimization) Integration and its applications (e.g., area under curves, accumulation in biological processes)
Module 3	Linear Algebra: Vectors and vector spaces, Matrices and matrix operations, Systems of linear equations, Eigenvalues and eigenvectors (relevant for modeling biological systems)
Module 4	Differential Equations: First-order differential equations and their applications in biology (e.g., population dynamics, biochemical reactions), Higher-order linear and nonlinear differential equations, Systems of differential equations and their solutions. Solving first order differential equations by using numerical methods (Euler, RK method).

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	HIGHER ENGINEERING MATHEMATICS	B. S GREWAL		
2	ADVANCED ENGINEERING MATHEMATICS	ERWIN KREYSZIG		

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Introductory Mathematical Methods for Biologists	NPTEL	Y	ONLINE	NPTEL	https://onlinecourses.nptel.ac.in/noc20_bt13/preview
2	Biostatistics and Mathematical Biology	UDEMY	Y	ONLINE	UDEMY	https://www.classcentral.com/course/swayam-biostatistics-and-mathematical-biology-13925

Tools used in Practical / Skill: NIL

Sl No	Tool Name	Parent Industry	Open Source/ Commercial

Evaluation Components:

In-Sem Exam-I	18	Summative	36
In-Sem Exam-II	18		
ALMs	8		
Tutorial	8	Formative	24
Home Assignment and Book. (Min. 4 Assignments etc.)	8		
End Semester Exam		40	

Flavor Chemistry and Technology (FCT)

COURSE CODE	22FT22EX	MODE	R	LTPS	3-1-0-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To get acquainted to the concepts of food flavor.	2	PO1, PO11, PSO1
CO2	To learn and apply flavor chemistry and technology.	3	PO1, PO11, PSO1
CO3	To learn and apply concepts of flavor generation.	3	PO1, PO11, PO12, PSO1
CO4	To learn and apply concepts of flavor control and analysis.	3	PO1, PO11, PSO1

Syllabus

Module 1	Introduction to Flavor as a Sensory Perception: Definitions, Anatomy of flavor – Perception of taste and aroma, Gustation and Olfaction, gustatory receptors, Types of taste (sweet, sour, salty, bitter, and umami) and their perception, Types of odors (spicy, flowery, fruity, resinous or balsamic, burnt, and foul) and their perception. Good flavor vs. bad flavor.
Module 2	Flavor Chemistry and Technology: Classification of food flavors – flavor class (fruit, vegetable, beverage, meat, fat, cooked, processed, and stench), subdivision, and representative foods. Factors affecting flavor perception. Chemical compounds for flavors, Natural vs Artificial flavors. Flavorists. Off-flavors. Synthetic flavoring materials, flavor intensifiers, flavor extracts.
Module 3	Flavor Generation: Biogenesis of flavors – Generation of flavors by carbohydrate, Lipids and protein metabolism, role of secondary metabolites in flavor generation in fruits and vegetables. Flavor changes during food processing – Sugar Thermal Breakdown, General overview of the Maillard reaction, pathways for flavor formation via the Maillard reaction, Lipid breakdown, Lignin degradation.
Module 4	Flavor Control and Analysis: Control of flavor – importance, effect of processing and microbial contamination. Control of flavor release by encapsulation. Analytical techniques –Chromatography, Mass spectrometry, Solid phase micro extraction, analysis by sensory panels, electronic nose, electronic tongue. Flavor profiling.

Reference Books:

SI No	Title	Author(s)	Publisher	Year
1	Flavor Chemistry and Technology.	Reineccius G.	T&F	2005
2	Food Flavor Technology.	Andrew J. Taylor, Robert S. T. Linforth.	Wiley	2010
3	Food Flavors.	Morton ID and Macleod AJ.	Elsevier	1990

Global Certifications:

Mapped Global Certifications:						
SI No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Flavor 101	FONA	Y			Flavor 101 FONA International

Tools used in Practical / Skill:

SI No	Tool Name	Parent Industry	Open Source/ Commercial
1	Tutorial sessions		Open Source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	7	25
	Quiz	3	
	Active learning	10	
	Attendance	5	
In-Sem Summative	Paper based	17.5	35
	Paper based	17.5	
End-Sem Summative	End-Sem Exam (Paper Based)	40	40

Packaging Materials (PM)

COURSE CODE	22FT31EX	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To be able to have an overview of various materials used for packaging of foods.	2	PO 4, 5,6 PSO 3
CO2	To be able to have an understanding of structure and properties of packaging materials.	3	PO 4, 5,6 PSO 3
CO3	To be able to have an understanding of testing of packaging materials.	3	PO 4, 5,6 PSO 3
CO4	To be able to have an understanding of applications of packaging materials in foods.	3	PO 4, 5,6 PSO 3
CO5	To be able to apply the knowledge of food packaging materials in testing their suitability for foods.	4	PO 4, 5,6 PSO 3

Syllabus

Module 1	Overview of packaging materials: Brief history and evolution of packaging materials. Need of packaging materials. Role of packaging in extending preservation and shelf-life of foods. Packaging materials used for foods (Paper and paperboard, plastics, metals, glass, wood, jute). Packaging forms. Sustainability considerations and recent developments.
Module 2	Structure and properties: Paper and paperboard (kraft paper, multilayer boards, solid bleached board, unbleached kraft paperboard, recycled paperboard). Properties. Plastics (polyolefins, polyester, vinyl, etc.). Metals (steel, aluminum). Glass. Wood. Jute. Food grade materials.
Module 3	Tests: Compositional (Fourier Transform Infrared Spectroscopy). Morphological (Microscopy). Mechanical (tensile, compressive). Chemical (resistance). Thermal (Differential Scanning Calorimetry, Thermogravimetric Analysis). Transport-worthiness (drop, vibration, compression). Barrier (WVTR, OTR).
Module 4	Materials used in food packaging: Dairy products (Milk, curd, buttermilk, ghee, paneer, etc.). Meat products (poultry, meat, fish). Fruits and vegetables (whole, cut, juices, etc.). Bakery, snacks, and confectionary products (Bread, biscuits, crackers, cake, chocolates, candies, etc.). Dry products (Grains, pulses, coffee, tea, etc.).
Module 5	<ol style="list-style-type: none"> 1. Identification tests on plastic packaging materials using FTIR instrument. 2. Determination of morphology of a packaging material. 3. Identifying directionality of paper. 4. Determination of grammage of a packaging material. 5. Testing of tensile properties of a food packaging material. 6. Testing of tear properties of a food packaging material. 7. To determine Burst index of paper material. 8. To determine Crush properties of corrugated boards. 9. To determine the bending stiffness of paper and paperboards. 10. To determine the bonding strength of paperboard. 11. To determine the bonding strength of a laminate. 12. Testing of thermal transitions of a food packaging material. 13. Testing of thermal degradation of a food packaging material.

	14. Testing barrier properties of a packaging material.
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Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Food Packaging: Principles and Practice	Gordon L. Robertson	Prentice Hall	2013
2	Food Packaging and Shelf Life: A Practical Guide	Gordon L. Robertson	App. Sci. Publ.	2010
3	Plastics Packaging: Properties, Processing, Applications, and Regulations	Ruben Hernandez, Susan E. M. Selke, John Culter, John D. Culter	Pergamon Press	2000
4	Fundamentals of Packaging Technology	Walter Soroka	InterSci. Publ.	2014

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Polymers in Packaging	The Packaging School, LLC	Y	Online	The Packaging School, LLC	https://packagingschool.com/courses/polymers-in-packaging

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Lab manual		Open Source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Active Learning	5	15
	Home Assignments	2	
	Quiz	3	
	Practical Continuous Evaluation	5	
In-Sem Summative	In-Sem 1	15	45
	In-Sem 2	15	
	Practical In-Sem	15	
End-Sem Summative	End-Sem Exam (Paper Based)	20	40
	Lab End-Sem Exam	20	

Packaging Design & Converting Process (PDCP)

COURSE CODE	22FT31EX	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To be able to have an overview of various packaging design and materials converting aspects.	2	PO 4, 5,6 PSO 3
CO2	To be able to have an understanding of packaging design requirements.	3	PO 4, 5,6 PSO 3
CO3	To be able to develop an understanding of converting processes for paper, glass, and metal packaging materials.	3	PO 4, 5,6 PSO 3
CO4	To be able to develop an understanding of converting processes for plastic packaging materials.	3	PO 4, 5,6 PSO 3
CO5	To be able to apply the knowledge of package designing and converting in real world scenario.	4	PO 4, 5,6 PSO 3

Syllabus

Module 1	Overview of packaging design: Brand representation (Product differentiation, product positioning). Graphic design (Role of graphic design, demographics and psychographics). Structural design for primary packaging, secondary packaging, and truckload; prototype, testing criteria of performance. Design for sustainable packaging. Software for design.
Module 2	Converting processes in general: Sealing (Bar, induction). Welding. Coating (Extrusion, roller). Lamination. Cutting. Creasing. Folding. Gluing. Stitching. Printing (Offset, flexographic, gravure). Web handling.
Module 3	Making of paper and paperboard. Carton-making. Corrugation process, production of corrugated board, box-making. Making of composite can. Making of glass bottles: Raw materials processing, molding. Metal converting: Making of tin can. Making of aluminum can.
Module 4	Plastic extrusion processes and equipment: Single-layer. Multi-layer. Blown film. Cast film. Plastic molding: Injection. Blow. Rotational. Compression. Transfer. Thermoforming.
Module 5	<ol style="list-style-type: none"> 1. Design a pouch for a food product. 2. Design a bottle for a food product. 3. Design a folding carton. 4. Design a corrugated box. 5. Demonstration of pulp and paper making. 6. Demonstration of carton making. 7. Demonstration of box making. 8. Demonstration of glass bottle molding. 9. Demonstration of tin can making. 10. Demonstration of aluminum can making. 11. Demonstration of composite can making. 12. Demonstration of film extrusion. 13. Demonstration of plastic bottle molding.

	14. Demonstration of thermoforming.
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Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Structural Package Designs (Pepin Press Design Book Series)	Haresh Pathak	Pepin Press	1998
2	Package Design Workbook: The Art and Science of Successful Packaging	Steven DuPuis, John Silva	Rockport Publishers	2011
3	The Package Design Book	TASCHEN GmbH	TASCHEN GmbH	2010

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Packaging Design Workflow	The Packaging School, LLC	Y	Online	The Packaging School, LLC	https://packagingschool.com/courses/packaging-design-workflow
2	Introduction to Package Printing	TAPPI	Y	Online	The Packaging School, LLC	https://learn.packagingschool.com/courses/package-printing?ref=b47580

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Lab manual		Open Source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Active Learning	5	15
	Home Assignments	2	
	Quiz	3	
	Practical Continuous Evaluation	5	
In-Sem Summative	In-Sem 1	15	45
	In-Sem 2	15	
	Practical In-Sem	15	
End-Sem Summative	End-Sem Exam (Paper Based)	20	40
	Lab End-Sem Exam	20	

Oils, Fats, Spices, and Condiments (OFSC)

COURSE CODE	22FT31EX	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	NIL
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To get acquainted to oils, fats, spices, and condiments	2	PO-1,5,7 PSO 1
CO2	To learn and apply technology of edible oils and fats	3	PO-1,5,7, PSO 1
CO3	To learn and apply technology of spices and condiments	4	PO-1,5,7 PSO 1
CO4	To learn and apply quality aspects of oils, fats, spices, and condiments	4	PO-1,5,7, PSO 1
CO5	To be able to demonstrate process and analyze oils, fats, spices, and condiments.	4	PO-1,5,7, PSO 1

Syllabus

Module 1	Introduction to Oils, Fats, Spices, and Condiments: Definitions and terminology, classification, sources, extraction / preparation, uses in food industry, processing, preservation, storage. Domestic and international market.
Module 2	Edible Oils and Fats: Definition, structure, properties, functions, classification, dietary sources, chemical reactions, deficiencies and excess, recommended dietary allowances (RDA values). Rancidity of fats.
Module 3	Spices and Condiments Processing Technology: Classification and composition of spices and condiments. Fumigation and irradiation of spices. Post-harvest technology – spice oils, spice powders, oleoresins, flavor components, concentrates.
Module 4	Quality Standards and Specifications: Quality of oils, fats, spices, and condiments – aspects, parameters, significance, test methods and techniques; Adulteration (adulterants, health effects, detection). Quality standards in regulated markets and compliance.
Module 5	<ol style="list-style-type: none"> 1. Preparation of Spice Powders. 2. Detection of Adulteration in Spices. 3. Determination of Capsaicin Content of Chilies. 4. Estimation of Curcumin in Turmeric. 5. Preparation of Virgin Oil. 6. Saponification, iodine, and acid value of edible oils – fresh, stale and packed foods.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Chemistry and Technology of Oils and Fats	Chakrabarty MM	Prentice Hall	2003
2	Fats and Oils - Chemistry and Technology	Hamilton RJ & Bhati A	App. Sci. Publ.	1980
3	Standard Methods of Analysis of Oils, Fats and Derivatives	Paquot C	Pergamon Press	1979
4	Bailey's Industrial Oil and Fat Products	Swern D	InterSci. Publ. 28	1964

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Certificate in Spices & Plantation Product Technology	Faculty of Food Safety and Quality (An Autonomous Body Recognized by Ministry of Commerce & Industry, Government of India)	Y	Written	Y	https://www.igmpiindia.org/Industry-Certificate-in-Spices-and-Plantation-Product-Technology.html

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Lab based learning	-	-

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Active Learning	5	15
	Home Assignments	2	
	Quiz	3	
	Practical Continuous Evaluation	5	
In-Sem Summative	In-Sem 1	15	45
	In-Sem 2	15	
	Practical In-Sem	15	
End-Sem Summative	End-Sem Exam (Paper Based)	20	40
	Lab End-Sem Exam	20	

Brewing and Beverage Technology (BBT)

COURSE CODE	22FT31EX	MODE	R	LTPS	3-0-2-0	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To get acquainted to brewing and beverages	2	PO 1, 5, 12
CO2	To learn and apply technology of non-alcoholic beverages	3	PO 1, 5, 12
CO3	To learn and apply technology of alcoholic beverages	3	PO 1, 5, 12
CO4	To learn and apply wild food plants	3	PO 1, 3, 5; PSO 3
CO5	To be able to demonstrate brewing and analyzing beverages.	5	PO 1, 5; PSO 2

Syllabus

Module 1	Introduction to Brewing: Brewing science – Definitions and terminology, various brewed alcoholic and non- alcoholic beverages in the market, introduction to brewing methods for alcoholic and non- alcoholic beverages (raw materials, processes)), factors affecting brew quality.
Module 2	Technology of Beverages: Types of beverages and their importance; status of beverage industry in India; Manufacturing technology for juice-based beverages; synthetic beverages; technology of still, carbonated, low-calorie and dry beverages; isotonic and sports drinks; role of various ingredients of soft drinks, carbonation of soft drinks.
Module 3	Non-Alcoholic Beverages: Water. Carbonated and non-carbonated beverages. Coffee – bean processing, blending, roasting, grinding, brewing. Caffeine – effect on health. Decaffeinated coffee – methods of decaffeination, Instant coffee processing. Tea – types of tea, chemical constituents, harvesting, processing and packaging. Instant tea processing. Fruit juices and other fruit pulp-based beverages. Specialty beverages based on tea, coffee, cocoa, spices, plant extracts, herbs, nuts, dairy and imitation dairy-based beverages. Sports beverages. Quality aspects of non-alcoholic beverages.
Module 4	Alcoholic Beverages: Types, manufacture and quality evaluation; the role of yeast in beer and other alcoholic beverages, ale type beer, lager type beer, technology of brewing process, equipment used for brewing and distillation, wine and related beverages, distilled spirits (whisky, rum, gin and brandy), Traditional alcoholic beverages: toddy, chang, kaomak, takju, feni and madhuka. Quality aspects of alcoholic beverages.
Module 5	Practicals Brewing and quality evaluation of coffee. Brewing and quality evaluation of tea. Preparation and quality evaluation of non-carbonated beverages. Preparation and quality evaluation of carbonated beverages. Brewing and quality evaluation of alcoholic beverages. Estimation of Sulphur Dioxide in Beverages. Estimation of Ascorbic Acid Content of Commercial Juices. Estimation of Phenolic Content in Beverages. Analysis of Mineral Content of Bottled Water. Analysis of Nutrient Content in Sports Drinks.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Handbook of Brewing	Hardwick WA	Marcel Dekker	First

2	Handbook of Food and Beverage Fermentation Technology	Hui YH. et al	Marcel Dekker	First
3	Handbook of Brewing	Priest FG & Stewart GG	CRC	Second

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	The Science of Beer	Wageningen University & Research	Y	MCQ	Wageningen University & Research	https://www.wur.nl/en/show/the-science-of-beer.htm

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Practical Manual	Nil	Open Source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	5	32
	Quiz	8	
	Practical Continuous Evaluation	14	
	Attendance	5	
In-Sem Summative	Paper based	10	28
	Paper based	10	
	Paper based	8	
End-Sem Summative	End-Sem Exam (Paper Based)	24	40
	Lab End-Sem Exam	16	

Principles of Food Preservation (PFP)

COURSE CODE	22FT12C1	MODE		LTPS	3-0-0-4	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	Introduction to food preservation techniques.	2	PO 1, 3, 5. PSO 3
CO2	To get acquainted to conventional food preservation techniques	3	PO 1, 3, 5. PSO 3
CO3	To understand modern filtration technology	3	PO 1, 3, 5. PSO 3
CO4	To know novel, i.e., non-thermal food processing techniques	3	PO 1, 3, 5. PSO 3
CO6	To able to know about the skilling techniques to be done in preservation of foods.	4	PO 1, 3, 5. PSO 3

Syllabus

Module 1	History, Scope and principles of food preservation; Preservation Methods- preservation by low temperature - processing, mechanism, refrigeration, chilling. Preservation Methods- preservation by low temperature - processing, mechanism, freezing, freezing curve, changes occurring during freezing, types of freezing, thawing, and its effects.
Module 2	Preservation by high temperature - Different thermal operations (sterilization, pasteurization, blanching, and UHT processing; Canning - canning equipment and operations). Types of canning containers. Thermal destruction of microorganisms – D-value, F- value, Z-value. Advantages and limitations. Chemical food preservation - Types of chemical preservatives and their functions (synthetic, natural); permissible limits and safety aspects. Advantages and limitations.
Module 3	Introduction to membrane processing - General principles, dead end and cross flow, Classification of membrane system - Reverse Osmosis. Classification of membrane system - Nano Filtration, Ultra Filtration, Micro Filtration, Electro-dialysis and Pervaporation. Commercial examples. Advantages and limitations.
Module 4	Introduction; Irradiation, microwave, radio-frequency, high-pressure processing, pulsed electric field, hurdle technology. Ohmic heating, cold plasma; modified-atmosphere packaging, vacuum packaging, aseptic processing, ultrasound. Advantages and limitations.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Food Processing Technology, Principles and Practices	J. P. Fellows	Wood Head Publishing	2022
2	Physical Principles of Food Preservation: Revised and Expanded	Marcus Karel, Daryl B. Lund	Blackwell Publishing & IFT	2003
3	Food Science	N. N. Potter and J. H. Hotchkiss	Springer	1999

Global Certifications:

Mapped Global Certifications:

SI No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Food Processing	Technology Ed		Y	5 homework assignments, and 1 final exam	https://www.technologyed.com/courses/food-processing-online-course-certificate/

Tools used in Practical / Skill:

SI No	Tool Name	Parent Industry	Open Source/ Commercial
1			

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	7	25
	Quiz	3	
	Active learning	10	
	Attendance	5	
In-Sem Summative	Paper based	17.5	35
	Paper based	17.5	
End-Sem Summative	End-Sem Exam (Paper Based)	40	40

Food Analysis and Quality Assurance (FAQA)

COURSE CODE	22FT22C1	MODE	Regular	LTPS	2-0-2-4	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To get introduced to analytical aspects of foods in quality and regulatory perspective.	2	PO1, PO3,PSO2
CO2	To understand and apply analytical methods for chemical, physico-chemical, and microbiological properties of foods	3	PSO2,PO3, PSO2
CO3	To understand and apply analytical methods for thermal, rheological, and nutritional properties of foods	3	PO3,PO12,PSO2
CO4	To understand and apply quality assurance aspects of foods.	3	PO3,PO12,PSO2
CO5	To be able to apply analytical methods to food components and food products.	4	PO1, 3, PSO2
CO6	To be able to do a Project on Quality analysis	4	PO1, 3, PSO2

Syllabus

Module 1	Introduction to Food Analysis: Importance of analysis of food components in various food products – purpose, sampling requirements of food components and products. Quality and aspects of food analysis – Properties, parameters, methods, techniques. Regulatory aspects of food analysis.
Module 2	Chemical, Physico-Chemical, and Mechanical Analysis of Foods: Chemical properties – pH, acidity, fat and oil quality, heavy metals (Hg, Pb, As, Cd), pesticide residues. Physico-chemical properties – water activity, water sorption, color. Mechanical properties – porosity, texture, shear, compression, elongation. Analysis of water – pH, hardness, total dissolved solids, chloride content, color, turbidity, titratable acidity, oil & grease
Module 3	Thermal, rheological, microbiological, and Compositional Analysis of Foods: Thermal properties – transition (glass and melting) and degradation temperatures of foods. Rheological properties. Food microbiology – sanitation, sampling, sample preparations, testing. Food composition – moisture, carbohydrates, fats, proteins, fibers, vitamins, minerals.
Module 4	Quality Assurance of Foods: Preparing test procedures. Reporting analytical data, data integrity – overall accuracy, completeness, and consistency of data. Audit requirements by various global regulatory agencies. Preparation of documents
Module 5	<ol style="list-style-type: none"> 1. Practical: Safety evaluation of foods for heavy metal content and pesticides residue. 2. Determination of water activity of foods. 3. Texture analysis of select foods. 4. Analysis of water for various parameters. 5. Determination of thermal properties of foods. 6. Rheological analysis of select food products. 7. Microbiological analysis of select food products. 8. Quantitative determination of carbohydrate and fat content. 9. Quantitative determination of protein and fiber content. 10. Quantitative determination of vitamin and mineral content. 11. Quantitative determination of color of select foods. 12. Determination of color and thermal properties of marketed products.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Handbook of Food Analysis Instruments	Semih Otles	CRC Press	2009
2	Instrumental Methods in Food and Beverage Analysis	David L. B. Wetzel, George Charalambous	Elsevier,	1998
3	Vitamin Analysis For The Health And Food Sciences	Ronald Ray Eitenmiller, Lin Ye, W. O. Landen	CRC	2008
4	Methods of Analysis of Food Components and Additives	Semih Otles	CRC Press	2012

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Certified Food Quality Auditor	IGMPI	Y	OL	IGMPI	https://www.igmpiindia.org/certified-food-quality-auditor.html

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Practical Manual	Nil	Open Source
2	Analytical tools	Nil	Open Source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	5	32
	Quiz	8	
	Practical Continuous Evaluation	7	
	Skill	7	
	Attendance	5	
In-Sem Summative	Paper based	10	28
	Paper based	10	
	Paper based	8	
End-Sem Summative	End-Sem Exam (Paper Based)	24	40
	Lab End-Sem Exam	16	

Fermented and Therapeutic Foods (FTF)

COURSE CODE	22FT22C4	MODE	Regular	LTPS	3-0-0-4	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To get acquainted to need for therapeutic foods	2	PO1,PO3, PSO2
CO2	To learn and apply principles of fermented foods	3	PSO2,PO3, PSO2
CO3	To learn and apply principles of therapeutic foods	3	PO3,PO12,PSO2
CO4	To learn and apply wild food plants	3	PO3,PO12,PSO2
CO5	To be able to apply the knowledge of fermented and therapeutic foods	4	PO1, 3, PSO2

Syllabus

Module 1	Need for Therapeutic Foods: Balanced diets for normal individuals. Therapeutic diets for people suffering from various ailments and disorders. Role of therapeutic foods in maintaining human health.
Module 2	Fermented Foods: Indian traditional fermented food products and health benefits – idli, dosa, dhokla, sauerkraut, kimchi, Kumis and pickles; Preparation and Maintenance of bacterial, yeast and mold cultures for food fermentations. Lactic acid bacteria – activities and health-promoting effects; Dairy Products: Cheeses, curd & yoghurt, butter milk; Fermented meat and fish products, Spoilages, defects and their control.
Module 3	Traditional Plants as Therapeutic Foods: Important herbs and their therapeutic uses – Tulsi, neem, fennel, turmeric, ginger, cinnamon, ginseng, aloe, etc. Vegetables – Bottle Gourd, Bitter Gourd, Drumstick. Fruits – Custard Apple, Breadfruit, Jackfruit, Jambolan, Cayenne Cherry, Pomegranate.
Module 4	Wild Food Plants (WFPs) as Therapeutics Foods: Indian wild vegetables – Vegetables grown in the jungles of India those have medicinal values, seasons they are grown in and availability, their constituents and nutritional composition, ailments that can be avoided and / or cured by consuming WFPs.
Module 5	Skill: 1. Identification of fermented foods and therapeutic foods. 2. Preparing the therapeutic diet for thyroid patient 3. Preparing the therapeutic diet for diabetic patient 4. Preparing the therapeutic diet for PCOD patient 5. Preparing the therapeutic diet for Anaemic adolescents 6. Preparing fermented foods and explaining their health benefits to the new generation people 7. New fermented foods for the new generation and their health benefits 8. Explaining the Fermented meat and fish products, Spoilages, defects and their control.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	Handbook of Fermented Functional Foods	Edward R. (Ted) Farnworth	CRC Press	2008
2	Himalayan Fermented Foods: Microbiology, Nutrition, and Ethnic Values.	Jyoti Prakash Tamang	CRC Press	2009

3	Microbiology of Fermented Foods.	M. R. Adams (auth.), Brian J. B. Wood (eds.).	Spinger	2010
4	Hand Book of Therapeutic foods	Alexandru Mihai Grumezescu, Alina Maria Holban	Academic Press	2017

Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Therapeutic Nutrition	Keystone	Y	OL	Keystone	https://www.onlinesudies.com/courses/therapeutic-nutrition

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Skill: Identifying the therapeutic foods and fermented foods.	Nil	Open Source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	5	32
	Quiz	8	
	Skill	14	
	Attendance	5	
In-Sem Summative	Paper based	10	28
	Paper based	10	
	Paper based	8	
End-Sem Summative	End-Sem Exam (Paper Based)	24	40
	Lab End-Sem Exam	16	

Food Packaging Technology (FPT)

COURSE CODE	22FT32C2	MODE	R	LTPS	2-0-0-4	PRE-REQUISITE	Nil
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Course Outcomes

CO#	CO Description	BTL	PO Mapping
CO1	To know designing and development of safe food packaging material.	2	PO1, PO11, PSO1
CO2	To know packaging requirement of food product and different types of food packaging system.	3	PO1, PO11, PSO1
CO3	To know various packaging materials and equipment used in packaging industry.	3	PO1, PO11, PO12, PSO1
CO4	To apply the learning toward testing and developing suitable packaging for a given product.	3	PO1, PO11, PSO1
CO5			
CO6	To be able to utilize the learning toward establishing marketable food products.	4	PO5, PO11, PSO1

Syllabus

Module 1	Introduction of Food packaging: Need of food packaging, Role of packaging in extending shelf life of foods, designing of package materials, testing of package materials, Testing of package performance, Principles in the development of safe and protective packing, Safety assessment of food packaging materials.
Module 2	Food packaging systems: Product characteristics and package requirements, Introduction of food packaging system, Different forms of packaging, Rigid, semi-rigid, flexible forms of packaging, Different packaging system for-Dehydrated foods, Frozen foods, Dairy products, Fresh fruits, Vegetables, Meat, Poultry, Sea foods.
Module 3	Introduction of packaging materials: Types of packaging materials their characteristics and uses, Use of paper as a packaging material-Pulping, Fibrillation, Beating, Types of papers, Testing methods, Use of glass as a packaging material-Composition, Properties, Types, Methods of bottle making, Use of metals as a packaging material: Tinsplate containers, Tinning process, Components of tinsplate, Tin free steel (TFS), Types of cans, Aluminum containers, Lacquers, Use of plastics as a packaging material-Types of plastics, Plastic films, laminated plastic materials, Co-extrusion.
Module 4	Package accessories and advances in Packaging technology: Introduction, Active packaging, Modified atmosphere packaging, Aseptic packaging, Packages for microwave ovens, Biodegradable plastics, Edible gums, Coatings, Packaging equipment and machinery- Vacuum packaging machine, CA & MA packaging machine, Gas packaging machine, Seal and shrink packaging machine. Form & fill sealing machine, Aseptic packaging systems, Retort pouches, Bottling machines, Carton making machines, Package printing machines.

Reference Books:

Sl No	Title	Author(s)	Publisher	Year
1	A Handbook of Food Packaging	P. John Jacob	Daya Publishing House	2010
2	Handbook of Food Packaging Technology	EIRI Board	EIRI	2008

3	Fundamentals of Packaging Technology	Walter Soroka	IOPP	2002
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Global Certifications:

Mapped Global Certifications:						
Sl No	Title	Certification Provider	Proctored (Y/N)	Format of the Exam	Exam Provider	URL of the Certification
1	Food Packaging Technology	NPTEL	Y		NPTEL	Food Packaging Technology - Course (nptel.ac.in)

Tools used in Practical / Skill:

Sl No	Tool Name	Parent Industry	Open Source/ Commercial
1	Skilling manual	Nil	Open Source

Evaluation Components:

Evaluation	Component	Weightage	Total
In-Sem Formative	Home Assignments	5	32
	Quiz	8	
	Skill	14	
	Attendance	5	
In-Sem Summative	Paper based	10	28
	Paper based	10	
	Paper based	8	
End-Sem Summative	End-Sem Exam (Paper Based)	24	40
	Lab End-Sem Exam	16	