THE ASSAM
ROYAL GLOBAL UNIVERSITY
GUWAHATI

ROYAL SCHOOL OF MEDICAL AND ALLIED SCIENCES
(RSMAS)

DEPARTMENT OF NUTRITION AND DIETETICS

COURSE STRUCTURE & SYLLABUS

(BASED ON NATIONAL EDUCATION POLICY 2020)

FOR

B.Sc. IN NUTRITION AND DIETETICS
(4 YEARS SINGLE MAJOR)

W.E.F

AY - 2023 – 24

TABLE OF CONTENTS

Preamble

The National Education Policy (NEP) 2020 conceives a new vision for India's higher education system. It recognizes that higher education plays an extremely important role in promoting equity, human as well as societal well-being and in developing India as envisioned in its Constitution. It is desired that higher education will significantly contribute towards sustainable livelihoods and economic development of the nation as India moves towards becoming a knowledge economy and society.

If we focus on the 21st century requirements, the higher education framework of the nation must aim to develop good, thoughtful, well-rounded, and creative individuals and must enable an individual to study one or more specialized areas of interest at a deep level, and also develop character, ethical and Constitutional values, intellectual curiosity, scientific temper, creativity, spirit of service, and twentyfirst-century capabilities across a range of disciplines including sciences, social sciences, arts, humanities, languages, as well as professional, technical, and vocational subjects. A quality higher education should be capable enough to enable personal accomplishment and enlightenment, constructive public engagement, and productive contribution to the society. Overall, it should focus on preparing students for more meaningful and satisfying lives and work roles and enable economic independence.

Towards the attainment of holistic and multidisciplinary education, the flexible curricula of the University will include credit-based courses, projects in the areas of community engagement and service, environmental education, and value-based education. As part of holistic education, students will also be provided with opportunities for internships with local industries, businesses, artists, crafts persons, and so on, as well as research internships with faculty and researchers at the University, so that students may actively engage with the practical aspects of their learning and thereby improve their employability.

The undergraduate curriculums are diverse and have varied subjects to be covered to meet the needs of the programs. As per the recommendations from the UGC, introduction of courses related to Indian Knowledge System (IKS) is being incorporated in the curriculum structure which encompasses all of the systematized disciplines of Knowledge which were developed to a high degree of sophistication in India from ancient times and all of the traditions and practises that the various communities of India—including the tribal communities—have evolved, refined and

preserved over generations, like for example Vedic Mathematics, Vedangas, Indian Astronomy, Fine Arts, Metallurgy, etc.

At RGU, we are committed that at the societal level, higher education will enable each student to develop themselves to be an enlightened, socially conscious, knowledgeable, and skilled citizen who can find and implement robust solutions to its own problems. For the students at the University, Higher education is expected to form the basis for knowledge creation and innovation thereby contributing to a more vibrant, socially engaged, cooperative community leading towards a happier, cohesive, cultured, productive, innovative, progressive, and prosperous nation."

OVERVIEW:

1.1 Introduction

The National Education Policy (NEP) 2020 clearly indicates that higher education plays an extremely important role in promoting human as well as societal well-being in India. As envisioned in the 21stcentury requirements, quality higher education must aim to develop good, thoughtful, well-rounded, and creative individuals. According to the new education policy, assessments of educational approaches in undergraduate education will integrate the humanities and arts with Science, Technology, Engineering and Mathematics (STEM) that will lead to positive learning outcomes. This will lead to develop creativity and innovation, critical thinking and higher-order thinking capacities, problem-solving abilities, teamwork, communication skills, more in-depth learning, and mastery of curricula across fields, increases in social and moral awareness, etc., besides general engagement and enjoyment of learning. and more in-depth learning.

The NEP highlights that the following fundamental principles that have a direct bearing on the curricula would guide the education system at large, viz.

i. Recognizing, identifying, and fostering the unique capabilities of each student to promote her/his holistic development.

ii. Flexibility, so that learners can select their learning trajectories and programmes, and thereby choose their own paths in life according to their talents and interests.

iii. Multidisciplinary and holistic education across the sciences, social sciences, arts, humanities, and sports for a multidisciplinary world.

iv. Emphasis on conceptual understanding rather than rote learning, critical thinking to encourage logical decision-making and innovation; ethics and human & constitutional values, and life skills such as communication, teamwork, leadership, and resilience.

v. Extensive use of technology in teaching and learning, removing language barriers, increasing access for Divyang students, and educational planning and management.

vi. Respect for diversity and respect for the local context in all curricula, pedagogy, and policy.

vii. Equity and inclusion as the cornerstone of all educational decisions to ensure that all students can thrive in the education system and the institutional environment are responsive to differences to ensure that high-quality education is available for all.

viii. Rootedness and pride in India, and its rich, diverse, ancient, and modern culture, languages, knowledge systems, and traditions.

Food is the most sought-after substance related to world peace. Human beings are able to survive due to innovations in development of agriculture and its products. The B.Sc. programme in Food Nutrition & Dietetics is conceived with the idea of development of Human Resource for engagement in the society and in health sector. The man power generated through the programme may be engaged in the ever-increasing and very important field of health sciences.

The major objective of the programme is as follows:

- Impart theoretical and practical knowledge in the area of food science, nutrition & dietetics so as to enable them to work in hospitals, government programme like NHM & research organizations etc.
- To develop healthy citizens who are competent in their chosen fields
- To instill confidence in the students for overall development of their professional expertise and traits.

Career Opportunities: Various scopes of career opportunities await graduates in Food Nutrition and Dietetics. Some such are as follows.

- Nutritionists
- Dieticians
- Nutrition counsellor
- Nutrition programme planner
- Food Biochemists
- Food Microbiologists
- Food Quality Control Managers
- Food Inspector
- Production Manager
- Academics
- Entrepreneurs in the field

Students can also pursue higher studies such as PG/PhD programme in food technology or other areas in biological sciences

1.2. Credits in Indian Context:

1.2.1. Choice Based Credit System (CBCS) By UGC

Under the CBCS system, the requirement for awarding a degree or diploma or certificate is prescribed in terms of number of credits to be earned by the students. This framework is being implemented in several universities across States in India. The main highlights of CBCS are as below :

- The CBCS provides flexibility in designing curriculum and assigning credits based on the course content and learning hours.
- The CBCS provides for a system wherein students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.
- CBCS also provides opportunity for vertical mobility to students from a bachelor's degree programme to masters and research degree programmes.

1.3 Definitions

1.3.1. Academic Credit:

An academic credit is a unit by which a course is weighted. It is fixed by the number of hours of instructions offered per week. As per the National Credit Framework

1 Credit = 30 NOTIONAL CREDIT HOURS (NCH)
Yearly Learning Hours = 1200 Notional Hours (@40 Credits x 30 NCH)

30 NOTIONAL CREDIT HOURS		
Lecture/Tutorial	Practicum	Experiential Learning
1 Credit = 15 -22 Lecture Hours	10-15 Practicum Hours	0-8 Experiential Learning Hours

1.3.2.Course of Study:

Course of study indicate pursuance of study in a particular discipline/programme.
Discipline/Programmes shall offer Major Courses (Core), Minor Courses, Skill Enhancement Courses (SEC), Value Added Courses (VAC), Ability Enhancement Compulsory Courses (AECCs) and Interdisciplinary courses.

1.3.3. Disciplinary Major:

The major would provide the opportunity for a student to pursue in-depth study of a particular subject or discipline. Students may be allowed to change major within the broad discipline at the end of the second semester by giving her/him sufficient time to explore interdisciplinary courses during the first year. Advanced-level disciplinary/interdisciplinary courses, a course in research methodology, and a project/dissertation will be conducted in the seventh semester. The final semester will be devoted to seminar presentation, preparation, and submission of project report/dissertation. The project work/dissertation will be on a topic in the disciplinary programme of study or an interdisciplinary topic.

1.3.4. Disciplinary/interdisciplinary minors:

Students will have the option to choose courses from disciplinary/interdisciplinary minors and skillbased courses. Students who take a sufficient number of courses in a discipline or an interdisciplinary area of study other than the chosen major will qualify for a minor in that discipline or in the chosen interdisciplinary area of study. A student may declare the choice of the minor at the end of the second semester, after exploring various courses.

1.3.5. Courses from Other Disciplines (Interdisciplinary):

All UG students are required to undergo 3 introductory-level courses relating to any of the broad disciplines given below. These courses are intended to broaden the intellectual experience and form part of liberal arts and science education. Students are

not allowed to choose or repeat courses already undergone at the higher secondary level (12^{th} class) in the proposed major and minor stream under this category.

i. Natural and Physical Sciences: Students can choose basic courses from disciplines such as Natural Science, for example, Biology, Botany, Zoology, Biotechnology, Biochemistry, Chemistry, Physics, Biophysics, Astronomy and Astrophysics, Earth and Environmental Sciences, etc.

ii. Mathematics, Statistics, and Computer Applications: Courses under this category will facilitate the students to use and apply tools and techniques in their major and minor disciplines. The course may include training in programming software like Python among others and applications software like STATA, SPSS, Tally, etc. Basic courses under this category will be helpful for science and social science in data analysis and the application of quantitative tools.

iii. Library, Information, and Media Sciences: Courses from this category will help the students to understand the recent developments in information and media science (journalism, mass media, and communication) ***iv. Commerce and Management:*** Courses include business management, accountancy, finance, financial institutions, fintech, etc.,

v. Humanities and Social Sciences: The courses relating to Social Sciences, for example, Anthropology, Communication and Media, Economics, History, Linguistics, Political Science, Psychology, Social Work, Sociology, etc. will enable students to understand the individuals and their social behaviour, society, and nation. Students be introduced to survey methodology and available large-scale databases for India. The courses under humanities include, for example, Archaeology, History, Comparative Literature, Arts & Creative expressions, Creative Writing and Literature, language(s), Philosophy, etc., and interdisciplinary courses relating to humanities. The list of Courses can include interdisciplinary subjects such as Cognitive Science, Environmental Science, Gender Studies, Global Environment & Health, International Relations, Political Economy and Development, Sustainable Development, Women's, and Gender Studies, etc. will be useful to understand society.

1.3.6. Ability Enhancement Courses (AEC): Modern Indian Language (MIL) & English language focused on language and communication skills. Students are required to achieve competency in a Modern Indian Language (MIL) and in the

English language with special emphasis on language and communication skills. The courses aim at enabling the students to acquire and demonstrate the core linguistic skills, including critical reading and expository and academic writing skills, that help students articulate their arguments and present their thinking clearly and coherently and recognize the importance of language as a mediator of knowledge and identity. They would also enable students to acquaint themselves with the cultural and intellectual heritage of the chosen MIL and English language, as well as to provide a reflective understanding of the structure and complexity of the language/literature related to both the MIL and English language. The courses will also emphasize the development and enhancement of skills such as communication, and the ability to participate/conduct discussion and debate.

1.3.7. Skill Enhancement Course (SEC): These courses are aimed at imparting practical skills, hands-on training, soft skills, etc., to enhance the employability of students and should be related to Major Discipline. They will aim at providing hands- on training, competencies, proficiency, and skill to students. SEC course will be a basket course to provide skill-based instruction. For example,

SEC of English Discipline may include Public Speaking, Translation & Editing and Content writing.

A student shall have the choice to choose from a list, a defined track of courses offered from 1st to 3rd semester.

i. Understanding India: The course aims at enabling the students to acquire and demonstrate the knowledge and understanding of contemporary India with its historical perspective, the basic framework of the goals and policies of national development, and the constitutional obligations with special emphasis on constitutional values and fundamental rights and duties. The course would also focus on developing an understanding among student-teachers of the Indian knowledge systems, the Indian education system, and the roles and obligations of teachers to the nation in general and to the school/community/society. The course will attempt to deepen knowledge about and understanding of

India's freedom struggle and of the values and ideals that it represented to develop an appreciation of the contributions made by people of all sections and regions of the

country, and help learners understand and cherish the values enshrined in the Indian Constitution and to prepare them for their roles and responsibilities as effective citizens of a democratic society.
ii. Environmental science/education: The course seeks to equip students with the ability to apply the acquired knowledge, skills, attitudes, and values required to take appropriate actions for mitigating the effects of environmental degradation, climate change, and pollution, effective waste management, conservation of biological diversity, management of biological resources, forest and wildlife conservation, and sustainable development and living. The course will also deepen the knowledge and understanding of India's environment in its totality, its interactive processes, and its effects on the future quality of people's lives.

iii. Digital and technological solutions: Courses in cutting-edge areas that are fast gaining prominences, such as Artificial Intelligence (AI), 3-D machining, big data analysis, machine learning, drone technologies, and Deep learning with important applications to health, environment, and sustainable living that will be woven into undergraduate education for enhancing the employability of the youth. ***iv. Health & Wellness, Yoga education, sports, and fitness:*** Course components relating to health and wellness seek to promote an optimal state of physical, emotional, intellectual, social, spiritual, and environmental well-being of a person. Sports and fitness activities will be organized outside the regular institutional working hours. Yoga education would focus on preparing the students physically and mentally for the integration of their physical, mental, and

spiritual faculties, and equipping them with basic knowledge about one's personality, maintaining self-discipline and self-control, to learn to handle oneself well in all life situations. The focus of sports and fitness components of the courses will be on the improvement of physical fitness including the improvement of various components of physical and skills-related fitness like strength, speed, coordination, endurance, and flexibility; acquisition of sports skills including motor skills as well as basic movement skills relevant to a particular sport; improvement of tactical abilities; and impro These are a common pool of courses offered by different disciplines and aimed towards embedding ethical, cultural and constitutional values; promote critical thinking. Indian knowledge systems; scientific temperament of students.

1.3.9. Summer Internship /Apprenticeship:

The intention is induction into actual work situations**.** All students must undergo internships / Apprenticeships in a firm, industry, or organization or Training in labs with faculty and researchers in their own or other HEIs/research institutions during the ***summer term***. Students should take up opportunities for internships with local industry, business organizations, health and allied areas, local governments (such as panchayats, municipalities), Parliament or elected representatives, media organizations, artists, crafts persons, and a wide variety of organizations so that students may actively engage with the practical side of their learning and, as a by-product, further improve their employability. Students who wish to exit after the first two semesters will undergo a 4-credit workbased learning/internship during the summer term to get a UG Certificate.

1.3.9.1. Community engagement and service: The curricular component of 'community engagement and service' seeks to expose students to the socio- economic issues in society so that the theoretical learnings can be supplemented by actual life experiences to generate solutions to real-life problems. This can be part of summer term activity or part of a major or minor course depending upon the major discipline.

1.3.9.2. Field-based learning/minor project: The field-based learning/minor project will attempt to provide opportunities for students to understand the different socio-economic contexts. It will aim at giving students exposure to development-related issues in rural and urban settings. It will provide opportunities for students to observe situations in rural and urban contexts, and to observe and study actual field situations regarding issues related to socioeconomic development. Students will be given opportunities to gain a first- hand understanding of the policies, regulations, organizational structures, processes, and programmes that guide the development process. They would have the opportunity to gain an understanding of the complex socio-economic problems in the community,

and innovative practices required to generate solutions to the identified problems. This may be a summer term project or part of a major or minor course depending on the subject of study.

1.3.10. Indian Knowledge System:

In view of the importance accorded in the NEP 2020 to rooting our curricula and pedagogy in the Indian context all the students who are enrolled in the four-year UG programmes should be encouraged to take an adequate number of courses in IKS so that the ***total credits of the courses taken in IKS amount to at least five per cent of the total mandated credits*** *(i.e. min. 8 credits for a 4 yr. UGP & 6 credits for a 3 yr. UGP)***.** The students may be encouraged to take these courses, preferably *during the first four semesters of the UG programme*. At least half of these mandated credits should be in courses in disciplines which are part of IKS and are related to the major field of specialization that the student is pursuing in the UG programme. They will be included as a part of the total mandated credits that the student is expected to take in the major field of specialization. The rest of the mandated credits in IKS can be included as a part of the mandated Multidisciplinary courses that are to be taken by every student. All the students should take a Foundational Course in Indian Knowledge System, which is designed to present an overall introduction to all the streams of IKS relevant to the UG programme. The foundational IKS course should be broad-based and cover introductory material on all aspects.

Wherever possible, the students may be encouraged to choose a suitable topic related to IKS for their project work in the 7/8th semesters of the UG programme.

1.3.11. Experiential Learning:

One of the most unique, practical & beneficial features of the National Credit Framework is assignment of credits/credit points/ weightage to the experiential learning including relevant experience and professional levels acquired/ proficiency/ professional levels of a learner/student. Experiential learning is of two types:

a. Experiential learning as part of the curricular structure of academic or vocational program. E.g., projects/OJT/internship/industrial attachments etc. This could be either within the Program-internship/ summer project undertaken relevant to the program being studied or as a part time employment (not relevant to the program being studied- up to certain NSQF level only). In case where experiential learning is a part of the curricular structure the credits would be calculated and assigned as per basic principles of NCrF i.e., 40 credits for 1200 hours of notional learning.

b. Experiential learning as active employment (both wage and self) post completion of an academic or vocational program. This means that the experience attained by a person after undergoing a particular educational program shall be considered for assignment of credits. This could be either Full or Part time employment after undertaking an academic/ Vocation program.

In case where experiential learning is as a part of employment the learner would earn credits as weightage. The maximum credit points earned in this case shall be double of the credit points earned with respect to the qualification/ course completed. The credit earned and assigned by virtue of relevant experience would enable learners to progress in their career through the work hours put in during a job/employment.

Learning Outcomes-Based Approach to Curricular Planning:

The learning outcomes-based curriculum framework is based on the premise that every student and graduate is unique. Each student or graduate has his/her own characteristics in terms of previous learning levels and experiences, life experiences, learning styles and approaches to future career- 2 related actions. The quality, depth and breadth of the learning experiences made available to the students while at the higher education institutions help develop their characteristic attributes.

The key objectives that underpin curriculum planning and development at the undergraduate level include Programme Learning Outcomes, and Course Learning Outcomes. For the B.Sc. (H) Food Nutrition & Dietetics course it includes:

- To demonstrate comprehensive knowledge and understanding of the food nutrition & dietetics curriculum.
- To apply the principles of food nutrition & dietetics and work in health science sector
- To understand that the real-world problems in the field of nutrition and health
- To analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
- To acquire knowledge and skills, including "learning how to learn", that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.
- To use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources.
- To acquire professional competency and entrepreneurial skills for economic empowerment.
- To demonstrate the ability to acquire, analyze, interpret and appropriately present laboratory data

2. Award of Degree

The structure and duration of undergraduate programmes of study offered by the University as per NEP 2020 include:

2.1. Undergraduate programmes of either 3 or 4-year duration with Single Major, with multiple entry and exit options, with appropriate certifications:

2.1.1. UG Certificate: Students who opt to exit after completion of the first year and have secured 40 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. These students are allowed to re-enter the degree programme within three years and complete the degree programme within the stipulated maximum period of seven years.

2.1.2. UG Diploma: Students who opt to exit after completion of the second year and have secured 80 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. These students are allowed to re-enter within a period of three years and complete the degree programme within the maximum period of seven years.

2.1.3. 3-year UG Degree: Students who will undergo a 3-year UG programme will be awarded UG Degree in the Major discipline after successful completion of three years, securing 120 credits and satisfying the minimum credit requirement.

2.1.4. 4-year UG Degree (Honours): A four-year UG Honours degree in the major discipline will be awarded to those who complete a four-year degree programme with 160 credits and have satisfied the credit requirements as given in Table 6 in Section 5.

2.1.5. 4-year UG Degree (Honours with Research): Students who secure 75% marks and above in the first six semesters and wish to undertake research at the undergraduate level can choose a research stream in the fourth year. They should do a research project or dissertation under the guidance of a Faculty Member of the University. The research project/dissertation will be in the major discipline. The students who secure 160 credits, including 12 credits from a research project/dissertation, will be awarded UG Degree (Honours with Research).

Table: 1: Award of Degree and Credit Structure with ME-ME

Award	Year	Credits to earn	Additional Credits	Re-entry allowed within (yrs)	Years to Complete
UG Certificate	1	40	4	3	7
UG Diploma	2	80	4	3	7
3-year UG Degree (Major)	3	120	x	x	x
4-year UG Degree (Honours)	4	160	x	x	x
4-year UG Degree (Honors with Research):	4	160	Students who secure cumulative 75% marks and above in the first six semesters		

3. Graduate Attributes:

Table: 7: The Learning Outcomes Descriptors and Graduate Attributes

Sl.no.	Graduate Attribute	**The Learning Outcomes Descriptors** ***(The graduates should be able to demonstrate the capability to:)***
GA1	Disciplinary Knowledge	Acquire knowledge and coherent understanding of the chosen disciplinary/interdisciplinary areas of study.
GA 2	Complex problem solving	Solve different kinds of problems in familiar and non-familiar contexts and apply the learning to reallife situations.
GA 3	Analytical & Critical thinking	Apply analytical thought including the analysis and evaluation of policies, and practices. Able to identify relevant assumptions or implications. Identify logical flaws and holes in the arguments of others. Analyse and synthesize data from a variety of sources and draw valid conclusions and support them with evidence and examples.
GA 4	Creativity	Create, perform, or think in different and diverse ways about the same objects or scenarios and deal with problems and situations that do not have simple solutions. Think 'out of the box' and generate solutions to complex problems in unfamiliar contexts by adopting innovative, imaginative, lateral thinking, interpersonal skills, and emotional intelligence.
GA 5	Communication Skills	Listen carefully, read texts and research papers analytically, and present complex information in a clear and concise manner to different groups/audiences. Express thoughts and ideas effectively in writing and orally and communicate with others using appropriate media.

GA 6	Research-related skills	Develop a keen sense of observation, inquiry, and capability for asking relevant/ appropriate questions. Should acquire the ability to problematize, synthesize and articulate issues and design research proposals, define problems, formulate appropriate and relevant research questions, formulate hypotheses, test hypotheses using quantitative and qualitative data, establish hypotheses, make inferences based on the analysis and interpretation of data, and predict cause-and-effect relationships. Should develop the ability to acquire the understanding of basic research ethics and skills in practicing/doing ethics in the field/ in personal research work.
GA 7	Collaboration	Work effectively and respectfully with diverse teams in the interests of a common cause and work efficiently as a member of a team.
GA 8	Leadership readiness/qualities	Plan the tasks of a team or an organization and setting direction by formulating an inspiring vision and building a team that can help achieve the vision.
GA 9	Digital and technological skills	Use ICT in a variety of learning and work situations. Access, evaluate, and use a variety of relevant information sources and use appropriate software for analysis of data.
GA 10	Environmental awareness and action	Mitigate the effects of environmental degradation, climate change, and pollution. Should develop the technique of effective waste management, conservation of biological diversity, management of biological resources and biodiversity, forest and wildlife conservation, and sustainable development and living.

4. Programme Learning Outcomes relating to B.Sc (Honours) degree programme in Nutrition & Dietetics

Students graduating with the degree B.Sc. Food Nutrition & Dietetics will be able to achieve the following:

PLO1: Knowledge of Nutrition and Dietetics : Students are able to demonstrate comprehensive knowledge and understanding of one or more disciplines such as chemistry, bio-chemistry, statistics, microbiology, regulations with support of different allied subjects of Health and Nutritional Science

PLO2: Develop Complex Problem solving Skills: Communicate effectively and write effective reports and design documentation, make effective presentations through seminars, project dissertations

PLO3: **Develop Critical Thinking and Analytical Skills:** Recognize the need for, and have the preparation and ability to engage in independent/as an entrepreneur and life-long learning in the broadest context of technological change logical reasoning and capability of recognizing and distinguishing the various aspects of real-life problems.

PLO4 : Develop the Ability to Create: Identify, formulate, review research literature, and analyze complex. Nutrition and Dietetics/applications problems and design solutions for health system and managing health through diet and nutrition

PLO5: Develop Effective Communication Skills: Acquire the practical knowledge and demonstrate the ability to design, conduct/trouble shoot experiments and analyze data in the field of nutrition & dietetics

PLO6: Develop Research Related Skills: The completion of this programme will enable the learner to use appropriate software's to apply for bulk scale/industrial production of technology-based health food products

PLO7: Develop the Ability of Team Building: Recognize new skills, ideas and technologies and its implementation in new product developments**.**

PLO8: Develop Leadership Qualities: Work effectively with health sciences, laboratories and production processing team to build the technical and practical learning aspects.

PLO9: Develop Digital and Technological Skills: Work effectively with the team work and building capabilities and leadership qualities for achieving the vision**.**

PLO10: Environmental awareness and action: Examining the role of health consciousness, environmental awareness and intention on purchase of organic food.

5. B.Sc. Nutrition & Dietetics Programme Specific Outcomes

The programme specific outcomes of the course are-

PSO 1: Knowledge of various areas related to Food Nutrition & Dietetics

PSO 2: Understanding the science behind foods, its physicochemical, nutritional, microbiological aspects

PSO 3: Knowledge of processing and preservation techniques of pulses, oilseeds, spices, fruits and vegetables, meat, fish, poultry, milk & milk products

PSO4: Knowledge on meal planning for normal and therapeutic conditions

6. Teaching Learning Process

Teaching and learning in this programme involve classroom lectures as well as tutorial and remedial classes.

Tutorial classes: Tutorials allow closer interaction between students and teacher as each student gets individual attention. The tutorials are conducted for students who are unable to achieve average grades in their weekly assessments. Tutorials are divided into three categories, viz. discussionbased tutorials (focusing on deeper exploration of course content through discussions and debates), problem-solving tutorials (focusing on problem solving processes and quantitative reasoning), and Q&A tutorials (students ask questions about course content and assignments and consolidate their learning in the guiding presence of the tutor).

Remedial classes: The remedial classes are conducted for students who achieve average and above average grades in their weekly assessments. The focus is laid to equip the students to perform better in the exams/assessments. The students are divided into small groups to provide dedicated learning support. Tutors are assigned to provide extra time and resources to help them understand concepts with advanced nuances. Small groups allow tutors to address their specific needs and monitor them. Following methods are adopted for tutorial and remedial classes:

- Written assignments and projects submitted by students
- Project-based learning
- Group discussions
- Home assignments
- Class tests, quizzes, debates organised in the department

- PPT (Presentation), Seminars and conferences
- Extra-curricular activities like cultural activities, community outreach programmes etc.
- Industrial tour / field visit

7. Assessment Methods

	Component of Evaluation	Marks	Frequency	Code	Weightage (%)
A	**Continuous Evaluation**				
i	Analysis/Class test	Combination of any three from (i) to (v) with 10+10+15 marks each	1-3	C	45%
ii	Home Assignment		1-3	H	
iii	Project		1	P	
iv	Seminar		1-2	S	
v	Viva-Voce/Presentation		1-2	V	
vi	Mid term examination	MSE shall be of 10 marks	1-3	Q/CT	
vii	Attendance	Attendance shall be of 5 marks	100%	A	5%
B	Semester End Examination		1	SEE	50%
	Project				**100%**

Course Structure

B.Sc. in Nutrition & Dietetics

Ist Semester				
Sl. No.	**Subject Code**	**Names of Subject**	**Level of courses**	**Credits**
		Major		
1	NDC152M101	Nutritional Biochemistry	100	3
2	NDC152M102	Fundamentals of Food Science	100	3
3		Swayam		3
4	NDC152M111	Practical on Nutritional Biochemistry	100	3
		Interdisciplinary		
5	IDC 1	IKS I(Introduction to Indian Knowledge System- I)	100	3
		AEC (Ability Enhancement Courses)		
6	CEN982A101	Communicative English		1
7	BHS982A102	Behavioural Science –I		1
		SEC (Skill Enhancement Courses)		
8	NDC152S111	Fruits and Vegetables Processing	100	3
		VAC (Value Added Courses)		
9	VAC 1	Basket Course	3	3
		TOTAL CREDIT		**23**

2nd semester				
Sl. No.	**Subject Code**	**Names of Subject**	**Level of courses**	**C**
		Major		
1	NDC152M201	Elementary Human Physiology	100	3
2	NDC152N202	Basic Microbiology	100	3

3	NDC152M211	Practical on Elementary Human Physiology	100	3
4		Swayam		3
		Interdisciplinary		
5	IDC 2	IKS II (Introduction to Indian Knowledge System- II)	100	3
		AEC(Ability Enhancement Courses)		
6	CEN982A201	Communicative English		1
7	BHS982A202	Behavioural Science –II		1
		SEC (Skill Enhancement Courses)		
8	NDC152S211	Methods of cookery	100	3
		VAC(Value Added Courses)		
9	VAC 2	Basket Course	100	3
		TOTAL CREDIT		**23**

3rd semester				
Sl. No.	**Subject Code**	**Names of Subject**	**Level of courses**	**C**
		Major		
1	NDC152M301	Principles of Human Nutrition	200	4
2	NDC152N302	Menu Planning	200	4
3	NDC152M311	Practical on Human Nutrition	200	4
4		Swayam		3
		Interdisciplinary/Indian Knowledge System		
5	NDC242I301	Traditional foods for health and well-being	200	3
		AEC		
6	CEN982A301	Communicative English		1
7	BHS982A302	Behavioural Science –III		1
		SEC		
8	NDC152S311	Food Quality Evaluation	200	3
		TOTAL CREDIT		**23**

4th semester				
Sl. No.	**Subject Code**	**Names of Subject**	**L**	**C**
		Major		
1	NDC152M401	Principles of Food Processing	200	4
2	NDC152M402	Therapeutic Nutrition I	200	4
3	NDC152N403	Food Product Development	200	3
4	NDC152N404	Sensory Evaluation	200	3
5	NDC152M411	Practical on Food Processing and Therapeutic Nutrition	200	4
6		Swayam		3
		AEC		
7	CEN982A401	Communicative English		1
8	BHS982A402	Behavioural Science –IV		1
		TOTAL CREDIT		**23**
5th semester				
Sl.No.	**Subject Code**	**Names of Subject**	**L**	**C**
		Major		
1	NDC152M501	Therapeutic Nutrition II	300	4
2	NDC152M502	Introduction to Clinical Nutrition	300	4
3	NDC152M503	Community Nutrition	300	4
4	NDC152M511	Practical on Therapeutic & Clinical Nutrition	300	4
5	NDC152M512	Clinical Posting	300	4
		TOTAL CREDIT		**20**

6th semester				
Sl. No.	**Subject Code**	**Names of Subject**	**L**	**C**
		Major		
1	NDC152M601	Nutrition Through life Cycle	300	4
4	NDC152N602	Food Toxicology	300	4
3	NDC152M603	Food Service Management	300	4
5	NDC152N604	Animal Products Processing & Utilization	300	4
4	NDC152M611	Practical on Life cycle Nutrition	300	4
		TOTAL CREDIT		**20**

7th semester				
Sl. No.	**Subject Code**	**Names of Subject**	**L**	**C**
		Major		
1	NDC152M701	Public Health Nutrition	400	4
2	NDC152M702	Food Hygiene & Sanitation	400	4
3	NDC152M703	Food Standard and Quality Control	400	4
4	NDC152M704	Research Methodology	400	4
5	NDC152M711	Practical on Public Health Nutrition	400	4
		TOTAL CREDIT		**20**

8th semester				
Sl. No.	**Subject Code**	**Names of Subject**	**L**	**C**
		Major		
1	NDC152M812	Major Project/Dissertation	400	20
		TOTAL CREDIT		**20**

Detailed Syllabus

Semester I

Course: Major	**Course Level-100**	**Scheme Evaluation: (T)**
Title of Paper: Nutritional Biochemistry		**Subject Code: NDC152M101**
L-T-P-C: 3-0-0-3		**Total credits: 3**

Course Objectives

To train the students with basic knowledge of biochemistry of different major nutrients– carbohydrates, lipids, proteins and related aspects.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Relate** the classifications and functions of major macro nutrients	**BT 1**
CO 2	**Explain** different metabolic pathways	**BT 2**
CO 3	**Develop** different concept of food functions	**BT 3**
CO 4	**Analyse** the significance of the nutrients and health	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Introduction to biochemistry - Definition, objectives, scope and inter relationship between biochemistry and other biological science	**15**
II.	Definition, types and classification of enzymes, definition and types of coenzymes, specificity of enzymes, isozymes, enzyme, kinetics including factors affecting enzyme action, velocity of enzyme catalyzed reactions, enzyme inhibitions	**15**
III.	Intermediary metabolism - Carbohydrate metabolism, glycolysis, TCA cycle and energy generation, gluconeogenesis, glycogenesis, glycogenolysis, blood sugar regulation, Lipids - Oxidation and biosynthesis of fatty acids (saturated and mono-unsaturated) - Synthesis and utilization of ketone bodies, ketosis, fatty livers,	**15**

IV.	Proteins - General reaction of amino acid metabolism, urea cycle, lipoproteins - Types, composition, role and significance in disease.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Texts:

1. West, E. S., Todd, W. R.; Mason. H.S. and Van Bruggen J.T.: 4th Ed. Text book of Biochemistry.Amerind Publishing Co. Pvt. Ltd.
2. Murray, R. K. Grannen, D. K.; Mayes, P. A. and Rodwell. V. W.: Harper's biochemistry. Lange Medical Book.

References:

1. Handler, P.: Smith E.I.; Stelten, D. W. : Principles of biochemistry, Me. Grew Hill Book Co.
2. Lehninger, A.L.; Nelson, D. L. and Cox, M. M. Principles of biochemistry. CBS Publishers and Distributors.
3. Devlin, T. M. : Text Book of biochemistry with clinical corelations. John Wiley and Sons.

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
60	**-**	**30**
		Handling & conducting estimation of human fluids for biochemical parameters

Course: Major	**Level of Course: 100**	**Scheme of Evaluation: (T)**
Title of Paper: Fundamentals of Food Science		**Subject Code: NDC152M102**
L-T-P-C: 3-0-0-3		**Total credits: 3**

Course Outcomes

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

SI No	Course Outcome	Blooms Taxonomy Level
CO 1	**Relate** the principle of food science, and food constituents- its properties and functions	**BT 1**
CO 2	**Explain** the basic preservation techniques used in food science	**BT 2**
CO 3	**Develop** different types of non thermal processing techniques used in food Industry	**BT 3**
CO 4	**Analyse** the different advantages and disadvantages of different preservation techniques in terms of increasing shelf life	**BT 4**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Introduction to Food Science**- Basic terms like food, nutrients, nutrition, diseases and disorders, etc. **Food constituents and their functions:** Carbohydrates and proteins, food sources, effects of deficiency and excess in body	**15**
II.	**Food constituents and their functions:** Lipids, vitamins and minerals, food sources, effects of deficiency and excess in body	**15**
III.	**Food preservation techniques:** Pasteurization, Sterilization, Ultra High temperature, Blanching, etc. Low temperature preservation techniques: Cooling, Evaporation, refrigeration and freezing, Drying	**15**
IV.	**Unit operations in Food Processing**: Cleaning, dry cleaning methods, wet cleaning methods, peeling, grading, sorting.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Texts:

1. Food Science by Norman N Potter and Joseph H. Hotchkiss, CBS Publishers and Distributors.
2. Advanced Textbook on Food and Nutrition by Dr. M. Swaminathan Vol: I & II, The Bangalore Printing and Publishing Co. Ltd.

References:

1. Fellows PJ, 2016. Food Processing Technology, Principles and Practice. Fourth Edition. Woodhead Publishing
2. Sivasankar B. Latest edition. *Food Processing and Preservation*. First Edition. PHI Learning

Course: Major	**Level of Course: 100**	**Scheme of Evaluation: (P)**
Title of Paper: Practical on Nutritional Biochemistry		**Subject Code: NDC152M111**
L-T-P-C: 0-0-6-3		**Total credits: 3**

Course Objectives

Understanding the techniques, handling equipments/apparatus and carry out the experiments

Course Outcomes

On successful completion of the course the students will be able to:		
SI No.	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** basic sample and solution preparations	**BT 1**
CO 2	**classify** the different categories of techniques	**BT 2**
CO 3	**construct** the procedures of biochemical analysis	**BT 3**
CO 4	**analyse** the process of concentration in biological fluids/samples	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Introduction to handling of equipment and instruments, preparation of samples, solutions and buffers	**24**
II	Blood constituents: Estimation of haemoglobin, blood glucose	**22**
III	Estimation of reducing and non-reducing sugars	**22**
IV	Urine constituents: Estimation of protein levels, glucose levels in urine, ketone bodies in urine, urine constituents	**22**
	Total	**90**
	Pedagogy: Lectures, Experiments, Laboratory sessions	

Recommended Texts: As suggested under the theory papers

Course: SEC 1	**Level of Course: 100**	**Scheme of Evaluation: (P)**
Title of Paper: Fruits and Vegetables Processing		**Subject Code: NDC152S111**
L-T-P-C: 0-0-3-3		**Total credits: 3**

Course Outcomes

On successful completion of the course the students will be able to:		
SI No.	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** basic fruits and vegetable varieties and identify their maturity indices	**BT 1**
CO 2	**classify** the TSS, acidity , firmness of different fruits and vegetables	**BT 2**
CO 3	**construct** the process for identification of spices and additives in different fruits and vegetables	**BT 3**
CO 4	**analyse** the procedures for equipment maintenance in a controlled atmospheric unit	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	1.Identification of different food groups (cereals, pulses, fruits and vegetables) 2. Moisture estimation of samples from different food groups (cereals, pulses, fruits and vegetables) as an understanding of perishable, semi- perishable and non-perishable foods.	**24**
II	1. Learning pre-processing operations- sorting, grading, washing, cleaning, peeling, cutting. 2. Learning processing operations- blanching, pasteurization, drying, dehydration, freezing, fermentation.	**22**
III	1. Preparation of jam, jellies and marmalade. 2. Preparation of pickles	**22**
IV	1. Cleaning and maintenance of equipment 2. Project planning on food processing unit.	**22**
	Total	**90**
	Pedagogy: Lectures, Experiments, Laboratory sessions	

Recommended Texts: As suggested under the theory papers

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
60	**-**	**30**
		Food processing techniques of different foods

Semester II

Course: Major	**Level of Course: 100**	**Scheme of Evaluation: (T)**
Title of Paper: Elementary Human Physiology		**Subject Code: NDC152M201**
L-T-P-C: 3-0-0-3		**Total credits: 3**

Course Objectives

To understand the human anatomy and physiology with different systems of the body

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Explain** the human anatomy and physiology	**BT 1**
CO 2	**Identify** different body systems.	**BT 2**
CO 3	**Apply** knowledge in understanding how the systems works	**BT 3**
CO 4	**Analyse** the conditions which may occur due to abnormal functioning of the systems	**BT 4**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	Introduction to anatomy and physiology and structural organization of body. The cell – Structure, its organelles, functions and multiplications, different types of cells and their functions, movement of particles across cell membrane - Active transport and passive transport ,Body fluids and its compartments and functions	**15**
II.	Water output and input into the body and maintenance of water balance in human body , the tissues – Types, structure and their functions, the skeletal system - Anatomy and functions, structure, formation and development of bones, different types of bones and types of joints and their movements.	**15**
III.	Circulatory system - The blood - Composition and function, blood clotting and blood grouping, Heart – Structure, functions, types of circulatory systems, blood pressure and heart rate and factors affecting it,	**15**

	electrocardiogram, the respiratory system - anatomy, functions, mechanism of breathing and respiratory volumes, gas transport and respiratory adaptation, the digestive system - anatomy and functions of alimentary tract and accessory organs, process of digestion of food, absorption and assimilation of digested food, enzymes involved in digestion of food, liver - Structure and functions	
IV	Pancreas – Structure and functions, the urinary system - Anatomy and functions, formation and composition of urine, the endocrine system - important ductless glands of the body and their functions, the reproductive system - Male reproductive system – Anatomy and functions, female reproductive system – Anatomy and functions, menstrual cycle, the nervous system - elementary study of (anatomy and functions), sensory organs – (anatomy and functions). Glossary of terms used in physiology	**15**
	TOTAL	**60**
Pedagogy: Lectures, Assignments, Seminars		

Texts:

1. Arthur J. V. Human physiology- The mechanisms of body function, Tata McGraw Hill Publishing Company, New Delhi.
2. Samson, Applied physiology 10th edn. Revised by Keele, C.A. and Neil, B. Oxford University Press, New York.
3. Guyton C. Text Book of medical physiology 5th edn. W.B. Saunders Company- Philadelphia, London.

References:

1. Text book of Human Physiology by P. Sathya, Viji Devanand, V M Ahuja, CBS Publishers & Distributors, 2018.

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
60	**-**	**30**
		Laboratory experience of conducting assessment on human physiology

Course: Major	**Level of Course: 100**	**Scheme of Evaluation: (T)**
Title of Paper: Basic Microbiology		**Subject Code: NDC152M202**
L-T-P-C: 3-0-0-3		**Total credits: 3**

Course Objectives

To train the students with various microbial growth control techniques in food preparation.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Relate** the scope, importance, basic techniques of microbiology	**BT 1**
CO 2	**Explain** the various sterilization- both physical and chemical methods	**BT 2**
CO 3	**Develop** the different methods for isolation and preservation of food microbes	**BT 3**
CO 4	**Analyse** the application of food microbiology and its comparison to other fields of microbiology	**BT 4**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	History and scope of Microbiology, discovery, importance and relevance of microorganisms. Microscopy: basic techniques of Microscopy optical and electron techniques of microscopy staining and its types.	**15**
II.	**Microbial Control:** sterilization and disinfection techniques. Physical and chemical methods of sterilization. **Important cultural characteristics** of Bactaria, Virus, Fungus and algae. Culture of micro-organisms culture media natural complex, semi defined, synthetic media, minimal media. General and selective media, Anaerobic cultures.	**15**
III.	**Isolation and preservation** of pure cultures. Pour plate method, streak plate spread plate and single cell isolation, micromani pulator and capillary pipette method.	**15**
IV.	**Applications –** Food microbiology, Agriculture microbiology, Medical microbiology, Industrial microbiology Environmental and Biotechnology microbiology.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Texts:

1. Microbiology (5th Ed) by M. J. Pelczar, E. C. S. Chan and Noel R. Krieg. Tata McGrawHill.
2. Microbiology by R. P. Singh Kalyani Publishers.

References:

1. Fellows PJ, 2016. Food Processing Technology, Principles and Practice. Fourth Edition. Woodhead Publishing
2. Sivasankar B. Latest edition. *Food Processing and Preservation*. First Edition. PHI Learning

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
60	**-**	**30**
		Laboratory experience on microbial techniques

Course: Major	**Level of Course: 100**	**Scheme of Evaluation: (P)**
Title of Paper: Practical on Human Physiology		**Subject Code: NDC152M211**
L-T-P-C: 0-0-6-3		**Total credits: 3**

Course Objectives

Understanding the human anatomy and physiology and their relation with diseases and nutrients.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No.	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Define** the human physiological system practically using models	**BT 1**
CO 2	**Classify** the systems of the human body and their functions	**BT 2**
CO 3	**Construct** the slides, solutions and other prepararations required for estimations	**BT 3**
CO 4	**Analyse** different constituents in fluids	**BT 4**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods

I.	Demonstration of animal viscera, identification of systems and organs, identification of cells – epithelial, muscle, nerve etc	**24**
II	Transverse section of stomach , intestine – small and large demonstration of specimens of spleen, kidney and brain models of excretory and reproductive organs and their histology	**22**
III	Colorimetric estimation of RBC count by heamocytometer, estimation of WBC count by heamocytometer, differential counting of WBC using peripheral smear	**22**
IV	Estimation of PCV, ESR, micro and macro heamatocrit, estimation of bleeding and clotting time and blood groups, measurement of pulse rate and blood pressure, its variation with exercise, testing for sensation, special sensors, measurement of body temperature, diurnal variations.	**22**
	Total	**90**
	Pedagogy: Lectures, Experiments, Laboratory sessions	

Recommended Texts: As suggested under the theory papers

Course: SEC 2	**Level of Course: 100**	**Scheme of Evaluation: (P)**
Title of Paper: Methods of cookery		**Subject Code: NDC152S211**
L-T-P-C: 0-0-6-3		**Total credits: 3**

Course Objectives

Understanding the various methods of cookery and resultant products.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No.	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Define** the different methods of cookery	**BT 1**
CO 2	**Classify** the cookery methods and procedural details	**BT 2**
CO 3	**Construct** the products out of different cooking methods	**BT 3**
CO 4	**Analyse** the changes and quality of the output with different methods	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**

I.	Introduction to kitchen equipment and apparatus Handling and care of the equipment and apparatus Sanitization of the equipment and apparatus	**24**
II	Demonstration on basic cooking methods using different categories of foods- cereals, pulses, fruits, vegetables, animal foods	**22**
III	Conduction of different practical using the different methods of cookery and different foods	**22**
IV	Quantity production using different methods and foods	**22**
	Total	**90**
	Pedagogy: Lectures, Experiments, Laboratory sessions	

Recommended Texts: As suggested under the theory papers

Semester III

Course: Major	**Level of Course: 200**	**Scheme of Evaluation: (T)**
Title of Paper: Principles of Human Nutrition		**Subject Code: NDC152M301**
L-T-P-C: 4-0-0-4		**Total credits: 4**

Course Objectives

Understanding how the body processes food for growth, metabolism, and repair.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Relate** the functions of nutrients in terms of disease condition	**BT 1**
CO 2	**Explain** the functioning of nutrients in details	**BT 2**
CO 3	**Develop** understanding related to function of digestion, absorption and the sources of nutrients	**BT 3**
CO 4	**Analyse** the symptoms of the deficiency disease	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**

I.	**Science of Nutrition**, Concept of Nutrition Definition of nutrition, health, nutritional status and malnutrition. **RDA-** Definition, factors affecting RDA and methods used for deriving RDA. **Carbohydrates-** Definition composition, functions, maintenance of blood sugar levels, requirement, sources, digestion and absorption; Dietary fiber- Definition, classification, physiological effects and sources.	**15**
II.	**Proteins-** Definition, composition, nutritional classification of proteins and amino acids, functions, sources, requirements, digestion and absorption. Evaluation of protein quality: PER, BV, NPU and Chemical score. **Lipids-**Definition, composition, functions, sources, requirements, digestion and absorption. Essential fatty acids. Definition, functions, sources and effects of deficiency.	**15**
III.	**Energy-** Definition, units of measurement, direct and indirect calorimetry; Determination of energy value of food, Total Energy requirement, Factors affecting physical activity, Factors affecting Basal Metabolic Rate, factors affecting Thermic effect of food, Recommended Dietary Allowances and Sources	**15**
IV.	**Fat soluble Vitamins Vitamin A, D, E and K:** Functions, requirements, sources and effects of deficiency. Water Soluble Vitamins Thiamine, riboflavin, niacin, ascorbic acid, folic acid, vitamin B6 and vitamin B12: Functions, requirements, sources and effects of deficiency. **Macro Minerals-** Calcium and Phosphorous: Functions, requirements, sources and effects of deficiency. Micro minerals- Iron, Iodine, Copper, Fluorine and Zinc: Functions, sources, requirements and effects of deficiency. Sodium and Potassium: Functions, sources, requirements and effects of imbalances.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Text Books:

1. Gordon. M. Wardlaw et.al; Contemporary Nutrition, 2nd edition, Publishing by Mosby, 2004.
2. Srilakshmi. B; Dietetics, 7th edition,New Age International (P) Limited Publishers, 2014.

Reference Books:

1. William's Nix; Basic Nutrition and Diet therapy, 14th edition, Published by Mosby, 2013.
2. MahtabS.Bamji, Prasad Rao, N.Vinodini Reddy; Textbook of Human Nutrition, Second Edition Oxford and IBH Publishing Co. Pvt .Ltd, 2003.
3. Nutrient Requirement and Recommend Dietary Allowances for Indians by Indian council of Medical research, National Institute of nutrition, Hyderabad.

Credit Distribution

Theory	Practical	Experiential Learning
88	-	32
		Effect of different components of food on human health

Course: Major	**Level of Course: 200**	**Scheme of Evaluation: (T)**
Title of Paper: Menu Planning		**Subject Code: NDC152M302**
L-T-P-C: 4-0-0-4		**Total credits: 4**

Course Objectives

To introduce the students with basics of menu planning based on the required condition.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Relate** the principle of menu planning and its role in daily life	**BT 1**
CO 2	**Explain** the functioning of different types of menus.	**BT 2**
CO 3	**Develop** menus for personal and industrial application.	**BT 3**
CO 4	**Analyse** the hygiene and sanitation of institutional food service.	**BT 4**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Introduction to terms related to menu planning-** RDA, nutritive value and its calculation, evolution of the food service industry, food management, factors affecting food choice.	**15**
II.	**Types of menu**– a la carte menus, static menus, du jour menus, cycle menus, and fixed menus, function of different menus, food groups, food exchange list, benefits and limitations of exchange list, menuplanning according to income groups.	**15**
III.	**Financial Management** – Introduction to financial management, costing and budgeting, pricing, accounting.	**15**

	Planning menu for different institutions - schools, college canteen, hostel, hotels/restaurants, celebrations/parties.	
IV.	**Food hygiene, sanitation and safety:** general principle of food hygiene and sanitation, personal hygiene and food handling habits, definition and meaning, deteriorative effects of microorganisms- physical and chemical changes.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Text Books:

1. Paul J. *et al*; Fundamentals of Menu Planning, 3rd edition, Wiley; 3rd edition (28 March 2008).
2. Sethi M. *et al*; Entrepreneurship and Food Service Management, IGNOU, 2022.

Reference Books:

1. Mohini Seth; Institutional Food Management, 2nd edition, New Age International Publishers, 2016

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
88	**-**	**32**
		Steps and procedures for setting a food court in different institutions

Course: Major	**Level of Course: 200**	**Scheme of Evaluation: (P)**
Title of Paper: Practical on Human Nutrition		**Subject Code: NDC152M311**
L-T-P-C: 4-0-0-4		**Total credits: 4**

Course Objectives

To develop knowledge and apply skill of the students in formulation of healthy diet plans.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Define** the basic terms related to human nutrition	**BT 1**

CO 2	**Classify** the different nutrients based on their function	**BT 2**
CO 3	**Construct** the diet plans related to different condition/ requirement	**BT 3**
CO 4	**Analyse** the role of different food constituents in protecting human health	**BT 4**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	Introduction to food groups, nutritive value and their role in planning diets, concept of "My Plate".	**22**
II.	RDA Table, Menu Planning Planning and calculation one day menu for different age and sex groups mentioning the portion size and nutritive value of each.	**24**
III.	Planning, preparation and calculation of nutritive values of low cost complementary foods.	**22**
IV.	Planning, preparation and calculation of low cost nutritious recipes.	**22**
	TOTAL	**90**
	Pedagogy: Lectures, Assignments, Seminars	

Text Books:

1. Gordon. M. Wardlaw et.al; Contemporary Nutrition, 2nd edition, Publishing by Mosby, 2004.
2. Srilakshmi. B; Dietetics, 7th edition,New Age International (P) Limited Publishers, 2014.

Reference Books:

1. William's Nix; Basic Nutrition and Diet therapy, 14th edition, Published by Mosby, 2013.
2. MahtabS.Bamji, Prasad Rao, N.Vinodini Reddy; Textbook of Human Nutrition, Second Edition Oxford and IBH Publishing Co. Pvt .Ltd, 2003.
3. Nutrient Requirement and Recommend Dietary Allowances for Indians by Indian council of Medical research, National Institute of nutrition, Hyderabad.

Course: IDC	**Level of Course: 200**	**Scheme of Evaluation: (T)**
Title of Paper: Traditional foods for health and well-being		**Subject Code: NDC242I301**
L-T-P-C: 3-0-0-3		**Total credits: 3**

Course Objectives

To develop the students with practical skills to identify key nutritional components and health benefits of traditional food preparations.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the basic terms related to traditional methods of cooking and its impact on nutrition.	**BT 1**
CO 2	**Classify** the relationship between traditional dietary patterns and chronic disease prevention	**BT 2**
CO 3	**Develop** skills to incorporate traditional food principles into modern meal planning	**BT 3**
CO 4	**Analyse** the sustainability aspects of traditional food system.	**BT 4**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Introduction to basic terms of nutrition:** Food, nutrients, nutrition, health, disease, disorder. **Role of nutrition in maintaining health and well-being**	**22**
II.	**Traditional methods of cooking in India:** moist heat methods, dry heat methods, combination methods. **Role of spices and condiments in Indian traditional cooking.**	**24**
III.	**Fermentation and traditional food preservation methods:** Drying, dehydration, pickling, etc. **Medicinal foods and herbs in traditional diets.**	**22**
IV.	**Mini project:** Collection and preparation of a herbarium consisting of common medicinal herbs found in India.	**22**
	TOTAL	**90**
	Pedagogy: Lectures, Assignments, Seminars	

Textbook:

1. Subbulakshmi G., and Subhadra M., Nutrition in traditional therapeutic foods, 2020, Daya Publishing House, Volume-2.

Reference book:

1. Shanahan C., and Shanahan L., Deep Nutrition- Why your genes need traditional food, 2019, Macmillan US.

Course: SEC	**Level of Course: 200**	**Scheme of Evaluation: (T)**
Title of Paper: Food Quality Evaluation		**Subject Code: NDC152S311**
L-T-P-C: 3-0-0-3		**Total credits: 3**

Course Objectives

To develop the students with practical skills required to work in food laboratory and analyse the nutrient aspects of food.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Define** the basic terms related to food analysis	**BT 1**
CO 2	**Classify** the different methods used for analysis of food sample	**BT 2**
CO 3	**Construct** the idea to characterize food products in terms of chemical composition, safety, quality, sensory perception and nutritional value.	**BT 3**
CO 4	**Analyse** the nutrient content of the food sample	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	**Nature and concepts of food analysis**; Different principles of analytical techniques based on colorimetry, spectrophotometry, atomic absorption of spectrophotometry, flame photometry, separation techniques by chromatography.	**22**
II.	**Chemical analysis lab:** need and requirements of a chemical analysis laboratory Proximate analysis of different food groups in terms of moisture, ash, carbohydrate, fibre.	**24**
III.	**Sensory evaluation lab:** introduction to sensory lab, need and requirements, Identification and differentiation of colour, flavour, texture,	**22**

	etc., threshold test using different taste samples like sugar, salt, citric acid and monosodium glutamate. **Sensory panel:** types, criteria for panel selection.	
IV.	**Methods for Sensory Evaluation:** Classification of test methods; discrimination tests: paired-comparison, duo-trio and triangle tests; affective tests: qualitative (interview and focus group) and quantitative tests (paired preference and acceptance tests); Two sample test, Ranking test, Two sample difference test, numeric scoring test, hedonic ranking test.	**22**
	TOTAL	**90**
	Pedagogy: Lectures, Assignments, Seminars	

Texts books:

1. A Manual of Laboratory Techniques. Eds. N. Raghuramulu, K Madhavan Nair, S Kalyansundaram, 1983.National Institute of Nutrition, ICMA, Hyderabad,
2. S. Ranganna (2011) Handbook of Analysis and Quality Control for Fruits & Vegetable Products. Tata McGraw - Hill Publishing Company Ltd. New Delhi.

Reference book :

1. Y. Pomeranz, C.E Meloan (2000) Food Analysis Theory & Practice. Springer

Semester IV

Course: Major	**Level of Course: 200**	**Scheme of Evaluation: (T)**
Title of Paper: Principles of Food Processing		**Subject Code: NDC152M401**
L-T-P-C: 4-0-0-4		**Total credits: 4**

Course Objectives

To understand the importance, principles and need of food processing and learn different processing techniques.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Relate** the significance of different food processing techniques.	**BT 1**
CO 2	**Explain** the various food processing techniques and their impact on nutritional value of food.	**BT 2**

CO 3	**Develop** understanding of different preservation techniques and additives used in them.	**BT 3**
CO 4	**Analyse** the significance of preservative techniques.	**BT 4**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Principles of food processing and preservation-** Preservation by low and high temperatures, canning, osmotic pressure, dehydration & drying, irradiation. & use of preservatives, food additives, definition, types, importance and industrial uses of food additives.	**15**
II.	**Methods of processing of cereals, legumes, and oilseeds:** Composition and nutritive value, milling, parboiling, gelatinization, dextrinization, rancidity. **Methods of processing of fruits and vegetables–**different methods of processing of pickles, juice, squash, canned products etc.	**15**
III.	**Methods of processing of milk & milk products–** composition, fermentation, different methods of processing of pasteurized milk, ghee, butter, curd, cheese etc.	**15**
IV.	**Methods of processing of animal foods–**salting, smoking, curing and fermentation, pickling. **Food fortification and enrichment** -current trends & applications, fermented food products.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Text Books:

Desrosier NW and Desrusier JN (1987) The Technology of Food Preservation, CBS Publishers and Distributors New Delhi

Reference Books:

Srivastava, R P and Kumar S (1998) Fruit and Vegetable preservation-Principles and practices. CBS Publishers and Distributors, New Delhi

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
88	**-**	**32**
		Learning the techniques for handling a food processing industry

Course: Major	Level of Course: 200	Scheme of Evaluation: (T)
Title of Paper: Therapeutic Nutrition I		Subject Code: NDC152M402
L-T-P-C: 4-0-0-4		Total credits: 4

Course Objectives

To understand the role of therapeutic nutrition and types of therapeutic diets.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Relate** the significance of therapeutic nutrition.	**BT 1**
CO 2	**Explain** the need for therapeutic diet based on requirement.	**BT 2**
CO 3	**Develop** understanding of different therapeutic diets and their relation with improving and maintain health.	**BT 3**
CO 4	**Analyse** the effects of therapeutic diets on different health conditions.	**BT 4**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Introduction to medical nutrition therapy-** definition and role of dietician in healthcare, nutrition care process (nutritional assessment, nutritional diagnosis, nutritional intervention, nutrition monitoring and evaluation, documentation), patient care and counselling.	**15**
II.	**Adaptation of therapeutic diets-** routine hospital diet (normal or general diets, liquid diets, soft diets, bland diets), mode of feeding (oral feeding, tube or enteral feeding, peripheral vein feeding, total parental nutrition).	**15**
III.	**Therapeutic diets for gastrointestinal diseases-** gastroesophageal reflux disorder (GERD), indigestion, peptic ulcer, constipation, diarrhoea, inflammatory bowel diseases.	**15**
IV.	**Therapeutic diets for metabolic disorders-** diabetes mellitus (type I DM, type II DM, gestational DM), hypertension, gout, risk factors, management and prevention.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Text books:

1. Joshi, S.A., Nutrition and Dietetics, Tata McGraw Hill Publications, New Delhi, 2004. 2. Srilakshmi B.,Dietetics, New Age International (P) limited Publications, 2004
2. Amy E. Galena, Msh Rd. 2013. Eat to Your Good Health: Exchange Lists and Meal Planning for Eating Disorders. USA

Reference books:

1. Peggy S. Stanfield, Peggy Stanfield, Y. H. Hui. 2010. Nutrition and Diet Therapy: Self- Instructional Approaches. 5th edition. Jones and Bartlett publishers. Canada.
2. B Srilakshmi. 2014. Dietetics. 9th edition, New Age International publishers.

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
88	**-**	**32**
		Planning diets for therapeutic conditions in hospital setup

Course: Major	**Level of Course: 200**	**Scheme of Evaluation: (T)**
Title of Paper: Food Product Development		**Subject Code: NDC152M403**
L-T-P-C: 3-0-0-3		**Total credits: 3**

Course Objectives

To introduce the students with insight for design, development, standardization, regulatory aspects and commercialization of food products.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Relate** the principle of food product development	**BT 1**
CO 2	**Explain** the importance of quality control and food safety.	**BT 2**
CO 3	**Develop** novel nutrient dense food products.	**BT 3**
CO 4	**Analyse** the different government scheme and regulations for food safety.	**BT 4**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**New food products development-** Introduction to new products, customers and consumers, value addition, and market; **Designing new products-** New Food Product Development (NPD) process and activities; Recipe development; Selection of materials/ingredients for specific purposes; Modifications for production on large scale, cost-effectiveness, nutritional needs.	**15**
II.	**Standardization and large scale production-** Process design; Sensory evaluation; Food testing lab requirements; Comparison of market samples.	**15**
III.	**Quality, Safety & Regulatory aspects-** Product stability; Evaluation of shelf life; Changes in sensory attributes and effects of environmental conditions; Developing packaging systems for maximum stability and cost effectiveness; Regulatory aspects: regulatory aspects of FSSAI for a food product.	**15**
IV.	**Marketing characteristics of new products**-product life cycle and profit picture: Opportunities in the marketplace for new product development, technological advances driving new product development, government's role in new product development.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Text Books:

Gordon W Fuller, "New Food Product Development: From Concept to Marketplace",3rd Edition, CRC press, Taylor and Francis Group, UK, 2016.

Reference Books:

Catherine Side., "Food Product Development: Based on Experience", 2nd Edition, Iowa State Press, Blackwell publications, 2008.

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
88	**-**	**32**
		Developing and evaluating new nutrient rich food products

Course: Major	**Level of Course: 200**	**Scheme of Evaluation: (T)**
Title of Paper: Sensory Evaluation		**Subject Code: NDC152M404**
L-T-P-C: 3-0-0-3		**Total credits: 3**

Course Objectives

To introduce the students with insight for development, standardization and evaluating sensory aspects of food products.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Relate** thebasic anatomy and physiology of the sensory organs used to evaluate food.	**BT 1**
CO 2	**Explain** the practical skills and techniques used to analyse the sensory properties of food	**BT 2**
CO 3	**Develop** sensory methods to product development and communicating sensory messages.	**BT 3**
CO 4	**Analyse** the ability to identify solutions to problems related to the sensory analysis of food.	**BT 4**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Introduction:** Definition of sensory evaluation; basic tastes; human senses and sensory perception; threshold; psychophysics, Tongue surface	**15**
II.	**Arrangements for Sensory Evaluation Test controls:** Environment and test room design; product controls: sample preparation and presentation; panelist controls; factors influencing measurements: psychological and physiological errors	**15**
III.	**Methods for Sensory Evaluation:** Classification of test methods; discrimination tests: paired-comparison, duo-trio and triangle tests; affective tests: qualitative (interview and focus group) and quantitative tests (paired preference and acceptance tests); Two sample test, Ranking test, Two sample difference test, numeric scoring test, hedonic ranking test	**15**
IV.	**Subjective and objective methods:** Texture analyser- mechanical characteristics- chewiness, brittleness, and geometric characteristics, Sensory panel-types-criteria for panel selection	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Text Books:

Gordon W Fuller, "New Food Product Development: From Concept to Marketplace",3rd Edition, CRC press, Taylor and Francis Group, UK, 2016.

Reference Books:

Catherine Side., "Food Product Development: Based on Experience", 2nd Edition, Iowa State Press, Blackwell publications, 2008

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
88	**-**	**32**
		Learning evaluation process and using sensory evaluation for evaluating a food product

Course: Major **Level of Course: 200** **Scheme of Evaluation: (P)**

Title of Paper: Practical on Food Processing and Therapeutic Nutrition

Subject Code: NDC152M411

L-T-P-C: 0-0-8-4 **Total credits: 4**

Course Objectives

To develop practical skills of the students required to work in food processing industry and be able to plan diets for therapeutic conditions.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Define** the basic terms related to food processing and therapeutic nutrition.	**BT 1**
CO 2	**Classify** the different methods used for food processing	**BT 2**
CO 3	**Construct** different therapeutic diets based on heath condition.	**BT 3**
CO 4	**Analyse** the nutritive value of the planned diets	**BT 4**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Processing of cereals, pulses and their products-** soaking, drying, grinding, parboiling, boiling, malting, fermentation.	**22**
II.	**Processing of fruits, vegetables and their products-** blanching, , canning, drying, dehydration, freezing, frying. **Processing of milk and milk products-** fermentation, pasteurization.	**24**
III.	**Planning diet for gastrointestinal diseases-** gastroesophageal reflux disorder (GERD), indigestion, peptic ulcer, constipation, diarrhoea, inflammatory bowel diseases.	**22**
IV.	**Planning diet for metabolic disorders-** diabetes mellitus (type I DM, type II DM, gestational DM), hypertension, gout.	**22**
	TOTAL	**90**
	Pedagogy: Lectures, Assignments, Seminars	

Text books:

1. Srivastava, R P and Kumar S (1998) Fruit and Vegetable preservation-Principles and practices. CBS Publishers and Distributors, New Delhi
2. Joshi, S.A., Nutrition and Dietetics, Tata McGraw Hill Publications, New Delhi, 2004. 2. Srilakshmi B.,Dietetics, New Age International (P) limited Publications, 2004

Reference books:

1. Desrosier NW and Desrusier JN (1987) The Technology of Food Preservation, CBS Publishers and Distributors New Delhi
2. Peggy S. Stanfield, Peggy Stanfield, Y. H. Hui. 2010. Nutrition and Diet Therapy: Self- Instructional Approaches. 5th edition. Jones and Bartlett publishers. Canada.
3. B Srilakshmi. 2014. Dietetics. 9th edition, New Age International publishers.

Semester V

Course:Major	**Level of Course:300**	**Scheme of Evaluation:(T)**
Title of Paper: Therapeutic Nutrition -II		**Subject Code: NDC152M501**
L-T-P-C:3-1-0-4		**Total credits:4**

Course Objective:

To understand the etiology, physiological, metabolic anomalies, nutritional management of acute and chronic disorders / diseases

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the factors to consider in dietary management in certain diseased conditions	**BT 1**
CO 2	**Understand** the effect of various disorders / diseases on nutritional status, nutritional and dietary requirements	**BT 2**
CO 3	**Apply** knowledge in dietary management through dietary modification and adaptations in diseases state.	**BT 3**
CO 4	**Analyse** the different diet related situations in diseased conditions.	**BT 4**
CO 5	**Evaluate** the various disorders / diseases on nutritional status, and their dietary & nutritional requirements dietary requirements	**BT 5**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Therapeutic diets for coronary heart disease (CHD)-** dyslipidemia, artereosclerosis, hypertension, angina pectoris, myocardial infartion, congestive cardiac failure, heart attack. **Therapeutic diets for liver disorders**	**15**
II.	**Therapeutic diets for renal diseases (RD)-**acute and chronic nephritis, nephrotic syndrome, acute renal failure, chronic renal failure, end stage renal disease, renal calculi.	**15**
III.	**Therapeutic diets for neurological disorders-** common neurological disorders, physiological aspects of the CNS, feeding and nutritional issues, dysphagia, alzheimers, Parkinson, epilepsy, neurotrauma, spinal trauma.	**15**
IV.	**Therapeutic diets for stress, burns and surgery-** introduction, nutritional requirement during stress, degree of burns (1st, 2nd and 3rd), diet, nutritional assessment, complications, nutritional care of patients with burns, principles of diet therapy, accidental injury- nutritional care and nutrition needed, surgery- nutrients needed, post- operative diet.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Textbooks:

1. Joshi,S.A.,Nutrition and Dietetics, Tata Mc Graw Hill Publications, New Delhi, 2004.

2. Srilakshmi B., Dietetics, New Age International (P) limited Publications, 2004
3. Amy E. Galena, Msh Rd. 2013. Eat to Your Good Health: Exchange Lists and Meal Planning for Eating Disorders, USA

Reference books:

1. Peggy S. Stanfield, Peggy Stanfield, Y. H. Hui. 2010. Nutrition and Diet Therapy: Self Instructional Approaches. 5th edition. Jones and Bartlett publishers. Canada.
2. B. Srilakshmi, Dietetics. 9th edition, New Age International publishers. 2014.

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
88	**-**	**32**
		Practicing therapeutic nutrition, contributing to optimal patient care and outcomes in various healthcare settings.

Course:Major	**Level of Course:300**	**Scheme of Evaluation:(T)**
Title of Paper: Introduction to Clinical Nutrition		**Subject Code:NDC152M502**
L-T-P-C:3-1-0-4		**Total credits:4**

Course Objective:

To understand the concept of basic principles of clinical nutrition and its relevance in healthcare.

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** role of a clinical dietitian in assessing and managing nutritional needs of patients	**BT 1**
CO 2	**Understand** the role of nutrition in prevention and treatment of diseases.	**BT 2**
CO 3	**Apply** the principles of clinical nutrition and its application in patient care.	**BT 3**

CO 4	**Analyse** the basic concepts of therapeutic diets and nutritional assessment.	**BT 4**
CO 5	**Evaluate the** basic principles of diet therapy and modify normal diets to meet therapeutic needs.	**BT 5**

CourseOutline

Modules	Topics(if applicable) & Course Contents	Periods
I.	**Introduction to Clinical Nutrition–** Definition, scope, and significance of clinical nutrition, Difference between normal and therapeutic nutrition, Role of the clinical dietitian in a healthcare team, Introduction to medical ethics and professional conduct in clinical practice	**15**
II.	**Nutrition Care Process (NCP)** :Overview and purpose of NCP, Steps in NCP: Nutrition Assessment, Nutrition Diagnosis, Nutrition Intervention, Monitoring and Evaluation, Documentation in clinical nutrition, Role of evidence-based practice	**15**
III.	**Nutritional Assessment Techniques-** Anthropometric measurements: height, weight, BMI, MUAC, WHR **Biochemical indicators**: blood glucose, hemoglobin, serum protein, lipid profile, Clinical signs of nutritional deficiency and excess, **Dietary assessment methods:** 24-hour dietary recall, Food frequency questionnaire (FFQ), Food diary and weighed food records	**15**
IV.	**Hospital Diets and Feeding Methods**: Types of hospital diets: Regular diet, Soft diet, Full fluid diet, Clear fluid diet **Special feeding methods:** Enteral nutrition (oral supplements, tube feeding**),** Parenteral nutrition (TPN**),** Pre- and post-operative nutritional care**.** Diets for patients on medications (brief intro to drug-nutrient interactions)	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Textbooks:

1. Mahan & Escott-Stump – Krause's Food & the Nutrition Care Process
2. Srilakshmi B. – Dietetics
3. Shubhangini A. Joshi – Nutrition and Dietetics

Reference Books:

1. Gibney M.J. et al. – Introduction to Human Nutrition
2. Antia F.P. & Abraham P. – Clinical Dietetics and Nutrition

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
88	**-**	**32**
		Implementing food standards and checking adulteration in regular food available in the market

Course: Major	**Level of Course:300**	**Scheme of Evaluation:(T)**
Title of Paper: Community Nutrition		**Subject Code: NDC152M503**
L-T-P-C:3-1-0-4		**Total credits:4**

Course Objective:

To understand community health and methods to assess nutritional status and needs at a community level.

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** nutrition-related policies and their impact on community health.	**BT 1**
CO 2	**Understand** how cultural diversity influences dietary practices and nutrition education.	**BT 2**
CO 3	**Apply** skills to design, implement, and evaluate community	**BT 3**

	nutrition programs.	
CO 4	**Analyse** the role of nutrition in public health and community well-being.the lifespan.	**BT 4**
CO 5	**Evaluate** how environmental issues affect food systems and community nutrition.	**BT 5**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Concept of Public Health Nutrition:** Understanding the terms, nutrition, health, healthcare, Role of public health nutrition in community, Public health nutrition- multidisciplinary concept **Nutritional problems: Protein Energy Malnutrition (PEM)**-Prevalence, causes, consequences, threat and prevention, Micronutrient deficiencies.	**15**
II.	**Methods of nutritional assessment** (Direct and Indirect methods), Anthropometric assessment, Biochemical assessment, Clinical assessment, Dietary assessment	**15**
III.	**Nutrition policies and programmes**: National nutrition programmes (ICDS), Supplementary feeding programmes, nutrition deficiency control programmes, food security programmes	**15**
IV.	**Strategies to combat public health nutrition problems:** food based strategies, dietary diversification, food fortification, and nutrition and health education, immunization, implementation of nutritional education programmes, identifying the target audience, designing messages, choosing medium multimedia.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Textbooks:

1. Wadhwa, *et al;* Textbook of Public Nutrition, IGNOU, New Delhi, 2013.
2. Das. S, Textbook of Community Nutrition, 4th Edition, Academia Publisher.

Reference Books:

1. Sehgal & Raghuvardhi, Textbook of Community Nutrition, 4th Edition, Indian Council of Agriculture Research, Pusa, 2000.

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
88	**-**	**32**
		Learning to identify and utilize available resources for community nutrition programs

Course:Major	**Level of Course:300**	**Scheme of Evaluation:(P)**
Title of Paper: Practical on Therapeutic & Clinical Nutrition		**Subject Code:NDC152M511**
L-T-P-C:0-0-8-4		**Total credits:4**

Course Objective:

To understand the importance of therapeutic diets in various disease conditions and identification of food adulterants**.**

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the different diseases and co-morbidities	**BT 1**
CO 2	**Understand** the dietary requirements in different disease conditions	**BT 2**
CO 3	**Apply** the practical knowledge of planning and preparing diets	**BT 3**
CO 4	**Analyse** the presence and effects of various food adulterants	**BT 4**
CO 5	**Evaluate** the presence of food adulterants using laboratory techniques	**BT 5**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	**Anthropometric and Dietary Assessment:** Measuring height, weight, BMI**,** Waist and hip circumference**,** Conducting and interpreting a 24-hour dietary recall**,** Calculating nutrient intake using food composition table	**15**
II.	**Planning and preparation of diet plans for different disease condition-** coronary heart disease, renal disease	**15**
III.	**Planning and preparation of diet plans for different disease condition-** neurological disorders.	**15**
IV.	**Planning and preparation of diet plans for different disease condition-** stress, burns and surgery.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Recommended Texts: As suggested under the theory papers

Semester VI

Course: Major	**Level of Course:300**	**Scheme of Evaluation:(T)**
Title of Paper: Nutrition through lifecycle		**Subject Code:NDC152M601**
L-T-P-C:3-1-0-4		**Total credits:4**

Course Objective:

To understand the nutritional needs at different life stages along with the physiological changes from infancy to elderly.

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** physiological changes that occur throughout life and their impact on nutrition.	**BT 1**
CO 2	**Understand** nutrition-related public health issues and interventions across the lifecycle.	**BT 2**
CO 3	**Apply** skills to evaluate nutrition information in real-life scenarios.	**BT 3**
CO 4	**Analyse** how cultural factors affect nutrition practices across the lifespan.	**BT 4**
CO 5	**Evaluate** how proper nutrition can promote health and prevent diseases at each life stage.	**BT 5**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	**Nutrition during Pregnancy and Lactation**: Prenatal growth and development, Nutritional requirements, RDA, pregnancy and diet, complications of pregnancy, Breast feeding- Colostrum and mature milk. Advantages of breast feeding, need and criteria for using expressed human milk.	**15**
II.	**Nutrition during Infancy**: Nutritional requirements for growth, RDA, Artificial feeding. Low birth weight and Preterm baby- Nutritional requirements, feeding the preterm baby, feeding problems. Weaning- Need for weaning, types of supplementary foods, problems in weaning. **Nutrition in Preschool children**: Growth and development, nutritional requirements, RDA, feeding dental problems and decay. Nutrition related problems of preschool children – Protein energy malnutrition- Types, symptoms, nutritional requirements and treatment.	**15**
III.	**Nutrition in School children**: Nutritional requirements, RDA, Feeding problems, Packed lunches, Supplementary foods. **Nutrition in Adolescents**: Growth and development, Nutritional requirements, RDA, Nutritional problems- eating disorders, predisposition to osteoporosis,	**15**

	anaemia, pre-menstrual syndrome, mal nutrition (overnutrition and undernutrition) due to early pregnancy..	
IV.	**Nutrition in Adults**: Growth and development, Nutritional requirements, RDA. **Nutrition in Old age:** General physiological changes, Theories on the causes of aging, Nutritional requirements, Nutrition related problems of old age, Degenerative diseases.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Textbooks:

1. Gordon. M. Wardlaw et. al; Contemporary Nutrition, 2nd Edition, Publishing by Mosby, 2004.
2. Srilakshmi. B; Dietetics, 7th Edition, New Age International (P) Limited Publishers, 2014.

Reference books:

1. Bamji. S. M, et al; Textbook of Human Nutrition, 2nd Edition, Oxford and IBH Publishing Co. Pvt. Ltd., 2003.

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
88	**-**	**32**
		Developing skills to evaluate nutrition information and apply it to real-life scenarios.

Course: Major	**Level of Course:300**	**Scheme of Evaluation:(T)**
Title of Paper: Food Service Management		**Subject Code: NDC152M602**
L-T-P-C:3-1-0-4		**Total credits:4**

Course Objective:

To understand regulations and ethical considerations in food service management and operations management in real- life scenario.

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** budgeting, cost control, and financial analysis techniques specific to food service operations.	**BT 1**

CO 2	**Understand** principles of kitchen layout, equipment selection, and maintenance.	**BT 2**
CO 3	**Apply** principles of food safety, hygiene, and sanitation in food service environments.	**BT 3**
CO 4	**Analyse** effective strategies for purchasing, receiving, storing, and controlling inventory.	**BT 4**
CO 5	**Evaluate** nutritionally balanced and cost-effective menus.	**BT 5**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Institutional Food Service Management:** Introduction to food management, tools of management, management of resources and spaces-kitchen spaces, storage spaces, service areas.	**15**
II.	**Food Management:** Characteristics of food, food purchasing, menu planning, food production, food service, clearing, cleaning and waste management.	**15**
III.	**Financial and Personnel management:** Costing and Budgeting, pricing, accounting, staff employment, employee benefits, staff training and development and legal aspects of personnel management.	**15**
IV.	**Hygine Sanitation and Safety:** hygiene and sanitation, safety and security, deep cleaning, pest control **Marketing:** Marketing the products of catering and food service management challenges.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Textbooks:

1. Sethi. M; Catering Management, Institutional Food Management: An Integrated Approach, New Age International Ltd. Publishers, 3rd Edition, 2015.

Reference Books:

1. Palacio. P. J, et. al; Foodservice Management: Principles and Practices, Pearson Education, 13th Edition, 2019.

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
88	**-**	**32**
		Learning techniques to promote food services and enhance customer experiences.

Course:Major	Level of Course:300	Scheme of Evaluation:(T)
Title of Paper: Food Toxicology		Subject Code:NDC152N603
L-T-P-C:3-1-0-4		Total credits:4

Course Objective:

To understand the concept of food safety and toxicology leading to health hazards.

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** thenaturally occurring toxicants & food contaminants	**BT 1**
CO 2	**Understand** the ethical issues related to food toxicology research and risk assessment	**BT 2**
CO 3	**Apply** toxicological principles to improve overall food safety	**BT 3**
CO 4	**Analyse** biochemical and physiological effects of toxicants on the body	**BT 4**
CO 5	**Evaluate** the potential health hazards associated with food toxicants	**BT 5**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Introduction to food safety and Toxicology:** Hazards-Microbiological, Nutritional, Environmental, Assessment of Food Safety, Risk assessment and risk benefit, Acute toxicity, Mutagencity and carcinogenicity, Reproductive and development toxicity, Neurotoxity and behavioural effects, Immunotoxicity	**15**
II.	**Naturally occurring toxicants & food contaminants:** Sea food toxins, mutagens & carcinogens in heated & processed foods, coffee & methylxanthines, toxicity of mushrooms alkaloids compounds, glucosinolates, protease inhibitors, phytate.	**15**
III.	**Food additives as toxicants:** Sweeteners; toxicants formed during food processing such as maillard reaction products acrylamide, benzene; risk of genetically modified food, food supplements, persistent organic pollutants.	**15**
IV.	**Agricultural and industrial contaminants in foods:** pesticides residues in fruits and vegetables, metal contaminants in foods and their toxicity in human	**15**

	body; animal drug residues in food and water, dioxins and related compounds in food; metals such as lead, arsenic and mercury.	
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Textbooks:

1. Winter. K C., Food Toxicology, Taylor and Francis Inc, 2000.
2. Altug. T., Introduction to Toxicology and Food, Taylor and Francis Inc, 2002.

Reference Books:

1. Omaye. T, S., Food and Nutritional Toxicology, Taylor and Francis Inc, 1st Edition, 2004.

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
88	**-**	**32**
		Identifying and evaluating potential toxic substances in food to ensure consumer safety.

Course: Major	**Level of Course:300**	**Scheme of Evaluation:(T)**
Title of Paper: Animal products processing and utilization		**Subject Code: NDC152N604**
L-T-P-C:3-1-0-4		**Total credits:4**

Course Objective:

To understand the need and importance of livestock, egg and poultry industry.

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** types of animal products available in the market.	**BT 1**
CO 2	**Understand** technology behind preparation of various animal food products and by-product utilization.	**BT 2**
CO 3	**Apply** skills in assessing organoleptic properties of processed animal products.	**BT 3**
CO 4	**Analyse** the appropriate packaging methods for different animal products.	**BT 4**
CO 5	**Evaluate** ethical issues related to animal product processing,	**BT 5**

	including animal welfare.	

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Introduction to Animal Products**: Overview of major animal food sources, Slaughter and post-mortem changes, Processing methods: curing, smoking, fermentation	**15**
II.	**Poultry and Egg Processing:** Egg structure and composition, Processing of poultry meat and eggs, Quality control and safety measures **Dairy Science and Technology:** Milk composition and nutritional value, Dairy product processing: pasteurization, homogenization**,** Fermented dairy products: yogurt, cheese, kefir	**15**
III.	**Seafood Processing:**Types of seafood: fish, shellfish, mollusks**,** Handling and preservation techniques**,** Processing methods: canning, smoking, drying **Nutritional Analysis of Animal Products:** Macronutrient and micronutrient profiles**,** Effects of processing on nutritional value	**15**
IV.	**Food Safety and Quality Control:** Microbial hazards in animal products**,** HACCP principles in animal product processing**,** Regulatory standards and compliance	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Textbooks:

1. Subbulakshmi. G and Shobha. A.U; Food Processing and Preservation, New Age International (P) Limited Publishers, 2014.
2. Srilakshmi. B, Food Science, 6th Edition, New Age International (P) Limited Publishers, 2015.

Reference Books:

1. Mann. I, Processing and Utilization of Animal By-products, 3rd Edition, Food and Agriculture Organization of the United Nations, 1962

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
88	**-**	**32**
		Understanding different preservation techniques like curing, smoking, freezing, and

		canning.

Course: Major	**Level of Course:300**	**Scheme of Evaluation:(P)**
Title of Paper: Practical on Lifecycle Nutrition		**Subject Code: NDC152M611**
L-T-P-C:0-0-8-4		**Total credits:4**

Course Objective:

To understand regulations and ethical considerations in food service management and operations management in real- life scenario.

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** physiological changes that occur throughout life and their impact on nutrition.	**BT 1**
CO 2	**Understand** nutrition-related public health issues and interventions across the lifecycle.	**BT 2**
CO 3	**Apply** skills to design, implement, and evaluate diets for different stages of life.	**BT 3**
CO 4	**Analyse** the role of nutrition in public health and community well-being.the lifespan.	**BT 4**
CO 5	**Evaluate** how environmental issues affect food systems and community nutrition.	**BT 5**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	**Planning and preparation of diets:** Preschool, school going and adolescents.	**15**
II.	**Planning and preparation of diets:** Pregnancy, Lactation and Old age.	**15**
III.	**Visit to primary schools:** Anganwadi schools, Anthropometric assessment and follow up Mid-Day Meal Programme.	**15**
IV.	**Visit to primary and secondary Schools for Clinical and Dietary Assessment.**	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments,	

	Seminars	

Textbooks:

1. Wadhwa, et al; Textbook of Public Nutrition, IGNOU, New Delhi, 2013.
2. Srilakshmi. B; Dietetics, 7th Edition, New Age International (P) Limited Publishers, 2014.

Reference Books:

1. Sehgal &Raghuvardhi, Textbook of Community Nutrition, 4th Edition, Indian Council of Agriculture Research, Pusa, 2000.
2. Bamji. S. M, et al; Textbook of Human Nutrition, 2nd Edition, Oxford and IBH Publishing Co. Pvt. Ltd., 2003.

Semester VII

Course: Major	**Level of Course:400**	**Scheme of Evaluation:(P)**
Title of Paper: Public Health Nutrition		**Subject Code:NDC152M701**
L-T-P-C:3-1-0-0		**Total credits:4**

Course Objective:

To get the students well-prepared to apply their knowledge and skills in real-world settings, contributing to improved nutritional health and well-being.

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the types of feeding techniques used for patients	**BT 1**
CO 2	**Understand v**arious nutritional assessments tools.	**BT 2**
CO 3	**Apply** knowledge and skills in administering different assessment tools.	**BT 3**
CO 4	**Analyse** and Interpret Data	**BT 4**
CO 5	**Evaluate** the effectiveness of various tools to interpret malnutrition	**BT 5**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Overview of Public Health Nutrition - Definition and scope of public health nutrition. Social, economic, and environmental factors affecting	**15**

	nutrition	
II.	Public Health Nutrition Frameworks-Models and frameworks for understanding public health nutrition. The role of government and non-governmental organizations in nutrition policy	**15**
III.	Nutrition Interventions and Programs: Principles of designing effective nutrition interventions. Target populations and setting objectives	**15**
IV.	Current Issues and Future Directions in Public Health Nutrition Global Nutrition Challenges, Food Security and Sustainability	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Textbooks:

1. Public Health Nutrition: From Principles to Practice" by Mark Lawrence and Tony Worsley
2. "Nutrition in Public Health: Principles and Practice for Community Health" by Arlene Spark and Judith A. H. M. van der Meer
3. "Food and Nutrition Security: A Global Perspective" by David J. Stang and Bonnie H. H. H. Stang

Course:Major	**Level of Course:400**	**Scheme of Evaluation:(T)**
Title of Paper: Food hygiene and Sanitation		**Subject Code: NDC152M702**
L-T-P-C:3-1-0-4		**Total credits:4**

Course Objective:

To understand the food hygiene and sanitation practises at different levels of food handlings.

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**

CO 1	**Remember** the hazards and food borne illness	**BT 1**
CO 2	**Understand** the effect of food sanitation on different sectors	**BT 2**
CO 3	**Apply** the principles of sanitation and food hygiene at various stages of food handling.	**BT 3**
CO 4	**Analyse** the public health hazards caused by compromised hygiene and sanitation.	**BT 4**
CO 5	**Evaluate** the various food borne diseases and related global health and economic impacts	**BT 5**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Food Hygiene and Sanitation-** concept of food hygiene and sanitation at different levels of food handling. • Personal hygiene and hand hygiene • Environmental hygiene • Sanitation and hygiene during food handling practices (preparing, cooking and handling food and utensils) • Food hygiene at food service institutions • Food waste management	**15**
II.	**Public health hazards** - Food infection, intoxication and poisoning – symptoms, mode of transmission, and prevention • Food storage (selection, purchase and storage of perishable, semi-perishable and non-perishable foods) • Principles and methods of food preservation	**15**
III.	**Food Spoilage and Food borne Illnesses** - Food borne diseases and related global health and economic impacts Transmission of pathogens through food Contribution factors to the prevalence of food borne illnesses Prevention of food borne illnesses/ outbreaks (Flow diagrams)	**15**
IV.	**Strategies and Partnership in Food Sanitation** - Health sector, Education sector, Tourism sector, Food and health inspector, Mass media, Food industry, Community.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Textbooks:

1. Roday. S., Food Hygiene and Sanitation, Mc Graw Hill India, 2011.
2. Kumar. A., Fundamentals of Food Hygiene, Safety and Quality, Dreamtech Press, 2019.

Reference books:

1. Mariott, G, N., Principles of Food Sanitation, Springer, 6th Edition, 2018.

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
88	**-**	**32**

		Implementing food hygiene and sanitation principles and practices ensuring food safety from production to consumption.

Course:Major	**Level of Course:400**	**Scheme of Evaluation:(T)**
Title of Paper: Food Standards and Quality Control		**Subject Code:NDC152M703**
L-T-P-C:3-1-0-4		**Total credits:4**

Course Objective:

To understand the concept of food adulteration, food preservation and food standardization.

Course outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** food standardization and regulation agencies in India	**BT 1**
CO 2	**Understand** the importance of food packaging and labelling	**BT 2**
CO 3	**Apply** the principles of food preservation techniques in daily life	**BT 3**
CO 4	**Analyse** the various steps of HACCP in food in food industry.	**BT 4**
CO 5	**Evaluate** the physical, chemical and microbiological food spoilage.	**BT 5**

CourseOutline

Modules	**Topics(if applicable) & Course Contents**	**Periods**
I.	**Food adulteration –** definition of adulteration, adulterants, types of adulterants, food laws – PFA act, essential commodities act, FPO act, milk and milk products order.	**15**
II.	**Food standardization and regulation agencies in India-** agencies at state level, central food laboratories, HACCP, powers of food inspector, food spoilage -physical, chemical and microbiological spoilage of foods.	**15**
III.	**Food packaging and labeling-** food packaging – definition, functions, classification, laws related to packaging, food labeling: standards, purpose, description types of labels, labeling regulation barcode, nutrition labeling, health claims, and mandatory labeling provision.	**15**

IV.	**Food preservation:** Introduction to food preservation- methods of preservation, general principles and applications of food preservation, preservation by use of temperature -- preservation by use of high and low temperature, preservation by drying- preservation by drying and use of salt and sugar, enhancement of foods – food fortification, enrichment, supplementation, fermentation, germination, pre- and probiotics and organic foods.	**15**
	TOTAL	**60**
	Pedagogy: Lectures, Assignments, Seminars	

Textbooks:

1. Mathur, P., Food Safety and Quality Control, Orient BlackSwan, 2018.
2. Dave, S. et al., Principles of Food Safety and Quality Management, Gyaniversity Publications, 2024.

Reference Books:

1. Ramaswamy, A., Food Science and Quality Control, Book Enclave, 2023.

Credit Distribution		
Theory	**Practical**	**Experiential Learning**
88	**-**	**32**
		Implementing food standards and checking adulteration in regular food available in the market

Course: Major	**Level of Course: 400**	**Scheme of Evaluation: (T)**
Subject Name: Research Methodology		**Subject Code: NDC152M704**
Credit Units: 3-1-0-4		**Total credit: 4**

Course Objective: The course aims to give a holistic knowledge with the principles and methods of scientific research and to familiarize students with statistical methods for data analysis

Course Outcomes:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the steps and sampling methods of research design and various methods of data design.	**BT 1**
CO 2	**Understand** the graphical representation of research methods and	**BT 2**
CO 3	**Apply** knowledge about probability and distribution factors.	**BT 3**
CO 4	**Analyse** the measures of central tendency (mean, mode)for grouped and ungrouped data.	**BT 4**
CO 5	**Evaluate** the measures of sigma scores, standard scores ,percentiles and calculation and interpretation of statistical procedures.	**BT 5**

Detailed Syllabus:

Modules	**Topics / Course content**	**Periods**
I	**Introduction to research** :Significance, Purpose and Types of Research , Ethics in Research, Plagiarism	**12**
II	**Research Design** – steps ,Sampling Methods and Scaling Techniques , Research Tools and Methodology of Data Collection , Databases in Food Research	**12**
III	**Research data presentation** : Variables in Research and Scales of Measurement , Tabulation of Research Data ,Graphical Presentation of Data – use of Excel and Statistical Software , Scientific Report Writing	**12**
IV	**Related research concepts :**Probability – Theoretical and Conditional ,Gaussian Curve ,Binomial Distribution , Poisson Distribution , Density Functions , Vital Statistics and Life Tables	**12**
Total		**48**
Pedagogy: Lectures, Assignments, Seminars		

Text Books:

1. Jackson SL. 2012. Research Methods and Statistics: A Critical Thinking Approach. Fourth Edition. Wadsworth Cengage Learning.
2. Krishnan V. Statistics for Beginners. Atlantic Publishers and Distributors (P) Ltd

Reference Books:

1. Shabbir S. Food Borne Diseases. Humana Press.
2. Stephen AM. (Ed.). Food Polysaccharides and Their Applications. Marcel Dekker.

Course: Major	**Level of Course: 400**	**Scheme of Evaluation: (P)**
Subject Name: Practical on Public Health Nutrition		**Subject Code: NDC152M711**
Credit Units: 0-0-8-4		**Total credit: 4**

Course Objective:

Understand and identify the high-risk patients requiring specialized nutritional support.

Course Outcome:

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Remember** the ethical principles in nutrition practice, including respect for diversity and cultural sensitivity in community c	**BT 1**
CO 2	**Understand** the special nutritional support techniques and feeding formulations to meet nutritional needs of public hedalth nutrition	**BT 2**
CO 3	**Apply** knowledge of nutrition and dietetics principles to assess and address public health nutrition issues effectively	**BT 3**
CO 4	**Analyse** Demonstrate critical thinking and problem-solving skills in the design and evaluation of nutrition interventions and programs	**BT 4**
CO	**Evaluate** the current nutritional guidelines and practices.	**BT 5**

Detailed syllabus:

Modules	**Topics / Course content**	**Periods**

I	**Dietary Assessment Methods**: ABCD Methods, Conducting 24-hour dietary recalls and food frequency questionnaires. Analyzing dietary intake using software tools (e.g., NutriSurvey, Food Processor). Interpreting dietary data and identifying nutritional deficiencies	**10**
II	**Community Nutrition Interventions:** Designing a Community Nutrition Program. Implementation of Nutrition Education Sessions	**12**
III	**Nutritional Surveillance and Data Collection**: Conducting Nutritional Surveys	**12**
IV	**Case Studies in Public Health Nutrition**	**14**
Total		**48**

Text books:

1. Janice L Raymond, MS, RDN, CSG and Kelly Morrow, MS, RDN, FAND (2023): Krause's Food Nutrition and Diet Therapy, 16th Edition, W.B. Saunders Ltd.
2. Rajendram, R., Preddy, V.R., Patel, V.B. (2015): Diet and Nutrition in Critical Care, Volume 2, Springer-Verlag New York Inc.

Reference Books:

1. Dixit, S., Zirpe, K., Khatib, K., Joshi, A., Kulkarni, S. (2017): Principles in Critical Care Nutrition (ICSSM), 1st edition, Jaypee Brothers Medical Publishers
Faber, P., Siervo, M. (2014): Nutrition in Critical Care, 1st edition, Cambridge University Press

Semester VIII

Course: Major	**Level of Course:400**	**Scheme of Evaluation:(P)**
Title of Paper: Major Project/Dissertation/Internship		**Subject Code:NDC152M818**
L-T-P-C:0-0-20-20		**Total**