MAHATMA GANDHI UNIVERSITY
of
MEDICAL SCIENCES & TECHNOLOGY
JAIPUR

Mahatma Gandhi Institute of Allied Health Sciences

Syllabus
Bachelor of Nutrition and Dietetics (Honours)

4 years

(3.5 years + 6 months internship)

Program Code: BND26

Duration- VIII Semesters (4 Years)

(BND)

2026-2027

Recommended by the BOS in Allied Health Sciences at its meeting held on 8th April, 2026, the Faculty of Allied and Healthcare Professions at its meeting held on 28.7.2026 and approved by Academic Council at its meeting held on 03.08.2026

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Notice

1. The university reserves the right to make changes in the syllabus /books/ guidelines, fee-structure or any other information at any time without prior notice the decision of the university shall be binding on all.

2. The jurisdiction of all court cases shall be Jaipur Bench of Hon'ble Rajasthan High Court only.

3. This syllabus is aligned with the NCAHP Curriculum dated 24.04.2025, Corrigendum dated 10.04.2026, and Corrigendum dated 05.08.2026. Any subsequent amendments, revisions, or corrigenda issued by the NCAHP shall automatically apply to the Rules, Regulations, and Syllabus of MGUMST, Jaipur, and shall be implemented accordingly.

References:

- https://ncahp.abdm.gov.in/Curriculum/Nutrition%20and%20Dietetics.pdf
- https://ncahp.abdm.gov.in/Curriculum/CurriculumCorrigendum/Corrigendum-1NutritionandDietetics_10-04-2026.pdf
- https://ncahp.abdm.gov.in/Curriculum/CurriculumCorrigendum/Corrigendum_2_dt05Aug2026_Nutrition_and_Dietetics.pdf

Rules and Regulations of
Bachelor of Nutrition and Dietetics (Honours)

BND26

1. **Title of the Program** – Bachelor of Nutrition and Dietetics (Honours)

2. **Duration of the Program** – 8 semesters (4 years including 6 months internship)

3. **Medium of Instruction** –English shall be the medium of instruction for all the subjects of study and examination of the course

4. **Eligibility for Admissions**
    - Candidate must have passed senior secondary (10+2) or equivalent with Physics, Chemistry, Biology with 50% Marks and English.
    - Admission on the basis of Senior Secondary (10+2) Merit.
    - He/she has completed 17 years of age at the time of admission or will complete that age on or before 31 December of the year of his/her admission to the first year of the Undergraduate Allied and Healthcare Course.
    - Medical fitness certificate is mandatory to submit and it is to be endorsed by Government Medical Officer.
    - Foreign students admission process in under graduate (UG) –
        i. Foreign national students intending to study UG program in India, shall have to take equivalence certificate of eligibility certificate from respective State Allied and Healthcare Council.
        ii. For admission of Foreign National students, merit list will be based on University Entrance Exam
        iii. Verification of valid visa and valid visa duration of foreign national students to be verified by respective institution and University before enrolling students for programme.

5. **Admission Process** - The admission process shall be conducted by State/ Union Territory/ University.

6. **Reservation Policy** – Reservation policy for admissions in undergraduate program shall be as per State/central Government norms.

7. Enrolment &/ Or Registration –

a) Every candidate who is admitted to Bachelor of Nutrition and Dietetics (Honours) Degree Program in Mahatma Gandhi Institute of Allied Health Sciences shall be required to get himself/herself enrolled with the Mahatma Gandhi University of Medical Sciences & Technology (MGUMST) after paying the prescribed eligibility and enrolment fees.

b) A candidate shall deposit enrolment fees along with tuition fees at the time of his/her admission to the course. Such a candidate who fails to submit, to the college Principal, duly filled enrolment form along with original documents including migration certificate required for enrolment within prescribed period then after he/she shall pay late fee applicable at that time. No student will be allowed to appear in the end of semester examination without his/her enrolment .

8. Introduction –

A nutritionist or a dietitian is a healthcare professional, who apply principles of Food, Nutrition and Dietetics to promote health, prevent and treat diseases and optimise the health of individuals or groups. Present curriculum enables the students to work in settings such as hospitals, private practice, research, the food industry, nursing homes, sports teams, and food service. Throughout this degree, the students will study the building blocks of nutrition: biochemistry, nutritional epidemiology, public health nutrition, and pathophysiology. The students will learn about medical nutrition therapy, which involves translating the science of nutrition into dietary advice to manage specific medical conditions and to develop community nutrition program plans to help improve the nutrition of communities. Other subjects include nutrition and food innovation, allied health practice, and food service management.

a. Learning Objectives: The learning objectives of a Bachelor of Nutrition and Dietetics (Honors) degree program include:

- Practical skills: to develop the ability to acquire practical skills for monitoring food and nutrition-related clinical problems.
- Analytical skills: to develop analytical and practical skills.
- Knowledge: to provide knowledge of nutrition, food, and how to stay healthy to the population.
- Career opportunities: to develop skills and abilities that open up new career opportunities.
- Communication: to learn to communicate effectively with patients, individuals, and multi-disciplinary healthcare team health professionals.

- Health status assessment: to design and carry out health and nutritional status assessment protocols.
- Nutritional risk factors: to learn to identify nutritional risk factors and application of tools for nutrition screening.
- Nutrition and dietetic care: to learn to provide nutrition and dietetic care for individuals, groups, and populations at risk of developing long-term health conditions.
- Therapeutic diets: to learn to plan and provide therapeutic diets to manage and treat medical conditions.
- Higher education: to enable to pursue higher education and research in clinical nutrition, dietetics, and food science.
- Nutritional assessment: Students learn the methods and application of validated tools of assessing human nutritional requirements and diet planning for the individual and community.

B. Programme Outcomes (POs): Upon successful completion of the BND program, students will be able to:

POs	Outcome
PO1	Apply fundamental knowledge of nutrition, food science, and human physiology.
PO2	Assess nutritional status and formulate evidence-based diet plans for healthy individuals and patients suffering from acute and chronic diseases
PO3	Perform nutritional screening, anthropometric assessment, dietary surveys, biochemical interpretation, and nutrition counseling using appropriate communication techniques.
PO4	Design, implement, and evaluate community nutrition programs for various population groups including maternal and child health, adolescent nutrition, geriatric nutrition, and malnutrition control programs.
PO5	Apply principles of food hygiene, sanitation, food quality assurance, food laws, and food service management in hospitals, institutions, industries, and community settings.
PO6	Demonstrate the ability to conduct basic nutrition research, analyze scientific literature, interpret research findings, and apply evidence-based practices in nutrition and dietetics.

PO7	Identify, analyze, and solve complex nutritional and dietetic problems using scientific reasoning, critical thinking, and decision-making skills.
PO8	Demonstrate ethical behavior, professional integrity, accountability, empathy, confidentiality, and respect for patient rights while delivering nutrition care services.
PO9	Communicate effectively with patients, healthcare professionals, caregivers, and the community through oral, written, and digital modes.
PO 10	Engage in lifelong learning, continuing professional education, and self-directed learning to keep pace with emerging trends in nutrition science, nutrigenomics, sports nutrition, functional foods, and healthcare technologies

C. Program Specific Outcomes (PSOs):

a) Students will be abreast of taking care of nutritional needs of healthy and diseased population

b) Planning diets and menus, and instructing people on the requirements and importance of diet and on the

planning and preparation of food;

c) Supervising the preparation and serving of meals;

d) Collecting, organizing, and assessing data relating to health and nutritional status of individuals, groups, and communities;

e) Monitoring food intake and quality to provide nutritional care;

f) Calculating nutritional values of food served;

g) Planning, conducting and evaluating nutrition intervention programs and compiling educational material;

h) Providing nutrition assessments, nutrition management, and nutrition education, research and training;

i) Consulting with other Health Professionals and related workers to manage the dietary and nutritional needs of patients.

9. Attendance – A candidate has to secure a minimum 75% attendance in theoretical and 80% in Skills training (practical) for qualifying to appear for the final examination.

10. Minimum Instruction/ Teaching Days –

Each semester shall consist of not less than 120 working days including examination. Teaching Hours shall be not less than 400 hours in every semester.

Proposed Credit Hours -

Year	Semester	Theory Hours	Practical Hours	Hours Per semester
1	1	240	150	390
1	2	210	240	450
2	3	255	150	405
2	4	270	120	390
3	5	225	210	435
3	6	135	390	525
4	7	165	360	525
4	8	0	660	660
Total Credit Hours		**1500**	**2280**	**3780**

Credit details:

One credit implies one hour of lecture per week, two hours of laboratory/practical per week or two hours of clinics per week or two hours of Research projects per week

A semester is considered to have 15 weeks. For example,

1 credit course = 15 hours of lectures per semester

3 credits course = 45 hours of lectures per semester

0.5 credit course = 15 hours of practical/laboratory.

CL	CP	L	P
1	1	15	30

CL: Credit for Lecture
CP: Credit for Practical
L: Hours for Lecture
P: Hours for Practical

11. Programme Structure (Semester I, II, III, IV, V, VI, VII, VIII - *Distribution of courses semester wise)*

Bachelor of Nutrition and Dietetics (Honours) - First Semester

S.No.	Course Title	Credits			Hours/ Semester (15 weeks)		
		Theory	Practical	Total	Theory	Practical	Total
BND 101	Fundamentals of Nutrition	3	1	4	45	30	75
BND 102	Human Anatomy and Physiology	3	1	4	45	30	75
BND 103	Basics of Food Science	3	1	4	45	30	75
BND 104	Environmental Science	3	0	3	45	0	45
BND 105	Indian Knowledge System on Foods	2	0	2	30	0	30
BND 106	Computer literacy	0	2	2	0	60	60
BND 107	English for Communication	2	0	2	30	0	30
TOTAL		16	5	21	240	150	390

Bachelor of Nutrition and Dietetics (Honours) - Second Semester

S.No.	Course Title	Credits			Hours/ Semester (15 weeks)		
		Theory	Practical	Total	Theory	Practical	Total
BND 201	Food Microbiology	3	1	4	45	30	75
BND 202	Fundamentals of Biochemistry	3	1	4	45	30	75
BND 203	Nutrition Through Life Cycle	2	2	4	30	60	90
BND 204	Psychology and Sociology Applied to Health Care	4	0	4	60	0	60
BND 205	Techniques of Nutritional Assessment	0	2	2	0	60	60
BND 206	Soft Skills and Communication	2	0	2	30	0	30
BND 207	Computer Literacy for Nutrition	0	2	2	0	60	60
TOTAL		14	8	22	210	240	450

Bachelor of Nutrition and Dietetics (Honours) - Third Semester

S.No.	Course Title	Credits			Hours/ Semester (15 weeks)		
		Theory	Practical	Total	Theory	Practical	Total
BND 301	Macronutrients in Human Nutrition	4	0	4	60	0	60
BND 302	Advanced Food Science	3	1	4	45	30	75
BND 303	Public Health Nutrition	3	1	4	45	30	75
BND 304	Basics of Medical Nutrition Therapy (Theory and Practical)	2	2	4	30	60	90
BND 305	Advanced Biochemistry	3	0	3	45	0	45
BND 306	Food Processing and Preservation	2	1	3	30	30	60
TOTAL		17	5	22	255	150	405

Bachelor of Nutrition and Dietetics (Honours) - Fourth Semester

S.No.	Course Title	Credits			Hours/ Semester (15 weeks)		
		Theory	Practical	Total	Theory	Practical	Total
BND 401	Clinical Biochemistry and Pathophysiology	3	1	4	45	30	75
BND 402	National Health and Nutrition Programs and Policies	3	1	4	45	30	75
BND 403	Micronutrients in Human Nutrition	4	0	4	60	0	60
BND 404	Functional Foods and Nutraceuticals	3	1	4	45	30	75
BND 405	Advanced Dietetics	3	1	4	45	30	75
BND 406	Food Safety and Standards	2	0	2	30	0	30
TOTAL		18	4	22	270	120	390

Bachelor of Nutrition and Dietetics (Honours) - Fifth Semester

S.No.	Course Title	Credits			Hours/ Semester (15 weeks)		
		Theory	Practical	Total	Theory	Practical	Total
BND 501	Research Methodology and Statistics	4	0	4	60	0	60
BND 502	Sports Nutrition	2	2	4	30	60	90
BND 503	Tools and Techniques for Nutrition Counselling	1	3	4	15	90	105
BND 504	Nutritional Epidemiology and Anthropology	4	0	4	60	0	60
BND 505	Food Analysis	2	2	4	30	60	90
BND 506	Emerging concepts in Nutrition and Dietetics	2	0	2	30	0	30
	TOTAL	15	7	22	225	210	435

Bachelor of Nutrition and Dietetics (Honours) - Sixth Semester

S.No.	Course Title	Credits			Hours/ Semester (15 weeks)		
		Theory	Practical	Total	Theory	Practical	Total
BND 601	Social Behaviour Change Communication	3	1	4	45	30	75
BND 602	Sustainable Food Systems	3	1	4	45	30	75
BND 603	Field Practice in Public Health and Nutrition	1	3	4	15	90	105
BND 604	Food Product Development	2	4	6	30	120	150
BND 605	Case Study Reviews	0	4	4	0	120	120
	TOTAL	9	13	22	135	390	525

Bachelor of Nutrition and Dietetics (Honours) - Seventh Semester

S.No.	Course Title	Credits			Hours/ Semester (15 weeks)		
		Theory	Practical	Total	Theory	Practical	Total
BND 701	Information Technology in Nutrition and Dietetics	2	2	4	30	60	90
BND 702	Entrepreneurship in Nutrition and Dietetics	3	1	4	45	30	75
BND 703	Nutrition in Critically ill	2	2	4	30	60	90
BND 704	Management and Administration in Dietetics Services	2	2	4	30	60	90
BND 705	Nutrition in Emergencies	2	1	3	30	30	60
BND 706	Applied Dietetics/Internship Project	0	4	4	0	120	120
	TOTAL	11	12	23	165	360	525

Bachelor of Nutrition and Dietetics (Honours) - Eighth Semester

S.No.	Course Title	Credits			Hours/ Semester (15 weeks)		
		Theory	Practical	Total	Theory	Practical	Total
BND 801	Internship in Hospital /Experiential Learning (6 months) 1 semester	0	14	14	0	420	420
BND 802	Research and Trends in Nutrition and Dietetics	0	4	4	0	120	120
BND 803	Scientific Writing in Nutrition and Dietetics	0	4	4	0	120	120
TOTAL		0	22	22	0	660	660

12. **Conduct of Continuous Assessment/ Internal Assessment –** There shall be two continuous assessments in each semester – continuous assessment I & continuous assessment II. Higher marks of either of the continuous assessments will be sent for final internal marks. Continuous assessments will consist of departmental examinations, assignments, departmental posting, and evaluations. The objective is to allow students to have hands on experience. It would also help students to develop and formulate the data collection process and data analysis.

13. **Dissertation/ Internship/ Project/ Clinical Postings (If any):** There will be internship/ clinical posting with case studies as internship project in 7th and 8th semester. Interns will be evaluated periodically i.e. in every quarter of 12 months and aggregate marks of all four assessments will be used to issue internship completion certificates. The internship completion certificate will be issued from the Dean's office, only after successfully clearing all four assessment exams and obtaining a satisfactory completion certificate from the head/in charge of the department at the end of the internship.

14. **Scheme of Examination –**

Bachelor of Nutrition and Dietetics (Honours) - First Semester

Course/ Paper Code	Course/Paper Name	Credits		Theory		Practical		Total
		Theory	Practical	EOSE	CA	EOSE	CA	
BND 101	Fundamentals of Nutrition	3	1	70	30	40	10	150
BND 102	Human Anatomy and Physiology	3	1	70	30	40	10	150
BND 103	Basics of Food Science	3	1	70	30	40	10	150
BND 104	Environmental Science#	2	0	40	10	-	-	50
BND 105	Indian Knowledge System on Foods	2	0	40	10	-	-	50
BND 106	Computer Literacy#	0	2	-	-	40	10	50
BND 107	English for Communication#	2	0	40	10	-	-	50
TOTAL	**07**	16	6	**360**	**140**	**200**	**50**	**750**

 # Non-University Exams

Bachelor of Nutrition and Dietetics (Honours) - Second Semester

Course/ Paper Code	Course/Paper Name	Credits		Theory		Practical		Total
		Theory	Practical	EOSE	CA	EOSE	CA	
BND 201	Food Microbiology	3	1	70	30	40	10	150
BND 202	Fundamentals of Biochemistry	3	1	70	30	40	10	150
BND 203	Nutrition Through Life Cycle	2	2	40	10	40	10	100
BND 204	Psychology and Sociology Applied to Health Care	4	0	70	30	-	-	100
BND 205	Techniques of Nutritional Assessment	0	2	-	-	40	10	50
BND 206	Soft Skills and Communication#	2	0	40	10	-	-	50
BND 207	Computer Literacy for Nutrition#	0	2	-	-	40	10	50
TOTAL	**07**	14	8	**290**	**110**	**200**	**50**	**650**

 # Non-University Exams

Bachelor of Nutrition and Dietetics (Honours) - Third Semester

Course/ Paper Code	Course/Paper Name	Credits		Theory		Practical		Total
		Theory	Practical	EOSE	CA	EOSE	CA	
BND 301	Macronutrients in Human Nutrition	4	0	70	30	-	-	100
BND 302	Advanced Food Science	3	1	70	30	40	10	150
BND 303	Public Health Nutrition	3	1	70	30	40	10	150
BND 304	Basics of Medical Nutrition Therapy	2	2	40	10	40	10	100
BND 305	Advanced Biochemistry	3	0	70	30	-	-	100
BND 306	Food Processing and Preservation	2	1	40	10	40	10	100
TOTAL	**06**	17	5	**360**	**140**	**160**	**40**	**700**

Bachelor of Nutrition and Dietetics (Honours) - Fourth Semester

Course/ Paper Code	Course/Paper Name	Credits		Theory		Practical		Total
		Theory	Practical	EOSE	CA	EOSE	CA	
BND 401	Clinical Biochemistry and Pathophysiology	3	1	70	30	40	10	150
BND 402	National Health and Nutrition Programs and Policies	3	1	70	30	40	10	150
BND 403	Micronutrients in Human Nutrition	4	0	70	30	-	-	100
BND 404	Functional Foods and Nutraceuticals	3	1	70	30	40	10	150
BND 405	Advanced Dietetics	3	1	70	30	40	10	150
BND 406	Food Safety and Standards	2	0	40	10	-	-	50
TOTAL	**06**	18	4	**390**	**160**	**160**	**40**	**750**

Bachelor of Nutrition and Dietetics (Honours) - Fifth Semester

Course/ Paper Code	Course/Paper Name	Credits		Theory		Practical		Total
		Theory	Practical	EOSE	CA	EOSE	CA	
BND 501	Research Methodology and Statistics	4	0	70	30	-	-	100
BND 502	Sports Nutrition	2	2	40	10	40	10	100
BND 503	Tools and Techniques for Nutrition Counselling	1	3	40	10	70	30	150
BND 504	Nutritional Epidemiology and Anthropology	3	1	70	30	40	10	150
BND 505	Food Analysis	2	2	40	10	40	10	100
BND 506	Emerging concepts in Nutrition and Dietetics	2	0	40	10	-	-	50
TOTAL	**06**	14	8	**300**	**100**	**190**	**60**	**650**

Bachelor of Nutrition and Dietetics (Honours) - Sixth Semester

Course/ Paper Code	Course/Paper Name	Credits		Theory		Practical		Total
		Theory	Practical	EOSE	CA	EOSE	CA	
BND 601	Social Behaviour Change Communication/ Nutrition Health Promotion	3	1	70	30	40	10	150
BND 602	Sustainable Food Systems	3	1	70	30	40	10	150
BND 603	Field Practice in Public Health and Nutrition	1	3	40	10	70	30	150
BND 604	Food Product Development	2	4	40	10	70	30	150
BND 605	Case Study Reviews	0	4	-	-	70	30	100
TOTAL	**05**	9	13	**220**	**80**	**290**	**110**	**700**

Bachelor of Nutrition and Dietetics (Honours) - Seventh Semester

Course/ Paper Code	Course/Paper Name	Credits		Theory		Practical		Total
		Theory	Practical	EOSE	CA	EOSE	CA	
BND 701	Information Technology in Nutrition and Dietetics	2	2	40	10	40	10	100
BND 702	Entrepreneurship in Nutrition and Dietetics	3	1	70	30	40	10	150
BND 703	Nutrition in Critically ill	2	2	40	10	40	10	100
BND 704	Management and Administration in Dietetics Services	2	2	40	10	40	10	100
BND 705	Nutrition in Emergencies	2	0	40	10	-	-	50
BND 706	Applied Dietetics/Internship Project	0	4	-	-	50	50	100
TOTAL	**06**	11	11	**230**	**70**	**210**	**90**	**600**

Bachelor of Nutrition and Dietetics (Honours) - Eighth Semester

Course/ Paper Code	Course/Paper Name	Credits		Theory		Practical		Total
		Theory	Practical	EOSE	CA	EOSE	CA	
BND 801	Internship in Hospital /Experiential Learning (6 months) 1 semester	0	14	-	-	100	200	300
BND 802	Research and Trends in Nutrition and Dietetics	0	4	-	-	70	30	100
BND 803	Scientific Writing in Nutrition and Dietetics	0	4	-	-	70	30	100
TOTAL	**03**	0	22			**240**	**260**	**500**

15. **Conduct of University Examination/ End of Semester Examination –** The End of Semester Examination (EOSE) for the Course shall be conducted semester-wise at the end of every semester. End of semester examination shall be conducted twice in a year with an interval of six months. Even Semester examination shall be conducted after 6 months of odd semester examinations.

a) Appointment of Examiners and Paper Setters (Qualification of paper Setters and Examiners)

- All the examiners - Paper setters, Theory examination answer books evaluators, External and internal Examiners for Practical examinations shall be appointed by the respective university.
- Professor/ Assoc. Professor /Assistant Professor/Lecturer/Allied Health Professional having PG qualification and 3 years teaching experience/ professional experience after PG in respective field is eligible to act as Internal/External examiner for theory/practical examination.
- In the VIth and VIIth semester examination, 25% of the theory question papers shall be set and evaluated by external examiners. The external examiner (paper setter) shall evaluate answer books of his/her theory paper.

b) Eligibility to appear for the Examination:

- Student is required to have minimum 75% attendance in theory and 80% attendance in practical to make him/her eligible to Candidates failing in one or more, subject in a

semester will be required to appear in their failing subject in the next examination of the same semester next year.

- A candidate will have to clear all the subjects of First to Seventh semester before appearing at the eighth semester examination.

c) Theory Examinations

- There shall be Theory papers at the end of each semester as End of Semester Exams (EOSE) as per the scheme of examination of each semester.
- The Paper Setter shall set the questions within the prescribed course of study of the concerned paper. There will be a set pattern of question papers duly approved by Academic Council.

Bloom's Taxonomy: A blended approach—combining didactic methods, experiential laboratory training, problem-solving, clinical immersion, and research exposure—is essential. When guided by educational frameworks such as Bloom's Taxonomy, these methodologies ensure that learners progress from acquiring foundational knowledge to demonstrating competence and ultimately practicing independently as professionals.

By weaving Bloom's Taxonomy (cognitive depth) the curriculum ensures that graduates not only master theoretical knowledge but also translate it into safe, accurate, and independent laboratory practice.



Question paper pattern -

Type of question	No. of questions	Marks per question	Total
Essay Question (EQ)	3 (to answer 2)	10	20
Short Essay Question	9 (to answer 7)	5	35
Short Answer Question (SAQ)	7 (to answer 5)	3	15
Total marks			**70**

Type of question	No. of questions	Marks per question	Total
Essay Question (EQ)	2 (to answer 1)	15	15
Short Essay Question	7 (to answer 5)	5	25
Total marks			40

- Passing Marks: A candidate will have to obtain at least 50% marks including continuous assessment in each theory paper to pass.

d) Practical Examinations and Viva Voce

(a) At the end of each semester there shall be practical and viva-voce examination. It shall be conducted after the Theory examination is over. A candidate will have to obtain at least 50% marks in practical and viva-voce examination

(b) Practical and viva-voce examination shall carry marks as per the marks allotted on the basis of credits as shown in scheme of examination.

(c) One Internal & one External Examiner will assess the University Practical examination

e) Results

- Candidate have to obtain at least 50% marks separately in each Theory paper including continuous assessment and a minimum of 50% marks in the practical examination including viva-voce for him to be declared pass.
- A Candidate who has failed in theory paper (s)/ practical examination will reappear in respective theory paper(s)/ practical examination in next examination of the same semester next year.

f) Supplementary Examination (MGUMST RULES)[@]:

- Supplementary examination conducted by the University for unsuccessful candidates.
- Lower semester exams conducted along with current semester exams.
- Internal assessment can be improved before supplementary examination**.**

Grace Marks: The Award of grace marks shall be as per the policy governed by rules of MGUMST.

g) Revaluation: (As per MGUMST Rules)

Re- Evaluation of marks is permitted only for theory papers. The University/board, on application within the stipulated time and remittance of a prescribed fee, shall permit a Re-evaluation of marks for the course/s applied. The marks obtained after re- evaluation shall be the final marks awarded

h) Promotion to the next Semester

- A candidate who has passed or failed in one or more subjects shall be promoted to respective next semester.
- A candidate will be allowed to appear for the VII semester examination only when the backlog of all papers (theory papers and practical) of I semester to VI semester exam is cleared.
- The student is required to clear all the End of Semester Examination within 8 years from the year of joining of the Program otherwise he/she will have to leave the course.

Letter Grades and Grade Points

LETTER GRADE	GRADE	PERCENTAGE OF MARKS
O (Outstanding)	10	100 %
A+(Excellent)	9	90-99.99 %
A (Very Good)	8	80-89.99 %
B+(Good)	7	70-79.99 %
B (Above Average)	6	60-69.99 %
C(Average)	5	50-59.99 %
F(Fail)	0	0 Less than 50 %
Ab (Absent)	0	0 Absent

Grades Qualifying for Pass: Theory and Practical Examination

1. Minimum 5 Grade in the end of semester examination and **5 Grade** in continuous assessment evaluated by the department are required to pass **who fails to obtain 5 Grade shall be declared failed.**

2. A student obtaining **Grade F** shall be considered **failed** and will be required to reappear in the examination.

3. Letter Grade **Ab (Absent)** will be showing the absent of the candidate in examination and will be required to reappear in the examination.

i) Credit Weightage Distribution

Item	Credit Weight (%)
1. Continuous Assessment	
Class participation/presentation, study records	10.00%
Assignment, quizzes and summer training report	10.00%
Ward Postings, case studies, project reports	10.00%
2. End of Semester Exam	
70.00%	
Total	**100%**

16. **Award of Degree:** The degree shall be awarded by the University only after receipt of Course completion certificate and No dues from the Principal of the college.

17. **Authority to issue transcript:** The Controller of Examination of the University shall be the authority for issuing transcript after receiving the described fee from the candidate.

18. **Logbooks and Clinical Records, if any –** A compulsory internship must be completed by each student to be eligible for the award of the Bachelor of Nutrition and Dietetics.

19. **Any specific point/ rule/ regulation related to college/ institute – NA**

20. **Course wise Syllabus with Recommended Text Books**

21. **Model Papers- Attached**

Course Content

First Semester
BND 101 Fundamentals of Nutrition

CL	CP	L	P
3	1	45	30

Course Outcomes

Course Learning Outcomes (Theory): By the end of this course, students will be able to:	
CO1	Define and explain the basic concepts of food and nutrition, including nutrients, functions of food, food groups, dietary guidelines, RDAs, and principles of a balanced diet (ICMR-NIN). *(Bloom's Level L1 and L2)*
CO2	Describe the composition, classification, functions, and dietary sources of macronutrients (carbohydrates, proteins, fats), water, and fiber. *(Bloom's Level: L2)*
CO3	Explain the classification, functions, sources, and basic deficiency/excess symptoms of fat-soluble and water-soluble vitamins. *(Bloom's Level: L2)*
CO4	Describe the classification, functions, sources, and common deficiency/excess conditions of macro and micro minerals. *(Bloom's Level: L2)*
CO5	Identify and explain different cooking methods and culinary terms used in food preparation, including moist heat, dry heat, and combination methods. *(Bloom's Level: L2and L3)*
CO6	Apply basic nutritional knowledge to select appropriate foods and understand the role of cooking methods in maintaining nutritional quality. *(Bloom's Level: L3)*
	Course Outcome (Practical)
CO1	Understand various types of food products available in the market
CO2	Understand nutritive value of various food stuffs
CO3	Prepare various recipes in the standardized manner

Semester	I
Course Name	**BND 101 Fundamentals of Nutrition 4 (3+1)**
Course Description	The students would be able to understand the fundamentals of Food and Nutrition and acquire knowledge of nutrients, their functions, deficiency disorders, sources, various food groups, and recommended dietary allowances (RDA).
Objectives	1. To introduce different food groups, their nutritional value, and their significance in daily diet. 2. To recognize the roles of food and the role of different nutrients, their requirements, and their impact on deficiency and excess.

	3. To acquaint students with diverse methods of cooking and their advantages and disadvantages. 4. Understand various food groups and RDA
Reference Books	1. Srilakshmi B. 9th Edition (2023). Dietetics. New Age Publishers. ISBN 13: 9789395161848 2. Dietary Guidelines for Indians A Manual, Revised Edition 2024. ICMR NIN, Hyderabad 3. Mudambi, S. R. (2007). Fundamentals of foods, nutrition and diet therapy. New Age International Pvt. Ltd. ISBN-10 : 9788122433494 4. Bamji, M. S., Krishnaswamy, K., & Brahmam, G. N. V. (Eds.). (2016). Textbook of human nutrition. Oxford & IBH. ISBN 13: 9788120417908. 63 "Curriculum of Nutrition and Dietetics (Intellectual Property of the National Commission for Allied and Healthcare Professions, Ministry of Health and Family Welfare)." 5. Chowdhury SR, Tamber Aeri B ()Textbook of Food Science and Nutrition. Kindle Edition. 6. Shadaksharaswamy, M, Manay, S, (2010): Food facts and Principles, 3rd Edition, New Age International Publishers. ISBN 13: 978-9395161091. 7. G Subbulakshmi, Udipi SA, Ghurge PA (2021). Food Processing and Preservation. ISBN: 978-8122472332.
Webliography	https://www.coursera.org/learn/food-and-health https://www.nutrition.gov https://www.who.int/health-topics/nutrition
Prerequisites: Higher secondary level 12th standard pass science or Food, Nutrition, and Dietetics students	

Course Plan		
Unit	**Topics**	**Hours**
1	Concept of Food and Nutrition : Introduction to nutrition- definition of food, nutrition, nutrients, and health, functions of food, food groups classification, Food pyramid, My Plate and dietary guidelines, Recommended Dietary Allowances (RDAs), Balanced diet (ICMR-NIN)	9
2	Composition, Classification, Functions, dietary sources, and clinical manifestations of deficiency/ excess of the following nutrients/non nutrients: Carbohydrates, lipids, protein, water, fiber	9
3	Classification, Functions, dietary sources, and clinical manifestations of deficiency/ excess of the following nutrients: Fat soluble vitamins Vitamin A, D, E, K and Water soluble vitamins – thiamin, riboflavin, niacin, pyridoxine, folate, vitamin B12 and vitamin C	9
4	Classification, Functions, dietary sources, and clinical manifestations of deficiency/ excess of the following nutrients Macro minerals- Calcium, potassium, Phosphorous, Chlorine, Sulfur, Magnesium, Micro Minerals – iron, zinc, selenium, copper, manganese	9

5	Introduction to different culinary terms Boiling, Simmering, Poaching, Steaming, Pressure cooking Grilling, broiling, roasting, Baking, Sautéing, Shallow fat frying, Deep fat frying, Combined (Moist and dry) Methods: Braising, Stewing Germination, Fermentation, Braising, Microwave cooking, Solar cooking	9
	Practical	
1	Market survey of locally available food items viz. cereals, pulses, fruits and vegetables, milk and milk products, fats and oils, nuts and oilseeds, sugar and jaggery, meat, fish, and poultry and miscellaneous food items like biscuits, jams, jellies, ketchup etc. and their cost.	5
2	Classify foods on the basis of nutrients: Protein, Iron, Calcium, Vitamin A, Vitamin C (list of 10 foods with highest and lowest amount of these nutrients- Plant and animals courses) Calculate the cost of food required for providing a given amount of nutrient for an adult man/woman as per RDA/EAR for each food group : cereals, pulses, fruits and vegetables, milk and milk products, fats and oils, nuts and oilseeds, sugar and jaggery, meat, fish, and poultry	5
3	Overview of Controlling techniques and Food exchange system Controlling techniques: Weights and measures - standard and household measures for raw and cooked foods (metric) Food exchange system and its applications.	10
4	Standardization of basic food preparations Beverages: Tea, coffee, cocoa, fruit juice, milk shakes and smoothies Cereal and flour mixtures: Basic preparations - boiled rice & rice, pulao; chapati, puri, paratha, sandwiches, pastas Pulses and legumes: Using whole, split and sprouted	15
5	Standardization of basic food preparations Nuts and oilseeds: Chikki, ladoo Vegetables: Simple salad, dry and gravy vegetable Fruits: Fruit preparations using fresh fruits - jam, squash, fruit salad Milk and products: Milk porridge – dalia; curd, paneer and their commonly made preparations- butter milk, lassi, shrikhand; milk based simple desserts and puddings - custards, kheer, ice-cream Egg : Hard and soft boiled, poached, scrambled, fried, omelette, eggnog Soups : Basic, clear and cream soups Snacks : Pakoras, upma, pohe	30

BND 102 Human Anatomy and Physiology

CL	CP	L	P
3	1	45	30

Course Outcomes

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Describe the structure and organization of various organs and organ systems of the human body. *(Bloom's Level: L1 & L2)*
CO2	Explain the anatomy and physiological functions of major human body systems. *(Bloom's Level: L1 & L2)*
CO3	Analyze the interrelationship between different organ systems in maintaining normal body functions. *(Bloom's Level: L4)*
CO4	Interpret the functional mechanisms of various physiological systems and their role in maintaining homeostasis. *(Bloom's Level: L3 & L4)*
CO5	Apply foundational knowledge of human anatomy and physiology to understand normal health and basic clinical conditions. (*Bloom's Level: L3)*
	Course Outcome Practical – Students will be able to
CO1	Understand and measure various functions of the respiratory system
CO2	Understand and measure various functions of circulatory system
CO3	Analyze various types of basic blood tests
CO4	Students will be able to perform salivary digestion test
CO5	Demonstrate various tests related to excretory system & interpret test findings

Semester	I
Course Name	**BND 102 Human Anatomy and Physiology Theory**
Course Description	This course shall enable the student to learn about the structure and functioning of the human body.
Objectives	1 To understand the anatomy of the various organs and organ systems of the human body. 2 To understand the functioning of the various systems of the human body
Reference Books	Tortora, G.J. and Derrickson, B.H. (2017). Principles of Anatomy and Physiology. 15th Edition. John Wiley and Sons. ISBN 1119400066 2. Waugh, A and Grant, A. (2022). Ross & Wilson Anatomy and Physiology in Health and Illness. 14th Edition. Elsevier Health Sciences. ISBN 0323834612 3. Standring, S. Gray's Anatomy. (2020). The Anatomical Basis of Clinical Practice. 42nd Edition. Elsevier ISBN 0702077054

Webliography	Carbrey,J. and Jakoi, E. 2024. Introductory Human Physiology. Duke University. Available on Coursera. https://www.coursera.org/learn/physiology?action=enroll
Prerequisites: 12th Science or Food, Nutrition and Dietetics	

Course Plan

Unit	Topics	Hours
1	Definition of Human anatomy and physiology Relevance of Human anatomy and physiology for Dietitians and Nutritionists Basic concepts –Anatomical positioning of various organs in the human body, Homeostasis -definition and relevance	2
2	Cell structure and functions- Cell organelles -Structure and functions of nucleus, cytoplasm, lysosomes, endoplasmic reticulum, Golgi apparatus, mitochondria, and cell membrane. Movement of particles across cell membrane -active transport and passive transport, body fluids and their compartments and functions Cellular growth, Mitosis, and meiosis. Tissues – Classification, structure, and functions Body fat and water percentage across the life cycle and relevance for health	7
3	Musculoskeletal system: structure and functions of bone, cartilage and connective tissue and muscle fibres. Types of muscles, structure and function. Bone health- Changes in bone mass during aging: osteoporosis	2
4	Respiratory System: Structure and functions of organs of respiration, mechanism of respiration, Pulmonary ventilation, external & internal respiration. Role of hemoglobin. Regulation of respiration: nervous and chemical. Respiratory function tests, Lung volume & Capacities	3
5	Digestive System: Structure and function of organs of gastrointestinal tract- Oral cavity, oesophagus, stomach, small intestine, large intestine, colon, pancreas, liver and gall bladder. Role of liver, gall bladder and pancreas in digestion. Enzymes and hormones of the GIT. Role of gut microbiota. Digestion and absorption process. Gut-brain connection	8
6	Excretory System: Anatomy and physiology of kidneys, ureter, urinary bladder. Structure and function of nephron. Glomerular filtration rate.Urine formation. Normal and abnormal constituents of urine.	3
7	Circulatory System: Structure and function of the heart and blood vessels. Capillary exchange. Regulation of cardiac output, cardiac cycle, blood-pressure and factors affecting it. Systemic, hepatic portal and pulmonary circulation. Interstitial fluid and lymph. Blood constituents -Erythrocytes, leucocytes, thrombocytes, plasma, Blood coagulation. Blood groups	5

8	Endocrine system; Structure, Mode of Action and Physiological functions of Pituitary, Thyroid, Parathyroid, Adrenal and Reproductive Hormones.	3
9	Immunology: Basic principles of Immunology- concept of immunity and types. Immunoglobulin- Types, general structure & function. T-Cells, B-Cells structure & function. Humoral and Cell-mediated Immunity. Role of nutrition in immunity	3
10	Regulation of body temperature: Thermo genesis, thermolysis, pyrexia, hypothermia, role of skin in maintaining body temperature.Homeostasis - definition and relevance	2
11	Reproduction System: Male reproductive system -anatomy and physiology, Female reproductive system- anatomy and physiology, Organs including hormones- structure and function, Menarche, Menstruation and ovarian cycles, Pregnancy-conception, three trimesters, Parturition, Lactation, Menopause	7
	Practical	
1	Respiratory System: Spirometry, Breath holding test, Use of Respirometer to estimate respiratory quotient	6
2	Cardiovascular System: Measurement of blood pressure and pulse rate, Effect of exercise on blood pressure and pulse rate	6
3	Blood test: Demonstration: Microscope, Haemocytometer, Blood, RBC count, Hb, WBC count, Differential Count	8
5	Digestion: Test salivary digestion	2
6	Excretion: Examination of Urine, Specific gravity, Albumin, Sugar, Microscopic examination for cells and cysts First aid medical skills like CPR, how to measure Blood Pressure	8

BND 103 Basics of Food Science

CL	CP	L	P
3	1	45	30

Course Outcomes

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Explain the fundamental concepts, principles, and scope of Food Science. *(Bloom's Level: L1)*
CO2	Identify and classify various plant- and animal-derived foods based on their composition, nutritive value, and functional properties. *(Bloom's Level: L 2)*
CO3	Analyze the physical, chemical, and nutritional properties of different food groups and their significance in food selection and utilization. *(Bloom's Level: L4)*
CO4	Apply food handling, preparation, preservation, and processing principles using appropriate theoretical and practical approaches. *(Bloom's Level: L3)*
CO5	Evaluate the impact of processing and handling methods on food quality, safety, and nutritional value. *(Bloom's Level: L5)*
	Course Outcome Practical – Students will be able to
CO1	Understand and perform various methods of cooking and justify its impact on nutritive value
CO2	Understand properties of various food groups – cereals, pulses, fruits, milk products, fats & oils, sugar
CO3	Preparation of various recipes using food properties
CO4	Understand and demonstrate various preservation techniques
CO5	Perform sensory evaluation tests

Semester	I
Course Name	**BND 103 Basics of Food Science**
Course Description	It is a first basic course in Food Science. The course enables students to understand basic principles of Food Science.
Objectives	1. Understand the concepts and principles of Food Science. 2. To gain knowledge of different plant and animal derived foods and their nutritive values and properties. 3. Gain both theoretical as well as practical knowledge in handling foods and applying processing principles.

Reference Books	1. Swaminathan. M.S(1987) Food science, Chemistry and Experimental Foods (2nd edition) Bappco Publishers 2. Norman. N. Potter (2007) Food Science (5th edition) CBS 3.Griswold R.M (1962,Digitized in 2008) Experimental study of Foods (digitized edition 2008) Houghton Mifflin Publishers 4. Thangam Philip (1965 digitized in 2006).Modern Cookery for Teaching and Trade, volume I&II (Digitized edition 2006), Orient Longmans Ltd. ISBN 8125025189,9788125025184 5. MacWiliams (2013). Food Fundamentals (10th edition) Pearson Education. ISBN 1292054409,978129205407. 6. Shakunthala Manay & Shadakhraswamy.(2008) Food Facts & Principles(2008 Reprint) New Age International. ISBN 8122422152 7. Srilakshmi .B.(2018) Food Science (7th edition). New Age International(P) Ltd, ISBN 9789386418890
Prerequisites: 12th Science or Food, Nutrition and Dietetics subject	

Course Plan		
Unit	**Theory (Topics)**	**hours**
1	Function of Foods and classification of Food groups; Cooking Techniques – Dry heat and Moisture heat techniques, Combination techniques, Techniques using fat as cooking medium. Fruit & Vegetable Preservation – Pickling, Preservation with high concentration of sugar – jam, jelly, candied fruit, Dehydration of fruits and vegetables, Concentration – Tomato sauce, Canning of acid and non-acid foods, Freezing, Chemical Preservation	9
2	Cereals: Structure and Composition of Rice, Wheat, and Millets. Effect of cooking on starch- Dextrinization, gelatinization, factors affecting Gel strength and Retrogradation; Primary processing of cereals and Millets – Drying and Milling of cereals and millets, Byproducts; Value-added products like pasta, noodles, multigrain flours, and RTE mixes Pulses: structure Composition of Pulses and Nutritive value of various pulses; Cooking study of pulses with different cooking media; Germination process and factors affecting germination; processing of fermented products from pulses like soybean	9
3	Milk– Milk composition and nutritive value; Homogenization, Pasteurization of milk, types of pasteurization and effect on nutritive value, UHT; Milk Products – Flavored milk, Ice cream, Cheese and Milk powders; Preparation of Indigenous milk products - channa, paneer, Sandesh, Rasogolla and Khoa	9

4	Eggs and Poultry: Structure of an egg; Composition and Nutritive value of eggs; functional properties of egg and cooking of eggs – green ring formation; preparation of egg powders; Nutritive value of poultry meat; Dressing of a poultry bird and cuts of poultry Meat – Structure of muscle, Composition and nutritive value of meat, Classes of meat, Slaughter and steps in slaughtering of animals, Postmortem changes of meat, factors affecting cooking quality of meat – Juiciness, marbling, flavor and tenderness; Meat cooking techniques; Meat emulsion and value added meat products	9
5	Spices and Condiments: Roles of spices and condiments in cooking; health benefits and types of spices & herbs; Essential oils ,fixed oil and oleoresins; Primary processing of spices – Sterilization of spices; milling of spices and cryogenic grinding of spices; Curry Powders Oils and Fats: Types of fats and oils; Smoking oils, Physical and chemical properties of oils- FFA, Iodine value, saponification, Rechiert Miessl value, fat emulsification and emulsifiers; Factors affecting absorption of oils; Processing of oils- Oil extraction, Refining of oils and Fractionation of oils; hydrogenated fats, Mayonnaise and specialty fats Sensory Evaluation of Foods: Types of sensory organs, Perception of sensory response , Basic tastes, Preparation of sensory card using various methods	9
	Practical	
1	Cooking methods Moist heat methods – (i) boiling, simmering, steaming & Pressure cooking	2
2	ii) Dry heat methods – baking. (iii), Fat as a medium for Cooking - shallow and deep fat frying.	2
3	Studying Temperature of gelatinization in different cereal and millet starches and gel Strength	2
4	Cooking of soaked and unsoaked pulses	2
5	Common preparations with pulses – Composite mixes and malts	2
6	Processing of vegetables- Fermentation and Pickling	2
7	Prevention of darkening in fruits & vegetables	2
8	Preservation of fruits - Jam, Jelly and Candied fruit	2
9	Preservation of fruits – Dehydration of fruits and vegetables	2
10	Processing of Milk & milk products – Paneer and Cheese.	2

11	Processing of Milk & milk products - Common preparation indigenous milk sweets like Channa based Rasogolla and Sandesh	2
12	Processing of Flesh foods: meat & poultry- preparations like pickling and value added products – nugget , meat loaf and meat balls	2
13	Processing of Flesh foods: Fish and shrimp – preparations like battered shrimp, Pickled fish & shrimp; fish wafers and fingers	2
14	Egg Experimental cookery- boiled egg, poached egg. Common preparations with eggs.	2
15	Sensory Evaluation and preparation of score card.	2

BND 104 Environmental Science (Theory)

CL	CP	L	P
3	0	45	0

Course Outcomes

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Explain the fundamental concepts, principles, and scope of Environmental Science and their relevance to sustainable development. *(Bloom's Level: L1)*
CO2	Describe the importance of conservation of natural resources, forests, and biodiversity in mitigating Climate Change. *(Bloom's Level: L2)*
CO3	Apply environmental conservation strategies and sustainable practices for protection of ecosystems and natural resources. *(Bloom's Level: L3)*
CO4	Analyze disaster management principles and their role in minimizing environmental damage and preserving the food chain during emergencies. *(Bloom's Level: L4)*
CO5	Evaluate environmental challenges and propose effective measures for climate resilience, disaster preparedness, and sustainable food chain preservation. *(Bloom's Level: L5)*

Semester	I
Course Name	**BND 104 Environmental Science (Theory)**
Course Description	It is the first basic course in Environmental Science giving an insight into various aspects of environment, ecology, and conservation of Natural resources.
Objectives	1. Understand the concepts and principles of Environmental Science. 2. Develop the students'knowledge base to conserve nature and forests to fight climate change 3. Develop and apply knowledge regarding Disaster management and preserve the food chain
Reference Books	1. Fellows P.J (2017) Food Processing Technology (4th edition) Wood head Publishing series. ISBN 978-0-08-101907- 8 2. Norman. N. Potter (2007) Food Science (5th edition) CBS publishers. ISBN 812390472X 3. Griswold R.M (1962, Digitized in 2008) Experimental study of Foods (digitized edition 2008) Houghton Mifflin Publishers 4. Deepak Mudgil and Shwetha Barak (2018). Beverages: Processing and Technology (1st edition) Scientific Publishers, ISBN 9387991725,9789387991729 5. Matz S.A (2008). Bakery Technology & Engineering (3rd edition Reprint) CBS Publishers India. ISBN 0942849302

	6. MacWiliams (2013). Food Fundamentals (10th edition) Pearson Education. ISBN 1292054409,978129205407 7. Robert Guy (2001). Extrusion cooking (1st edition reprint) Elsevier. ISBN 1855736314 8. Minife and Minife (2012). Cocoa, Confectionery, and chocolate products (3rd edition reprint) Springer Netherlands. ISBN 9401179263,97899401179263 9. Sanjeev Kumar and Srivastava (2017). Fruit and Vegetable Preservation (3rd edition Reprint). International Book Distributing Company. ISBN8123924372,9788123924373
Prerequisites: 12th Science or Food, Nutrition and Dietetics	

Course Plan		
Unit	**Theory Topics**	**hours**
1	Multidisciplinary nature of environmental studies- Definition, scope and importance. Natural resources- Renewable and non-renewable resources and their associated problems. Forest resources- Use and over-exploitation, deforestation, timber extraction, mining, dams and their effects on forest and tribal people Water resources- Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Mineral resources- Use and exploitation, environmental effects of extracting and using mineral resources. Food resources- World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.	9
2	Energy resources- Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Land resources- Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources, equitable use of resources for sustainable lifestyles. Ecosystems- Concept, structure and function of an ecosystem. Producers, consumers and decomposers, energy flow in the ecosystem, ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of forest, grassland, desert and aquatic ecosystems.	9

3	Biodiversity and its conservation- Introduction, definition, genetic, species, ecosystem diversity and biogeographical classification of India. Value of biodiversity- Consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, national and local levels, India as a mega-diversity nation. Hot-sports of biodiversity. Threats to biodiversity- Habitat loss, poaching of wildlife, man-wildlife conflicts, endangered and endemic species of India. In-situ and Ex-situ conservation of biodiversity. Environmental pollution- Definition, cause, effects and control measures of air, water, soil, marine, noise and thermal pollution and nuclear hazards. Solid waste management- Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.	9
4	Social issues and the environment- Unsustainable to sustainable development, urban problems related to energy. Water conservation, rain water harvesting, watershed management. Environmental ethics- Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Environment protection acts- Air (Prevention and control of pollution) act, water (Prevention and control of pollution) act, wildlife protection act, forest conservation act, Issues involved in enforcement of environmental legislation, public awareness. Human population and the environment- Population growth, variation among nations, population explosion. Role of Information Technology in environment and human health.	9
5	Natural disasters- Meaning and nature, types (floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, heat and cold waves, global warming, sea level rise, ozone depletion) and effects. Man-made disasters- Nuclear, chemical, and biological disasters, building fires, coal fires, forest fires, oil fires, road accidents, rail accidents, air accidents, and sea accidents. Disaster management- International strategy for disaster reduction at national and global levels; National disaster management framework- Financial arrangements, role of NGOs, community–based organizations and media, central, state, district and local administration, armed forces in disaster response, police and other organizations. Feeding the people struck by the disaster, managing house and dress need during disaster	9

BND 105 Indian Knowledge System on Foods

CL	CP	L	P
2	0	30	0

Course Outcome

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Explain the concepts of the Indian Knowledge System and its relevance to India's diverse food culture and culinary heritage. *(Bloom's Level: L2)*
CO2	Describe the principles of food anthropology and examine the historical, cultural, and social factors influencing regional Indian cuisines and food traditions. *(Bloom's Level: L1)*
CO3	Analyze dietary patterns and evaluate the use of indigenous and local ingredients in traditional culinary practices across different regions of India. *(Bloom's Level: 4)*
CO4	Interpret food-related customs, rituals, and household practices across various Indian communities and their significance in cultural preservation. *(Bloom's Level: L3)*
CO5	Document and assess traditional recipes, cooking methods, and food narratives for preservation and promotion of India's rich culinary heritage. *(Bloom's Level: L3 & L5)*
CO6	Apply knowledge of regional food cultures to support the Food Safety and Standards Authority of India's Eat Right Movement by promoting healthy eating habits and sustainable food practices. *(Bloom's Level: L3)*

Semester	I
Course Name	BND 105 Indian Knowledge System on Foods (2+0)
Course Description	This course focuses on the Indian food cultures across the states and Union territories. Understand the local household food traditions and understand Indian food anthropology which can be used for the Eat Right Movement.
Objectives	1. To explore and understand the Indian Knowledge system in the context of the diverse Indian food culture. 2. To understand the concept of Food Anthropology and its importance - regional cuisines, culinary traditions historical, cultural, and social factors that have shaped Indian food practices and traditions over time. 3. To analyze the Dietary Patterns and Investigate the local, Indigenous ingredients used in traditional Indian culinary practices across different parts of India- Central, Northern, Western, and Eastern India.

	4. To understand the traditions of the food-related customs, rituals, and daily practices in Indian households across various regions. 5. To promote the rich culinary heritage of India and explore ways to preserve and promote traditional food practices by documenting and recording traditional recipes, cooking methods, and food stories from different regions. 6. To support the Eat Right Movement and Integrate knowledge of regional food cultures into the Eat Right Movement, promoting healthy eating habits and sustainable food practices.
Reference Books	1. Nambiar, V. (Ed.). (2021). Indian Food Anthropology and the Eat Right Movement- Volume 1. Selective & Scientific Books. ISBN: 978-81-951492-2-3. 2. Nambiar, V. (Ed.). (2021). Indian Food Anthropology and the Eat Right Movement- Volume 2. Selective & Scientific Books. ISBN: 978-81-951492-4-7. 3. Achaya, K. T. (1994). Indian food: a historical companion. Oxford University Press. ISBN-13978-0195634488. 4. Sen, C. T. (2014). Feasts and fasts: A history of food in India. Reaktion Books. ISBN-13978-1780233529.
Webliography	1. Indian Knowledge Systems :: (iksindia.org) 2. Centre for Indian Knowledge Systems (ciks.org)

Prerequisites: 12th Science or Food, Nutrition and Dietetics

Course Plan

Unit	Topics (Theory)	Hours
1	Introduction to Indian Knowledge Systems and its importance as per NEP 2020. Traditional diets and food culture (Food anthropology) and Regional diets of North India (Jammu, Kashmir, Ladakh, Punjab, Haryana, Uttarakhand) and South India (Tamil Nadu, Kerala, Andhra Pradesh, Telangana, Puducherry, Karnataka)	6
2	Traditional diets and food culture (Food anthropology) and Regional diets of Central India (Uttar Pradesh, Madhya Pradesh) and Western India (Gujarat, Maharashtra, Rajasthan, Goa).	6
3	Traditional diets and food culture (Food anthropology) and Regional diets of anthropology Regional diets of East India (West Bengal, Bihar, Odisha) and	6
4	Traditional diets and food culture (Food anthropology) and Regional diets of North East India (Assam, Mizoram, Manipur, Meghalaya, Sikkim, Nagaland, Tripura, Arunachal Pradesh)	6
5	Traditional diets and food culture (Food anthropology) of specific religions of India (Muslims, Parsi, Buddhist, Sikhs and any other local communities).	6

BND 106 Computer literacy

CL	CP	L	P
0	**2**	**0**	**60**

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Identify and describe the various components of a computer system and their functions. *(Bloom's Level: L1 & l2)*
CO2	Explain the basic working principles of computer hardware, software, and operating systems. *(Bloom's Level: L1 & L 2)*
CO3	Demonstrate the use of word processing software for creating, editing, formatting, and managing documents. *(Bloom's Level: 3)*
CO4	Apply spreadsheet tools for data entry, basic calculations, analysis, and graphical representation of information. *(Bloom's Level: L3)*
CO5	Develop effective multimedia presentations using presentation software for academic and professional communication. *(Bloom's Level: L 6)*

Semester	I
Course Name	**Computer Literacy Practical**
Course Description	The course is designed to introduce students to computer basics and it's application for nutritionists and dietitians.
Objectives	1 To know about the various parts of a computer and to understand how it's working. 2. To learn about word processing, spreadsheets and making presentations
Reference Books	1. Balagurusamy E., Fundamentals of Computers (2009). Tata McGraw Hill Education Private Limited NEW DELHI ISBN 9780070141605
Webliography	1.E-Learning Material Computer Application of 1st/2nd semester of all Engineering Branches of Diploma courses of SCTE&VT, Odisha. Ajay Ku. Panda, D. Susmita, Ajit Ku. Behera, Kalpana Panigrahi, Swetalina Das, Published by SCTE&VT, Odisha, Bhubaneswar-12 https://sctevtodisha.nic.in/en/ secretarysctevt@gmail.com,material.sctevt@gmail.com 2. Basic Applications of Computers http://egyankosh.ac.in//handle/123456789/50864 3. Computer Basics (Video) http://hdl.handle.net/123456789/35766
Prerequisites: Nil	

Course Plan		
Unit	**Topics Practical**	**Hours**
1	Introduction and Basic Applications of Computer Components of Computer System - Central Processing Unit , Keyboard, mouse and VDU, Other Input devices, Computer Memory Concept of Hardware and Software - Application Software, Systems software Concept of computing, data, and information Applications of IECT Bringing computer to life- Connecting keyboard, mouse, monitor and printer to CPU, Checking power supply	6
	Operating Computer using GUI-Based Operating System : What is an Operating System; Basics of Popular Operating Systems; The User Interface, Using Mouse; Using right Button of the Mouse and Moving Icons on the screen, Use of Common Icons, Status Bar, Using Menu and Selection, Running an Application, Viewing of File	6
	Folders and Directories, Creating and Renaming of files and folders, Opening and closing of different Windows; Using help; Creating Short cuts, Basics of O.S Setup; Common utilities.	8
	Understanding Word Processing: Word Processing Basics; Opening and Closing of documents; Text creation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document.	6
	Using Spread Sheet: Basics of Spreadsheet; Manipulation of cells; Formulas and Functions; Editing of Spread Sheet, printing of Spread Sheet.	4
2	Basic of Computer networks; LAN, WAN; Concept of Internet; Understanding the World Wide Web, Web Browsers, Browsing the internet,Using a Search Engine, connectivity related troubleshooting, World Wide Web; Web Browsing softwares, Search Engines; Understanding URL; Domain name; IP Address; Using e-governance website	6
	Input Devices: Keyboard, Pointing Devices, Scanning Devices, Optical Recognition Devices, Digital Camera, Voice Recognition System, Data Acquisition Sensors, Media Input Devices	6
	Output Devices: Display Monitors, Printers, Voice Output Systems, Projectors, Terminals	4
	Communications and collaboration: Basics of electronic mail; Getting an email account; Sending and receiving emails; Accessing sent emails; Using Emails; Document collaboration; Instant Messaging; Netiquettes.	6

	Making Presentation: Basics of presentation software; Creating Presentation; Preparation and Presentation of Slides; Slide Show; Taking printouts of presentation/handouts.	8

BND 107 English For Communication (Theory)

CL	CP	L	P
2	0	30	0

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Explain the significance, process, and various types of communication in personal, academic, and professional contexts. *(Bloom's Level: L1 & L 2)*
CO2	Demonstrate effective reading skills by comprehending and interpreting prescribed texts accurately. *(Bloom's Level: L1 & L2)*
CO3	Develop professional writing skills for preparing clear, coherent, and independent written communication. *(Bloom's Level: 3)*
CO4	Communicate confidently and fluently in English in academic and professional settings. *(Bloom's Level: L3)*
CO5	Participate effectively in group discussions, presentations, and interactive conversations conducted in English. *(Bloom's Level: L 3)*

Semester	I
Course Name	**BND 107 English For Communication (Theory)**
Course Description	It is a first basic course for developing Communication skills.
Objectives	1. Understand the significance of communication, the process and different types of communication 2. Read fluently and comprehend the prescribed texts and write independently required for professional written communication 3. Converse confidently in English and participate in discussions conducted in English
Reference Books	1. The above said skills would be developed with the integration of Language Lab software in the English tutorials and with the help of selected texts from the book _Reflections II -An Anthology of Prose, Poetry and Fiction by Nandini Nayar (Foundation Books); 2. Punishment in kindergarten – A poem by Kamala Das 3. People who never took a _No' – Case study of Akio Morita and Henry Ford

	4. The Wonders of new millennium – by Michael David
Prerequisites: 12th Science or Food, Nutrition and Dietetics	

Course Plan		
Unit	**Topics (Theory)**	**hours**
1	Introduction to Communication: Explain the significance of Communication. Discuss the process of communication, 3. Identify different types of communication	5
2	Reading prescribed texts, narratives and articles: Read fluently and comprehend prescribed texts, .Read the text / poems with understanding and enjoyment, Summarize the given text	10
3	Writing - Letter ; Report writing, Write business letters effectively Prepare a report of an event /visit with correct usage of grammar and tense. Public Speaking: Draft various kinds of speeches and Vote of thanks. Interact and communicate confidently at professional level. Demonstrate listening skills (with the language lab software) Practice enhanced listening skills, Demonstrate the correct pronunciation with proper stress, intonation and pacing	15

Second Semester

BND 201 FOOD MICROBIOLOGY

CL	CP	L	P
3	1	45	30

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Describe the morphology, classification, and structural characteristics of microorganisms and explain different microscopy techniques used for their study. *(Bloom's Level: L1 & L 2)*
CO2	Explain the environmental and nutritional factors influencing the growth and survival of microorganisms. *(Bloom's Level: L1 & L2)*
CO3	Analyze microbial contamination in foods and its implications for food safety and quality. *(Bloom's Level: 4)*
CO4	Apply food preservation principles and methods to prevent microbial spoilage and ensure food safety. *(Bloom's Level: L3)*
CO5	Evaluate the beneficial role of microorganisms in the production and development of fermented foods and their significance in food processing. *(Bloom's Level: L 5)*
	Course Outcome – Practical – Students will be able to
CO1	Understand basic techniques of Microbiology and understand various parts of microscope
CO2	Identify various types of bacteria
CO3	Understand various types of sterilization techniques
CO4	Preparation of common laboratory media, broth and slant and dilution techniques
CO5	Enumeration of cell counts– colony forming units, PROBABLE NUMBER TEST
CO6	Microbial analysis of water, milk, fruit juice, solid foods

Semester	II
Course Name	**BND 201 FOOD MICROBIOLOGY**
Course Description	General Microbiology, Morphology & growth of microorganisms, Microbiology of Plant & Animal based foods, Fermented food & its beneficial effects on Humans.
Objectives	1. Obtain knowledge on morphology of microorganisms and types of microscopy 2. Understand the factors influencing the growth of microorganisms 3. Apply the preservation principles and methods to preserve the foods from microbial contamination

	4. Explore the beneficial effects of microorganisms in the development of fermented foods
Text Books	1. Frazier C (2024) Food Microbiology, (6th Revised Edition), Science Technology. 2. Narang S.P (2014),Food Microbiology, APH Publishing Corporation, NewDelhi. 9788176487405 3. Foster WM(2016), Food Microbiology, CBS Publishers and Distributors Pvt.,Ltd,New Delhi. 9788123929125
Reference Books	1. Adams, M. R., & Moss, M. O. (2015). Food microbiology. New Age International (P) Ltd., New Delhi. ISBN-13: 978-8122439756 2. Cappuccino, J. G., & Sherman, N. (2008). Microbiology: A laboratory manual (8th ed.). Pearson Education. ISBN-13: 978-0321648785 3. Jay, J. M. (2015). Modern food microbiology (4th ed.). CBS Publishers & Distributors.ISBN-13: 978-8123912044
Webliography	1.Frontiers in Microbiology, Frontiers, https://www.frontiersin.org/journals/microbiology/sections/food microbiology/about 2. Food Microbiology Academy, foodmicrobiology. academy 3.Science.gov, https://www.science.gov/topicpages/f/fundamental+food+microbiology

Prerequisites: Basics of Biology, Food Science/ Fundamentals of Nutrition

Course Plan

Unit	Topics Practical	Hours
1	Introduction to Microbiology Importance of microbiology for Dieticians - recent examples Morphology and Growth factors of Microorganisms; Definition and History Microscopy, Light and electron Microscopy, Listing other Types. General Morphology of Microorganisms Bacteria, Fungi, Algae, Yeast and Virus Bacteriophage Microbial Biomass, Growth Curve, Definition of Batch and Continuous culture, Factors Affecting Growth Intrinsic Factors, Nutrient Content, pH, Redox Potential, Antimicrobial Barrier and Water Activity. Extrinsic Factors: Relative Humidity, Temperature and Gaseous Atmosphere	15
2	Microbiology of Plant and animal based foods	15

	Outline of Contamination, Spoilage and Preservation of Vegetables and Fruits, Cereals and Cereal Products, Pulses, Nuts and oil seeds, Sugar and Sugar Products Outline of Contamination, Spoilage and Preservation of Milk and Milk Products, Canned Foods, Meat and Meat Products, Egg and Poultry	
3	Significance of Microbes in food quality, food safety and standards: Applications of HACCP in Nutrition and Dietetics Beneficial and Harmful Effects of Microorganisms: Fermented Foods–Curd, Cheese, Sauerkraut, Meat, Soy Based Foods, Alcoholic Beverages and Vinegar	15
	Practical	
1	Basic lab techniques for food microbiology	2
2	Bright field light microscopy	2
3	Hanging Drop Method–Motility of Bacteria	2
4	Staining of Bacteria–Simple Staining, Gram Staining	4
5	Sterilization techniques	2
6	Preparation of common laboratory media, broth and slant	2
7	Serial dilution and plating techniques– pour plate, streak plate	4
8	Enumeration of cell counts– colony forming units.	4
9	Most probable number test	2
10	Microbial analysis of water	2
11	Microbial analysis of liquid foods –Milk and Fruit juice	2
12	Microbial analysis of solid foods	2

BND 202 FUNDAMENTALS OF BIOCHEMISTRY

CL	CP	L	P
3	1	45	30

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Explain the biochemical structure, properties, and functions of major nutrients including carbohydrates, proteins, lipids, vitamins, and minerals. *(Bloom's Level: L1)*
CO2	Describe the digestion, absorption, transport, and utilization of major nutrients in the human body. *(Bloom's Level: L2)*
CO3	Illustrate the fundamental metabolic pathways involved in carbohydrate, protein, and lipid metabolism. (*Bloom's Level: 2)*
CO4	Analyze the regulation and integration of metabolic pathways under normal physiological conditions. *(Bloom's Level: L4)*
CO5	Identify defects and disorders associated with abnormalities in various metabolic pathways. *(Bloom's Level: L 2)*
CO6	Apply knowledge of nutritional biochemistry to interpret metabolic disturbances and their implications for health and disease. *(Bloom's Level: L3)*
	Course Outcome Practicals – Students will be able to
CO1	Understand safety measures in laboratory and usage of various glasswares
CO2	Understand concept of normality, molarity
CO3	Perform reactions of Monosaccharides, Disaccharides and Polysaccharides: Pentose, Glucose, Fructose, Galactose and Mannose, Sucrose, Maltose, Lactose, Starch, Dextrin and glycogen
CO4	Perform qualitative analysis of proteins; Precipitation reactions of proteins, color reactions of proteins, color reactions of amino acids, Color reactions of proteins- Biuret, Xanthoproteic, Millon‘s
CO5	Perform qualitative analysis of Lipids : Solubility, Acrolein test, Salkowski test, Lieberman- Burchard test.
CO6	Demonstrate various characteristics of fats- acid number, iodine number, saponification number, and RM number and interpretation of results

Semester	II

Course Name	**BND 202 FUNDAMENTALS OF BIOCHEMISTRY**
Course Description	Study of Biochemistry of Major Nutrients, Classification- Structure and Properties of Carbohydrates, Lipids, Amino acids and Proteins, Nucleic acids, Enzymes and Vitamins
Objectives	1. To enable the students to obtain depth in the study of biochemistry of major nutrients 2. To help the students to understand the basic metabolic pathways 3. To gain knowledge about the defects in various metabolic pathway
Text Books	1. Satyanarayana, U., & Chakrapani, U. (2021). Biochemistry (Revised reprint) (6th ed).Elsevier. ISBN-13:978-8131264355 2. Nelson, D. L., & Cox, M. M. (2021). Lehninger principles of biochemistry (th ed.). W.H. Freeman and Company NewYork.ISBN 13 : 978-1319381493 3. Dickson, J. K. (2020). Food biochemistry. CBS Publishers & Distributors. ISBN-13: 978-9389396355 4. Appling, D. R., Cahill, S. J. A., & Mathews, C. K. (2018). Biochemistry: Concepts and connections (2nd ed). Pearson Education Limited. ISBN-13 : 978-0134641621
Reference Books	1. Kennelly, P., Botham, K., McGuinness, O., Rodwell, V., & Weil, P. A.(2022). Harper's illustrated biochemistry (32nd ed.).McGraw Hill. ISBN-13: 9781260469943
Webliography	1. Biochemical Society. (n.d.). Biochemical Society. https://www.biochemistry.org. 2. E-learning. AOAC India. https://aoac-india.org/e-learning/
Prerequisites: Fundamentals of Nutrition, Basics of Chemistry	

Course Plan		
Unit	**Theory - Topics**	Hours
1	Carbohydrates: Introduction, Classification. Structure and Properties of monosaccharides (hexoses andpentoses). Reactions of monosaccharides– oxidation, reduction, and reaction with hydrogen cyanide, hydroxylamine, and phenylhydrazine. Oligosaccharides – Sucrose, maltose,	12
2	Lipids: Classification–Triglycerides(Fats), Phospholipids and other non phosphorylated lipids–cerebrosides, gangliosides, sulfolipids. Characterization of fats. Rancidity of fats. Chemistry of Essential fatty acids	9
3	Amino acids, Peptides and Proteins: Structure and classification of standard amino acids- rare amino acids and non-protein amino acids – physical and electrochemical properties- reactions of amino acids- due to amino groups, carboxyl groups, and R groups – color reactions of amino acids. Peptides-Peptide bond, structure, and biological importance of glutathione and valinomycin.	12
4	Nucleic acids and Enzymes: Composition and function.	12

	Structure and properties of DNA and RNA (t-RNA, m-RNA, and r RNA), minor RNA types. Classification of enzymes. IUB classification Enzyme kinetics Michaelis Menten equation. Factors affecting enzyme activity (pH, temperature, substrate concentration and enzyme concentration).	
	PRACTICAL - TOPICS	
1	Good Laboratory Practices Safety measures in Laboratory, Preparation of Molar and Normal solutions, Safety Hazards and Disposal of wastes, Calibration of volumetric glassware-burette, pipette, and measuring cylinder	5
2	Reactions of Monosaccharides, Disaccharides and Polysaccharides: Pentose, Glucose, Fructose, Galactose and Mannose, Sucrose, Maltose, Lactose, Starch, Dextrin and glycogen	5
3	Qualitative analysis of Proteins; Precipitation reactions of proteins, color reactions of proteins, color reactions of amino acids, Color reactions of proteins-Biuret, Xanthoproteic, Millon‘s	10
4	Qualitative analysis of Lipids : Solubility, Acrolein test, Salkowski test, Lieberman- Burchard test. Demonstration- Characterization of fats- acid number, iodine number, saponification number, and RM number.	10

BND 203 Nutrition Through Life Cycle

CL	CP	L	P
2	2	30	60

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Explain the concepts and principles of meal planning and dietary guidelines for maintaining health across the life cycle. *(Bloom's Level: L1 & L2)*
CO2	Describe the nutritional requirements and dietary recommendations during different stages of life. *(Bloom's Level: L2)*
CO3	Identify nutritional concerns and challenges associated with various life stages. (*Bloom's Level: 4)*
CO4	Apply appropriate dietary management strategies to address nutritional needs during different stages of the life cycle. *(Bloom's Level: L3)*
CO5	Demonstrate the use of food exchange lists for planning balanced diets and therapeutic meal modifications. *(Bloom's Level: L 3)*
CO6	Plan and prepare nutritionally adequate meals for individuals at different stages of life based on dietary requirements and health needs. *(Bloom's Level: L6)*
	Course Outcomes Practical – Students will be able to
CO1	Understand basics of meal planning, food exchange list, standardization of recipes with standard weights and measures
CO2	Meal Planning (as per nutritional requirements) and preparation of healthy diets and dishes for different stages of life span and physiological states
CO3	Planning healthy snacks and beverages for all age groups

Semester	II
Course Name	**BND 203 Nutrition Through Life Cycle**
Course Description	The course is designed to introduce students to the concept of meal planning during the various phases of life cycle with emphasis on heathy diet and lifestyle. The students shall be made to understand the nutritional requirements, recommendations, nutrition related problems and concerns of each age group.
Objectives	1 To understand the concept of meal planning and dietary guidelines. 2 To learn about the dietary management during various stages of life 3. To learn about the nutritional concerns and its management during various stages of life. 4. To understand the concept and use of food exchange list and to learn planning and preparation of meals for various stages of life

Reference Books	Khanna K, Gupta S, Seth R, Passi SJ, Mahna R, Puri S (2013). Textbook of Nutrition and Dietetics. Phoenix Publishing House Pvt. Ltd. ISBN 8188901539 Wardlaw GM, Hampi JS, DiSilvestro RA (2004). Perspectives in Nutrition, 6th edition. McGraw Hill. ISBN 0072921633, 9780072921632 Chadha R and Mathur P eds. Nutrition: A Lifecycle Approach. Orient Blackswan, New Delhi. 2015.ISBN 9788125059301 Bamji MS, Krishnaswamy K, Brahmam GNV (2009). Textbook of Human Nutrition, 3rd edition. Oxford and IBH Publishing Co. Pvt. Ltd. ISBN 9788120417427 Srilakshmi B. 9th Edition (2023). Dietetics. New Age Publishers.ISBN 9395161841 Seth V and Singh K (2006). Diet Planning through the Life Cycle: Part 1 Normal Nutrition. A Practical Manual. Elite Publishing House Pvt. Ltd. New Delhi. ISBN 8193599624 Indian Food Composition Tables (2023), NIN, Hyderabad ISBN 9352676777 Dietary Guidelines for Indians A Manual, Revised Edition 2024. ICMR NIN, Hyderabad
Prerequisites: First semester of nutrition and knowledge of basics of nutrition and food science	

Course Plan		
Unit	**Theory Topics**	**Hours**
1	Basic concepts of meal planning: EAR and RDA, Concept of Dietary Reference Intakes, Dietary Guidelines for Indians, Meal planning: objectives and principles, Factors affecting meal planning - Nutritional, socio-cultural, religious, geographic, economic, availability of time, energy and resources, Indian meal patterns - vegetarian & non-vegetarian. Food faddism, unhealthy food habits.	6
2	Nutrition during Adulthood: Reference women and man Nutritional requirements, recommendations, nutrition-related problems and concerns, and Meal planning with emphasis on healthy diet and lifestyle to prevent chronic diseases	3
3	Nutrition in Pregnancy and Lactation Physiological stages of pregnancy, Physiology of lactation, Nutritional requirements. recommendations, nutrition-related problems, and concerns Meal planning with emphasis on maternal and child health	5
4	Nutrition for Infancy: Importance of breastfeeding, Exclusive breastfeeding, early initiation, colostrum, Nutritional requirements. recommendations, nutrition-related problems, and concerns, Complementary Feeding – timely	4

	introduction of appropriate foods, adequacy, consistency, frequency, utilization and safety, Meal planning with emphasis on exclusive breastfeeding	
5	Nutrition during growing years : Nutritional requirements, nutritional guidelines and healthy food choices : Preschool children, School children. Adolescents, Meal planning with emphasis on growth and development and establishment of healthy food habits and physical activity	6
6	General Diets for Athletes	3
7	Geriatric Nutrition : Physiological changes during old age, Nutritional requirements, nutritional guidelines, nutritional concerns, and healthy food choices, Meal planning with emphasis on maintenance of good health	3
	PRACTICAL TOPICS	
Unit 1		
1	Introduction to meal planning, Use of food exchange list, Recipe standardization	6
2	Meal Planning (as per nutritional requirements) and preparation of healthy diets and dishes for adult man and woman	6
3	Meal Planning (as per nutritional requirements) and preparation of healthy diets and dishes for pregnant woman	6
4	Meal Planning (as per nutritional requirements) and preparation of healthy diets and dishes for lactating woman	6
5	Meal Planning (as per nutritional requirements) and preparation of healthy diet and dishes for infants. Planning homemade premixes.	6
6	Meal Planning (as per nutritional requirements) and preparation of healthy diet and lunch box dishes for Preschool child	6
7	Meal Planning (as per nutritional requirements) and preparation of healthy diet and lunch box for School-age child	6
8	Meal Planning (as per nutritional requirements) and preparation of healthy diet and lunch box for adolescents.	6
9	Planning healthy snacks and beverages for all age groups	12

BND 204 Psychology and Sociology Applied to Health Care

CL	CP	L	P
4	0	60	0

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Explain the relationship between society and health and its influence on individual and community well-being. *(Bloom's Level: L2)*
CO2	Describe the sociological concepts of health, illness, and disease from diverse social perspectives. *(Bloom's Level: L1)*
CO3	Analyze the social, cultural, and economic determinants influencing health and illness behavior. *(Bloom's Level: L4)*
CO4	Identify and compare different systems of medical care in India and their role in healthcare delivery. *(Bloom's Level: L3)*
CO5	Examine health-seeking behavior and factors affecting access to and utilization of healthcare services in India. *(Bloom's Level: L5)*
CO6	Evaluate patterns of health system utilization and their implications for improving healthcare accessibility and delivery. *(Bloom's Level: L5)*

Semester	II
Course Name	BND 204 Psychology and Sociology Applied to Health Care
Course Description	Introduction to psycho-social interventions approach, Social Determinants of Health, Case studies, and Application of Psycho-Social science theories
Objectives	• To explain and discuss the relationship between Society and Health; • To explain concepts of health and illness from the sociological point of view; • To enumerate the different systems of medical Care and their relation to health seeking behaviour with reference to India; and • To explain the pattern of utilization of the health system.
Text Books	• Warr, P. B. (2002). Psychology at work. Penguin Books Ltd. ISBN-13 : 978 0141000107 • Pasricha, N. (2016). The happiness equation: Want nothing + do anything = have everything. G.P. Putnam's Sons. ISBN-13 : 978-0425277980
Reference Books	• Pryce-Jones, J. (2010). Happiness at work: Maximizing your psychological capital for success. John Wiley & Sons. ISBN-13:978-0470749463 • Gilbert, D. (2006). Stumbling on happiness. Alfred A. Knopf. ISBN-13: 9780739474556 • Levy, P. (2016). Industrial/organizational psychology: Understanding the workplace. (5th edit). Worth Publishers.ISBN-13: 978-1319014261

	• Rubin, G. (2009). The happiness project: Or, why I spent a year trying to sing in the morning, clean my closets, fight right, read Aristotle, and generally have more fun. HarperCollins.ISBN-13: 978-0061583254 • Breuning, L. G. (2016). Habits of a happy brain: Retrain your brain to boost serotonin, dopamine, oxytocin, and endorphin levels.Adams Media. ISBN-13 : 978-1440590504
Prerequisites	Basic concepts of Psychology and sociology related to health

Course Plan		
Unit	**Topics**	**Hours**
1	Introduction to psychology and sociology, Foundational psychological theories and findings in psychology. psycho-social interventions approach: Relationship between Psychology and Sociology, Concept of Health, Concept of Illness, Illness: Sociological View, psychotherapeutic approaches for the treatment and care of persons with acute and chronic physical illness. Role of interdisciplinary approaches in health care.	18
2	Social determinants of Health: Cultural, systemic, and environmental factors that affect human development. psychological factors influencing health behaviors and health care utilization	15
3	Chronic Illness and Management : Psychological impact of chronic illness on patients and families. Sociological perspectives on chronic illness management. Case studies: Long-term care and patient support systems	15
4	Application of Psycho-Social science theories: Social Science theories-Psychoanalytic, Developmental, Interpersonal, Humanistic and Behavioral theories. Behavioral Aspects of Health and Medical Care, Policies to Improve Health Care	12

BND 205 Techniques of Nutritional Assessment

CL	CP	L	P
0	2	0	60

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Explain the principles, methods, and tools used in nutritional assessment. *(Bloom's Level: L1 & L2)*
CO2	Assess the nutritional status of individuals and population groups using anthropometric, biochemical, clinical, and dietary assessment techniques. *(Bloom's Level: L3)*
CO3	Monitor and interpret nutritional status trends in different population groups. *(Bloom's Level: L 5)*
CO4	Identify at-risk individuals and vulnerable groups based on nutritional assessment data. *(Bloom's Level: L3)*
CO5	Analyze the relationship between dietary patterns and disease conditions to support evidence-based nutrition interventions. *(Bloom's Level: L4)*

Semester	II
Course Name	**BND 205 Techniques of Nutritional Assessment**
Course Description	This course provides a comprehensive knowledge about the methods and approaches for conducting nutrition assessment of individuals and populations throughout the lifecycle. The course is structured into three assessment components: dietary, clinical, anthropometric and biochemical. The topics include in-depth overview of the assessment methods, strengths and limitations of methodology, evaluation and interpretation of assessment data, sources of measurement errors, validity of assessment methods and basic analytical approaches used to interpret assessment data.
Objectives	1. To learn the principles and methods of nutritional assessment 2. To monitor nutritional status and trends in population groups 3. To identify at-risk individuals & groups 4. To investigate diet and disease relationships

Reference Books	1. Sehgal S. and Raghuvanshi RS (2007) Textbook of community nutrition. Directorate of Information and Publications of Agriculture, Indian Council of Agricultural Research, New Delhi. 2. Latham M.C. (1997) Human nutrition in the developing world. Food and Agricultural Organization of United Nations. 3. Dahiya, S., Boora, P. and Rani, V. (2013). A manual on community nutrition, Department of Foods and Nutrition, published under ICAR Assistance scheme. 4. Bamji MS, Krishnaswamy K, Brahmam GNV (2009). Textbook of Human Nutrition, 3rd edition. Oxford and IBH Publishing Co. Pvt. Ltd. ISBN 9788120417427 5. Flamino Fidanza .1991. Nutritional Status Assessment, Springer Science Business Media. 6. Beghan I Cap M Dajardan B (1988) A guide to Nutritional Status Assessment WHO Geneva.
Prerequisites: BND 101, 102 & 202	

Course Plan		
Unit	**Practical Topics**	**Credit hours**
1	• Assessment to be done in at least 5 individuals • Dietary Assessment - Methods of assessing food intake • Using Food and Nutrient Databases • Accuracy, Precision and Validity of Dietary Assessment • Assessing the Intakes of Individuals using Recommended Dietary Allowances	15
	• Assessment to be done in at least 5 individuals • Anthropometric Assessment – Anthropometric assessment of children • Anthropometric assessment of adults • Anthropometric assessment of Elderly • Body composition measurements	15
2	• Assessment to be done in at least 5 individuals • Clinical assessment - Screening in Clinical Assessment - (MUST Tool, SGA) • Medical History and Physical Examination • Assessment of Energy Expenditure and Energy Requirements	15
	• Biochemical Assessment - Assessment of Protein Status • Biochemical Assessment for Anaemia	15

	• Target group selection from local hospitals suffering from nutritional deficiencies, tabulation, interpretation and report writing of their tested biomarkers.	

BND 206 Soft Skills and Communication

CL	CP	L	P
2	0	30	0

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Explain the structure, principles, and processes of effective communication. *(Bloom's Level: L1 & L2)*
CO2	Identify various soft skills essential for effective personal and professional communication. *(Bloom's Level: L3)*
CO3	Analyze the relationship between soft skills and effective communication in different contexts. *(Bloom's Level: L 4)*
CO4	Demonstrate the application of communication techniques and soft skills in interpersonal and professional interactions. *(Bloom's Level: L3)*
CO5	Develop and implement an action plan to enhance communication effectiveness and professional competency. *(Bloom's Level: L6)*

Semester	II
Course Name	**BND 206 Soft Skills and Communication**
Course Description	The academic and career success depends much on communication and presentation skills. As a student, the individual is expected to analyze, prepare, and present the content on different platforms. This course builds awareness, understanding, and frameworks for skill development in the qualities and attributes of presentational formats that involve the voice and the body when used together with technologies to present ideas and concepts that not only inform but also seek to persuade and motivate.
Objectives	1. To understand the structure and processes of effective communication 2. To identify various soft skills and relate them with effective communication 3. To prepare an action plan to improve the effectiveness of the communication.
Reference Books	1. Lamerton J (2001) Everything you need to know public speaking. Harper Collins Glasgow. 2. Ernest S and Sharon AR (1985) Effective Group Communication- How to get action by working in groups. National Textbook Company, Lincolnwood. 3.

	Vanni F (2014) The Role of Collective Action. Agriculture and Public Goods, 21. DOI 10.1007/978-94-007-7457-5_2, © Springer Science +Business Media Dordrecht. 4. Mary S (2010) Book of conflict resolution games quick, effective activities to improve communication, trust, and collaboration. ISBN: 978-0-07-174366-2. Future Research Directions. Group Facilitation. 5. Lawrence R. Frey (2005) Facilitating group communication in context: Innovations and applications with natural groups: Facilitating group task and team communication. Hampton Pr.
Prerequisites: BND 107	

Course Plan

Unit	Topics	Credit hours
1	Communication skills: Need and importance of communication in the present context; Types of communication skills - verbal, non-verbal, and written communication; Types of workplace communication skills - oral presentations, group discussions, public speaking, interviews, extempore presentations, e-mail, memos, business letters, blogs, interoffice memorandums, report writing. Using language for effective communication, techniques of dyadic communication- message pacing and message chunking, self disclosure, mirroring, expressing conversational intent, paraphrasing, vocabulary building- word roots, prefixes, Greek and Latin roots	8
2	Soft skills : Introduction to soft skills and hard skills. Personality- meaning and definition of personality, theoretical perspectives on personality, behavioural trait and humanistic personality patterns, molding the personality patterns. Personality development - self perception, self-concept, self-esteem and gender stereotyping, persistence, and changes in personality determinants (physical, intellectual, emotional, social, educational and family), aspirations, achievements and fulfilment. Cosmopolitan culture- presentational etiquettes, formal dressing, formal greetings. stress and conflict management- goal setting, decision making, career planning, resume building, interview skills.	8
3	Public speaking : Types of speeches - persuasive, informative, and motivational or inspirational speech; Structuring the speech - introduction, body content and	7

	conclusion; Effective delivery – voice; modulation, appearance during speeches and delivery; Platform performance - posture, gesture, eye contact, emphasis, pause, voice pitch, overcoming fear and anxiety of public speaking; Visuals in presentation - type of visuals for public speaking, tips for effective use, computer aided visual presentation, body language.	
4	Importance of Listening: Listening styles - active & amp; passive and direct & amp; indirect listening, thinking & amp; listening, adjusting listening style to that of speaker, social situations & listening; Listening improvement techniques; listening to audio-video conversations oral presentations for evaluation of body language and communication skills based on group discussions and interviews, role plays and pronunciation exercises	7

BND 207 Advanced Computer Literacy for Nutritionists

CL	CP	L	P
0	2	0	60

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Explain the concepts of internet security and its importance in the safe use of digital technologies in nutrition practice. *(Bloom's Level: L2)*
CO2	Describe the applications of Artificial Intelligence in nutrition assessment, dietary planning, and healthcare decision-making.. *(Bloom's Level: L1)*
CO3	Identify nutritional concerns and appropriate dietary management strategies during various stages of the life cycle*(Bloom's Level: L5 & L6)*
CO4	Demonstrate the use of food exchange lists for planning balanced and therapeutic diets.*(Bloom's Level: L3)*
CO5	Plan and prepare nutritionally adequate meals for different stages of life by integrating dietary guidelines, food exchange systems, and technology-based approaches.. *(Bloom's Level: L6)*

Semester	II
Course Name	**BND 207 Advanced Computer Literacy for Nutritionists**
Course Description	The course is designed to introduce students to computer basics and its application for nutritionists and dietitians.
Objectives	1. To know about internet security and the use of Artificial Intelligence (AI) in nutrition 2. To learn about the nutritional concerns and their management during various stages of life. 3. To understand the concept and use of a food exchange list and to learn planning and preparation of meals for various stages of life
Reference Books	1. Computer Applications in Nutrition & Dietetics An Annotated Bibliography. John Orta, eBook Published7 December 2018. Routledge, New York DOI https://doi.org/10.4324/9781315057538 eBook ISBN9781315057538 2. Thareja Reena. Fundamentals of Computers.(2019) Oxford University Press; Second edition ISBN 0199499276

Webliography	1. AI nutritionist: Intelligent software as the next generation pioneer of precision nutrition - ScienceDirect 2. The application and impact of computer-generated personalized nutrition education: A review of the literature – ScienceDirect
Prerequisites: The first semester of Bachelor of Nutrition and Dietetics in Honours and basics of computers	

Course Plan		
Unit	**Topics**	**Credit hours**
1	Internet Security, Privacy, Ethical Issues & Cyber Law	6
	Use of Artificial Intelligence (AI for nutritionists and dietitians	6
	Introduction to Web design, Types of Web Pages Web design Pyramid Building web sites Web development process model	6
2	Use of computers for data analysis	4
	Mobile based apps for diet counseling and diet planning	16
	Meal Planning, Exercise Tracking & Analysis, Patient record management, Menu planning modules, meal or menu plan creation/analysis, Diet analysis spreadsheets and reports, recipe analysis and management, Food intake/diary analysis Indian and international nutrient databases	22
	Interactive Multimedia Nutrition Education	6

Third Semester

BND 301 Macro Nutrients (Theory)

CL	CP	L	P
4	0	60	0

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Explain the chemical structure and composition of major food components including water, lipids, carbohydrates, and proteins. *(Bloom's Level: L1 & L2)*
CO2	Describe the relationship between the chemical structure and functional properties of major food constituents. *(Bloom's Level: L2)*
CO3	Analyze the chemical reactions of food components and their effects on food quality, stability, and shelf life. *(Bloom's Level: L4)*
CO4	Evaluate the role of physicochemical interactions among food components in determining food characteristics and processing behavior. *(Bloom's Level: L5)*
CO5	Apply advanced concepts of Food Chemistry to interpret quality changes and solve problems related to food stability and preservation. *(Bloom's Level: L3)*

Semester	III
Course Name	**BND 301 Macro Nutrients (Theory)**
Course Description	It is a first basic course in Food chemistry. The course enables students to understand basic principles of Food chemistry revolving around macro nutrients in food environment
Objectives	1.The subject will focus on the main components in food: water, lipids, carbohydrates and proteins. The subject deals in depth with the relationship between the chemical structure of the components and the reactions and function of the components in food 2. The students should be able to explain the relationship between the chemical structure and the properties of the main components in food (proteins, lipids, polysaccharides and water) and be able to explain the relationship between the properties and reactions of these components and the quality and stability of foods. In addition, the students should have acquired a deeper understanding in selected topics within food chemistry
Reference Books	1. Manay, N.S. and Shadaksharswamy, M. (2001). Food facts and principles, II Ed. . New Age International (P)Ltd. Publishers, New Delhi. 2. Aurand, L.W. and Woods A.E. (1973). Food chemistry. The AVI Publishing Company, Inc., Westport Connecticut.

	3. Mondy, N.I. (1980). Experimental food chemistry. AVI Publishing Company, Inc. Westport Connecticut. 4. Owen r, Fennema, 1996. Food Chemistry, 3rd Edition, Marcel Dekker, Inc., New York, USA 5. H.D. Belitz, 2009.Food Chemistry, 4th Edition. Springer
Prerequisites: The first semester of Bachelor of Nutrition and Dietetics in Honours	

Course Plan		
Unit	**Topics**	**Credit hours**
1	Properties of foods. Solubility, vapour pressure, boiling point, freezing point, osmotic pressure, viscosity, surface tension, specific gravity, oxidation and reduction. Acids, bases and buffers. Chemical bonding, octet rule, ionic bond, covalent bond, hydrogen bond, polar and non-polar molecules. Colloids, sols, gels, emulsions and foams. Water,- physical problem, free, adsorbed and bound water; Water activity in foods; Molecular mobility and stability Food emulsions: O/W and W/O emulsions; Stability of emulsions; Role of emulsifiers and stabilizers in contributing stability of emulsions- natural and synthetic emulsifiers Composition of foods- classification, structure and properties of carbohydrates, proteins and lipids	15
2	Carbohydrates: Changes in carbohydrates on cooking, Digestibility, Modified starches, Enzymatic and chemical hydrolysis of Carbohydrates and Dietary fibre Protein in foods: Plant proteins, Milk Proteins, Egg proteins and Meat proteins; processing induced physical, chemical and nutritional changes in proteins Formations of toxins and allergens in protein foods; Functional Properties of proteins; Chemical modification of proteins like acylation, alkylation, phosphorylation, sulphitolysis and esterification	15
3	Lipids in Foods: Role and functions of fats in food processing; Polymorphism exhibited by fat – crystallization, and consistency of fats – Palm kernel fat, Cocoa butter, and Milk butter Lipid hydrolysis, Auto-oxidation, and Thermal decomposition of fats Methods of Fat extraction from foods: Rendering – wet and dry rendering techniques, Pressing techniques and solvent extraction Chemistry involved in Hydrogenation, Deodorization, Neutralization, and Interesterification of foods; Significance of MCTs in fats; Enzymatic and chemical modification of fats ; Fat replacers – Natural and synthetic and their composition Chemistry of frying – process of oil absorption by foods during foods and effect of hydrocolloids on oil uptake by foods	15

	Deterioration of fats – Mechanism underlying hydrolytic rancidity and oxidative rancidity ; formation of lipid oxidation decomposition products; Detection tests for rancidity Antioxidants – role in preventing oxidation; natural and synthetic antioxidants, mechanism of action and synergistic action between antioxidants and chelators in removing prooxidants	
4	Effect of processing on fruits and vegetables – effect on Structure and composition Processing effect on the composition of cereals, pulses, and oilseeds. Processing effect on the composition of milk, eggs, meat, and poultry. Chemical changes and nutrient losses during processing Pasteurization, Caramelization, Baking, Demineralization, Dehydration, Irradiation, Fermentation of plant and animal foods, Freezing, Canning Fortification, Enrichment, and restoration of nutrients – Micronutrient fortification, fortificants and vehicles of fortification; Methods of fortification	15

BND 302 Basics of Food Science (Theory)

CL	CP	L	P
3	1	45	30

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Explain advanced concepts, principles, and emerging trends in Food Science. *(Bloom's Level: L1 & L2)*
CO2	Describe novel food processing techniques and their applications in food production and preservation. *(Bloom's Level: L2 & L3)*
CO3	Analyze the effects of advanced processing methods on food quality, safety, nutritional value, and shelf life. *(Bloom's Level: L4)*
CO4	Apply theoretical and practical knowledge of food handling and processing principles in food preparation and production systems. *(Bloom's Level: L3)*
CO5	Evaluate and select appropriate food processing technologies for improving efficiency, product quality, and food safety. *(Bloom's Level: L5)*
	Course Outcomes Practical – Students will be able to
CO1	Identify various stages of sugar crystallisation and preparation of recipes using this principle
CO2	Preparation of hot and cold beverages
CO3	Preparation of cereal based recipes by understanding physical properties of cereals
CO4	Preparation of RTE premixes
CO5	Perform sensory evaluation of a product and making a score card for it

Semester	III
Course Name	**BND 302 Advance Food Science**
Course Description	The course enables students to understand Advances in Food Science.
Objectives	1. Understand the advanced concepts and principles of Food Science. 2. To gain knowledge of novel food processing techniques. 3. Gain both theoretical as well as practical knowledge in handling foods and applying processing principles.
Reference Books	1. Food Processing Technology by P.J Fellows 2. Food Science by Norman. N. Potter. 3. Experimental study of Foods by Griswold R.M.

	4. Food Science by Helen Charley. 5. Beverages: Processing and Technology by Deepak Mudgil and Shwetha Barak 6. Bakery Science and Technology by S.A. Matz 7. Food Fundamentals by MacWiliams, John Willy and son‟s, New York. 8. Extrusion cooking by Robert Guy. 9. Cocoa, Confectionery , and chocolate products by Minife and Minife 10. Fruit And Vegetable Preservation by Sanjeev Kumar and Srivastava
Prerequisites: The second semester of Bachelor of Nutrition and Dietetics in Honours	

Course Plan		
Unit	**Topics**	**Credit hours**
1	Sugar – Processing of sugar from sugarcane; Types and grades of sugar and their uses; Stages of sugar cookery & crystallization; Preparation of caramel sauce, Processing of sugar confectionery – Types of sugar confectionery products – fudge , fondant, lollipop, hard-boiled candy, marshmallow, sugar pastes, and nougat, Chocolate confectionery: Processing of cacao beans to nibs; Processing of chocolate; Types of chocolate – Dark, White, Milk chocolate and compound chocolate; Chocolate defects	9
2	Beverages: Classification of beverages; Processing of Tea- types of tea; Coffee processing – types of coffee; Decaffeination; Processing cola beverages; Processing of cocoa-based flavored drinks Processing of Fruit based beverages: RTS, Squashes, Crushes Nectars, Cordials, Syrups, Concentrates and fruit juice powders Alcoholic beverages: Fruit Wines – Grape wine, port, perry, cider, sherry, ginger wine and Feni; Alcoholic - Brandy, Beer, Whisky	9
3	Processing of Bakery Products Breads –Role of ingredients, Processing of Bread, methods of bread mixing, Bread faults and remedies Biscuits – Ingredients, types of biscuits and preparation, defects in biscuit making Processing of cookies - Ingredients, types of Cookies and preparation, defects in Cookie making	9

	Processing of Cakes and Muffins: Ingredients and their role, Types of cakes, and types of cake mixing techniques Processing of other bakery products like pizza bases, Doughnuts, Pretzels, Bagels, French Loaf	
4	Novel processing Techniques Supercritical fluid extraction and its applications Irradiation of food – theory, application, advantages and disadvantages High pressure processing of foods -theory, application, advantages and disadvantages Ohmic heating and Pulsed electric field processing - theory, application, advantages and disadvantages Pulsed light and Infrared heating - theory, application, advantages and disadvantages	9
5	Processing of Convenience – RTC and RTE foods; Weaning mixes and infant foods Processing pasta, and noodles Extrusion – types of extrusion, types of extruders, Classification of extruded products Processing of snack foods – fried snacks, popped and flaked snacks	9
	Practicals	
1	Stages of sugar crystallization	2
2	Preparation of Fudge and fondant	2
3	Preparation of hardboiled candy and caramel	2
4	Preparation of chocolate and enrobed products with chocolate	2
5	Preparation of hot beverages- coffee, tea and malt beverages	2
6	Preparation of cold Beverages- fruit drinks & milk shakes	2
7	Processing of Bread	2
8	Processing of Biscuits and cookies	2
9	Processing of Pizza and dough nuts	2
10	Preparation noodles and pasta	2
11	Preparation of RTE mixes and weaning foods	2

12	Preparation of popped grains and coating them	2
13	Preparation of flaked cereal and millet	2
14	Preparation of extruded snacks.	2
15	Sensory Evaluation and preparation of scorecard.	2

BND 303 Public Health Nutrition

CL	CP	L	P
3	1	45	30

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Explain the basic concepts, principles, and scope of Public Health Nutrition and its role in promoting community health. *(Bloom's Level: L1 & L2)*
CO2	Describe the significance of nutrition across the life cycle and its contribution to achieving the United Nations Sustainable Development Goals. *(Bloom's Level: L2)*
CO3	Analyze epidemiological and nutritional surveillance data to assess diet–health relationships and monitor public health nutrition trends. *(Bloom's Level: L4)*
CO4	Evaluate the impact of public policies and community nutrition programs in addressing nutritional challenges and improving health outcomes. *(Bloom's Level: L5)*
CO5	Design evidence-based health promotion and community nutrition strategies for diverse populations to address specific public health challenges. *(Bloom's Level: L6)*
	Course Outcomes Practical – Students will be able to
CO1	Understand the situational analysis of ongoing National Nutrition Program
CO2	Understand local and national Surveillance data sets
CO3	Understand significance of local events calendar
CO4	Assessment of dietary adequacy using various data collection methods and interpretation of results
CO5	Identify signs and symptoms of various nutritional deficiency diseases
CO6	Assessment of nutritional status of population using direct and indirect methods

Semester	III
Course Name	**BND 303 Public Health Nutrition**
Course Description	The course aims to focus on the basics of Public Health Nutrition at National level and Global level
Objectives	• To understand and define the basic concepts in Public Health Nutrition (PHN) • To understand the global importance of nutrition across the life cycle and its role in achieving Sustainable Development Goals (SDGs).

	• To assess the impact of public policies on community nutrition and global health targets. • To explore nutritional surveillance systems, for monitoring and evaluating public health nutrition programs. • To analyze epidemiological data to understand the relationship between diet and community health. • To explore community nutrition programs to address specific health challenges. • To emphasize the need for Health Promotion in a diverse population.
Reference Books	• Lal, S. (2018). Textbook Of Community Medicine Preventive And Social Medicine With Recent Update. CBS Publishers & Distributors Private Limited. ISBN:938774289X, 9789387742895 • Vir SC (2011). Public Health Nutrition in Developing Countries 2nd Edition (2 Volume Set). Woodhead Publishing India Pvt Ltd. ISBN: 9789388320351.
Webliography	• UNICEF. https://www.unicef.org/ • WHO. http://www.who.int/ • World Food Programme. http://www.wfp.org/content/about wfp- • WHO. United Nations Decade of Action on Nutrition. http://www.who.int/nutrition/decade-of-action/en/ • Mother, Infant, and Young Child Nutrition and Malnutrition. http://motherchildnutrition.org/india/overview-india.html • Double burden of malnutrition. http://www.who.int/nutrition/double-burden-malnutrition/en/ • United Nations Development Programme. Sustainable Development Goals. http://www.undp.org/content/undp/en/home/sustainable development-goals.html • Global targets 2025 http://www.who.int/nutrition/global target-2025 • Improving breastfeeding, complementary foods and feeding practices. www.unicef.org/nutrition/index_breastfeeding.html • National Guidelines on Infant and Young Child Feeding. www.wcd.nic.in • WHO Health Statistics and Information Systems. Global Health Estimates. http://www.who.int/healthinfo/global_burden_disease/en/

	• WHO Non-communicable diseases and risk factors. http://www.who.int/ncds/en/ • Overview of Non-Communicable Diseases and Related Risk Factors. https://www.cdc.gov/globalhealth/healthprotection/fetp/
Prerequisites: Bachelor of Nutrition and Dietetics (Honors) (4-year program)	

Course Plan		
Unit	**Theory Topics**	**Credit hours**
1	• Introduction to Public Health Nutrition • What is Public Health Nutrition (PHN)? Roles and responsibilities of public health nutritionists. • Definitions of important concepts: Positive health, Malnutrition (under nutrition, overweight, obesity, micronutrient malnutrition), • Nutritional status, Nutrition intervention, Food and nutrient supplements, Food substitutes, Nutrition Education	9
2	• Sectors in Public Health Nutrition • Primary Health Care of the Community and Health Systems of India. National Health Care Delivery System. Determinants of Health Status, Indicators of Health. • Food and Nutrition Security: Food Production, access, Distribution Availability, Losses, Consumption, Dietary patterns and their implications on Nutrition and Health • Nutritional Status: Determinants of Nutritional Status of individuals and populations • Nutrition and Non-nutritional indicators: Sociocultural biological, environmental and economic • Approaches and Strategies for Improving nutritional status and health: Health-based intervention, Food-based intervention, Nutrition education for behaviour change. • Supplementation and Food fortification	9
3	• Nutrition – A Developmental Priority, Population Dynamics (Local, National, Global), Demographic transition, Population structure, Fertility, Behaviour, • Quality of life, Burden of death and disease (Local, National, Global), United Nations (UN) Decade of Action on Nutrition (2016 - 2025), Nutrition at center stage of Sustainable Development Goals (SDGs), 12 of the 17 Goals require good nutrition to be met – an overview.	9

4	• Importance of nutrition throughout the life cycle : Role of Nutrition in Achieving Global Targets, Optimal Infant and Young Child Feeding: Significance of the first 1000 days of life, Improving maternal, infant and young child nutrition – WHO Global Targets, Role of dietary risk factors in achieving global targets related to Non-Communicable Diseases (NCDs), maternal and child health, Addressing micronutrient deficiencies	9
5	• Nutritional Surveillance and Surveillance Systems; Understanding Nutritional Surveillance and its purpose in programme design planning, implementation, operation monitoring, surveillance, and Evaluation Surveillance/reporting system used in ICDS program, Strength & weaknesses, Newer initiatives taken by government to improve ICDS surveillance system. Monthly Program Report and its uses in surveillance, Definitions of terms used in nutritional surveillance, Long term nutrition monitoring , Evaluation of programs impact , Timely warning and intervention systems • Types of nutritional surveillance appropriate to different situations, Indicators, and data sources from existing macro and micro systems of information in India (Origin, objectives, importance, and their use in community nutrition) NNMB, NFHS, NSSO, ICDS, NSS, CENSUS, MICS CES, etc. • Nutrition surveillance for action –cycle of triple A. • Critique of Nutrition surveillance data available in sources like NFHS (National Family Health Surveys) , NNMB (National Nutrition Monitoring Bureau)	9
	Practical	
1	• Understand the situational analysis of ongoing National Nutrition Program • ICDS • MDM • Urban Primary Health Center • Rural Health Center and Sub Centres	6
2	• Understand the significance of a local event calendar and prepare a calendar for the past three years. • Understand local and national Surveillance data sets (NFHS, NNMB, DLHS) for various age groups (Pregnant, Lactation, children under 5y, Adult man and Adult women)	6
3	• Assess the nutritional status of populations using Indirect parameters • Prepare a tool to assess the SES of different income groups (LIG, HIG, MIG as per Kuppuswamy scale), (10 subjects/student).	6

	• Morbidity profile (last 15 days) (10 subjects/student), and understand ICD 11	
	• Assess the nutritional status of populations using Direct parameters (Primary care setup) • Understand the use of a growth chart as an advocacy tool. • Conduct anthropometric measurements and data analysis in a community setup for children and adults (weight, height, BMI, waist/hip, MUAC), (10 subjects/student) and classify them using Asia Pacific and WHO cutoffs of BMI. • Introduce the WHO Child Growth Standard Analysis and interpretation using WHO Anthro and Anthroplus software.	6
4	• Assess the nutritional status of populations using Direct parameters (Primary care setup) • Dietary Data and its analysis: assess the dietary intakes (10 subjects/student), using 24hDRM and FFQ using standard cups and measures in a community. • Analysis, comparisons with RDA, calculation of consumption units and interpretation using the RDA (NIN, 2024), identifying dietary risk factors from dietary intake data. • Compute dietary diversity score.	6
5	• Assess the nutritional status of populations using Direct parameters (Primary care setup) • Understanding the Clinical signs and symptoms for various nutritional deficiencies through field visits, power point presentations, videos: • SAM/MAM • Anemia • VAD, Xerophthalmia • IDD • Water soluble vitamin B-Complex and ascorbic acid • Zinc and other micronutrients	6

BND 304 Basics of Medical Nutrition Therapy

CL	CP	L	P
2	2	30	60

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Explain the fundamental concepts and principles of nutrition in basic dietetics and their application in health care. *(Bloom's Level: L1 & L2)*
CO2	Describe the nutritional requirements and dietary modifications for various therapeutic conditions. *(Bloom's Level: L2 & L3)*
CO3	Plan and prepare balanced and therapeutic diets based on individual nutritional needs and disease conditions. *(Bloom's Level: L3 & L6)*
CO4	Apply principles of Medical Nutrition Therapy in clinical practice for effective patient care. *(Bloom's Level: L3)*
CO5	Evaluate diet plans and recommend evidence-based nutritional interventions for the management of therapeutic conditions. *(Bloom's Level: L5)*
	Course Outcomes Practical – Students will be able to
CO1	Understand concept of modified therapeutic diets in terms of consistency, texture
CO2	Plan and prepare diet plans & standardized recipes with portion control for various non communicable diseases
CO3	Plan and prepare diet plans & standardized recipes with portion control for various infectious diseases
CO4	Plan and prepare diet plans & standardized recipes with portion control for various diseases related to GI tract
CO5	Plan and prepare diet plans & standardized recipes with portion control for various diseases related to liver disorders
CO6	Plan and prepare diet plans & standardized recipes with portion control for various diseases related to autoimmune diseases

Semester	III
Course Name	**BND 304 Basics of Medical Nutrition Therapy**
Course Description	It is a first basic course in therapeutic nutrition. The course enables students to understand basic principles of Medical nutrition Therapy.
Objectives	1. Understand the concepts and principles of nutrition in basic dietetics. 2. Develop the ability to plan and prepare diets for therapeutic conditions 3. Apply knowledge of clinical practice in medical nutrition therapy.

Reference Books	1. Karuse and Mahan (2022); Food and the Nutrition Care Process; Saunders.ISBN0323810268. 2. Annalynn Skipper. (2009). Medical Nutrition Therapy Practice . Jones & Barlett Publishers. 3. Mary Mariah, Mary K.Russell., Scott .A. Shikora.(2008).Clinical Nutrition for surgical patients. Jones & Barlett Publishers. 4. Thomas , Briony. (Eds). (1994). Manual of Dietetics Practice . Oxford : Blackwell Scientific Publication. 5. Wardlaw M, Gardon. (1999) Perspectives In Nutrition. (4th ed) . USA : WCB/ McGraw – Hill. 6. Zeman J. Frances., Ney M. Denise. (1988). Application of Clinical Nutrition. London :Prentice – Hall International. 7. Shills E, Maurice., Olson A, James., Shike, Moshe.(Eds).(1994) Modern Nutrition in Health and Disease. (8th ed.). USA :Lea & Febige. 8. Williams , Rodwell. (1993). Nutrition and Diet Therapy (7th ed.). USA : Mosby Year book. Inc. 9. Anderson ,Dibble. (1982) Nutrition in Health and Disease (17th ed.) . Philadelphia : J. B. Lippincott Company. 10. Alpers ,D., Stenson ,Williams., Denis, Bier. (1995) Manual of Nutrition Therapeutics (3 rd ed.) Boston : Little Brown and Company. 11. Nambiar VS and Zaveri D (2024). Nutrition Guidance After Mini Gastric Bypass Bariatric Surgery. Adhyayan Publishers and Distributors. ISBN-10 : 8119681169. 12. Nambiar VS and Zaveri D (2024).Nutrition Guidelines for Roux-en-Y Gastric Bypass Bariatric Surgery. Adhyayan Publishers and Distributors. ISBN-10 : 8119681215.
Prerequisites: The second semester of Bachelor of Nutrition and Dietetics in Honours	

Course Plan

Unit	Topics	Credit hours
1	Concepts in Basic Dietetics, Growth of dietetics; Purpose and principles of therapeutic diets, Modifications of normal diet. Cultural aspects in diet planning, Role of a dietitian	1
2	Modified hospital diets ; Consistency and texture modifications , Clear liquid Full liquid diets, Soft diets, Mechanically soft diets, Convalescent diets, Regular diets.Nutrient modifications ▪ Sodium ▪ Fibre ▪ Residue	3
3	Nutrition and Weight management (Obesity and Underweight) , Concept of energy balance.Body Composition and Fitness. Parameters for assessment, Grades of obesity and underweight, Types of obesity, etiology and pathophysiology of obesity, Medical Nutrition Therapy of weight management, Diet, Exercise, Behavioral modification strategies, Pharmacological treatments Surgical treatments. A brief dietary guideline to states like anorexia nervosa and Bulimia nervosa. FAD Diets. Medical Nutrition Therapy for thyroid related disorders and poly cystic ovarian disease (PCOD)	6
		2

4	Nutritional Status, Immunity and Infections, Immune Systems- Brief Introduction, Nutrients for Immunity, Medical Nutrition Therapy for different types of fevers Food borne: Typhoid, Tuberculosis Vector borne, Malaria, Dengue, Viral fever: -H1N1.Pathophysiology and Medical Nutrition Therapy for HIV.	3
6	Pathophysiology and Medical Nutrition Therapy of the following conditions: Disorders of the upper Gastrointestinal tract; Gastroesophageal Reflux, Esophagitis, Hiatus Hernia. Disorders of the stomach, Gastritis Peptic ulcers Diseases / Disorders of the Lower Gastrointestinal tract- Pathophysiology and Medical Nutrition Therapy of the following conditions: Constipation and Diarrhea, Celiac Disease and Tropical sprue, Lactose Intolerance Inflammatory Bowel Disease, Crohn‘s Disease, Ulcerative colitis, Irritable Bowel Syndrome ▪ Diverticular Disease	6
7	Diseases of the liver: Hepatitis, Cirrhosis, Hepatic failure, Alcoholic liver disease, Liver abscess, Nonalcoholic steatohepatitis (MASLD), Wilson‘s disease, Liver transplant Diseases of gall bladder: Cholelithiasis, Cholecystitis, Cholestasis Acute and chronic pancreatitis Liver, Gall bladder, and Pancreas Function tests- a brief introduction	6
8	Dietary Guidelines; Elimination Diets; Allergen Tests, Food Challenge. Osteoarthritis ; Rheumatoid , arthritis , Gout	3
Unit	**Practical**	**Hours**
1	Modified hospital diets: Standardization of recipes for the following: Consistency and texture modifications, Clear liquid, Full liquid diets, Soft diets, Mechanically soft diets, Convalescent diets, and Regular diets. Nutrient modifications; Sodium, Fibre, Residue	8
2	Planning and preparation of diets and standardized recipes with the concept of portions and portion control in My Indian Plate (ICMR, NIN 2024) • Overweight • Obesity Grade 2 • Bariatric surgery • Bulimia /Anorexia Nervosa • Underweight • Thyroid Disorders • PCOS	10
3	Nutrition, Immunity, and Infection Planning of Diets for the following conditions: Fevers Foodborne, Typhoid, Tuberculosis, Vector-borne, Malaria, Dengue, Viral fever:-H1N1; COVID; HIV.	6

4	Diseases / Disorders of the Upper Gastro-Intestinal tract Disease : Planning and preparation of diets for the following conditions: Constipation and Diarrhea, Celiac Disease, and Tropical sprue, Lactose Intolerance, Inflammatory Bowel Disease, Crohn‘s Disease, Ulcerative colitis, Irritable Bowel Syndrome ▪ Diverticular Disease. GERD	15
5	Pathophysiology and Medical Nutrition Therapy of the Diseases of Liver, Gallbladder, and Pancreas Planning and preparation of diets for the following conditions: Viral Hepatitis (A and C) Cirrhosis, Hepatic failure, Alcoholic liver disease, Nonalcoholic steatohepatitis , Metabolic dysfunction-associated steatotic liver disease (MASLD), Cholelithiasis Cholecystitis, Acute and chronic pancreatitis	15
6	Diagnosis and management of food allergies. Planning of diets for the following conditions, Elimination Diets, Food Challenge Pathophysiology and Medical Nutrition Therapy for Rheumatic Disorders Osteoarthritis; Rheumatoid arthritis, Gout	6

BND 305 ADVANCED BIOCHEMISTRY

CL	CP	L	P
3	0	45	0

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	**Define Biochemical Principles:** Identify the fundamental concepts of thermodynamics, enzymes, and chemical bonding that drive cellular processes. *(Bloom's Level: L1 & L2)*
CO2	**Outline Metabolic Pathways:** Map out the interconnected sequences of catabolic and anabolic reactions responsible for the breakdown and synthesis of biomolecules. *(Bloom's Level: L3 & L4)*
CO3	**Analyze Nutrient Metabolism:** Detail the specific biochemical steps and regulatory mechanisms involved in the processing of carbohydrates, lipids, and proteins. *(Bloom's Level: L4)*
CO4	**Evaluate Energy Production:** Explain how nutrients are processed through cellular respiration and oxidative phosphorylation to generate biologically usable energy. *(Bloom's Level: L5)*
CO5	**Diagnose Metabolic Dysfunctions:** Relate disruptions in normal biochemical reactions and metabolic pathways to common physiological disorders and nutritional diseases. *(Bloom's Level: L4 & L5)*

Semester	III
Course Name	BND 305 ADVANCED BIOCHEMISTRY
Course Description	Study of Biochemistry of Major Nutrients, Classification- Structure and Properties of Carbohydrates, Lipids, Amino acids and Proteins, Nucleic acids, Enzymes and Vitamins
Objectives	• To acquire knowledge on basic concepts of biochemical reactions • To understand the biochemical reactions involved in the metabolism of various nutrients in the body.
Text Books	• U. Satyanarayana, U. Chakrapani (2013) Biochemistry (4th ed).Elsevier.ISBN-13 : 978-8131236017 • Dean R. Appling, Spencer J. Anthony Cahill, Christopher K. Mathew (2019) Biochemistry concepts and connections (2nd ed). Pearson Education, Limited. • JK Dickson (2020) Food Biochemistry, CBS Publishers Distributors, Pvt. Ltd. ISBN-13 : 978-9389396355

Reference Books	• Adams, M. R., & Moss, M. O. (2006 Reprint). Food microbiology.New Age International. ISBN-8122410146. • Cappuccino, J. G., & Sherman, N. A. (2013). Microbiology: A laboratory manual. Pearson Benjamin Cumming. ISBN-13 : 978 0321840226 • Jay, M. J. (2005). Modern food microbiology (4th ed.). CBS Publishers Distributors. ISBN-13 : 978-8123904757 •
Webliography	• Gavin Publishers. Advances in biochemistry and biotechnology (ISSN 2574-7258). https://www.gavinpublishers.com/journals/details/advances-in biochemistry-and-biotechnology-issn-2574-7258 • Fenteany, G. Biochemistry web. http://biochemweb.fenteany.com/ • AOAC India. E-learning. https://aoac-india.org/e-learning/
Prerequisites	• Fundamentals of Biochemistry

Course Plan

Unit	Topic	Hours
1	Carbohydrate Metabolism Types of metabolism: Anabolism and catabolism, compartmentalization of metabolic pathways. Glycolysis and its energetic, Entry of other carbohydrates (fructose, galactose, mannose) into the glycolytic pathway, Fates of pyruvate to lactace, alcohol and acetyl –CoA, TCA Cycle and its energetic, Glyoxalate cycle. Glycogen metabolism- Glycogenesis, Glycogenolysis, Cori cycle, Gluconeogenesis, Hexose monophosphate shunt and its significance, Glucuronic acid pathway	12
2	Lipid Metabolism Synthesis of Fatty acids- saturated and unsaturated, synthesis of essential fatty acids. Fatty acid β-oxidation. Ketone body formation. Biosynthesis and degradation of triglycerides, phosphor; lipids, glycolipids and cholesterol	12
3	Protein and Amino acid Metabolism General reaction of amino acid degradation- Transamination, deamination and decarboxylation. Ketogenic and glucogenic amino acids. Urea cycle and its significance. Biosynthesis of protein	12
4	Nucleic acid Metabolism Anabolism and Catabolism of Nucleic acid bases, Fate of Purine bases after catabolism, Mechanism for types of Ribonucleic acid reductase enzymes.	9

BND 306 FOOD PROCESSING AND PRESERVATION

CL	CP	L	P
2	1	30	30

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	**Explain** the principles and methods involved in the processing of various food products. *(Bloom's Level: L1 & L2)*
CO2	**Demonstrate understanding** of different food preservation and processing techniques used in the food industry *(Bloom's Level: L2 & L3)*
CO3	**Identify and evaluate** appropriate packaging materials and technologies for different food products. *(Bloom's Level: L3 & L5)*
CO4	**Analyze** the role of packaging in maintaining food quality, safety, and shelf life. *(Bloom's Level: L4)*
CO5	**Apply marketing strategies** for the promotion and commercialization of new food products. *(Bloom's Level: L3)*
CO6	Develop and present innovative food product concepts with suitable processing, packaging, and marketing plans. *(Bloom's Level: L6)*
	Course Outcomes Practical – Students will be able to
CO1	Understand different stages in sugar cookery and physical and chemical properties of sugar
CO2	Analyze protein quality of various foods
CO3	Prepare various processed foods using crystallization properties of sugar
CO4	Prepare various preserved/ fresh beverages and Ready to Serve (RTS)
CO5	Prepare various preservation food items by applying principles of food preservation

Course Name	BND 306 FOOD PROCESSING AND PRESERVATION
Course Description	Food Processing, Different techniques on Food Processing and Preservation, Standard specifications for food products
Objectives	1. To gain knowledge of the processing methods for various foods 2. To understand packaging techniques for different food products. 3. To develop marketing skills to promote new food products.
Text Books	1. Warris, D. S. (2020). Food processing and preservation. CBS Publishers Distributors.ISBN-13 : 978-9389688597 2. Subbulakshmi, G., Udipi, A. S., & Ghurge, S. P. (2021). Food processing and preservation (2nd ed). New Age International Private Limited. ISBN-13: 978-8122472332 3. Sharma, M. (2015). Analytical techniques in food processing. Random Publications.ISBN-13 : 978-9351116073
Reference Books	1. Dr. Joshi R.D., Dr.AdapureNitin (2017) Food Processing , Packaging, Preservation, Irradiation, Allergy and Safety, Agrotech press. ISBN-139789384568689 2. Pander S.N., (2015) Handbook of Food Processing Design, Raj Publication. ISBN-13: 9789382983460 3. Ruth, S. K. (2017). Food storage and preservation. Navyug Books International. ISBN-13: 9789380731865
Webliography	1. Ministry of Food Processing Industries. (n.d.). Food processing schemes. Government of India. https://www.mofpi.gov.in/ 2. National Agricultural Library. National Center for Home Food Processing and Preservation. U.S. Department of Agriculture. https://www.nal.usda.gov/research-tools/food-safety-research projects/national-center-home-food-processing-and-preservation. 3. Institute of Food Technologists. (n.d.). Food processing. Institute of Food Technologists. https://www.ift.org/policy-and advocacy/advocacy-toolkits/food-processing
Prerequisites	Basics of food science

Unit	Topic	Hours
1	Traditional and Modern Food Processing Techniques & Food Additives Element and basic riles of food processing. Traditional food processing drying, smoking, freezing, explosive puffing, vacuum packaging, addition of salt, sugar and pickling. Modern food processing techniques-microwave processing, irradiation, evaporation, ohmic heating, hydrostatic pressure treatment and high voltage pulse electric field technique. Food additives definition, need and types of food additives, antioxidants, chelating agents, coloring agents, curing agents, emulsifying agents and flavor enhancers	**9**

2	Types of Processed Foods Types – Fresh and processed foods, ready to eat and ready to cook foods, extruded, fabricated, value added and designer foods, health and nutragenics supplements, special functional foods (sports, space, and therapeutic uses), process of product development and standardization, product testing (sensory objective and shelf life evaluation).	**6**
3	Introduction to Food Preservation Importance of Food Preservation, Types of Food Preservation, Types of Spoilage, Basic Principles of Food Preservation. Vegan Foods and Organic Foods. Preservation by the Use of Low and High Temperature Refrigeration and Freezing Advantages, Factors to be Considered, Difference Between Refrigeration and Freezing, Freeze drying and Freeze concentration, Steps Involved in Freezing Common Foods, storage Canning, Pasteurization and Sterilization Practical	**9**
4	Preservation by Using Chemicals and Salts Fermentation Definition, Types of fermentation, Advantages. Common fermented foods, Wine and Cheese making, Tomato processing, General consideration involved in preparation of sauce/ ketchup. Pickling- Principles involved and Types of Pickles- Indian pickles, Vinegar, Salt preservation. Chemical preservatives- Definition, types of Preservatives, Role of Preservation, Permitted Preservatives and FPO Specifications.	**6**
	PRACTICAL	
1	Stages in sugar cookery, Evaluation of pectin quality, sugar concentration (Brix), pH and acid content	**10**
2	Preparation of jam, jelly, marmalades, preserves, candied, Tutti fruity, Glazed, Crystallized fruits, Toffees	**10**
3	Preparation of squashes, fruit juice, and Ready to Serve (RTS)	**6**
4	Preparation of Tomato sauce, Tomato ketchup, Preparation of pickles	**4**

Fourth Semester

BND 401 Clinical Biochemistry and Pathophysiology

CL	CP	L	P
3	1	45	30

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	**Explain** the pathophysiology of diseases affecting various organ systems. *(Bloom's Level: L1 & L2)*
CO2	**Analyze** the relationship between disease processes and alterations in normal body functions. *(Bloom's Level: L4)*
CO3	**Identify** the clinical manifestations associated with disorders of different organ systems. *(Bloom's Level: L2)*
CO4	**Interpret** signs, symptoms, and diagnostic findings related to disease conditions. *(Bloom's Level: L2 & L3)*
CO5	**Correlate** pathophysiological changes with clinical presentations for effective understanding of disease progression. *(Bloom's Level: 4)*
CO6	**Apply** knowledge of disease mechanisms to assess clinical conditions and support nutrition-related interventions. *(Bloom's Level: L3)*
	Course Outcomes Practical – Students will be able to
CO1	Understand Standardization of various acid & base reagents
CO2	Interpret results by qualitative and quantitative evaluation of urine sample
CO3	Determine pH and other estimations of various biological samples - blood, serum urine, saliva, plasma (demonstration)
CO4	Perform and interpret assay of salivary amylase

Course Name	**Clinical Biochemistry and Patho-physiology**
Course Description	It is a course that integrates the pathophysiology of therapeutic nutrition and its interrelationship with clinical biochemistry.
Objectives	• To integrate the pathophysiology of diseases with various organ systems. • To identify and interpret the clinical manifestation of diseases.
Reference Books	• Voet, D., Voet, J., & Pratt, C. W. (2013). Principles of biochemistry (4th ed., International student version). John Wiley & Sons, Inc. • Satyanarayana, U., & Chakrapani, U. (2013). Biochemistry (4th ed.). Elsevier. • Berg, J. M., Tymoczko, J. L., & Stryer, L. (2012). Biochemistry (7th ed.). W. H. Freeman and Company. • Rama Rao, A. V. S. S., & Suryalakshmi, A. (2009). A textbook of biochemistry

	(11th ed.). UBS Publishers' Distributors Pvt. Ltd. • Lehninger, A. L., Cox, M. M., & Nelson, D. L. (2004). Lehninger principles of biochemistry (4th ed.). W. H. Freeman Company. • Baynes, J., & Dominiczak, M. (2002). Medical biochemistry. Mosby. • Murray, R. K., Granner, D. K., Mayes, P. A., & Rodwell, V. W. (2000). Harper's biochemistry. McGraw-Hill. • Stryer, L. (1997). Biochemistry (4th ed.). W. H. Freeman and Company. • Marshall, W. J., & Bangert, S. K. (2008). Clinical biochemistry. Metabolic and clinical aspects (3rd ed.). Churchill Livingstone. • Chatterjee, M. N., & Shinde, R. (1995). Textbook of medical biochemistry (2nd ed.). Jaypee Brothers Medical Publishers (P) Ltd. • Rastogi, S. C. (1993). Biochemistry. Tata McGraw Hill. • Orten, J. M. (1990). Human biochemistry (10th ed.). C. V. Mosby Publishers. • Godkar, P. B., & Godkar, D. P. (2003). Textbook of medical laboratory technology (2nd ed.). Bhalani Publishing House. • Gowenlock, A. H. (Ed.). (1996). Varley's practical clinical biochemistry (6th ed.). CBS Publishers. • Oser, B. L. (Ed.). Hawk's physiological chemistry (14th ed.). Tata McGraw Hill.
Prerequisites	Basics of Biochemistry

	Course Plan	
Unit	**Theory Topic**	**Hours**
1	Nutrition and Weight Management, Energy Metabolism, and weight management. Endocrine system physiology, functions, and disorders of the endocrine system Dental Health Pathogenesis and Treatment of Dental Diseases.	**15**
2	Bone Health pathophysiology of diseases associated with the skeletal system Gastrointestinal System Physiology, Functions and disorders of the digestive system. Liver Gallbladder and Pancreas ; Disorders of Liver, Gallbladder and Pancreas.	**15**
3	Cardiovascular System; Physiology, functions and disorders of the circulatory system. Pulmonary System; Physiology, functions and disorders of the respiratory systems.	**15**
4	Cancer; Pathogenesis and clinical manifestation of cancer. Inborn errors of Metabolism; Pathogenesis and clinical manifestation of inborn errors associated with metabolic pathways. Renal system; Physiology, functions, and disorders of the excretory system .	**15**

	PRACTICAL TOPICS	
	1. Standardization: 2. Preparation of primary standard e.g. succinic acid, for titrating alkali 3. Urine analysis 4. Qualitative estimation of normal and abnormal constituents of urine 5. Routine urine analysis-Biochemical (using multi sticks) and Microscopic examination of urine (demonstration). 6. Determination of pH of biological samples - blood, urine, saliva, plasma (demonstration). 7. Blood analysis 8. Determination of erythrocyte sedimentation rate (ESR) 9. Determination of clotting time and bleeding time 10. Estimation of hemoglobin. 11. Estimation of blood glucose 12. Quantitative estimation of constituents of serum • Bilirubin • Creatinine • Urea • Total proteins • Albumin • cholesterol, HDLc, LDLc. (enzymatic Kit) • Serum Triglyceride, VLDL (enzymatic Kit) • Sodium, potassium, chloride (Using Flame Photometer) 13. Assay of salivary amylase (kit) 14. Blood sugar monitoring	**30**

BND 402 National Health and Nutrition Programs and Policies

CL	CP	L	P
3	1	45	30

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	**Describe** the history, evolution, and current status of health and nutrition policies. *(Bloom's Level: L1)*
CO2	**Explain** the framework, goals, and strategies of major health and nutrition programmes. *(Bloom's Level: L1 & L2)*
CO3	**Identify** key national and global health and nutrition initiatives and their intended outcomes. *(Bloom's Level: L2)*
CO4	**Analyze** the implementation and effectiveness of health and nutrition programmes in diverse settings. *(Bloom's Level: L4)*
CO5	**Evaluate** the impact of health and nutrition programmes using appropriate assessment indicators. *(Bloom's Level: L5)*
CO6	**Apply** principles of health economics to assess the cost-effectiveness and sustainability of health and nutrition programmes. *(Bloom's Level: L3)*
	Course Outcomes Practical – Students will be able to
CO1	Do critical evaluation of government programs and give recommendations for improvement
CO2	Identify actual community nutritional problems, plan intervention & critically evaluate it's outcomes by direct field exposure
CO3	Analyse budget and expenditure of nutrition programmes.

Course Name	**National Health and Nutrition Programs and Policies**
Course Description	National health and nutrition programs to improve health through initiatives like maternal care, disease prevention, food security, and water sanitation, supported by international organizations.
Objectives	1. To understand the history, development and current state of health and nutrition policies. 2. To identify the key health and nutrition programmes, goals, strategies, outcomes, and framework. 3. To explain the evaluation of effectiveness and Health Economics of the health and nutrition programmes.
Reference Books	• Park, K. (2023). Park's textbook of preventive and social medicine. 27th Edition. Banarsidas Bhanot Publishers. Jabalpur. ISBN: 9789382219194. • Vir, S.C. (Ed.) (2011). Public Health Nutrition in Developing Countries 2nd

	Edition (2 Volume Set). Woodhead Publishing India Pvt Ltd. ISBN: 9789388320351. • Vir, S.C. (Ed.) (2023) Child Adolescent and Women Nutrition in India, Public Policies, Programmes, and Progress. Taylor and Francis. Kindle Edition.
Webliography	RMNCAH+N:: National Health Mission (nhm.gov.in) Guidelines on PM POSHAN SCHEME.pdf (education.gov.in) Anaemia Mukt Bharat :: National Health Mission (nhm.gov.in)
Prerequisites	Semester 4

Unit	Topic	Hours
1	• Universal Health Coverage • Universal health Coverage – World Health Organization • Universal Health Coverage Policies by G0I -National Health Mission • Goals and Objectives; National Rural Health Mission (NRHM), • National Urban Health Mission (NUHM)	**6**
2	• Health Systems in India • National Health and Nutrition Programs and Policies by the Ministry of Health and Family Welfare: Overview, Organograms, programs and their objectives (MAA, JSY, JSSK and others)	**6**
3	• Understanding the Principles Health and Nutrition Programme Management • Design • Plan • Implementation, • Operation monitoring, • Surveillance, and • • Evaluation	**6**
4	• Health Economics • Macroeconomics • Microeconomics • Understand the effectiveness and cost efficiency of Health and Nutrition budgets of the past 5 years compared to the burden of disease, Overnutrition, undernutrition and micronutrient malnutrition • Cost-benefit, Cost-effectiveness, and cost efficiency	**6**
5	• **National Nutrition Mission of India** • POSHAN 2.0 • National Health and Nutrition Programs and Policies by the Ministry of Women and Child Development: Overview, Organograms, programs and their objectives • Integrated Child Development Services Scheme- • Universalization of ICDS with quality,	**10**

	• ICDS in Mission mode, • Objectives & target groups, • Monitoring system • Mode of implementation, • Administrative setup, • Coverage and compliance, • Impact • PM POSHAN- Mid-Day/ Nutritious Meal Program	
6	• National Programs to Combat Micronutrient Malnutrition • Anemia Mukt Bharat (Nutritional Anaemia Control Program • National Iron Plus Initiative (NIPI, I-NIPI) • National Deworming Campaign • Vitamin A: Vitamin A Prophylaxis Program (VAPP) • Iodine: National Iodine Deficiency Disorders Control Program (NIDDCP) • Universal Salt Iodization (USI), Double Fortified Salt (DFS) • Diarrhoea Control Program: Role of Zinc, ORS • Fluorosis Control Program	**6**
7	• National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) • Rising Burden of Non-Communicable Diseases • Public Health strategies to control NCDs • NPCDCS: Objectives and Key Strategies	**5**
	PRACTICALS	
1	Critical appraisal of existing interventions and government programs and suggestions for improving the same	**10**
2	Field exposure in the operational public nutrition programs, Nutrition rehabilitation centers	**10**
3	Budget and cost analysis of nutrition programmes.	**10**

BND 403 Micronutrients in Human Nutrition (Theory)

CL	CP	L	P
4	0	60	0

Course Learning Outcomes: By the end of this course, students will be able to:

CO1	**Describe** the chemical structure and properties of vitamins, minerals, and antioxidants in food systems. *(Bloom's Level: L1)*
CO2	**Describe** the deficiency diseases caused by micronutrient deficiency. *(Bloom's Level: L1 & L2)*
CO3	**Analyze** the role of micronutrients in health and various disease conditions. *(Bloom's Level: L4)*
CO4	Analysis of pigment and flavour compounds in food – their retention, analysis, effects of various processings. *(Bloom's Level: L4)*
CO5	**Apply** advanced concepts of food chemistry to interpret the behavior of micronutrients in different food matrices. *(Bloom's Level: L3)*
CO6	**Demonstrate** an in-depth understanding of selected topics in micronutrient food chemistry through critical analysis and problem-solving. *(Bloom's Level: L2 & L5)*

Course Name	**Micronutrients in Human Nutrition (Theory)**
Course Description	The course enables students to understand basic principles of Food chemistry revolving around micronutrients in the food environment
Objectives	1. The subject will focus on the main components of food: Vitamins, Minerals, and antioxidants. The subject deals in depth with the relationship between the chemical structure of the components and the reactions and function of the components in Food 2. The students should have acquired a deeper understanding of selected topics within food chemistry of Micronutrients
Reference Books	1. Manay, N.S. and Shadaksharswamy, M. (2001). Food facts and principles, II Ed. New Age International (P)Ltd. Publishers, New Delhi. 2. Aurand, L.W. and Woods A.E. (1973). Food chemistry. The AVI Publishing Company, Inc., Westport Connecticut. 3. Mondy, N.I. (1980). Experimental food chemistry. AVI Publishing Company, Inc. Westport Connecticut. 4. Owen r, Fennema, 1996. Food Chemistry, 3rd Edition, Marcel Dekker, Inc., New York, USA 5. H.D. Belitz, 2009.Food Chemistry, 4th Edition. Springer
Prerequisites	12 th standard – with Biology, Physics and Chemistry

Unit	**Topic**	**Hours**

1	• Flavour: Definition, classification, extraction and purification of flavours , Natural and synthetic flavours; Flavour compounds – structure and occurrence of terpenoids, flavonoids, Polyphenols, sulphur compounds and volatile flavour compounds in foods(plants and animal foods) • Analysis of flavor compounds – HPLC,GC and GCMS; Sensory assessment of flavours • Concepts of flavor retention, Flavour modification and Flavour enhancement, taste modification and taste enhancement • • Flavours produced during fermentation – wines, fermented milk and meat products	**15**
2	• Pigments in Animal foods: structure, function and chemical transformation of hemoglobin and myoglobin; Stability of Myoglobin in cured meats; Role of nitrates and cure accelerators in colour fixation in meat • Pigments in Plant Kingdom: Classification; Structure, physical properties and chemical properties - Chlorophyll, Carotenoids, Anthocyanins, Betalaines • Pigment behavior and colour changes during processing and cooking - Chlorophyll, Carotenoids, Anthocyanins, Betalaines; Effect of various cooking media (Acid and Alkali) on pigment colour and hue • Techniques for colour extraction, retention, and estimation - Chlorophyll, Carotenoids, and Anthocyanins • Synthetic colourants- permitted and non- permitted colours; Dyes and Lakes; advantages and disadvantages; safety regulation of food colours; production of synthetic colours –azo coupling	**15**
3	• Vitamins- Classification, requirements, allowances, toxicity, losses, retention and optimization • Fat Soluble vitamins: A, D, E, and K – Structure, General properties, stability, mechanism of degradation; factors affecting absorption and bioavailability • • Water Soluble vitamins: Structure, General properties, stability, mechanism of degradation; factors affecting absorption and bioavailability – Thiamin, Riboflavin, Niacin, Ascorbic acid, Vitamin B6, Folic acid, Biotin, Vitamin B12(Cyanocobalamin)	**15**
4	• Nutritional aspects of minerals, mineral composition of foods, chemical, and functional properties in foods • Macrominerals – types, sources, requirements, allowances, absorption and bioavailability of minerals like calcium, phosphorous, magnesium, sodium, potassium, chloride and sulphur	**15**

	• Microminerals - types, sources, requirements, allowances, absorption and bioavailability of minerals like Iron, Zinc, Copper, Molybdenum, Selenium, Iodine, Chromium, and Manganese • Toxicity of macrominerals and microminerals; Losses of minerals – Leaching, Retention and optimization • Chemistry of Antinutritional factors – saponins, phytic acid, Hemagglutinins and Lectins • Effect of enzymes on food in processing – Types and their role in processing	

BND 404 Functional Foods and Nutraceuticals

CL	CP	L	P
3	1	45	30

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	**Explain** the concept, development, and different types of functional foods. *(Bloom's Level: L1)*
CO2	**Classify** nutraceuticals based on their sources, mechanism of action, and chemical nature. *(Bloom's Level: L2)*
CO3	**Analyze** the health benefits and therapeutic potential of foods of different biotic origin. *(Bloom's Level: L4)*
CO4	**Identify** bioactive compounds present in foods and evaluate their functional efficiency. *(Bloom's Level: L2, L3)*
CO5	**Assess** the role of functional foods and nutraceuticals in promoting health and disease prevention. *(Bloom's Level: L3 & L4)*
CO6	**Interpret** national and international regulatory frameworks governing the development and commercialization of functional foods. *(Bloom's Level: L5)*
	Course Outcomes Practical – Students will be able to
CO1	Prepare Sample after extraction and analysis primary and secondary metabolites qualitatively
CO2	Perform & interpret results after determination of vitamins and other flavonoids in the given sample
CO3	Able to develop functional food products

Course Name	**BND 404 Functional Foods and Nutraceuticals**
Course Description	An advanced course to learn the concepts of Functional foods and Nutraceuticals, Categorization, Probiotics, Prebiotics, and Synbiotics; Functional nature of nutraceuticals, and Regulatory aspects.
Objectives	1. To learn the development of functional foods along with the types of functional foods 2. To understand the category of nutraceuticals based on sources, mechanism of action and chemical nature. 3. To analyze the health benefits of foods of different biotics origin 4. To acquire the skills in identification of foods of bioactive compounds with functional efficiency 5. To be aware of the National and International regulatory aspects of Functional foods

Text Books	• Gibson, G. R., & Williams, M. C. (2000). Functional foods: Concept to product. CRC Press. ISBN-13: 9780849308512 • Wildman, R., Wallace, T. C., & Wildman, R. E. C. (2016).Handbook of Nutraceuticals and Functional Foods (2nd ed). CRC Press. ISBN-13 : 978-1498770637 • Schmidl, M. K., & Labuza, T. P. (2000). Essentials of functional foods.Aspen Publishers Inc.,U.S. ISBN-13 : 978-0834212619
Reference Books	• Webb G.P (2011), Dietary Supplements and Functional Foods (2nd ed). Wiley-Blackwell • Balamurugan, V., Fatima, S. M., & Velurajan, S. (2019). A guide to phytochemical analysis. International Journal of Advance Research and Innovative Ideas in Education, 5(1), 236–245. • Nijhawan, R. (2024). Food Safety and Standards Act, 2006, Rules & Regulations-- ILBCO (25th ed). ILBCO INDIA.978-8194507123 • Hasler,C.M. (2005). Regulation of Functional Foods and Nutraceuticals. Wiley-Blackwell.ISBN-13: 9780813811772
Webliography	• MDPI. Nutraceuticals & functional foods. Foods. https://www.mdpi.com/journal/foods/sections/Nutraceuticals_Functional _Foods Westminster University. (n.d.). Centre for nutraceuticals. • Westminster University.https://www.westminster.ac.uk/research/groups-and centres/centre-for-nutraceuticals
Prerequisites	Basics of Food Science and Nutrition

Course Plan

Unit	Topic	Hours
1	Introduction to Functional Foods and Nutraceuticals Definition, History, Classification- designer foods and pharma foods, Nutritional Supplements, Health effects of functional foods, Stages involved in development of functional foods.	**12**
2	Categorization of Nutraceuticals Classification - Based on food source, mechanism of action and chemical nature isoprenoid, phenolic substances, fatty acids and structural lipids, terpenoids–saponins, tocotrienols and simple terpenes, carbohydrates and amino acid based derivatives, isoflavones	**12**
3	• Probiotics, Prebiotics and Synbiotics	**9**

	• • Probiotics: Concept, Human gastro intestinal tract and its microbiota, Classification of Probiotics, role of probiotics in health and diseases • Prebiotics: Oligosaccharides, Dietary fiber, Resistant Starch, Gums, Spirulina as bioactive components.	
4	• Functional nature of Nutraceuticals and Regulatory Aspects • Polyphenols: Flavonoids, Catechins, Isoflavones, Tannins: Phytoestrogens, Phytosterols, Glucosinolates, Pigments, Organo sulphur compounds, proteins and peptides, Conjugated linoleic acid, Omega 3 Fatty acids, Bioactive compounds: Saponins, Hemagglutinins, Resveratrol, Kaempferol, Quercetin, Cinnamaldehyde, Lutoline, Capsaicin, Piperine, Gingerol, Eugenol, Rosemarinic acid, Apigenine, Thymoquinone. • Regulatory aspects- International and national regulatory aspects of functional, foods in India.	**12**
	Practical	
Unit	**Topic**	**Hours**
1	Preparation of Sample	4
2	Methods of Extraction	6
3	Qualitative analysis of Primary metabolites	3
4	Qualitative analysis of Secondary metabolites	3
5	Qualitative analysis of Vitamins	4
6	Determination of Total Phenols and Flavonoids	4
7	Development of Functional food products	6

BND 405 Advanced Dietetics

CL	CP	L	P
3	1	45	30

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	**Demonstrate** the ability to plan, prepare, and evaluate therapeutic diets for individuals with various clinical conditions. *(Bloom's Level: L2 & L6)*
CO2	**Apply** the principles of medical nutrition therapy in the dietary management of complex and multiple clinical disorders. *(Bloom's Level: L3)*
CO3	**Integrate** nutritional knowledge with clinical assessment to design appropriate diet plans for advanced disease conditions. *(Bloom's Level: L3)*
CO4	**Analyze** the nutritional requirements and formulate evidence-based therapeutic interventions for hospitalized patients with advanced clinical disorders. *(Bloom's Level: L4)*
CO5	**Evaluate** and modify therapeutic diet plans according to patient condition, treatment response, and hospital care protocols. *(Bloom's Level: L5 & L6)*
	Course Outcomes Practical – Students will be able to
CO1	Analyse how food intake is affected in various diseases and planning diet for cardiovascular, diabetes, metabolic disorders, renal diseases, pulmonary diseases, critical care and cancer
CO2	Evaluate available nutraceuticals available in the market and their usage in practice under various settings and disease conditions

Course Name	**BND 405 Advanced Dietetics**
Course Description	It is an Advanced Course in therapeutic nutrition. The course will enable students to expand their knowledge on the complex impact of nutrition on human health. This course will focus on advanced nutritional principles and their application in various health conditions.
Objectives	1. Develop skills in planning, preparation, and evaluation of various therapeutic diets. 2. Develop the ability to apply, integrate the principles of medical nutrition therapy in combination of clinical disorders. 3. Understand the principles of planning therapeutic diets for advanced clinical disorders in hospital settings.
Reference Books	1. Raymond, Janice L., and Morrow, Kelly. (2022). Krause and Mahan's Food and the Nutrition Care Process (16th ed.). St. Louis, MO: Elsevier. 2. Skipper, Annalynn. (2009). Advanced Medical Nutrition Therapy Practice. Jones & Bartlett Learning. 3. Marian, Mary, Mary K. Russell, and Scott A. Shikora. (2008). Clinical Nutrition for Surgical Patients. Jones & Bartlett Learning.

	4. Thomas, B. (Ed.). (1994). Manual of dietetics practice. Blackwell Scientific Publication. 5. Wardlaw, G., & Hampl, J. S. (1999). Perspectives in nutrition (4th ed.). McGraw-Hill Education. 6. Zeman, F. J., & Ney, D. M. (1988). Applications of clinical nutrition. Prentice-Hall International. 7. Shils, M. E., Olson, J. A., Shike, M., & Ross, A. C. (Eds.). (1994). Modern nutrition in health and disease (8th ed.). Lea & Febiger. 8. Williams, S. R. (1993). Nutrition and diet therapy (7th ed.). Mosby Year Book, Inc. 9. Anderson, L., & Dibble, M. V. (1982). Nutrition in health and disease (17th ed.). J. B. Lippincott Company. 10. Alpers, D. H., Stenson, W. F., Bier, D. M., & Taylor, B. E. (Eds.). (1995). Manual of nutritional therapeutics (3rd ed.). Little, Brown and Company.
Prerequisites	12 th standard - HSc, ICSC with Science (Biology and Chemistry/ Food, Nutrition and Dietetics) who has completed the first year of BSc Nutrition and Dietetics

Course Plan

Unit	Topic	Hours
1	• Cardiovascular Diseases • Hypertension • Hyperlipidemia • Atherosclerosis • Ischemic Heart Disease (Compensated and Decompensated) • Cardiac Function tests • Congestive Heart failure • Rheumatic Heart Disease	**10**
2	• Diabetes Mellitus and Metabolic Disorders Introduction and Classification of Diabetes Mellitus • Metabolic syndrome, Prediabetes and other disorders and its dietary management. • Medical Nutrition Therapy (MNT) for Type 1 Diabetes, type 2 Diabetes and Gestational Diabetes. • Pharmacotherapy in Different types of Diabetes and its relationship with diet. • MNT for persons with diabetes in special conditions. • Complications of Diabetes Mellitus (Acute and Chronic) and its Management. • Education and Counseling in Diabetes	**10**

3	• Renal Diseases • Functional Units in the Kidney • Etiology ; Clinical findings and medical nutrition therapy of different stages of renal disease - Glomerulonephritis; Nephrotic Syndrome; Acute Renal Failure; Chronic Kidney Disease; Renal Replacement Therapy; Renal Transplant; Renal Calculi. • Protein Requirements, Electrolyte and fluid Balance with the progression of renal disease. • Medical Nutrition Therapy, protein, sodium, potassium, phosphorus Exchange, Acid-Base Balance in renal disease.	**8**
4	• Enteral and Parenteral Nutrition Basic Principles; Formulations; Conditions, Indications, Contraindications, Management of complications.	**5**
5	• Medical Nutrition Therapy of a range of pulmonary disease - bronchitis, asthma, chronic Obstructive Pulmonary Disease.	**5**
6	• Food and Drug Interactions of commonly used medications in various disease conditions and the dietary guidelines. • Effect of Nutritional Status and Nutritional Deficiencies on the efficacy of drug utilization in the body.	**5**
Practical		
Unit	**Topic**	**Hours**
1	Cardiovascular Diseases Planning Diets for the following conditions: • Hypertension • Hyperlipidemia • Atherosclerosis • Ischemic Heart Disease (Compensated and Decompensated) • • Congestive Heart failure	6
2	Diabetes Mellitus and Metabolic Disorders Planning diets for the following Conditions: • Metabolic syndrome, Prediabetes and other disorders • Type 1 Diabetes, type 2 Diabetes and Gestational Diabetes. • Complications of Diabetes Mellitus (Acute and Chronic) and its Management. • Education and Counseling in Diabetes	7
3	Renal Diseases Planning diets for the following Conditions: Glomerulonephritis; Nephrotic Syndrome; Acute Renal Failure; Chronic kidney Disease; Renal Replacement Therapy; Renal Transplant; Renal Calculi. Focus on Protein Requirements, Electrolyte and fluid Balance with the progression of renal disease. Development of protein, sodium, potassium, and phosphorus Exchange in renal disease.	7

4	Enteral and Parenteral Nutrition Market survey of Enteral Formulations; Demonstration of preparation of enteral feeds. Basic orientation for parenteral feeds in a clinical setting.	2
5	Pulmonary Disease Planning diets for the following Conditions: Range of pulmonary disease - bronchitis, asthma, Chronic Obstructive Pulmonary Disease.	4
6	Cancer Understand the role of the registered dietitian in the oncology setting, Nutrition screening and assessment in oncology, Understand how caloric needs of cancer patients are affected by the treatment phase (pretreatment, during treatment, post-treatment), Describe how different types of cancer treatment (including chemotherapy, radiation, surgery, and immunology) affect food intake	6

BND 406 Food Safety and Standards

CL	CP	L	P
2	0	30	0

Course Learning Outcomes: By the end of this course, students will be able to:

CO1	**Explain** the various biological, chemical, and physical factors that threaten food safety and quality. *(Bloom's Level: L1)*
CO2	**Identify** potential hazards and risks associated with food contamination during handling and processing. *(Bloom's Level: L1 & L2)*
CO3	**Demonstrate** safe methods of food preparation, holding, and storage to ensure food quality and prevent spoilage. *(Bloom's Level: 2)*
CO4	**Apply** food safety principles and best practices in maintaining hygiene and sanitation during food handling. *(Bloom's Level: L3)*
CO5	**Interpret** national and international food safety laws, standards, and regulations for ensuring compliance in food systems. *(Bloom's Level: L5)*

Semester	**IV**
Course Name	**BND 406 Food Safety and Standards**
Course Description	This subject is important because the student must know, classify, apply, develop and systematize the main hygiene and sanitation applications to enhance their application as a health professional for the exit profile, such as: • Life Sciences (in areas related to Nutrition and Dietetics); • Public Health and/or Community Nutrition; • Management and Quality Control in Public and Collective Catering
Objectives	1. To understand the factors that threaten the safety of foods 2. To understand safe preparation, holding and storage of foods 3. To understand food safety laws
Reference Books	• Roday S. (2017) Food Hygiene and Sanitation, 2nd Edition, Tata Mc Graw Hill Publication. ISBN: 978-0070700208 • Food Safety and Standards (Licensing & Registration of Food Businesses) Regulations, 2011. (http://www.fssai.gov.in/home/fss-legislation/fss regulations.html • Food Safety & Standard Act, 2006 (http://www.fssai.gov.in/home/fss-legislation/food-safety and-standards-act.html) • http://www.who.int/news-room/fact-sheets/detail/food safety
Prerequisites	Semester 4

Unit	Topic	Hours

1	Food hygiene concepts Importance of food hygiene and sanitation in a o Community setting, o Hospital setting and o Food businesses Selection and purchase of food a. Receiving and storing food safely b. Preparing and holding food safely c. serving safe food d. storing cooked food safely e. Personal Hygiene	**6**
2	Food safety and contaminants -biological, physical or chemical nature. a. Importance in food security and associate different contaminants with risks and relevance to food safety and food safety. b. Precautions against contamination c. Risk Analysis d. Know and define risk analysis e. HACCP system, characterize each phase and apply the system to case studies – collective restoration	**6**
3	Storage temperatures; relative humidity of the environment; presence and concentration a. Identify temperatures in food processing and conservation; b. Identify the humidity reference values; c. Identify the importance of air quality in food hygiene. d. Importance of water and sanitation as an important element in food, hygiene and health promotion. e. Strengthening sustainable WASH programming (UNICEF / WHO guidelines)	**6**
4	Pest control and waste management • Insect, rodent and bird infestation • Use of pesticides and Integrated pest management • Waste disposal- Solid waste, Liquid waste, ETP	**6**
5	Food Standards -Legal and regulatory documents related to food safety a. Codex b. FSSAI c. Food Hygiene and Safety Audits d. Define audit and phases of an audit	**6**

Fifth Semester

BND 501 Research Methodology and Statistics (Theory)

CL	CP	L	P
4	0	60	0

Course Learning Outcomes: By the end of this course, students will be able to:

CO1	**Explain** the various types of research and their significance in scientific inquiry. *(Bloom's Level: L1)*
CO2	**Identify and differentiate** appropriate research methodologies for conducting qualitative and quantitative studies. *(Bloom's Level: L1 & L2)*
CO3	**Apply** suitable statistical tools and techniques for analysis and interpretation of research data. *(Bloom's Level: 3)*
CO4	**Design and develop** appropriate tools and techniques for systematic data collection. *(Bloom's Level: L6)*
CO5	**Demonstrate** the ability to document references and prepare bibliographies using standard scientific citation styles. *(Bloom's Level: L5)*
CO6	**Prepare and present** a comprehensive research proposal by integrating appropriate research design, methodology, and documentation practices. *(Bloom's Level: L3)*

Semester	**V**
Course Name	**BND 501 Research Methodology and Statistics (Theory)**
Course Description	It is a course which is an introduction to Research Methods and Statistics at the Graduation level
Objectives	1. To understand different types of research. 2. To develop the ability to identify and apply appropriate research and statistical methods for research. 3. To be able to develop appropriate tools for data collection and appropriate style of documenting Bibliography. 4. To be able to prepare a research proposal.
Reference Books	1. Research methodology: methods and techniques (C R Kothari), New age international publishers 2. W. W. Daniel, C. L. Cross. Biostatistics: A Foundation for Analysis in the Health Science, 10/e., Wiley, 2013
Prerequisites	12th standard - HSc, ICSC with Science (Biology and Chemistry) who has completed Second year of BSc Nutrition and Dietetics
	COURSE PLAN

Unit	Topic	Hours
1	Introduction to research methodology: What is Research, importance of research, Steps in research	**30**

	Types of research - Qualitative and Quantitative research, cross-sectional and longitudinal research with examples from papers. Variables and levels of measurements - Independent and Dependent variables; Categorical Variables: nominal and ordinal Scale; Continuous variables; Interval ratio scale; Primary Data, Secondary data Methods of Data Collection: Questionnaire and Interview techniques and development; Dietary data Collection - FFQ and Dietary Data collection techniques; Merits, Demerits and suitability in specific studies.	
2	Report writing ; Proposal writing; Types of research papers - Interpretation and presentation Referencing and reviewing literature using search engines and indexed peer reviewed journals. Bibliography - styles and detailing. Statistics : calculation of measures of central tendency and dispersion ; understanding various tests and their interpretation with the help of examples from paper ; T test, ANOVA, Chi square, Pearson's Correlation, Regression analysis, Levels of significance Use of technology in statistical analysis, google forms, excel based data coding and compilation; use of SPSS software.	**30**

BND 502 Sports Nutrition

CL	CP	L	P
2	2	30	60

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	**Explain** the fundamental principles and concepts of sports nutrition and their relevance to athletic performance. *(Bloom's Level: L1)*
CO2	**Identify and analyze** the specific nutritional requirements of athletes engaged in different types of sports and physical activities. *(Bloom's Level: L2)*
CO3	**Evaluate** the role of macronutrients and micronutrients in enhancing athletic performance, endurance, and recovery. *(Bloom's Level: 53)*
CO4	**Assess** the impact of nutrition on physical fitness, exercise adaptation, and overall sports performance. *(Bloom's Level: L3)*
CO5	**Design and formulate** individualized nutrition plans tailored to the needs of athletes based on sport-specific demands. *(Bloom's Level: L6)*
CO6	**Understand and interpret** the psychological and physiological aspects of eating disorders in athletes and their implications for health and performance. *(Bloom's Level: L4)*
	Course Outcomes Practical – Students will be able to
CO1	Understand various methods of assessment of nutritional status and fitness for male and female athletes in person and in group
CO2	Creating and evaluating nutrition plans for athletes for various nutritional needs and types of sports
CO3	Creating diet plans for recovery from sports injuries
CO4	Assess body composition of athletes engaged in different types of sports activities
CO4	Understanding of use and practice of ergonomic aids and commercial availability of sports supplements by survey techniques

Semester	**V**
Course Name	**BND 502 Sports Nutrition**
Course Description	This course covers the principles of sports nutrition, focusing on the role of diet in athletic performance, recovery, and overall health. Students will explore the nutritional needs of athletes, the impact of various nutrients, dietary strategies for different sports, and the latest research in the field.
Objectives	1. To learn the fundamental principles of sports nutrition. 2. To identify the nutritional requirements of athletes in various sports. 3. To assess the role of macro and micronutrients in athletic performance and recovery. 4. To develop individualized nutrition plans for athletes. 5. To understand the psychological and physiological aspects of eating disorders

	in athletes.
Reference Books	1. Kang J and Barnett S R N(2022) Nutrition and Metabolism in Sports, Exercise and Health (2nd Edition). Routledge publishing company. 2. Maughan R J and Burke L M(2023) Sports Nutrition: Enhancing Athletic Performance" (3rd Edition). CRC Press 3. Dunford M J, Doyle A and Kalman D M (2021) Nutrition for Sport, Exercise, and Health (2nd Edition) Cengage Learning 4. Burke L and Deakin V (2022) Clinical Sports Nutrition (6th Edition) McGraw-Hill Education 5. Ryan M (2020) Sports Nutrition for Endurance Athletes (3rd Edition). VeloPress 6. William D. McArdle, F I K and Victor L K (2020) Sports and Exercise Nutrition (5th Edition). Wolters Kluwer 7. Austin K G and Seebohar B (2021). Performance Nutrition for Athletes. Human Kinetics 8. Heather Hedrick Fik and Alan E. Mikesky (2015) Practical Application in Sports and Nutrition. Fourth Edition. Jones & Bartlett Learning, Burlington, MA 01803. 9. www.eatright.org/fitness 10. www.nutritionist-resource.org 11. www.sportsoracle.com 12. www.nutritionaustralia.org 13. www.acsm.org/nutrition 14. www.sportsnutrition society.org 15. www.sportsdietitians.com
Prerequisites	Following prerequisites are recommended to ensure that the students have the foundational knowledge necessary to understand and apply the concepts discussed in the course sports nutrition. The typical pre-requisites are: 1. Understanding of basic nutrition, food science and biochemistry 2. Knowledge about human anatomy and exercise physiology 3. Knowledge about dietetics including dietary assessment, nutrition counselling and meal planning.

Course Plan

Unit	Topic	Hours
1	Sports nutrition and physical fitness Overview of sports nutrition, Definition and scope, training and exercise, nutrition guidelines and principles. Basic nutrients for sports	**6**

	persons. Physical fitness - principles, types and components Techniques and methods of measuring physical fitness	
2	Body composition and energy balance concept Body composition in different physiological conditions and factors affecting it and methods of assessing body composition. Energy – energy concept and factors affecting energy and methods of measuring energy intake and expenditure and concept of energy balance.	**6**
3	Nutrient metabolism and fluid management Macronutrients in Sports Nutrition - Carbohydrates: Types, role, timing, and loading strategies. Proteins: Requirements, sources, timing, and muscle protein synthesis, Fats: Types, roles, and their use as energy during exercise. Micronutrients and Hydration. Key vitamins and minerals for athletes, Electrolyte balance and its importance - Hydration strategies and fluid replacement	**8**
4	Nutritional Strategies for Training and Competition Pre-exercise nutrition - Intra-exercise nutrition - Post-exercise recovery nutrition and special considerations for different sports (endurance, strength, team sports, etc). Sports nutrition products - supplements related to energy metabolism - weight reduction, Botanical and herbal supplement. .Ergogenic aids and their efficacy - Safety, regulations, and ethics. Special nutritional consideration for women athletes, young teen athletes, athletes with diabetes, vegetarian athletes. Specific nutrition for gymnastics and weight lifters, skiers and cyclists, swimming and skating. Addressing eating disorders and disordered eating in athletes.	**6**
5	Emerging Trends and Research in Sports Nutrition, ethics and Professional Practice Advances in sports nutrition research - Current trends in dietary practices among athletes. Future directions in sports nutrition. Professional responsibilities of a sports nutritionist- Ethical considerations in sports nutrition counselling. Working with a multidisciplinary team (coaches, trainers, medical staff).	**4**
	Practical	
	1. Development of methodology for collection of data on nutritional status 2. Development of methodology for collection of data on physical fitness	**60**

	3. Clinical and dietary assessment techniques for athletes 4. Clinical and dietary assessment techniques for group activities 5. Assessment of nutritional status of athletes 6. Assessment of nutritional status of group activities 7. Creating and evaluating nutrition plans for athletes 8. Planning diet for energy dense and high protein recipes 9. Planning diet for fat recipes for athletes 10. Planning diet for athletes and endurance sports 11. Planning nutritional requirements for sports injuries 12. Assessment of physical fitness of athletes 13. Assessment of physical fitness of group activities 14. Assessment of body composition of athletes and performed sports activities. 15. Development and standardization of tool for physical fitness. 16. Assessment of physical fitness of men athletes using standard tool 17 Assessment of physical fitness of women athletes using standard tool. 18. Use and practice of ergonomic Ft for assessment of energy expenditure. 19. Market survey of commercially available sports supplements. 20. Visit to a sports academy and fitness centres.	

BND 503 Tools and Techniques for Nutrition Counselling

CL	CP	L	P
1	3	15	90

Course Learning Outcomes: By the end of this course, students will be able to:

CO1	**Explain** the principles and importance of diet counseling in nutrition and dietetic practice. *(Bloom's Level: L1)*
CO2	Understand various models and methods of diet counselling
CO3	Analyse barriers of understanding in nutritional/ behavioural counselling of patients
CO4	Explain role of interpersonal skills and soft skills in patient counselling
	Course Outcomes Practical – Students will be able to
CO1	**Demonstrate** effective communication and interpersonal skills required for successful diet counseling. *(Bloom's Level: L2)*
CO2	**Apply** appropriate counseling techniques to address individual nutritional concerns and promote healthy dietary behavior. *(Bloom's Level: L3)*
CO3	**Analyze** patient case studies to identify nutritional problems and counseling needs. *(Bloom's Level: L4)*
CO4	**Evaluate** counseling outcomes through case-based assessment and reflective practice to improve patient care. *(Bloom's Level: L5)*
CO5	**Develop** suitable dietary counseling strategies and recommendations based on patient-specific conditions. *(Bloom's Level: L6)*

Semester	**V**
Course Name	**BND 503 Tools and Techniques for Nutrition Counselling**
Course Description	The course is designed to introduce students to the concept of nutrition counseling and provide internship in hospital setups for experiential learning.
Objectives	1 To enable the students to learn about diet counseling skills 2. To provide practical learning experiences with patients through case studies
Reference Books	1. Mahan, L.K. and Escott-Stump, S. (2021): Krause's Food Nutrition and Nutrition Care Process, 16th Edition, Elsevier Pvt. Ltd. .ISBN 032381025X 2. Wardlaw GM, Hampi JS, DiSilvestro RA (2004). Perspectives in Nutrition, 6th edition. McGraw Hill. ISBN 0072921633, 3. Anita Jatana. Daphne JK, Harita Shyam, Priyanka Rohtagi, Kajal Pandya Reptho Apollo Clinical Nutrition Handbook.(2022). Jaypee Brothers ISBN 978-9354650895 4. Bamji MS, Krishnaswamy K, Brahmam GNV (2009). Textbook of Human

	Nutrition, 3rd edition. Oxford and IBH Publishing Co. Pvt. Ltd. 5. Srilakshmi B. 9th Edition (2023). Dietetics. New Age Publishers.ISBN 939516184
Prerequisites	Understanding of Basics of medical nutrition therapy and advanced dietetics

	COURSE PLAN	
Unit	**Topic**	**Hours**
1	Introduction to Dietary Counseling ; Definition, Expectations, goals, scope and limits Counseling Responsibilities and Role of Nutrition Counselor Ethical code and responsibility. Characteristics of an effective counselor Skills and attributes of the nutrition educator or counselor o Cultural Competency o Client's Perspective o Informed Negotiation o Empathy and Rapport	**2**
2	Stages of Diet Counseling: Stage I: problem exploration and clarification, Stage II: Developing new perspectives and setting goals, Stage III: Implementation follow up and evolution Stages of Change: Precontemplation, Contemplation, Preparation, Action, Maintenance, Relapse	**3**
3	Behaviour Change Models 1. Behaviour change and factors affecting the ability to change 2. Models for behaviour change a. Health Belief Model b. Social Cognitive Theory c. Theory of Planned Behaviour d. Transtheoretical Model of Change 3. Models for educational program development Cognitive behavioral therapy (CBT) Acceptance and commitment therapy (ACT) Motivational interviewing (MI) 4. Different approaches of counselling- o Psychoanalytical approach o Cognitive- Behavioural approach o Humanistic approach (Client centred therapy and Gestalt therapy)	**4**
4	Facilitating Change: Expressing empathy Understanding cultural factors Developing discrepancy	

	Avoiding arguments and defensiveness Rolling with resistance Supporting self efficacy	
5	Different types of counselling methods 1. Types of Counselling o Multicultural counselling o Motivational counselling o Directive counselling o Guided counselling 2. Conditions during diet counselling sessions, components of first session and follow-up visits, Group counselling 3. Not ready to change Vs. Unsure about change counselling Sessions	**3**
6	Resistance Behaviour and Strategies to modify them o Reflecting o Shifting Focus o Agreeing with a twist o Reframing o Ending the Sessions Ready to change Counselling Sessions o Setting Goals o Action Plan	**3**
	PRACTICAL	
1	Development of IEC materials and patient counselling 1.Preparation of different types of models like cardboard models/wax models of various food items like chapati, bhakri, fruits, vegetables and other various food groups and use of diet atlas 2. Development of innovative IEC material like brochure, posters, cards, puzzle, games, calendar for imparting key messages / information. 3. Use of social networking sites to impart nutrition knowledge in community 4. Planning, preparation, implementation, testing of IEC material for a target group alongwith feedback.	**30**
2	Use of online applications like Ntuitive Calculator, Diet Cal,	**10**
3	Planning and making diet charts for patients using nutrition education resources and apps for various diseases and special conditions.	**20**
4	Case Studies in Dietary Counselling in Hospital/clinical settings.	**30**

BND 504 Nutritional Epidemiology and Anthropology

CL	CP	L	P
4	0	60	0

Course Learning Outcomes: By the end of this course, students will be able to:

CO1	**Explain** the epidemiology, prevalence, and public health significance of major nutritional deficiency disorders in India. *(Bloom's Level: L1)*
CO2	**Identify and analyze** the causes, risk factors, and consequences of common health and nutritional deficiency disorders. *(Bloom's Level: L2)*
CO3	**Demonstrate** knowledge of various research and study designs used for assessment of nutritional and health disorders. *(Bloom's Level: L2)*
CO4	**Apply** appropriate assessment methods and study approaches for understanding, evaluating, and managing nutritional deficiency disorders. *(Bloom's Level: L3)*
CO5	**Explain** the concepts of anthropology and its relevance in nutrition and health studies. *(Bloom's Level: L4)*
CO6	**Interpret** the influence of cultural, social, and environmental factors on dietary intake, nutritional status, food choices, and health outcomes. *(Bloom's Level: L5)*

Semester	**V**
Course Name	**BND 504 Nutritional Epidemiology and Anthropology**
Course Description	The course covers the principles and methods used to study disease patterns in populations. Topics include disease transmission, risk factors, study designs, and data analysis. It's crucial for understanding public health challenges and designing interventions to improve community health.
Objectives	1. To understand the epidemiology of important nutrition deficiency disorders in India 2. To develop skills on various study designs to assess, understand and treat various health and nutritional deficiency disorders 3. To understand anthropology and its importance for interpreting dietary intakes, nutritional status, food choices and cultural environment.
Reference Books	1. Bonita, R., Beaglehole, R., & Kjellström, T. (2006). Basic epidemiology. World Health Organization. 2. Norell, S. E. (1995). Workbook of epidemiology. Oxford University Press, USA.Moon, G., & Gould, M. (2000). Epidemiology: an introduction. McGraw-Hill Education (UK).

	3. Chrzan, J., & Brett, J. (Eds.). (2017). Research Methods for Anthropological Studies of Food and Nutrition: Volumes I-III (Vol. 1). Berghahn Books. 4. Nambiar, V. (Ed.). (2021). Indian Food Anthropology and the Eat Right Movement- Volume 1. Selective & Scientific Books. ISBN: 978-81-951492-2-3. 5. Nambiar, V. (Ed.). (2021). Indian Food Anthropology and the Eat Right Movement- Volume 2. Selective & Scientific Books. ISBN: 978-81-951492-4-7. 6. Bernard, H. R. (2012). Research methods in anthropology. AltaMira.
Webliography	https://nie.gov.in/
Prerequisites	Bachelor of Nutrition and Dietetics 4th Semester

	COURSE PLAN	
Unit	**Topic**	**Hours**
1	1) Introduction to Epidemiology 2) Definition, uses, branches of Epidemiology 3) Epidemiology and public health nutrition: a. Causation of diseases based on nutritional deficiencies b. Natural history of disease based on nutritional deficiencies c. Health status of populations d. Evaluating interventions	**7**
2	1. Measurements in Health and Disease with a focus on nutrition 2. Definitions of diagnostic criteria: Measuring disease frequency, Population at risk, Incidence and prevalence, Case fatality 3. Interrelationships of the different measures: 4. Mortality- Death rates, Infant mortality, Child mortality rate, Maternal mortality rate, Adult mortality rate, Life expectancy, Age standardized rates. 5. Morbidity -Disability, Health determinants, indicators, and risk factors	**8**
3	1. Types of studies: Observational epidemiology- Descriptive studies, Ecological studies, Cross-sectional studies, Case-control studies, Cohort studies. Examples of importance studies related to health and Nutrition in each category 2. Experimental epidemiology- Randomized controlled trials, Field trials, Community trials	**8**

	3. Potential errors in epidemiological studies o Random error o Sample size o Systematic error o Selection bias o Measurement bias o Confounding Other key concepts o The control of confounding o Validity o Ethical issues	
4	Epidemiology and prevention: with a focus on chronic DRNCDs 1. Preventive potential 2. Causation framework 3. Levels of prevention o Primordial prevention o Primary prevention I. Population strategy II. High-risk individual strategy o Secondary prevention o Tertiary prevention 4. Screening a. Types of screening b. Criteria for screening	**7**
5	Communicable diseases: epidemiology surveillance and response The burden of communicable disease Epidemic and endemic disease: Epidemics, Endemic diseases, Emerging and re-emerging infections Chain of infection o The infectious agent o Transmission o Host Environment o Investigation and control of epidemics o Investigation o Identifying cases o Management and control o Surveillance and response	**8**
6	Environmental and occupational epidemiology 1. Environment and health	**8**

	2. Impact of exposure to environmental factors 3. Evaluation of preventive measures 4. Exposure and dose o General concepts o Biological monitoring o Interpreting biological data o Individual versus group measurements o Population dose o Dose–effect relationships o Dose–response relationships 5. Assessing risk o Risk assessment o Health impact assessment o Risk management o Environmental health impact assessment o Measuring past exposure f. Healthy worker effect in occupational studies 6. Epidemiology of the main foodborne diseases a. Identify the relevance of public health epidemiology and nutritional epidemiology in the context of food-borne diseases.	
7	Anthropology and Management of Nutrition Health and Disease 1. Types of anthropology o Physical o Sociocultural o Psychological o Linguistic o Cultural anthropology 2. Its role in the prevention and treatment of disease	**7**
8	Methods of assessing anthropology and its relevance in food and nutrition 1. Ethnographic Research Methods o Mixed Methods o Observations o In depth Interviews o Transect Walk 2. Critical Medical Anthropology o Medical ecological approach to understand biomedicine, public health and global political economic structures which focus on Health care systems o Micro level	**7**

	○ Intermediate level ○ Macrosocial level 3. Indian Food and Nutrition Anthropology for combating health and disease	

BND 505 Food Analysis

CL	CP	L	P
2	2	30	60

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	**Explain** the principles and significance of modern methods used in food analysis. *(Bloom's Level: L1)*
CO2	**Identify and describe** various analytical techniques employed for evaluating food quality and composition. *(Bloom's Level: L2)*
CO3	**Analyze** the physical characteristics of foods using appropriate analytical methods. *(Bloom's Level: L4)*
CO4	***Assess*** *the chemical properties and quality parameters of food products through standard testing procedures. (Bloom's Level: L3)*
CO5	**Demonstrate** knowledge of microbiological techniques used for evaluating the microbial quality and safety of foods. *(Bloom's Level: L3)*
CO6	**Interpret and evaluate** analytical results to determine the overall quality, safety, and acceptability of food products. *(Bloom's Level: L5)*
	Course Outcomes Practical – Students will be able to
CO1	Determine physical examination of various food grains.
CO2	Detect presence of adulteration in milk, turmeric powder, pure ghee, wheat flour, khoa.
CO3	Determine proximate composition of food samples analyze the results
CO4	Determine quality of fats/oils

Semester	**V**
Course Name	**BND 505 Food Analysis**
Course Description	This course is designed to give the students knowledge about food chemistry and analysis
Objectives	1 · To gain knowledge regarding modern methods of food analysis 2 To understand various physical, chemical and quality characteristics of foods. 3. To gain insight into techniques used for the analysis microbial quality of foods
Reference Books	1. Owen R. Fennema (1996) Food Chemistry Third Edition Edited by University of Wisconsin Madison. ISBN 0-8247-9346-3 (cloth: alk. paper). — ISBN 0-8247-9691-8(paper:alk.paper)

https://ipapasca.unpak.ac.id/pdf/Food%20Chemistry%20by%20Fennema%203rd%20Ed.pdf

2. Peter C.K. Cheung and Bhavbhuti M. Mehta (2015) Handbook of Food Chemistry. Edited. Springer Heidelberg New York Dordrecht London ISBN 978-3-642-36604-8
https://earthwormexpress.com/wpcontent/uploads/2021/10/Handbook_of_Food_Chemistry.pdf

3. D. Belitz, W. Grosch, and P. Schieberle (2009) Food Chemistry edited. ISBN 978-3-540-69933-0 e-ISBN 978-3-540-69934-7 DOI 10.1007/978-3-540-69934-7. Springer Heidelberg New York Dordrecht London. https://tech.chemistrydocs.com/Books/Food%20Chemistry/Foodchemistry-by-H.D.Belitz-W.Grosch-&-P.Schieberle-4th-revised and-extended-ed..pdf

4. J. M. Deman, J.M. Finley, W.J. Hurst and C. Y. Lee (2018) Principles of Food Chemistry. Springer Heidelberg New York Dordrecht London.ISBN 978-3-319-63605-4

5. L.H. Meyer (2004). Food Chemistry. CBS Publishers.ISBN-13978 8123911496

6. Sahin S. and Sumnu S.G. (2006) Physical Properties of Foods (Food Science Text Series). Springer-Verlag New York Inc.ISBN-13. 978 0387307800

7. Vaidya G. (2022) Textbook of Food Chemistry. Book Rivers publications.ISBN-13 : 978-93-5515-315-9

8. Kontogiorgos V. (2021) Introduction of Food Chemistry. Springer Nature.ISBN -978-3-030-85644-1

9. Iqbal S.A. (2008). Food Chemistry. Discovery Publishing Pvt.Ltd.

10. AOAC (2023) Official Methods of Food Analysis. Association of Official Analytical Chemists Inc. Suite 400, 2200 Wilson Bouleward, Arlington, Verginia, USA.

11. FSSAI (2023) Manual of Methods of Food Analysis: Cereals and Cereals Products. Food Safety and Standards Authority of India, Ministry of Health And Family Welfare Government of India New Delhi. https://fssai.gov.in/upload/uploadfiles/files/Manual%20on%20Cereal%20and%20Cereal%20Products.pdf

	12. FSSAI (2016) Manual of Methods of Food Analysis: Oil and Fats. Food Safety and Standards Authority of India, Ministry of Health And Family Welfare Government of India New Delhi. 13. Raghuramulu N. Nair K.M. and Kalyanasundaram (2003) A manual of Laboratory Techniques. NIN, Hyderabad-500007. 14. Yadav P. Food Analysis and Quality Control A Practical Manual. ©Vedpal Yadav, Lecturer in Food Technology, Government Polytechnic, Mandi Adampur, Hisar, Haryana, India-125052. https://gpadampur.wordpress.com/wp-content/uploads/2011/11/6-2 faqc-practicals-08022014.pdf 15. Sharma S. (2007) Experiments and Techniques in Biochemistry. Galgotia Publications Pvt Ltd. 16. N. Siva Subramanian, P. Ushasree and G. Naveen Kumar Reddy (2022). Textbook of Food Analysis, Unique Pub International (UPI).
Prerequisites	Bachelor of Nutrition and Dietetics 4th Semester

	COURSE PLAN	
Unit	**Topic**	**Hours**
1	Need and importance of food analysis	**1**
2	Physical Properties of Food: • Hydrogen ion concentration • oxidation-reduction potentials • adsorption • isoelectric points of proteins • Specific Gravity/Density • Specific Heat Capacity • Surface Tension • Viscosity • plasticity • Refractive Index • Filth • Particle Size	**8**
3	Chemical Properties: • Moisture • Water Activity • Protein • Fat • Volatile Oil • Crude Fiber • Dietary Fiber • Total Ash	**7**

	• Acid Insoluble Ash • Sulphated Ash • Reducing and Non-Reducing Sugars • Starch	
4	Important food quality attributes Sensory quality - colour, texture, flavor and taste Microbiological quality nutritional quality evaluation for food products. Food Adulteration Shelf life studies	**5**
5	Physical and Chemical Properties of Oils and Fats: • Acid Value and Free Fatty Acids • Unsaponifiable Matter • Melting Point • Solid-liquid Ratio • Specific Gravity • Titre Value • Colour • Iodine Value • Saponification Value • Acetyl Value and Hydroxyl Value • Reichert-Meissl (RM) Value • Polenske Value • Rancidity	**6**
6	Colloidal chemistry of foods : sols, gels, foams, and emulsions.	**3**
	PRACTICAL	
1	Physical examination of various food grains.	**2**
2	Detection of adulteration: Milk, turmeric powder, pure ghee, wheat flour, khoa.	**2**
3	Determination of the Moisture content in food sample.	**2**
4	Determination of the acid insoluble ash in food sample.	**2**
5	Determination of fat content in food sample	**2**
6	Determination of the Crude fibre content in food sample.	**4**
7	Determination of the Protein Content in food sample.	**4**
8	Calculation of carbohydrate content of food sample on the basis of principle of proximate composition	**2**
9	Determination of quality of fats/oils	**6**

BND 506 EMERGING CONCEPTS IN NUTRITION

CL	CP	L	P
2	0	30	0

Course Learning Outcomes: By the end of this course, students will be able to:

CO1	Explain the fundamental and current concepts of Human Nutrition and their significance in health promotion. *(Bloom's Level: L1)*
CO2	Describe recent advances and emerging trends in nutrition science and their practical applications. *(Bloom's Level: L2)*
CO3	Analyze the role of nutrition in maintaining health and preventing nutrition-related disorders. *(Bloom's Level: L4)*
CO4	Evaluate contemporary developments and innovations in nutritional research and practice. *(Bloom's Level: L5)*
CO5	Apply current nutritional concepts to assess and address health and dietary challenges. *(Bloom's Level: L3)*
CO6	Critically interpret emerging evidence and trends in nutrition for informed decision-making in professional practice. *(Bloom's Level: L5)*

Semester	**V**
Course Name	**BND 506 EMERGING CONCEPTS IN NUTRITION**
Course Description	Investigation, discussion and presentations of emerging concepts in nutrition.
Objectives	1. To orient students with current concepts in Human Nutrition 2. To Know about the Emerging trends in Nutrition
Text Books	1.Singh P. Kumar Y, Singh A (2024). Futuristic Trends in Food Science, Nutrition and Technology. P.K. Publishers and Distributors.Delhi, ISBN-10 8119428625 2. Sterling, R. A. (2024). Space medicine and nutrition: A comprehensive guide for future healthcare. Independently Published.ISBN-13 : 979-8879788242
Reference Books	1.Andjelkovic, M., Paal, P., Kriemler, S., Mateikaite-Pipiriene, K., Rosier, A., Beidleman, B. A., Derstine, M., Pichler Hefti, J., Hillebrandt, D., Horakova, L., Jean, D., & Keyes, L. E. (2024). Nutrition in Women at High Altitude: A Scoping Review-UIAA Medical Commission Recommendations. High altitude medicine & biology, 25(1), 9–15. https://doi.org/10.1089/ham.2023.0047 2. NASA. (2012). NASA: Space food and nutrition educator guide. BiblioGov.ISBN-13: 9781288291038
Prerequisites	4th semester in Nutrition and Dietetics in Honours

	Course Plan	
Unit	**Topic**	**Hours**
1	Artificial Intelligence applications in Nutrition and Dietetics : Merits and Demerits of the applications of AI nutrition and dietetics, AI sources related to nutrition, Career opportunities by using AI in Dietetics	**8**
2	Nutrigenomics and Nutrigenetics : Nutrigenomics- Definition of nutrigenomics, gene expression – transcription, translation, post translational modification, nutrition in the omics era- elementary concepts on epigenetics, transcriptomics, proteomics, metabolomics; genetic variation and nutritional implications. Nutrition and Gene Expression and Nutrigenomics and Complex Diseases : Nutrient control of gene expression – amino acids, nucleotides, basic concepts of nutrigenomics and complex diseases – diabetes, cancer and obesity, Personalized Nutrition and Precision Nutrition	**8**
3	Microbiome and Nutrition: Human gastrointestinal tract and its microbiota, functions, concept of probiotic, prebiotics and synbiotics; applications of probiotics in human nutrition	**6**
4	Emerging trends in Nutrition : What‘s Next in Feeding a Growing Global Population, Human milk oligosaccharides(HMO), Chrono Nutrition and Nano Nutrition	**4**
5	New technology in Nutrition Research and Practice Application of food tech and smart health care to clinical nutrition service Telemedicine, mobile, wearable devices and clinical nutrition services	**4**

Semester VI

BND 601 Social Behaviour Change Communication

CL	CP	L	P
3	1	45	30

Course Learning Outcomes: By the end of this course, students will be able to:

CO1	Explain the theories, principles and tools/ methods of social and behavioral change communication in health promotion. *(Bloom's Level: L1)*
CO2	Understand role of various agencies/ organizations role in bringing changes in community health through SBCC. *(Bloom's Level: L2)*
	Course Outcomes Practical – Students will be able to
CO3	Develop and apply IEC material for effecting social and behavioural change for better community health outcome. *(Bloom's Level: L3, L6)*
CO4	Analyze the role of health promotion strategies in achieving the United Nations Sustainable Development Goals. *(Bloom's Level: L4)*
CO5	Design and implement health promotion programs in various community and institutional settings. *(Bloom's Level: L6)*
CO6	Evaluate the effectiveness of health promotion interventions using appropriate monitoring and assessment tools. *(Bloom's Level: L5)*

Semester	**VI**
Course Name	**BND 601 Social Behaviour Change Communication/ Nutrition Health Promotion**
Course Description	This course aims to teach various theories of Social and Behaviour Change Communication (SBCC) or Communication for Development (C4D), which will enhance communication skills and essentials of nutrition health promotion. The course aims to teach communication strategies to promote positive behaviours which are needed to address the most serious health issues in the world at individuals, groups, or communities
Objectives	1. To understand and apply theories and methods of social and behavior change communication. 2. To learn about the evolution of health promotion and its role in promoting the SDGs. 3. To gain skills in planning, conducting and evaluating Health promotion programs in different settings.
Reference Books	1. Glanz K, Rimer BK. Theory at a glance: A guide for health promotion practice. NIH, National Cancer Institute. 2nd ed. 2005. 2. Kristal AR, Glanz K, Curry SJ, Patterson RE. How can stages of change be best

used in dietary interventions? J Am Diet Assoc. 1999;99:679-684.

3. STEPS: A framework for surveillance: The WHO STEP wise approach to Surveillance of noncommunicable diseases (STEPS), Noncommunicable Diseases and Mental Health World Health Organization, Geneva, 2003

4. Social and Behavior Change Communication (SBCC) Training for Information, Education, and Communication (IEC) Officers, USAID, 2013

5. Sallis JF, Owen N, Fisher EB. Ecological models of health behavior. In: Glanz K, Rimer BK, Viswanath K (eds). Health Behavior and Health Education: Theory, Research, and Practice. 4th edition. San Francisco, CA: Jossey-Bass. 2008. pp 465-485.

6. Spahn JM, Reeves RS, Keim KS, Laquatra I, Kellogg M, Jortberg B, Clark NA. State of the evidence regarding behavior change theories and strategies in nutrition counseling to facilitate health and food behavior change. J Am Diet Assoc. 2010;110(6):879-91.

7. Boynton PM and Greenhalgh T, Hands-on guide to questionnaire research, Selecting, designing, and developing your questionnaire, BMJ, 328, 2004, 1312-1315.

8. Health Promoting Schools: A framework for action, ISBN 978 92 9061 447 0 World Health Organization, Geneva, 2009

9. Lytle LA, Perry CL. Applying research and theory in program planning: An example from a nutrition education intervention. Health Promotion Practice. 2001;2(1):68-80.

10. Healthy workplaces: a model for action For employers, workers, policy-makersand practitioner, WHO, 2010

11. Simons-Morton BG, Greene WH, Gottlieb NH. (Chpt 8) Evaluation. In: Introduction to Health Education and Health Promotion, 2nd Ed. Prospect Heights, IL: Waveland Press. 1995:218-241.

12. Field guide to designing communication strategy, WHO publication-2007.

13. Designing a health communication strategy, John Hopkins University-Centre for Communication programmes.

14. Michael Favin and Marcia Griffiths 1999, Nutrition tool kit-09-Communication for Behaviour change in Nutrition projects. Human Development Network-The World Bank-1999

	15. Hubley J (1993) Communicating Health. London: Teaching Aids at Low Cost, London, UK. 16. Health education: theoretical concepts, effective strategies and core competencies: a foundation document to guide capacity development of health educators/World Health Organization. Regional Office for the Eastern Mediterranean, 2012.
Pre requisites	5th semester in Nutrition and Dietetics in Honours

Course Plan – Social Behaviour Change Communication

Unit	Topics	Hours
1.	Concepts and components of Nutrition health promotion Definitions of concepts- Health literacy, Health education, health promotion and their interrelationships Need for Nutrition Health Promotion Principles of Health Promotion The Ottawa Charter for health promotion-1986 The Bangkok Charter for Health Promotion in a Globalized World – 2005 Promoting health in the SDGs- Shanghai 2016	5
2.	Concepts and Theories of communication Definitions of concepts Formal – non-formal communication, Participatory communication Components of BCC: Sender, Message, Channel, Receiver Various types of communication – interpersonal, mass-media, visual, verbal/ non-verbal. Health behaviour theories, models and frameworks	8
3.	Social and Behaviour change communication Three characteristics of SBCC Ten overarching principles for developing SBCC program or campaign Steps for developing a successful Social and Behaviour change communication program History, need and relevance of SBCC in India	8

4.	Role of Nutrition Health Promotion for Schools Health Promoting schools – WHO, FSSAI Advantages of a health promoting school Six factors of a health promoting School Health Index	8
5.	Role of Nutrition health promotion in creating healthy workplaces Definition of a healthy workplace Healthy workplace core principles, processes and avenues of influence The content: avenues of influence for a healthy workplace The process: initiating and sustaining a programme Underlying principles: keys to success Workplace wellness Index Workplace health promotion as a strategy for NCD prevention in productive population, FSSAI	8
6.	Experiences and challenges of developing and developed countries in Nutrition Health Promotion Impediments to health promotion in developing countries- the way forward Barriers to nutrition health promotion in developing countries Successful examples of Nutrition health promotion for example North Karelia project	8

Practical

S. No	Topic	Hours
1.	Tool development for a successful SBCC program for conducting a need assessment survey Different types of IEC tools, their advantages and disadvantages Using various software for developing IEC material Outcome impact evaluation	10
2.	School Health Promotion To conduct an assessment of the school based on School health Index. To identify gaps and plan a nutrition health promotion strategy for the school.	10

	To implement the NHP program and write a brief report on outcome impact evaluation.	
3.	Workplace Health Promotion To identify the presence of NCD risk factors using the WHO STEPS approach in a workplace setting To plan a nutrition health promotion strategy To implement the NHP program and write a brief report on outcome impact evaluation	10

BND 602 Sustainable Food Systems

CL	CP	L	P
3	1	45	30

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	**Understand** the concepts, principles, and components of sustainable food systems and their role in ensuring food security and environmental sustainability. *(Bloom's Level: L2)*
CO2	**Analyze** the environmental, social, and economic challenges affecting food production, distribution, and consumption at local and global levels. *(Bloom's Level: L4)*
CO3	**Evaluate** sustainable agricultural practices, food processing methods, and resource management strategies for improving food system resilience. *(Bloom's Level: L5)*
CO4	**Apply** principles of sustainability to assess food supply chains, reduce food waste, and promote efficient utilization of natural resources. *(Bloom's Level: L3)*
CO5	**Examine** the relationship between food systems, nutrition, public health, and the achievement of Sustainable Development Goals (SDGs). *(Bloom's Level: L4)*
CO6	**Develop** innovative and evidence-based strategies for designing sustainable food policies, programs, and interventions to support healthy and equitable food systems. *(Bloom's Level: L6)*
	Course Outcomes Practical – Students will be able to
CO1	Prepare food value chain after exposure to various food systems
CO2	Understand local food vulnerability using available GIS maps.
CO3	Collect diet diversity scores and evaluate and interpret the findings
CO4	Create a tool for food environment in urban and rural households, data analysis and interpretation

Course Name	**BND 602 Sustainable Food Systems**
Course Description	Sustainable food systems course is to understand the food from production to consumption, emphasizing, ecological sociological and economic dimensions, global and local challenges in creating resilient sustainable food systems.
Objectives	1. Students would be introduced the concept of Food Systems, Sustainable Diets for improved health & Nutrition outcomes 2. Students will be able to understand the need to create food systems approach for promotion of healthy diets 3. Students will learn the importance of developing sustainable and resilient food systems and policy options for the same 4. Students will be able to understand the burden of disease due to unsafe food

	consumption & learn methods to keep food safe, identify potentially hazardous food & establish linkages between microbial activity, product quality safety, and practical management of these needs.
Reference Books	1. Fact Sheet on Food Safety, WHO 2. Food Systems | IFPRI 3. Agrifood Systems | Food and Agriculture Organization of the United Nations (fao.org) 4. Impact Assessment of Policies to support Healthy Food Environments and Healthy Diets -Discussion Paper, Implementing the Framework for Action of the Second International Conference on Nutrition, United Nations System Standing Committee on Nutrition UNSCN, October 2016. 5. Global Panel. 2017. Urban diets and nutrition: Trends, challenges and opportunities for policy action. Policy Brief No. 9. London, UK: Global Panel on Agriculture and Food Systems for Nutrition. 6. Anna Herforth, Selena Ahmed, Fabrice Declerck, Jessica Fanzo And Roseline Remans, 2017. Creating sustainable, resilient food systems for healthy diets, UNSCN, 4215-22. 7. Shenggen Fan, 2016.Reshaping the Global Food System for Sustainable Development, Food Policy in 2015-2016, IFPRI. 8. Stuart Gillespie and Mara van den Bold, 2017. Agriculture, Food Systems, and Nutrition: Meeting the Challenge Global Challenges 2017, DOI: 10.1002/gch2.201600002 9. FSSAI- Transforming the Food Safety and Nutrition Landscape in India. http://www. indiaenvironmentportal.org.in/files/file/Fssai_Report_201 7.28 06 2017. pdf 10. Miraglia, M., H.J.P. Marvin, G.A. Kleter, P. Battilani, C. Brera, E.Coni, and F. Cubadda et al. 2009. "Climate change and food safety: An emerging issue with special focus on Europe". Food and Chemical Toxicology 47 (5): 1009-1021.doi: 10.1016/j.fct.2009.02.005. 11. Dietary diversity guidelines. FAO-guidelines-dietary-diversity2011.pdf 12.
Prerequisites	5‘ semester in Nutrition and Dietetics in Honours

	COURSE PLAN	
Unit	**Topic**	**Hours**
1	Food Systems Overview Defining Food Systems (production to consumption including food waste) Food system development paradigm Global and National Food Systems Industrial Food System Local Food System and nutrition anthropology (Tailoring food systems investments to specific context). Overview of food value chains in India for various food groups. Spatial typology for food system analysis- GIS mapping for food vulnerability	7
2	Sustainable diets	6

	Importance of food systems approach for meeting SDG goals and improving diet quality and health Sustainable diets for all: A key to meeting the SDGs Impact of Biodiversity, Environment and Climate on Sustainable diets Impact of Equity and fair trade on Sustainable diets Eco-friendly local and seasonal foods Cultural heritage, skills (Food Anthropology) Food and Nutrient needs, Food security – (availability, accessibility, affordability, utilization and stability).	
3	Healthy Diets Understanding dietary diversity Guidelines for measuring household and individual dietary diversity Household Dietary diversity score (HDDS), Women's' Dietary diversity score (WDDS), Minimum acceptable diets (MAD), Minimum Dietary diversity (MDD).	6
4	Promoting Nutrition Sensitive Agriculture Overview of nutrition sensitive agriculture Horticulture and healthy diets Shift incentives toward the foods that are most lacking in diets globally (fruits, vegetables, legumes) Innovations in biofortification, newer technologies for producing nutritious foods including grow your own food (Terrace/kitchen gardening, hydroponics etc.) Implement environmentally sound production practices Future of food Shaping a climate smart global food system	6
5	Climate smart agriculture (CSA) and agriculture produce certification Overview climate change and Food and Nutrition Security Principles of CSA Mitigation of GHG from agriculture Adaptation of agricultural practices to climate change Sustainable maintenance Achieving the triple win of CSA Increased productivity Enhanced resilience Reduce emissions CSA and the world bank group Livable planet – achieving net zero emissions in agri-food systems Role of government: public sector leveraging its investment to incentivize private sector to include improved nutrition amongst its goals and its alignment with other social goal. Identifying the gaps that exist and need to be closed in the knowledge available to countries in selection of investment choices and priorities for food systems in the national nutrition context	8
6	Food environments Understanding physical, economic, political and socio-cultural contexts in which consumers engage with the food system to make their decisions about acquiring, preparing and consuming food.	6

	Urban diets and food systems: Trends, challenges and opportunities for policy action. Rural diets and food systems: Trends, challenges and opportunities for policy action	
7	Animal Husbandry/livestock/fisheries- for sustainable diets Extension approaches for climate resilient livestock farming Livestock, fisheries and and sustainable food systems – a complex relationship Trade & Taxation Policies to Promote nutritious, sustainable and healthy diets	6
	Practical	
1	Visit farms, markets and food processing units to prepare food value chains in India for various food groups.	6
2	Understand local food vulnerability using available GIS maps.	4
3	Prepare a tool and assess Food security – (availability, accessibility, affordability, utilization and stability)- in urban and rural households- data analysis and interpretation.	4
4	Assess household and individual dietary diversity Household Dietary diversity score (HDDS) in urban and rural households- data analysis and interpretation.	4
5	Assess Women‘s‘ Dietary diversity score - in urban and rural households- data analysis and interpretation (WDDS)	4
6	Assess Minimum acceptable diets (MAD), Minimum Dietary diversity (MDD) for children - data analysis and interpretation (WDDS)	4
7	Develop a tool and assess food environment in urban and rural households- data analysis and interpretation.	4

BND 603 Field Practice in Public Health Nutrition

CL	CP	L	P
1	3	15	90

Course Learning Outcomes: By the end of this course, students will be able to:

CO1	**Understand** the key components of program management, including program design, implementation, monitoring, evaluation, sustainability, and scaling up. *(Bloom's Level: L1 & L2)*
CO2	**Apply** various program management methodologies and tools for effective planning, execution, and assessment of public health programs. *(Bloom's Level: 3)*
CO3	**Analyze** the structure and functioning of government programs at the sub-national level through field-based learning experiences. *(Bloom's Level: L4)*
CO4	**Demonstrate** practical skills in program management through case studies, class exercises, and field visits. *(Bloom's Level: L3)*
CO5	**Evaluate** public health interventions using evidence-based approaches to assess their effectiveness, sustainability, and impact. *(Bloom's Level: L5)*
CO6	**Integrate** knowledge gained from seminars, coursework, and project experiences to develop an informed understanding of public health practice and its application in India. *(Bloom's Level: L6)*
	Course Outcomes Practical – Students will be able to
CO1	Situational Analysis
CO2	Planning on SMART criteria
CO3	Implementation of program plan under various community health settings
CO4	Create IEC material for nutrition education for various target audience

Semester	**VI**
Course Name	**BND 603 Field Practice in Public Health Nutrition**
Course Description	Public health nutrition and program management for enhancing public health practice in India. An exploration of program management with a practical, hands-on approach through case studies, class exercises, and field visits.
Objectives	• To understand key components of program management including program design, implementation, monitoring and evaluation, sustainability and scaling up. • To learn the applicatory use of various methodologies and tools for the successful management of programs. • To provide exposure in field settings about the functioning of government programs at the sub-national level.

	• To explore program management with a practical, hands-on approach through case studies, class exercises and field visits. • To connect all aspects of the curriculum including seminars, course works, project experience to establish an understanding, appreciation and working knowledge of public health practice and analyze how their chosen area of intervention or study enhanced public health practice in India.
Reference Books	1. Schmets G, Rajan D, Kadandale S, editors. Strategizing national health in the 21st century: a handbook. Geneva: World Health Organization; 2016 2. United Nations Development Programme 2009. Handbook on planning, monitoring and evaluating for development results. UNDP New York USA 3. MWCD 2018. Guidelines for Implementation of ICT-RTM System. POSHAN Abhiyaan. Ministry of Women and Child Development, Government of India 4. Global Nutrition Report March, 2016. How to Make SMART Commitments to Nutrition Action 5. Sustainability Report. 2013. The Program Sustainability Assessment Tool. Washington University, St Louis, MO. http://www.sustaintool.org 6. World Health Organization 2011. Beginning with the end in mind. Planning pilot projects and other programmatic research for successful scaling up. World Health Organization Expand Net 7. CORE Group. Nutrition Working Group. Nutrition Program Design Assistant: A Tool for Program Planners. Reference Guide. Washington, DC: 2010 8. The International Training and Education Center for Health (I TECH) 2008. Technical Implementation Guide. Rapid Evaluation. I-TECH, Washington, USA 9. United Nations. Statistical Institute for Asia & the Pacific (SIAP). Results-Based Management: Logical Framework Approach. SIAP Chiba, Japan 2007 10. Horld Health Organization. Drinking and Driving: A Road Safety Manual. Module 4: How to evaluate the program 11. Karabi et al. BASICS II. 2004. Using 'Essential Nutrition Actions' to Accelerate Coverage with Nutrition Interventions in High Mortality Settings. Published by the Basic Support for Institutionalizing Child Survival Project (BASICS II) for the United States Agency for International Development. Arlington, Virginia, 2004. 12. Save the children. Monitoring, Evaluation, Accountability, and Learning (MEAL). Programme Frameworks, Objectives and Indicators 13. Management, Leadership & Partnership for District Health. WHO 2004 (Module 2)
Webliography	https://www.logframer.eu/content/results-based-management-rbm http://www.fao.org/investment-learning-platform/background/en/

	http://www.fao.org \Results-based Management _ Investment Learning Platform (ILP) _ Food and Agriculture Organization of the United Nations https://www.fantaproject.org https://usaidlearninglab.org/events/advanced-project-management training-course https://www.who.int/hiv/strategic/me/en/ https://www.who.int/roadsafety/projects/manuals/alcohol/4 How%20to.pdf
Prerequisites	

COURSE PLAN

Unit	Topic	Hours
1	Nutrition and Health Program Planning at Sub-National Level Understanding the sub-national level: local, district or regional level situation through the use of available data sets; understanding the local nutrition health delivery systems for Essential Nutrition Actions (ENA), decentralization & governance Strategizing at the sub-national level Concept, need, and importance, fostering increased community participation Bottom-up, inter-sectoral, multi-stakeholder collaboration at the sub-national level (Management, Leadership & Partnership for District Health) Issues to consider during planning social determinants, socio-cultural context, scale up & sustainability	**5**
2	Result-based Model for Nutrition Program Management Results Based Management (RBM) – basic concepts, core principles and best practices RBM as a tool for managing the implementation of strategy; logical framework approach Understanding the link between resources and results – inputs and activities leading to outputs, outcomes, and impact	**2**
3	Scaling up and Sustainability of Programs Program sustainability – definition, importance, assessment Sustainability Action Plan – tools, agencies, organizations, resources, timeframe Scaling up nutrition and health service interventions – participatory process involving key stakeholders Tailoring and testing the intervention according to the socio-cultural and institutional settings Assessing and documenting the process of implementation, surveillance changes	**3**
4	Nutrition / Health Program Design Gather and synthesize information on the nutrition and health situation Determine initial program goals and objectives (SMART objectives) Review existing nutrition and health services, their coverage, utilization & identify gaps	**5**

	Preliminary program design – determining interventions based on priority areas, program approaches to deliver these interventions, replicability and sustainability Importance of programme frameworks for programme design, monitoring and evaluation Types of monitoring; ICT based real time monitoring Process, impact and outcome evaluation	
	Practical	
1	Situational Analysis – Crucial Step in the Planning Cycle 1. Organizing and conducting situational analysis / need assessment – setting priorities based on tracking the local nutrition health targets met and rapid needs assessment based on available data gaps 2. Designing and Pretesting appropriate survey tools – Quantitative and Qualitative tools – their description, advantages and challenges: 3. Structured interviews o Semi-structured interviews with key informants • Open / informal in-depth interviews	**15**
2	Planning – Strategic and Operational 1. Setting goals and objectives - formulating strategic objectives on the basis of SMART criteria 2. Planning at local level (decentralized environment) 3. Issues to consider while planning at sub-national level 4. Selecting appropriate study design and sampling framework and sample size 5. Steps in operational planning 6. Mapping the stakeholders of health and nutrition delivery services and involving them in participatory program planning (Triple A approach)	**25**
3	Implementation, Monitoring and Evaluation 1. Execution of implementing plans & their monitoring 2. Identifying output, outcome, impact indicators for discussion for evaluation 3. Identify risks, threats, issues, and tasks – tools and methodology 4. Reporting progress and performance and disseminating results to stakeholders	**25**
4	Field Exposure The students will be placed in an government, NGO or donor/bilateral agency in a nutrition/health related program 1. Conduct situational analysis of the selected program/community from the management, anthropological, epidemiological and IEC perspective 2. Students will do a critique on an existing health nutrition programme with a focus on studying the inter and intra-sectoral linkages in planning and implementation.	**25**

	3. The students will conduct formative research using qualitative and participatory research tools to assess the nutrition health perceptions of health services providers, clients, and the community. 4. Students will critique the IEC materials and techniques in the relevant health and nutrition programmes of the government or NGO. 5. The students will plan, implement, and evaluate a focused intervention covering the above components in consultation with the field agency 6. The students will analyze the data manually and using the computers and submit a report. 7. The class will carry out selected components of the above (as feasible) in urban as well as rural/ tribal settings	

BND 604 FOOD PRODUCT DEVELOPMENT

CL	CP	L	P
2	4	30	120

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	**Understand** the principles and practices involved in the production and processing of various food products. *(Bloom's Level: L1 & L2)*
CO2	**Apply** quality management concepts and standards to ensure food safety and maintain product quality during processing. *(Bloom's Level: 3)*
CO3	**Develop** nutritionally balanced, economically viable, and marketable food products based on consumer needs and industry trends. *(Bloom's Level: L6)*
CO4	**Evaluate** different food packaging materials, labeling systems, and testing methods for ensuring product quality and shelf-life. *(Bloom's Level: L5)*
CO5	**Demonstrate** knowledge of packaging technologies and assess their suitability for different food products. *(Bloom's Level: L3)*
CO6	**Develop** entrepreneurial skills required for planning and establishing small-scale food processing industries. *(Bloom's Level: L3)*
	Course Outcomes Practical – Students will be able to
CO1	Develop cereal and pulse based food product
CO2	Develop Ready to Serve (RTS), Fruit juices, Squash, Jams and Preserves
CO3	Develop weaning foods
CO4	Develop Health Foods and Nutritional Supplements
CO5	Develop Convenience foods
CO6	Identify role of packaging material, labeling, cost calculation and marketing

Course Name	**BND 604 FOOD PRODUCT DEVELOPMENT**
Course Description	Introduction to Food Production and processing of foods, Criteria for selection of raw materials for food processing, Principles and stages involved in product development, Sensory, Chemical and Microbial evaluation, Packaging, Labeling and Food Standards and Marketing of Food Products
Objectives	1. To gain insights on production and processing of foods 2. To learn about quality management considerations 3. To develop new marketable, nutritionally and economically viable food products 4. To gain knowledge about packaging of foods, packaging materials and systems of labeling, testing and evaluation of packaged foods. 5. To develop entrepreneurship skills for setting up small scale food industries

Text Books	1. Potter, N. M. (2007). Food science (5th ed). CBS Publ Dist Pvt Ltd India. ISBN-13 : 978-8123904726 2. Fuller, G. W. (2015). New food product development (2nd ed.). CRC Press. ISBN 13 : 978-0849316739	
Reference Books	1. Lawless, H. T., & Heymann, H. (2010). Sensory evaluation of foods (2nd ed.). Springer. 2. Jaiswal, P. K. (2020). Food quality and safety . CBS Publishers and Distributors Pvt. Ltd. ISBN 13:978-8123917757	
Webliography	1. Ministry of Food Processing Industries. Government of India. https://www.mofpi.gov.in/ 2. Food Research Lab. New product development service. Food Research Lab. https://www.foodresearchlab.com/what-we-do/new-product-development-service/	
Prerequisites	Fundamentals of Food Science and Food processing	
	COURSE PLAN	
Unit	**Topic**	**Hours**
1	Criteria for Raw Material Selection and Product Development Criteria for selection of raw materials for food processing. Manufacture of food - small scale, large scale, manual, automated and computerized. Principles and stages involved in product development, Sensory, chemical and microbiological evaluation of processed foods. Convenience Foods, Extruded foods, Health foods. Nutritional supplements, RTS, and RTE foods Definition, classification, characterization, factors influencing product development- Social and health concerns, generation and screening of ideas for new product development, impact of technology and marketing.	**12**
2	Packaging, Labeling and Food Standards Definition, Principles, Classification Packaging methods and materials for packaging conventional and innovative packaging techniques. Food labeling, Recent trends in packaging materials and labeling. Food Safety and Standards Act, 2006 (FSSAI) and HACCP for processed and packed foods.	**9**
3	Marketing of Food Products Product Cost Calculation, Product Specifications, Marketing Strategies, Advertising Methods, Consumer Behavior and Food Acceptance	**9**
	PRACTICAL	
1	Cereal and Pulse based foods	18
2	Ready to Serve (RTS), Fruit juices, Squash, Jams and Preserves	18

3	Pickles, Ketchup, Sauce	12
4	Weaning Foods	12
5	Health Foods and Nutritional Supplements	12
6	Convenience foods	18
7	Selection of a product, preparation, standardization and quality cooking	12
8	Selection of packaging material, labeling, cost calculation and marketing	12
9	Presentation of report	6
Total Hrs.		**120**

BND 605 Case Study Reviews (Practical)

CL	CP	L	P
0	4	0	120

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	**Understand** the principles, methodology, and guidelines involved in conducting case study research. *(Bloom's Level: L1 & L2)*
CO2	**Demonstrate** the ability to document, interpret, and critically review case study reports in clinical and research settings. *(Bloom's Level: 3)*
CO3	**Apply** methodological considerations in the design, planning, analysis, interpretation, and reporting of case studies. *(Bloom's Level: L3)*
CO4	**Identify and analyze** key issues presented in case studies using relevant Medical Nutrition Therapy (MNT) principles and concepts. *(Bloom's Level: L4)*
CO5	**Evaluate** clinical and nutritional case scenarios to formulate evidence-based recommendations and intervention strategies. *(Bloom's Level: L5)*
CO6	**Develop** problem-solving and decision-making skills for recommending appropriate courses of action for specific case-based nutrition and health challenges. *(Bloom's Level: L6)*

Semester	**VI**
Course Name	**BND 605 Case Study Reviews (Practical)**
Course Description	It is an advanced applied course in therapeutic nutrition. The course enables students to apply principles of Medical nutrition Therapy in clinical conditions through Case Study Reviews.
Objectives	1. To comprehend case study methodology and guidelines for researchers. 2. To document case studies and read case study reports. 3. To apply the key methodological considerations in relation to the design, planning, analysis, interpretation and reporting of case studies. 4. To Identify the key issues of the case, analyze the case using relevant MNT Principles, concepts and recommend a course of action for that particular case.
Reference Books	1. Billon, W. (2006). Clinical nutrition case studies (4th ed.). Wadsworth. 2. Douglas, P. (2016). Dietetic and nutrition case studies (1st ed.). Wiley Blackwell . 3. Emery, E. Z., & Jones, E. (2011). Dietetic and nutrition case studies. Jones & Bartlett Publishers. 4. Mahan, K. L., & Stump, S. E. (2012). Food and the nutrition care process (13th ed.). Saunders Elsevier.

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<tr><td></td><td colspan="2">5. Skipper, A. (2009). Medical nutrition therapy practice. Jones & Bartlett Publishers.

6. Mariah, M., Russell, M. K., & Shikora, S. A. (2008). Clinical nutrition for surgical patients. Jones & Bartlett Publishers.

7. Thomas, B. (Ed.). (1994). Manual of dietetics practice. Blackwell Scientific Publications.

8. Wardlaw, M., & Gordon, D. (1999). Perspectives in nutrition (4th ed.). WCB/McGraw-Hill.

9. Zeman, J. F., & Ney, M. D. (1988). Application of clinical nutrition. Prentice Hall International.

10. Shils, M. E., Olson, J. A., & Shike, M. (Eds.). (1994). Modern nutrition in health and disease (8th ed.). Lea & Febiger.

11. Williams, R. (1993). Nutrition and diet therapy (7th ed.). Mosby Year Book, Inc.

12. Anderson, D., & Dibble, M. (1982). Nutrition in health and disease (17th ed.). J. B. Lippincott Company.

13. Alpers, D., Stenson, W., & Bier, D. (1995). Manual of nutrition therapeutics (3rd ed.). Little, Brown and Company.</td></tr>
<tr><td>Prerequisites</td><td colspan="2">12th standard – H.Sc., ICSC with Science (Biology and Chemistry) who has completed the Second year (4 Semester) of BSc Nutrition and Dietetics</td></tr>
<tr><td></td><td colspan="2">COURSE PLAN</td></tr>
<tr><td>Unit</td><td>Topic</td><td>Hours</td></tr>
<tr><td rowspan="2">1</td><td>Identification and collection of case studies with advanced complications
A. Diabetes and Cardiac care
B. Renal
C. Pediatric
D. Hepatic
E. Critical care
F. Respiratory.
G. Cancer</td><td>40</td></tr>
<tr><td>Disease Specific Scientific Review & Analysis
i. Metabolic Health & Disease
ii. Women‘s Health
iii. Diabetes
iv. Cardiovascular disease
v. Geriatric nutrition
vi. Pediatric nutrition
vii. Renal health</td><td>40</td></tr>
</table>

	Case study discussions and presentations i. Standardized protocol for case study presentations ii. Various methods used for case study presentations iii. Simulations exercises iv. Mock sessions v. Group discussions 1. Presentations on the Meta analysis of the literature review collected.	**40**

Semester VII

BND 701 Information Technology in Nutrition and Dietetics (Theory and Practical)

CL	CP	L	P
2	2	30	60

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Understand the role, scope, and relevance of information and communication technology in nutrition and healthcare practices *(Bloom's Level: L1 & L2)*
CO2	Explain the concepts, components, and applications of healthcare information management systems. *(Bloom's Level: 2)*
CO3	Apply technology-assisted tools and common software for dietary assessment, nutritional analysis, and interpretation of nutritional status. *(Bloom's Level: L3)*
CO4	Analyze and interpret nutritional and healthcare data using digital tools for effective decision-making and planning. *(Bloom's Level: L4)*
CO5	Evaluate the effectiveness of information technology-based approaches for managing, monitoring, and improving nutrition and health outcomes. *(Bloom's Level: L5)*
CO6	Design and disseminate nutrition and health-related information to diverse target groups using appropriate technological and communication platforms. *(Bloom's Level: L6)*
	Course Outcomes Practical – Students will be able to
CO1	Understand and apply application of Software for Research and Dietary Analysis
CO2	Create Content and IEC material for Nutrition education for different types of media

2	**VII**
Course Name	**BND 701 Information Technology in Nutrition and Dietetics (Theory and Practical)**
Course Description	It is a course which relates to integration of technology in application of principles of therapeutic nutrition. The course enables students to be twenty first century ready to improve accuracy and efficiency.
Objectives	1. Demonstrate knowledge of the role and relevance of information and communication technology in the area of nutrition and healthcare. 2. Comprehend the concepts of healthcare information management system 3. Apply various technology assisted tools and common software used for assessment and analysis of dietary intake and nutritional status. 4. Integrate the principles of communicating and disseminating nutrition and health

	related information to varied target groups in the community using technology.
Reference Books	1. Mahan, L. K. (2014). Food & nutrition care process (14th ed.). Cengage Learning. 2. Giblin, L. (2010). Skill with people (Revised ed.). Skill with People. 3. Hacker, D., & Sommers, N. (2012). A writer's reference (8th ed.). Bedford/St. Martin's. 4. Nandi, C. (2009). Principles of communication. Reference Press. 5. Michie, S., van Stralen, M. M., & West, R. (2011). ABC of behavior change theories: An essential resource for researchers and diet practitioners. Silverback Publishing. 6. Johns, M. L. (2010). Health information management technology: An applied approach. Cengage Learning. 7. Microsoft Office Excel, PowerPoint, and Access Software. 8. Nutritionist Pro. (n.d.). Dietcal: Tutorials and demonstrations. Nutritionist Pro.
Prerequisites	12th standard - HSc, ICSC with Science (Biology and Chemistry) who has completed the Third year of BSc Nutrition and Dietetics

	COURSE PLAN	
Unit	**Topic**	**Hours**
1	Introduction to Information Technology in Healthcare i. Overview of computer systems, networks and computer-based application process ii. Areas of ICT in health education, research, referral and data management- case studies from each area iii. Significance of information systems for health care impact on quality of care, economics and efficiency of health institutions. iv. Initiatives and goals of eHealth, mHealth and telemedicine; barriers to implementation. v. Basics of developing mobile applications and electronic health modules research trends and examples of application in healthcare institutions	15
2	Information System in Health Systems and Dietetic Practice i. Introduction to the methods of health information processing ii. Health Information management theory and practice iii. Technology assisted dietary assessment IPSAS (Interactive Portion Size Assessment System) and the SCRAN24 (Self-Completed Recall and Analysis of Nutrition), electronic diet recall protocols iii. Designing electronic questionnaires, google forms and conducting surveys using the tools; reporting and discussing results. iv. Essentials of report writing, ethics, plagiarism and copyright issues	15
	PRACTICAL	

1	Application of Software for Research and Dietary Analysis A. Training in working with tools and resources/ software Basic MS office tools Microsoft Office Excel, Powerpoint, MS Access i. Literature Review and bibliography Mendeley, TurnItIn, Easybib, Purdue Owl ii. Nutritional Status WHO Anthro Plus iii. Dietary Analysis Nutritionist Pro, Diet Cal B. Presentation of the results	30
2	Nutrition Communication using Media i. Dietetic Practice using social media- LinkedIn, YouTube, Facebook, twitter, Pinterest ii. Designing websites, writing blogs, creating infographics, recipe videos and nutrition podcasts- (Project based learning) iii. Writing for magazines/ newspaper articles, catering to general population i. Research posters- what makes a good poster, how to add content and tables, design templates and examples of effective posters	30

BND 702 Entrepreneurship in Nutrition and Dietetics

CL	CP	L	P
3	1	45	30

Course Learning Outcomes: By the end of this course, students will be able to:	
CO1	Understand the concepts of entrepreneurship, business economics, and entrepreneurial opportunities in the field of nutrition and dietetics *(Bloom's Level: L1 & L2)*
CO2	Identify and evaluate entrepreneurial opportunities related to dietetics, public health nutrition, and food sciences. *(Bloom's Level: 3)*
CO3	Apply entrepreneurial knowledge and managerial skills for planning and executing nutrition- and food-based business ventures. *(Bloom's Level: L3)*
CO4	Analyze the principles of leadership and social entrepreneurship for addressing nutrition and public health challenges. *(Bloom's Level: L4)*
CO5	Evaluate food industry formulations, quality standards, and regulatory requirements relevant to nutrition and food enterprises. *(Bloom's Level: L5)*
CO6	Develop innovative entrepreneurial strategies by integrating knowledge of dietetics, public health nutrition, and food sciences for sustainable business growth. *(Bloom's Level: L6)*
	Course Outcomes Practical – Students will be able to
CO1	Evaluate themselves as a entrepreneur
CO2	Prepare a business plan with understanding of all essential elements such as operational and financial aspects

Semester	**VII**
Course Name	**BND 702 Entrepreneurship in Nutrition and Dietetics**
Course Description	A fundamental outcome of entrepreneurship is the creation of new value, usually through the creation of new products and services, which may lead to the creation of a new business entity. The objective of this course is to demonstrate and understand that exploiting a new opportunities in the field of nutrition and dietetics.
Objectives	1. To facilitate the student in identification and exploration of entrepreneurial opportunities and basic understanding about business economics. 2. To support the students in the development of knowledge and skill related to success in entrepreneurial activities in the field of nutrition and dietetics. 3. To teach about Leadership and social entrepreneurship. 4. To upscale Dietetics, Public Health Nutrition or Food Sciences and quality learnings to Food Industry Formulations and regulations.

	5. To understand the trends, challenges, opportunities, and future needs of the dietetic workforce. 6. Upscaling food product development to Food business, Issues, and concerns in Food Service Management.
Reference Books	1. Chowdhry Ajay. Just Aspire: Notes on Technology, Entrepreneurship and the Future. Harper Collins India. 2023. 2. HBR's 10 Must Reads on Startups and Entrepreneurship (Featuring Bonus Article "Why the Lean Startup Changes Everything" by Steve Blank). Harvard Business Review Press. 2018. 3. Vishal Gupta. Research Handbook on strategic Entrepreneurship. Edward Elgar Publishing Ltd. 2023. 4. KP Sudheer and Sangeetha K Prathap. Introduction to Entrepreneurship Development in Food Processing. CRC Press. 2021.
Prerequisites	**Semester 6**
	COURSE PLAN

Unit	Topic	Hours
1	Introduction to Entrepreneurship a) Definition of Entrepreneurship and Business. b) Evolution of entrepreneurship in today‘s economy c) Definition of success, entrepreneurial attributes, traits, skills for success d) Understand the needs of target markets related to food service, dietetics, public health, and potentially viable business ideas.	**3**
2	Types of Entrepreneurship a) Small business entrepreneurs b) Large company entrepreneurs c) Scalable startup entrepreneur d) Researcher Entrepreneur e) Hustler Entrepreneur f) Innovative Entrepreneurs g) Social Entrepreneurs h) Trading/Marketing/Manufacturing Entrepreneurs i) Lifestyle Entrepreneurs j) Intrapreneurs	**7**
3	Skills for Entrepreneurship a) State the skills required to be an entrepreneur: Budgeting, communication, time management, problem solving, creative thinking, leadership, management, decision making, networking, collaboration, pubic speaking	**7**

	b) Other requirements for an entrepreneur: assets, values and attitudes, qualities, roles demands c) Barrier to entrepreneurship. d) Examples of successful traits of successful business/entrepreneurs in the area of nutrition and dietetics (Local/national and global).	
4	Customer identification a) Environmental scan b) Competitive assessment c) Marketing strategies - 3 Cs of Marketing (company, customers, and competitors). d) How to have a Successful Marketing Plan? e) Components of a Successful Marketing Plan f) Examples of marketing strategies in the area of nutrition and dietetics (Local/national and global). g) SWOT analysis of Brands	**7**
5	Dietitians as an entrepreneur 1. Establishing – making a mark 2. Practice roles 3. Overcoming the challenges through holistic approach 4. Dealing with nutritional non-compliance 5. Skills and competencies required for working in wellness settings Food Industry Formulations and Regulations Standard for professional practice and code of ethics overview of Registration, documentation and patents in the area of food service, Nutrition and Dietetics IP and University Tech Transfer Compliances and Approvals	**7**
6	Business Plans a) Formulation of business plan: meaning, contents, significance, network analysis, common errors in business plan formulation. b) Generating business ideas : Locating business ideas, Expanding the ideas, Size the potential market for potential viable idea, Validating the opportunity, Develop initial sales, profit, competitive landscape and future growth for potential viable business idea, Match potential viable idea to personal assessment profile c) Feasibility analysis d) Examples of startups and successful business in the area of food service, nutrition and dietetics (Local/national and global).	**7**
7	Entrepreneurship Development Programmes (EDP): a) Examples and details of local, national and International EDPs b) Funding opportunities for Start-ups: Government & Private. c) Incentives and Subsidies for Women Entrepreneurs d) National Innovation and Start-up Policy for Students and Faculty	**7**
	PRACTICAL	

1	a) Self-evaluation with regard to entrepreneurial interest, intent, and capabilities. b) Elevate of personal leadership style. c) Evaluate personal traits, skills, attitudes and assess the drive necessary to be a successful entrepreneur. d) Identify personal strengths and weaknesses and compare with profiles of successful small business owners. e) Develop personal growth plans to address weaknesses and capitalize on f) Strengths in order to increase their potential to succeed in small business. g) Identify external market conditions in the field of nutrition and dietetics (Local/national and global)	**15**
2	Steps to prepare a business plan in the area of nutrition and dietetics Preparing a Business Plan and strategy a) Opportunity identification and selection: need, identification, opportunity selection, steps in setting up a small enterprise. b) Formulation of business plan: meaning, contents, significance, network analysis, c) Common errors in business plan formulation. d) Financial aspects and Management Strategies of Start-ups	**15**

BND 703 Nutrition in Critically ill

CL	CP	L	P
2	2	30	60
Instructor in charge M.Sc. and / Ph.D. in Foods and Nutrition or equivalent			
Course Learning Outcomes: By the end of this course, students will be able to:			
CO1	Understand the principles of nutritional assessment and support in critically ill patients. *(Bloom's Level: L1 & L2)*		
CO2	Explain the physiological and metabolic changes associated with critical illness and their nutritional implications. *(Bloom's Level: L2)*		
CO3	Apply evidence-based guidelines for timely nutritional intervention in critically ill patients. *(Bloom's Level: L3)*		
CO4	Analyze the nutritional requirements and appropriate feeding strategies for various critical care conditions. *(Bloom's Level: L4)*		
CO5	Evaluate the effectiveness of nutrition support interventions in improving clinical outcomes of critically ill patients. *(Bloom's Level: L5)*		
CO6	Develop individualized nutrition care plans for critically ill patients to optimize recovery and patient outcomes. *(Bloom's Level: L6)*		
	Course Outcomes Practical – Students will be able to		
CO1	Design and develop enteral nutrition formulations		
CO2	Identify patients at nutritional risk and to do detailed nutritional assessment, plan intervention and evaluation of outcome for various critical care problems		

Course Name	**BND 703 Nutrition in Critically ill**
Course Description	The course shall enable the student to apply medical nutrition therapy in critical illness
Objectives	Learn about optimal and timely nutrition intervention in critically ill patients.
Text Books & References	1. Al-Dorzi H.M., & Arabi Y.M. (2023). Nutrition for critically ill patients. Schmidt G.A., & Kress J.P., & Douglas I.S.(Eds.), Hall, Schmidt and Wood's Principles of Critical Care, 5th Edition. McGraw Hill. 2. Mehta Y, Sunavala JD, Zirpe K, Tyagi N, Garg S, Sinha S, Shankar B, Chakravarti S, Sivakumar MN, Sahu S, Rangappa P, Banerjee T, Joshi A, Kadhe G. Practice Guidelines for Nutrition in Critically Ill Patients: A Relook for Indian Scenario. Indian J Crit Care Med. 2018 Apr;22(4):263-273. a. doi: 10.4103/ijccm.IJCCM_3_18. PMID: 29743765; PMCID: PMC5930530.

	3. Walker RN, Heuberger RA. Predictive equations for energy needs for the critically ill. Respir Care. 2009;54(4):509–521.	
Prerequisites	BND 405 Advanced Dietetics	
Unit	**Topic**	**Hours**
1	Nutrition support practice: Challenges and opportunities 1. Role of Nutrition therapy in improving clinical outcomes in critical illness	**6**
2	Early Indicators of malnutrition in ICU, Energy and Protein requirements for critically ill, Complications of nutrition support: Refeeding syndrome, overfeeding, hyperglycemia, Enhanced Recovery after surgery	**12**
3	Nutrition support in Burn, Trauma, and Critically ill patients Absorption, metabolism, and sterilization of micro and macronutrients, Nutritional status and body composition of Burn, Trauma, and Critically ill patients,. Criteria for implementation of nutrition support, Principles of prescription (Route and amount), Composition of nutrition support formulas for Burn, Trauma, and Critically ill patients, Post ICU Management	**12**
	PRACTICALS	
1	Enteral nutrition formulations-1	**5**
2	Enteral nutrition formulations- 2	**5**
3	Nutrition Screening	**5**
4	Case studies in Burn patients. for nutritional planning.	**15**
5	Case studies in Trauma patients for nutritional planning.	**15**
6	Case studies in Critically ill patients. for nutritional planning.	**15**

BND 704 Management and Administration in Dietetics Services

CL	CP	L	P
2	2	30	60
Instructor in charge M.Sc. and / Ph.D. in Foods and Nutrition or equivalent			

CO1	Understand the principles and processes involved in food production systems. *(Bloom's Level: L1 & L2)*
CO2	Explain the objectives and functions of different types of kitchens in food service operations. *(Bloom's Level: L2)*
CO3	Analyze various methods and techniques of food production used in institutional settings. *(Bloom's Level: L4)*
CO4	Describe the planning and organizational processes involved in managing a food production unit. *(Bloom's Level: L2)*
CO5	Evaluate food production practices and operational requirements in hospital food service systems. *(Bloom's Level: L5)*
CO6	Develop effective food production plans for hospital settings to ensure quality, efficiency, and nutritional adequacy. *(Bloom's Level: L6)*
	Course Outcomes Practical – Students will be able to
CO1	Analyse on-site and off-site catering management in a Hospital
CO2	Classify the patients in a hospital as per their dietary requirements
CO3	Analyse different types of food production procedures in hospitals
CO4	Give a brief outline of an organizational chart for a food service team in hospitals.
CO5	Describe the important types of commercial food production equipment.
CO6	Plan and prepare type of menu is generally followed in schools and hospitals

Course Name	**BND 704 Management and Administration in Dietetics Services**
Course Description	The course shall enable the students to learn protocol of provision and preparation of healthy and therapeutic diets to the hospital dieted patients as per medical conditions in a hospital.
Objectives	Understand the food production process Comprehend different kitchen objectives Analyze different methods of food production Describe the planning process in food production unit Discuss food production in hospital
Text Books &	1. Drummond, Karen E. and Lisa M. Brefere. 2013. Nutrition for Foodservice and

References	Culinary Professionals. New Jersey: Wiley. 2. Sethi, Mohini and Surjeet Malhan. 2018. Catering Management: An Integrated Approach. New Delhi: New Age International Private Limited. 3. Puckett, Ruby Parker. 2012. Foodservice Manual for Health Care Institutions. San Francisco: Jossey Bass Publishers.
Prerequisites	BND 405 Advanced Dietetics

Unit	Topic	Hours
1	Hospital Food Service Management - Principles and Techniques of Effective Management, Leadership and Managerial Abilities. Tools of Food Management - Organizational Chart of the Food Service Team in Hospital.	**5**
2	Human Resource Management - Recruitment & Selection, Induction, Training, Performance Appraisal, Leadership, Communication, Employee Benefits, and Laws Governing Food Service Establishment.	**5**
3	Physical Facilities and Layout – Size and Type of Kitchen, Design of Kitchen, Ventilation, Lighting, Flooring, Carpets, Wall Covering and Sample Layout of Kitchen. Storage Area and Equipment Required	**5**
4	Food Materials Management - Purchasing of Food Materials, Receiving & Storing – Importance of Receiving Raw Materials	**5**
5	Hospital Food Production – Menu Planning for Patients and Process of Food Production. Different Methods of Holding Foods for Service.	
6	Sanitation and Hygiene - Environmental Hygiene & Sanitation, Safe Food Handling Practices, Personal Hygiene.	**5**
	PRACTICAL	
1	Analyse on-site and off-site catering management in a Hospital	**10**
2	Classify the patients in a hospital as per their dietary requirements	**10**
3	Analyse different types of food production procedures in hospitals	**10**
4	Give a brief outline of an organizational chart for a food service team in hospitals.	**10**
5	Describe the important types of commercial food production equipment.	**10**
6	Plan and prepare type of menu is generally followed in schools and hospitals	**10**

BND 705 Nutrition in Emergencies

CL	CP	L	P
2	1	30	30

CO1	Understand the impact of emergencies and disasters on nutritional status and public health outcomes. *(Bloom's Level: L1 & L2)*
CO2	Explain methods and tools used for assessing and monitoring nutritional needs during crisis and emergency situations. *(Bloom's Level: L2)*
CO3	Apply knowledge of emergency nutrition programs and interventions for addressing nutritional challenges in affected populations. *(Bloom's Level: L3)*
CO4	Analyze the causes and consequences of malnutrition and food insecurity in emergency contexts. *(Bloom's Level: L4)*
CO5	Evaluate international standards, protocols, and guidelines for nutrition response in emergencies. *(Bloom's Level: L5)*
CO6	Develop evidence-based strategies for managing malnutrition and ensuring food security during emergency and disaster situations. *(Bloom's Level: L6)*
	Course Outcomes Practical – Students will be able to
CO1	Understand various techniques of nutritional assessment.
CO2	Develop a plan for a general food distribution program with understanding of challenges and solution.
CO3	Plan supplementary and therapeutic feeding programs
CO4	Analyze case studies of past emergencies
CO5	Demonstrate effective communication strategies with affected populations and stakeholders
CO6	Create culturally appropriate nutrition education materials for emergencies
CO7	Design public awareness campaigns on nutrition and hygiene

Semester VII	
Course Name	**BND 705 Nutrition in Emergencies**
Course Description	This course delves into the critical role of nutrition during emergencies, equipping students with the knowledge and skills to address nutritional needs in crises such as natural disasters, conflicts, and pandemics. It covers the assessment of nutritional needs, the planning and implementation of nutrition interventions, and the management of malnutrition in crisis settings
Objectives	1. To understand the impact of emergencies on nutritional status.

	2. To learn methods for assessing and monitoring nutritional needs in crisis situations. 3. To gain knowledge of emergency nutrition programs and interventions. 4. To develop skills for managing malnutrition and food insecurity in emergencies 5. To familiarize with international standards and guidelines for nutrition in emergencies
References Books	1. Watson, F., & Sandoz, Y. (Eds.). (2020). Emergency Nutrition: Principles and Practice in Humanitarian Response. Oxford University Press. 2. Wilkinson, C, & Whitehead, C. (2019). Nutrition in Emergencies. CABI Publishing 3. The Sphere Project. (2018).The Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response. 4th Edition. Practical Action Publishing. 4. World Health Organization. (2013).Management of Severe Acute Malnutrition in Children: Working Towards Results at Scale. WHO. 5. World Food Programme & United Nations Children's Fund. (2017). Food and Nutrition in Emergencies: An Approach to Effective Interventions. WFP & UNICEF. A comprehensive guide to planning and implementing nutrition interventions in emergencies, including food aid, supplementary feeding, and micronutrient supplementation. https://www.who.int/nutrition/topics/nut_emergencies/en/] (https://www.who.int/nutrition/topics/nut_emergencies/en/) https://www.unicef.org/nutrition/emergencies] (https://www.unicef.org/nutrit ion/emergencies) https://spherestandards.org/] (https://spherestandards.org/) http://www.fao.org/emergencies/resources/documents/emergency prevention-system-for-food afety/en/] (http://www.fao.org/emergencies/resources/documents/emergency-prevention-system-for-food-safety/en/) https://www.nutritioncluster.net/] (https://www.nutritioncluster.net/) https://www.wfp.org/emergencies] (https://www.wfp.org/emergencies) https://www.actionagainsthunger.org/nutrition] (https://www.actionagainsthunger.org/nutrition) https://reliefweb.int/topics/nutrition](https://reliefweb.int/topics/nutrition) https://www.ifrc.org/nutrition] (https://www.ifrc.org/nutrition) https://www.usaid.gov/glob
Prerequisites	Following prerequisites are recommended to ensure that the students have the foundational knowledge necessary to understand and apply the concepts discussed in the course nutrition in emergencies. The typical pre-requisites are:

	1. Understanding of basic nutrition and dietetics 2. Knowledge about Public Health Nutrition or Community nutrition 3. Knowledge about Food Security and Policy, biostatistics and epidemiology.

	COURSE PLAN	
Unit	**Topic**	**Hours**
1	Introduction to Nutrition in Emergencies Definition and types of emergencies (natural disasters, conflicts, pandemics). Impact of emergencies on food security and nutrition. Assessment of Nutritional Needs in Emergencies - Rapid nutrition assessments and surveys. Indicators of nutritional status (anthropometry, biochemical, clinical, dietary)	**7**
2	Emergency Nutrition Programs and Interventions Nutritional requirements in emergency-affected populations. Types of nutrition interventions: general food distribution, supplementary feeding, therapeutic feeding – Micronutrient interventions and prevention of micronutrient deficiencies. Mobilization and distribution of resources - local resources, general fund and social funds.	**8**
3	Managing Malnutrition in Emergencies Classification and management of acute malnutrition (SAM and MAM). Community-based Management of Acute Malnutrition (CMAM). Role of ready-to use therapeutic foods (RUTF) and supplementary foods.	**7**
4	Food Security and Livelihoods in Emergencies Strategies for food security and livelihood support - Importance of water, sanitation, and hygiene (WASH) in nutrition. Coordination and collaboration with humanitarian organizations. Overview of international guidelines (Sphere standards, WHO, UNICEF). Ethical considerations and cultural sensitivity in emergency nutrition.	**8**
	PRACTICAL	
	1. Techniques of nutritional assessment. 2. Conducting a mock rapid nutrition assessment using assessment tools and data collection techniques 3. Practice in anthropometric measurements (weight, height, MUAC) 4. Calculating and interpreting nutritional indicators (BMI, z-scores 5. Developing a plan for a general food distribution program 6. Planning supplementary and therapeutic feeding programs 7. Analyzing case studies of past emergencies 8. Discussing challenges and solutions in implementing nutrition	**30**

	programs 9. Role-playing scenarios in emergency response coordination 10. Communication strategies with affected populations and stakeholders 11. Creating culturally appropriate nutrition education materials for emergencies 13. Designing public awareness campaigns on nutrition and hygiene	

BND 706 Applied Dietetics/Internship Project

CL	CP	L	P
0	4	0	120

Focus Areas, impact and Outcomes:

Basic research: Basic research focusing on the bioavailability of nutrients, understanding Indigenous foods, and nutrient-gene interactions to improve the food supply for better health and improved individualized nutritional recommendations.

CO 1: Collaborations with Central Food Technological Research Institute (CFTRI), National Institute of Nutrition (NIN), and other Institutes of the country that have produced novel functional foods and supplements. (Bloom's Level: L1, L2)

Applied research: Applied research in appetite and satiety mechanisms exploring how people can be more successful in maintaining a healthy body weight. To engage with Sports Authority of India (SAI) to explore the influence of diet and fluid interventions on athlete participation, well-being, performance etc.

CO 2: Well-being and performance of sports person by nutritional intervention will be enhanced (Bloom's Level: L1 - L6)

Clinical nutrition research: Application of innovative approaches to prevent, manage, and cure diet-related diseases and medical conditions.

CO 3: The development and implementation of innovative evidence-based practice will improve the nutritional status of the population across the lifecycle. (Bloom's Level: L1 - L6)

Semester VIII

BND 801 Internship in Hospital /Experiential Learning (6 months)

Name of the program	Bachelor of Nutrition and Dietetics (Honours)
Course Title	Internship
Academic Year	Fourth year /VIII Semester
Semester	VIII Semester
No. of Credits	14
Course Prerequisite	Students should know and possess skills in planning and demonstrating the therapeutic diet for the required.
Course Synopsis	This module provides students with an opportunity to integrate and apply acquired knowledge and technical skills in actual clinical settings.

Internship Guidelines

The aim is to enable all Bachelors in Nutrition and Dietetics (Honors) students to be licensed to practice as professionals in Nutrition and Dietetics.

Competencies to be achieved

Expected key competencies -

I. Ability to identify patients that require nutrition assessment.
II. Ability to use the nutrition assessment tools available.
III. Have the technical practice of medical nutrition.

Expected general competencies

I. Communication and listening skills.
II. Nutrition counseling.
III. Identifying, and evaluating medical family genetic history, social information, nutritional, and medication history. Physical information and laboratory data.
IV. Accurate measurement and recording of the anthropometric measures using appropriate
V. Equipment/tools in accordance with the available Standard Operating Procedures (SOPs)
VI. Interpretation and application of the biochemical measures.
VII. Nutrition physical and assessment skills.
VIII. Counselling skills.
IX. Have good interpersonal relationships; team player.
X. Organizing, planning, and coordinating skills.

XI. Training skills.
XII. Skills in research methodology, data analysis, and interpretation.
XIII. Development of Information, education and Communication (IEC) materials.
XIV. Documentation and report writing skills.
XV. Leadership skills.

Nutrition Screening

Provides a mechanism to identify patients who would benefit from nutrition assessment The intern is expected to:

I. Screen patient/client to determine whether they are nutritionally compromised, or at nutrition risk.
II. Assign a nutrition status or risk of malnutrition for each patient after completing the evaluation and assessment.
III. Use assigned nutrition status or risk levels to prioritize nutritional interventions.

Anthropometric

I. The intern should be able to carry out all the anthropometric measurements such as:
II. Weight.
III. Height.
IV. Mid Upper Arm Circumference (MUAC).
V. Head circumferences.
VI. Arm span, waist circumference, skin fold.
VII. The intern should be able to analyze and interpret the measurements.
VIII. Use the results to counsel and educate the client/patient.

Biochemical Assessment

I. The intern should be able to understand, interpret, and apply the results of the biochemical parameters in the nutritional management of diseases.
II. The intern should also be able to assess vital signs; blood pressure, and random blood sugar.

Clinical Signs

I. The intern should be able to observe and identify signs and symptoms of nutritional deficiencies and apply them in the nutritional management of the condition.

Dietary Assessment

The intern should be able to take dietary history using the standard tools.
• An intern should be able to assess:
• Taste change(s).
• Eating and feeding problems.
• Nausea.
• Vomiting.
• Diarrhoea.
• Constipation.
• Food intolerances, adverse reactions and/or allergies.
• Food-drug interactions.
• Unhealthy dietary behaviours.

- Eating disorders.
- Socioeconomic, religious, ethnic, and cultural background.
- Lifestyle practices

After the intern has gone through the above processes he/she should be able to interpret analyze, and plan the nutrition intervention. They should be able to diagnose and plan dietary intervention.

Nutrition Therapy Process

The Clinical Nutritionist

- Participates with other healthcare team members and the patient in planning and implementing suitable diet therapy intervention(s) through the exchange of information and education.
- Actively participates in interdisciplinary team meetings, ward rounds, discharge planning conferences, peer reviews, performance improvement activities, and other relevant activities to monitor and share findings and recommendations with team members.
- Educates the interdisciplinary team members on the role of nutrition in health and disease and the role of the clinical dietician in giving nutrition guidance.
- Provides consultation and training to other appropriate health care programs and services.
- Initiates or participates in nutrition research.

Nutrition Counselling

- The Clinical Nutritionist initiates nutrition counseling consistent with the patient‘s current diet or nutrition therapy needs, recording intervention, and counseling in the medical record.
- These include the patient‘s level of comprehension and the clinician‘s assessment of the patient‘s readiness to learn, expected compliance, and identification of respective barriers.
- Provides nutrition counseling to patients when food-drug interaction significantly alters the patient‘s food selection.
- Evaluate and document progress toward desired outcomes and/or goals.
- Initiates health maintenance nutrition education.
- Evaluates and implements alternate method(s) or system(s) for nutrition education, as appropriate. • Monitors, evaluates, and documents individualized nutrition therapy plans.
- Refers or schedules patients for follow-up in the Out Patient Nutrition Clinic or inpatient and outpatient group education activities
- Evaluate educational materials for content, reading level, and other pertinent factors.
- Employs application of technology in nutrition intervention, when appropriate.
- Documents findings utilizing established practice guidelines and quality improvement and assessment indicators.

Nutrition Education

• Conduct nutrition education sessions as an essential component of medical nutrition therapy and services helping individuals establish and maintain healthy lifestyles, good food habits, and attitudes.

Interdisciplinary Care Team Planning

• Be an active member of the interdisciplinary care planning team so that medical nutrition therapy is integrated into the patient‘s care plans as needed.

Working within multidisciplinary healthcare teams

- Teamwork and collaboration are central to modern healthcare delivery. By working alongside physicians, nurses, therapists, and other healthcare professionals, dietitians leverage their specialized knowledge to create integrated care plans tailored to each patient's unique needs.
- Examples of collaboration:
- Dietitians and physicians: Develop nutrition plans for chronic conditions or recovery.
- Dietitians and nurses: Monitor dietary intake and assess nutritional needs.
- Dietitians and therapists: Address the nutritional aspects of mental health, eating disorders, and other complex needs.

Support of Patient Care Programmes

Programs and services with a nutrition component are supported by a Clinical Nutritionist. These include, but are not limited to:

- Outpatient Clinics/Department.
- Trauma and Emergency.
- Long-Term Patients.
- Primary Health Care Centres.
- Specialized units and Clinics e.g. ICU & HDU, Diabetes, Renal Unit, burns unit, oncology, and others.

Course Outcomes

CO1	Identify patients requiring nutritional assessment and apply appropriate nutrition assessment tools for clinical evaluation. *(Bloom's Level: L3)*
CO2	Demonstrate technical competence in medical nutrition therapy, including accurate anthropometric measurements, nutritional physical assessment, and interpretation of biochemical and laboratory data. *(Bloom's Level: L2)*
CO3	Analyze medical, family, genetic, social, nutritional, and medication histories to assess nutritional status and formulate appropriate nutrition care plans. *(Bloom's Level: L4)*
CO4	Apply effective communication, counseling, and interpersonal skills for nutrition education, counseling, and collaborative healthcare practice. *(Bloom's Level: L4)*
CO5	Evaluate and document nutritional assessment findings through accurate report writing, data interpretation, and development of Information, Education, and Communication (IEC) materials. *(Bloom's Level: L5)*
CO6	Develop leadership, planning, coordination, research, and training skills to effectively manage nutrition care services and contribute to evidence-based professional practice. *(Bloom's Level: L6)*

Supervised Practice Work

Content	Competencies
Department orientation	Define the role of dietitian in hospitals Outline the functioning of the dietary department in a hospital and learn about its working schedules and plans. List and summarize the knowledge about the maintenance of the patient's case file and how the details are entered/registered in it.
Food Service Area	Interpret the therapeutic and normal diet settings in the kitchen Interpret acquiring skills in food procurement quality maintenance and patient food service Acquire skills in : • Menu system • Personnel management • Food supply, procurement, and control • Food production • Foodservice distribution • Financial management
Medicine (3 cases)	• Illustrate the assessment of nutritional status among patients. • Interpret and apply dietary interventions in disease condition of the patients. • Explain and develop the dietary counseling given to the patients. • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration, and formulation.
Nephrology and Urology (3 cases)	• Illustrate the assessment of nutritional status among patients. • Interpret and apply dietary interventions in disease condition of the patients. • Explain and develop the dietary counseling given to the patients. • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration, and formulation.
Cardiology (3 cases)	• Illustrate the assessment of nutritional status among patients. • Interpret and apply dietary interventions in disease condition of the patients. • Explain and develop the dietary counseling given to the patients. • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration, and formulation.
Gastroenterology (3cases)	• Illustrate the assessment of nutritional status among patients. • Interpret and apply dietary interventions in disease condition of the patients. • Explain and develop the dietary counselling given to the patients. • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration, and formulation.
Oncology (2 cases)	• Illustrate the assessment of nutritional status among patients.

	• Interpret and apply dietary interventions in disease condition of the patients. • Explain and develop the dietary counselling given to the patients. • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration, and formulation.
Neurology (3 cases)	• Illustrate the assessment of nutritional status among patients. • Interpret and apply dietary interventions in disease condition of the patients. • Explain and develop the dietary counselling given to the patients. • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration, and formulation.
Obstetrics gynaecology (2cases)	• Illustrate the assessment of nutritional status among patients. • Interpret and apply dietary interventions in disease condition of the patients. • Explain and develop the dietary counselling given to the patients. • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration, and formulation.
Paediatrics (2 cases)	• Illustrate the assessment of nutritional status among patients. • Interpret and apply dietary interventions in disease conditions of the patients. • Explain and develop the dietary counselling given to the patients. • Illustrate and relate the conditions in which Enteral and Parenteral nutrition is provided, its administration, and formulation.
Surgery (2cases)	• Illustrate the assessment of nutritional status among patients. • Interpret and apply dietary interventions in disease condition of the patients. • Explain and develop the dietary counselling given to the patients. • • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation.
Intensive care unit (3 cases)	• Illustrate the assessment of nutritional status among patients. • Interpret and apply dietary interventions in disease condition of the patients. • Explain and develop the dietary counselling given to the patients. • • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation.
Multi- speciality clinics(1case)	• Illustrate the assessment of nutritional status among patients. • Interpret and apply dietary interventions in disease condition of the patients. • Explain and develop the dietary counselling given to the patients. • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration, and formulation.

Psychiatry/Rehabilit ation (2cases)	• Illustrate the assessment of nutritional status among patients. • Interpret and apply dietary interventions in disease condition of the patients. • Explain and develop the dietary counselling given to the patients. • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation.
Dialysis (1case)	• Illustrate the assessment of nutritional status among patients. • Interpret and apply dietary interventions in disease condition of the patients. • Explain and develop the dietary counselling given to the patients. • Illustrate and relate the condition in which Enteral and Parenteral nutrition is provided, its administration and formulation.

Learning Strategies: Small group discussion (SGD), Problem-Based Learning (PBL), Case Based Learning (CBL), Clinics, seminars.

Formative Assessment: Quiz, Viva, Clinical assessment (OSCE, OSPE, WBPA), Clinical Log Book

Interns will be evaluated periodically i.e. in every quarter of 12 months and aggregate marks of all four assessments will be used to issue internship completion certificates. The internship completion certificate will be issued from the Dean‘s office, only after Successfully clearing all four assessment exams and Obtaining a satisfactory completion certificate from the head/in charge of the department at the end of the internship.

BND 802 Research and Trends in Nutrition and Dietetics

CL	CP	L	P
0	4	0	120

Expected Course Outcomes after completion of course, the student should be able to achieve -	
CO1	Understand the principles of research design, methodology, and data analysis in nutrition and health-related research. *(Bloom's Level: L1 & L2)*
CO2	Explain ethical principles in research, including responsible conduct, plagiarism avoidance, and adherence to academic integrity standards. *(Bloom's Level: L2)*
CO3	Apply appropriate research methods and analytical techniques to investigate nutrition-related problems. *(Bloom's Level: L3)*
CO4	Analyze complex nutrition-related issues using critical thinking and evidence-based problem-solving approaches. *(Bloom's Level: L4)*
CO5	Evaluate research findings and interpret scientific evidence for informed decision-making in nutrition practice. *(Bloom's Level: L5)*
CO6	Communicate scientific and research-based information effectively to diverse audiences through written, oral, and professional presentations. *(Bloom's Level: L6)*

Semester	**VIII**
Course Name	**BND 802 Research and Trends in Nutrition and Dietetics**
Course Description	This course will provide an introduction to the research process, responsible conduct in research, and explore major types of study design in nutrition. Students will examine the literature to evaluate evidence about nutrition problems and interventions. Students will search and exchange the information from journals, books and reports for exchange of ideas in issues related to Nutrition and Dietetics.
Objectives	1. To develop understanding regarding the principles of research design, methodology, and analysis 2. To develop responsible conduct in research, including ethical considerations and plagiarism avoidance 3. To developing critical thinking and problem-solving skills to approach complex nutrition-related issues 4. To communicate scientific information to various audiences
Reference Books	Vegrove JA., Hodson L., Sharma S. and Lanham-New SA. (2015). Nutrition Research Methodologies (The Nutrition Society Textbook). Wiley-Blackwell; 1st edition.

	Starks TP. (2006). Trends in Nutrition Research. Nova Science Publishers Inc 1st edition. Pounis G. (2018). Analysis in Nutrition Research: Principles of Statistical Methodology and Interpretation of the Results. Academic Press Inc. Nelson M. (2020). Statistics in Nutrition and Dietetics. Wiley-Blackwell Chrzan J. and Brett J.(2017). Research methods for anthropological studies of food and nutrition. Berghahn Books Sreelathak NT. and Sreelatha K. (2021) Research ethics and plagiarism. Ess Ess Pubns.
Prerequisites	Completion of 6th Semester

COURSE PLAN		
UNIT	**TOPIC**	**HOURS**
1	Research Process and Responsible Conduct • Principles of research design, methodology, and analysis • Ethical considerations for research studies and concept, factors and solutions related to plagiarism • Identification of complex nutrition-related issues 1	30
2	Study Design and Evaluating Evidence in Nutrition • Different types of study designs, such as observational studies, experimental studies, and quasi-experiments etc. • Strengths and limitations of each design • Quality evaluation of research studies • Reviewing the literature on nutrition-related topics • Analysis and interpretation of the findings of research studies	30
3	Literacy skills to search relevant and reliable sources • Reliable databases, journals, and other sources to locate scientific evidences and information • Evaluation of the credibility and reliability of information sources	30
4	Knowledge translation to various audiences • Principles of knowledge translation • Group discussion on perspectives related to nutrition-related issues with peers	30

BND 803 Scientific Writing in Nutrition and Dietetics

CL	CP	L	P
0	4	0	120

Expected Course Outcomes after completion of course, the student should be able to achieve -

CO1	Understand the importance and principles of scientific writing in nutrition and dietetics. *(Bloom's Level: L1 & L2)*
CO2	Explain the structure, components, and standards of scientific manuscripts and research publications. *(Bloom's Level: L2)*
CO3	Critically evaluate and interpret research studies in nutrition and dietetics using evidence-based approaches. *(Bloom's Level: L4)*
CO4	Apply scientific writing skills to prepare clear, concise, and well-structured research manuscripts. *(Bloom's Level: L3)*
CO5	Evaluate and present research findings effectively in scientific forums using appropriate presentation techniques. *(Bloom's Level: L5)*
CO6	Develop professional communication and presentation skills for dissemination of scientific knowledge to academic and professional audiences. *(Bloom's Level: L6)*

Semester	**VIII**
Course Name	**BND 803 Scientific Writing in Nutrition and Dietetics**
Course Description	This course will provide students with the skills and knowledge necessary to effectively communicate scientific information related to nutrition and dietetics through written reports, articles, and other forms of scientific writing. Students will learn to identify and critically evaluate research studies, write clear and concise abstracts, introduction sections, methods, results, discussions, and conclusions, as well as prepare tables, figures, and references. The course will also cover strategies for editing and revising scientific writing, as well as strategies for communicating scientific information to various audiences.
Objectives	1. To identify the importance of scientific writing in nutrition and dietetics 2. To critically evaluate and interpret research studies in nutrition and dietetics 3. To write a clear and concise manuscript 4. To develop presentation and communication skills to effectively present a research paper at scientific forum
Reference Books	• Heard SB. (2016). The Scientist's Guide to Writing: How to Write More Easily and Effectively throughout Your Scientific Career. Princeton University Press.

	• Wheatley D. (2021) Scientific Writing And Publishing. Cambridge University Press. • Prasann K. and Bharti PK. (2020) Scientific writing and research quality. Discovery Publishing House. • Pounis G. (2018). Analysis in Nutrition Research: Principles of Statistical Methodology and Interpretation of the Results. Academic Press Inc. • Nelson M. (2020). Statistics in Nutrition and Dietetics. Wiley Blackwell • Sreelathak NT. and Sreelatha K. (2021) Research ethics and plagiarism. Ess Ess Pubns.
Prerequisites	Completion of 6th Semester

COURSE PLAN		
UNIT	**TOPIC**	**HOURS**
1	Introduction to Scientific Writing 1. Overview of scientific writing in nutrition and dietetics 2. Importance of clear communication in science 3. Types of scientific writing (e.g., research articles, review articles, case reports)	30
2	Research Study Evaluation 1. Identifying key components of a research study e.g., background, objectives, methods, results, conclusions 2. Critically evaluating research studies e.g., study design, population selection, data analysis	30
3	Writing a Clear and Concise Scientific Manuscript 1. Abstract and introduction section including background information, research question 2. Methodology comprising appropriate study design, participant recruitment models 3. Results covering effective data presentation 4. Discussion describing implications of findings 5. Conclusion including summary of findings 6. Preparing effective tables, figures, and correct references	30

	7. Strategies for editing scientific writing e.g., grammar, syntax, clarity and concision	
4	Presentation and communication skills for scientific forum 1. Synthesis, interpretation, and communication of research results for professional audiences 2. Oral and poster presentations	30

Model Paper

BND Semester-I
Paper Code: BND101

Bachelor of Nutrition and Dietetics (Honours)
Semester I
Fundamentals of Nutrition

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2 out of 3) (2x10 = 20 Marks)

Q1. Define nutrition and write the functions, sources of carbohydrates in detail. (CO 1, 2, 4) (L2)
Q2. Describe the classification, functions, digestion and absorption of proteins. (CO 1, 2, 4) (L2)
Q3. What is a balanced diet? Explain the factors affecting meal planning. (CO1 & 6) (L2)

Section B – Short Essay Questions (Answer any 7 out of 9) (7x5 = 35 Marks)

Q1. Explain the importance of dietary fibre in health. (CO2) (L2)
Q2. Describe the functions and sources of calcium. (CO3) (L2)
Q3. Write a short note on Recommended Dietary Allowances (RDA). (CO1) (L1, L2)
Q4. Discuss the causes and prevention of iron deficiency anaemia. (CO4) (L2)
Q5. Explain the role of water in the human body. (CO2) (L2)
Q6. Differentiate between macro nutrients and micro nutrients. (CO1) (L3)
Q7. Describe the dry heat methods of cooking. (CO5) (L2)
Q8. Write a note on food groups and their significance. (CO1) (L1, L2)
Q9. Why boiling is better than frying. (CO5 &6) (L3)

Section C – Short Answer Questions (Answer any 5) (5 x 3 = 15 Marks)

Q1. Define nutrition and nutrients. (CO1) (L1)
Q2. List any four functions of proteins. (CO2) (L1)
Q3. Name any four sources of Vitamin A. (CO3) (L1)
Q4. Mention any four deficiency diseases. (CO4) (L2)
Q5. Define balanced diet. (CO1) (L1)
Q6. List any four sources of iron. (CO3) (L1)
Q7. Why energy requirements of infants are higher than adults on per kg body weight basis. (CO4) (L4)

Model Paper

BND Semester-I
Paper Code: BND102

Bachelor of Nutrition and Dietetics (Honours)

Semester I
Human Anatomy and Physiology

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Explain the anatomy and physiology of the cardiovascular system. (CO2, 4) (L1- L4)

Q2. Describe the structure and functions of the human kidney. (CO2, 3) (L1, L3, L4)

Q3. Explain the physiology of digestion and absorption of nutrients in the human alimentary canal. (CO2) (L1, L2)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Explain the structure and functions of the plasma membrane. (CO1) (L1, L2)
Q2. Explain the composition and functions of blood. (CO1) (L2)
Q3. Describe the structure of a neuron with a neat, labelled diagram. (CO2) (L1, L2)
Q4. Explain the mechanism of muscle contraction. (CO4) (L2)
Q5. Discuss the functions of the skeletal system. (CO2) (L2)
Q6. Explain the structure and functions of the nephron. (CO2) (L2)
Q7. Describe the cardiac cycle briefly. (CO2) (L2)
Q8. Explain the process of pulmonary ventilation. (CO4) (L3, L4)
Q9. Discuss the role of liver in metabolism. (CO2) (L4)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. Define homeostasis. (CO1) (L1)
Q2. Name the chambers of the human heart. (CO1) (L1)
Q3. What is the functional unit of the kidney? (CO2) (L1)
Q4. Define tidal volume. (CO4) (L1)
Q5. Name any two endocrine glands. (CO4) (L1)
Q6. State two functions of white blood cells. (CO1) (L1)
Q7. What is synapse? (CO1) (L1)

Model Paper

BND Semester-I
Paper Code: BND103

Bachelor of Nutrition and Dietetics (Honours)

Semester I
Basics of Food Science

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (EQ) (Answer any 2) **(2x10 = 20 Marks)**

Q1. Explain the role of food science in improving food quality, safety, and nutritional value. (CO1) (L1)

Q2. Define the effect of different methods of cooking on the nutritive value. (CO1) (L1)

Q3. Explain the principles of food preservation and various preservation methods used in households and industries. (CO1) (L1)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Explain the classification of foods based on function. (CO1) (L1)
Q2. Describe the physical and chemical properties of carbohydrates in foods. (CO1) (L1)
Q3. Discuss the role of proteins in food preparation. (CO1) (L1)
Q4. Explain gelatinization and dextrinization with examples. (CO1) (L1)
Q5. Describe the functions of fats and oils in cookery. (CO1) (L1)
Q6. Explain the causes and prevention of food adulteration. (CO1) (L1)
Q7. Discuss the principles of refrigeration in food preservation. (CO1) (L1)
Q8. Explain the importance of sensory evaluation of foods. (CO1) (L1)
Q9. Describe the factors affecting food spoilage. (CO1) (L1)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. Define food science. (CO1) (L1)
Q2. What is pasteurization? (CO1) (L1)
Q3. Name any two methods of food preservation. (CO1) (L1)
Q4. Define food adulteration. (CO1) (L1)
Q5. What is an emulsion? (CO1) (L1)
Q6. Name two fat-soluble vitamins. (CO1) (L1)
Q7. Define rancidity. (CO1) (L1)

Model Paper

BND Semester-I
Paper Code: BND104

Bachelor of Nutrition and Dietetics (Honours)
Semester I
Environmental Science

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Write the causes and effects of environmental pollution. (CO1) (L1)
Q2. Explain the importance of biodiversity conservation and write various methods for protecting natural resources. (CO3) (L3)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Explain the components of an ecosystem. (CO1) (L1)
Q2. Describe the structure and functions of the atmosphere. (CO1) (L1)
Q3. Discuss the causes of water pollution. (CO1) (L1)
Q4. Explain the greenhouse effect and global warming. (CO2) (L2)
Q5. Discuss the causes and effects of deforestation. (CO4) (L2)
Q6. Describe the methods of rainwater harvesting. (CO5) (L2)
Q7. Explain the importance of the 3Rs – Reduce, Reuse, and Recycle. (CO6) (L2)

Model Paper

BND Semester-I
Paper Code: BND105

Bachelor of Nutrition and Dietetics (Honours)

Semester I
Indian Knowledge System on Foods

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Define the importance of traditional Indian food systems in promoting. (CO 5) (L4)
Q2. Describe the role of millets and indigenous grains in traditional Indian diets. (CO3) (L4)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Explain the concept of *Satvik, Rajsik,* and *Tamsik* foods. (CO1) (L1)
Q2. Describe the importance of spices in Indian traditional food systems. (CO3) (L2)
Q3. Discuss the nutritional significance of fermented foods in India. (CO5) (L3, L5)
Q4. Explain the traditional Indian cooking methods and their advantages. (CO5) (L3, L5)
Q5. Describe how regional food cultures can support the FSSAI's Eat Right Movement and promote healthy and sustainable food practices. (CO6) (L2)
Q6. Describe the significance of community eating practices in Indian culture. (CO4) (L3)
Q7. Q1. Explain the historical, cultural, and social factors influencing regional Indian cuisines and food traditions. (CO2) (L2)

Model Paper

BND Semester-I
Paper Code: BND107

Bachelor of Nutrition and Dietetics (Honours)
Semester I
English for Communication

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x10 = 15 Marks)**

Q1. Explain the importance of effective communication skills in academic. (CO1) (L1, L2)
Q2. Explain the importance of group discussion and public speaking skills in personality development. (CO5) (L2)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Describe the characteristics of effective communication. (CO4) (L1)
Q2. Discuss the importance of body language in communication. (CO5) (L5)
Q3. Describe the essentials of formal letter writing. (CO3) (L3)
Q4. Discuss the importance of pronunciation and fluency in spoken English. (CO4) (L2)
Q5. Explain the difference between formal and informal communication. (CO1) (L4)
Q6. Describe the steps involved in preparing for a presentation. (CO5) (L3)
Q7. Explain the importance of reading skills in language development. (CO2) (L4)

Model Paper

BND Semester-II
Paper Code: BND201

Bachelor of Nutrition and Dietetics (Honours)
Semester II
Food Microbiology

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Describe the role of microorganisms in food spoilage. (CO3) (L2, L4)
Q2. Explain the principles and applications of food preservation techniques. (CO4) (L3)
Q3. Explain the importance of sanitation and hygiene in food industries. (CO3) (L3)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Explain the classification of microorganisms found in foods. (CO1) (L1, L2)
Q2. Describe the factors affecting microbial growth in foods. (CO2) (L1, L2)
Q3. Discuss the sources of microbial contamination in food. (CO3) (L1)
Q4. Explain the characteristics of bacteria, yeasts, and molds. (CO1) (L1)
Q5. Describe the process of pasteurization and its importance. (CO4) (L2)
Q6. Explain the role of microorganisms in food fermentation. (CO5) (L1)
Q7. Discuss the causes and prevention of food poisoning. (CO3) (L2, L3)
Q8. Explain the principles of sterilization and disinfection. (CO4) (L1, L2)

Section C – Short Answer Questions (SAQ) (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. Define food microbiology. (CO1) (L1)
Q2. What is fermentation. (CO5) (L1)
Q3. Name any two food-borne pathogens. (CO2) (L1)
Q4. Define pasteurization. (CO4) (L1)
Q5. What are probiotics? (CO5) (L1, L2)
Q6. Name two methods of sterilization. (CO4) (L1)
Q7. Define food spoilage. (CO2) (L1)

Model Paper

BND Semester-II
Paper Code: BND202

Bachelor of Nutrition and Dietetics (Honours)
Semester II
Fundamentals of Biochemistry

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Write the structure and functions of carbohydrates and explain their role in energy metabolism. (CO1) (L1)
Q2. Explain the digestion, absorption, and metabolism of proteins and discuss their importance in human health. (CO2) (L1, L2)
Q3. Describe the structure and functions of enzymes and explain the factors affecting enzyme activity. (CO4) (L1, L2)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Explain the classification of carbohydrates with examples. (CO1) (L1)
Q2. Describe the structure and functions of proteins. (CO1) (L1)
Q3. Discuss the biological importance of lipids. (CO5) (L2)
Q4. Explain the properties and functions of water in living organisms. (CO1) (L2)
Q5. Describe the structure of DNA and RNA. (CO1) (L1)
Q6. Explain the mechanism of enzyme action. (CO4) (L2)
Q7. Discuss the functions of vitamins in the human body. (CO1) (L1)
Q8. Explain the importance of minerals in metabolism. (CO4) (L2)
Q9. Describe glycolysis briefly. (CO3) (L2)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. Define biochemistry. (CO1) (L1)
Q2. What is an enzyme. (CO1) (L1)
Q3. Name two monosaccharides. (CO1) (L1)
Q4. Define denaturation of proteins. (CO1) (L1)
Q5. What is ATP. (CO1) (L1)
Q6. Name two fat-soluble vitamins. (CO1) (L1)
Q7. Define metabolism. (CO3) (L1)

Model Paper

BND Semester-II
Paper Code: BND203

Bachelor of Nutrition and Dietetics (Honours)
Semester II
Nutrition Through Life Cycle

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Describe the nutritional requirements during pregnancy. (CO3) (L4)
Q2. Describe the nutritional needs during adolescence. (CO2, 4) (L2, L3)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Explain the nutritional needs during lactation. (CO2) (L2)
Q2. Describe the importance of complementary feeding in infants. (CO3) (L2)
Q3. Explain the dietary requirements and plan a balanced diet of school-going children using food exchange list. (CO5, 6) (L2)
Q4. Describe the physiological changes during adolescence affecting nutrition. (CO3) (L2)
Q5. Explain the importance of nutrition during old age. (CO3) (L2)
Q6. Discuss the causes and prevention of anemia during pregnancy. (CO3) (L4)
Q7. Explain the concept of balanced diet for different age groups. (CO1) (L2)

Model Paper

BND Semester-II
Paper Code: BND204

Bachelor of Nutrition and Dietetics (Honours)
Semester II
Psychology and Sociology Applied to Health Care

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Define the role of psychology in health care and explain how psychological factors influence patient behavior and recovery. (CO3) (L4)
Q2. Explain the importance of sociology in community health. (CO1) (L2)
Q3. Describe stress and its effects on physical and mental health,. (CO5) (L4)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Describe the branches of sociology related to health care. (CO1) (L1)
Q2. Discuss the importance of motivation in human behavior. (CO3) (L1)
Q3. Explain the types of personality. (CO1) (L1)
Q4. Describe the concept of mental health and mental hygiene. (CO2) (L1)
Q5. Explain the role of attitude and perception in patient care. (CO3) (L1)
Q6. Discuss the causes and effects of stress. (CO2) (L2)
Q7. Explain the importance of empathy in health care professions. (CO3) (L1)
Q8. Describe the role of family in maintaining health. (CO2) (L1)
Q9. Discuss the impact of culture on food habits and health practices. (CO3) (L4)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. What is sociology. (CO1) (L1)
Q2. Define stress. (CO1) (L1)
Q3. Name any two types of motivation. (CO1) (L1)
Q4. Define psychology. (CO1) (L1)
Q5. What is communication. (CO1) (L1)
Q6. What is mental health. (CO1) (L1)
Q7. Define culture. (CO1) (L1)

Model Paper

BND Semester-II
Paper Code: BND206

Bachelor of Nutrition and Dietetics (Honours)
Semester II
Soft Skills and Communication

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Discuss the importance of soft skills in professional and personal development. (CO2) (L3)

Q2. Explain the role of effective communication in teamwork and organizational success. (CO1) (L1, L2)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Explain the meaning and importance of soft skills. (CO1) (L1, L2)
Q2. Describe the characteristics of effective communication. (CO2) (L3)
Q3. Discuss the importance of body language in interpersonal communication. (CO4) (L3)
Q4. Explain the role of listening skills in communication. (CO1) (L1, L2)
Q5. Describe the importance of teamwork in organizations. (CO4) (L3)
Q6. Analyze the role of soft skills in improving effective communication in the workplace. (CO3) (L4)
Q7. Develop an action plan to improve communication skills and professional competency for a successful career. (CO5) (L6)

Model Paper

BND Semester-III
Paper Code: BND301

Bachelor of Nutrition and Dietetics (Honours)
Semester III
Macronutrients in Human Nutrition

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Explain the classification, functions, dietary sources, of carbohydrates in human nutrition. (CO1) (L1, L2)
Q2. Describe the role of proteins in growth and maintenance of the human body. (CO1) (L3, L4)
Q3. Describe the classification, functions and health implications of dietary fats. (CO1) (L1, L2)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Differentiate between simple carbohydrates and complex carbohydrates with examples. (CO1) (L1)
Q2. Write a short note on glycogen and its functions. (CO1) (L1)
Q3. Explain the physiological functions of dietary fibre. (CO2) (L 2)
Q4. Discuss the Protein Digestibility Corrected Amino Acid Score (PDCAAS). (CO3) (L4)
Q5. Define essential amino acids and list any six essential amino acids. (CO2) (L2)
Q6. Explain the significance of biological value of proteins. (CO3) (L4)
Q7. Differentiate between saturated and unsaturated fatty acids. (CO1) (L1, L2)
Q8. Write a short note on trans fats and their health effects. (CO2) (L2)
Q9. Discuss the functions of lipoproteins in fat transport. (CO1) (L1)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. Define macronutrients. (CO1) (L1)
Q2. What is the calorific value of carbohydrates, proteins and fats? (CO1) (L1)
Q3. Name two essential fatty acids. (CO1) (L1)
Q4. Define nitrogen balance. (CO1) (L1)
Q5. What are complete proteins? (CO1) (L1)
Q6. What is dietary fibre? (CO1) (L1)
Q7. Mention any two functions of lipids. (CO1) (L1)

Model Paper

BND Semester-III
Paper Code: BND302

Bachelor of Nutrition and Dietetics (Honours)
Semester III
Advanced Food Science

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Explain the physical and chemical properties of carbohydrates in foods. (CO3) (L4)
Q2. Describe the structure and functional properties of proteins in foods.. (CO1) (L1, L2)
Q3. Write the role of lipids in food systems with reference to emulsification,. (CO4) (L3)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Differentiate between gelatinization and retrogradation of starch. (CO2) (L2, L3)
Q2. Write a short note on food emulsions with suitable examples. (CO3) (L4)
Q3. Explain the functional properties of gluten in bakery products. (CO4) (L3)
Q4. Discuss the factors affecting Maillard reaction in foods. (CO1) (L2)
Q5. Write a short note on food additives and their functions. (CO5) (L1, L2)
Q6. Explain the concept of water activity and its importance in food preservation. (CO2) (L2, L3)
Q7. Differentiate between pasteurization and sterilization. (CO2) (L4)
Q8. Discuss the role of enzymes in food spoilage. (CO4) (L2)
Q9. Explain the mechanism of lipid oxidation. (CO4) (L2)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. What is denaturation of proteins. (CO1) (L1)
Q2. Define water activity. (CO1) (L1)
Q3. Name two natural food preservatives. (CO1) (L1)
Q4. What is caramelization. (CO1) (L2)
Q5. Define emulsifier with one example. (CO1) (L 2, L3)
Q6. Mention two causes of food spoilage. (CO1) (L4)
Q7. What are hydrocolloids. (CO1) (L1)

Model Paper

BND Semester-III
Paper Code: BND303

Bachelor of Nutrition and Dietetics (Honours)
Semester III
Public Health Nutrition

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Define Public Health Nutrition and discuss its objectives, scope and importance in improving community health. (CO1) (L1, L2)
Q2. Explain the major nutritional problems prevalent in India. (CO2) (L2)
Q3. Write the role of nutrition education in promoting community. (CO4) (L5)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Differentiate between malnutrition, undernutrition and overnutrition. (CO1) (L1, L2)
Q2. Write a short note on the Triple Burden of Malnutrition. (CO1) (L4)
Q3. Discuss the causes and consequences of protein-energy malnutrition (PEM). (CO2) (L4)
Q4. Explain the importance of growth monitoring in child health programmes. (CO3) (L4)
Q5. Write a short note on food fortification and its advantages. (CO2) (L2)
Q6. Discuss the role of Anganwadi centres in improving nutritional status. (CO4) (L5)
Q7. Explain the significance of nutrition surveillance. (CO3) (L4)
Q8. Differentiate between direct and indirect methods of nutritional assessment. (CO3) (L2)
Q9. Discuss the importance of breastfeeding in public health nutrition. (CO2) (L2)

Section C – Short Answer Questions (SAQ) (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. Define Public Health Nutrition. (CO1) (L1)
Q2. What is BMI. (CO1) (L1)
Q3. Define food fortification. (CO1) (L1)
Q4. Mention any two indicators of nutritional status. (CO1) (L1)
Q5. What is stunting. (CO1) (L2)
Q6. Name any two micronutrient deficiency disorders. (CO3) (L1)
Q7. Define complementary feeding. (CO2) (L1)

Model Paper

BND Semester-III
Paper Code: BND304

Bachelor of Nutrition and Dietetics (Honours)
Semester III
Basics of Medical Nutrition Therapy

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Define Medical Nutrition Therapy (MNT) and importance in disease management. (CO1) (L1)

Q2. Write the nutritional management of cardiovascular diseases. (CO5) (L5)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Write a short note on the role of dietitian in patient care. (CO1) (L2)
Q2. Discuss the principles of planning a therapeutic diet. (CO2) (L2, L3)
Q3. Explain the dietary modifications in hypertension. (CO4) (L2, L3)
Q4. Write a short note on enteral nutrition. (CO3) (L3, L5)
Q5. Discuss the nutritional considerations in fever and infection (CO2) (L2, L3)
Q6. Explain the dietary management of constipation. (CO1) (L1)
Q7. Discuss the role of fibre in disease prevention and management. (CO1) (L1)

Model Paper

BND Semester-III
Paper Code: BND305

Bachelor of Nutrition and Dietetics (Honours)
Semester III
Advanced Biochemistry

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Explain the structure, classification and biological functions of proteins.. (CO3) (L4)
Q2. Describe the metabolism of carbohydrates with special reference to glycolysis and glycogenesis. (CO3) (L4)
Q3. Write the structure, functions and metabolism of lipids in the human body. (CO2) (L3, L4)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Differentiate between DNA and RNA. (CO2) (L2, L4)
Q2. Write a short note on biological oxidation. (CO4) (L4)
Q3. Explain the importance of ATP in metabolism. (CO4) (L2)
Q4. Discuss the functions of enzymes in biochemical reactions. (CO1) (L1, L2)
Q5. Write a short note on β-oxidation of fatty acids. (CO4) (L1, L2)
Q6. Explain the concept of denaturation of proteins. (CO1) (L1, L2)
Q7. Differentiate between anabolic and catabolic pathways. (CO2) (L3, L4)
Q8. Discuss the role of vitamins as coenzymes. (CO1) (L1)
Q9. Explain the process of gluconeogenesis. (CO3) (L4)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. What are fatty acids. (CO1) (L1)
Q2. Name two monosaccharides. (CO1) (L1)
Q3. What is ATP. (CO1) (L1)
Q4. Define oxidation. (CO1) (L1)
Q5. Mention two functions of lipids. (CO1) (L1)
Q6. What is denaturation. (CO2) (L1)
Q7. Define metabolism. (CO1) (L1)

Model Paper

BND Semester-III
Paper Code: BND306

Bachelor of Nutrition and Dietetics (Honours)

Semester III
Food Processing and Preservation

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Explain the principles and importance of food processing in improving shelf life, safety and quality of foods. (CO1) (L1, L2)
Q2. Develop a suitable food product concept along with its processing, packaging, and marketing plan. (CO6) (L6)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Explain the marketing strategies used for the promotion and commercialization of new food products. (CO5) (L3)
Q2. Write a short note on canning of foods. (CO2, 4) (L2)
Q3. Explain the role of preservatives in food preservation. (CO2, 4) (L2, L3)
Q4. Discuss the importance of packaging in processed foods. (CO4) (L4)
Q5. Define canning. (CO3, 4)(L1)
Q6. Differentiate between freezing and refrigeration. (CO2, 4) (L2)
Q7. Explain the role of water activity in food spoilage and preservation. (CO1) (L1, L2)

Model Paper

BND Semester-IV
Paper Code: BND401

Bachelor of Nutrition and Dietetics (Honours)
Semester IV
Clinical Biochemistry and Pathophysiology

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Explain the biochemical basis, clinical features and laboratory investigations of diabetes mellitus. (CO4) (L1, L2)
Q2. Write the pathophysiology of cardiovascular diseases. (CO1, 4) (L2, L4)

Q3. Describe liver function tests and discuss their clinical significance in liver disorders. (CO5) (L3)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Write a short note on lipid profile tests and their significance. (CO4) (L4)
Q2. Explain the causes and biochemical features of jaundice. (CO1, 4) (L1, L2)
Q3. Discuss the role of enzymes as diagnostic markers. (CO 1) (L1)
Q4. Write a short note on anaemia and its biochemical assessment. (CO2, 4) (L2, L3)
Q5. Explain the importance of electrolyte balance in the body. (CO1) (L1, L2)
Q6. Differentiate between nephritis and nephrosis. (CO5) (L2, L4)
Q7. Discuss the clinical significance of serum creatinine and blood urea levels. (CO4) (L4)
Q8. Explain the role of insulin in glucose metabolism. (CO1) (L1, L2)
Q9. Write a short note on inflammation and inflammatory markers. (CO2) (L 2, L3)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. What is hyperglycaemia. (CO2) (L2, L3)
Q2. Define jaundice. (CO1) (L1)
Q3. Name two liver function tests. (CO4) (L1, L2)
Q4. What is hypertension. (CO 3) (L1, L2)
Q5. Define anaemia. (CO1) (L1)
Q6. Mention two cardiac biomarkers. (CO4) (L1)
Q7. What is serum creatinine. (CO2) (L1)

Model Paper

BND Semester-IV
Paper Code: BND402

Bachelor of Nutrition and Dietetics (Honours)
Semester IV
National Health and Nutrition Programs and Policies

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Write the objectives and significance of major national nutrition programmes in India. (CO2) (L1, L2)
Q2. Explain the National Health Policy and its role in improving public health in India. (CO 2) (L1, L2)
Q3. Describe the Integrated Child Development Services (ICDS) programme on maternal and child nutrition. (CO3) (L2)

Section B – Short Essay Questions (Answer any 7) **(7x 5 = 35 Marks)**

Q1. Write a short note on Mid-Day Meal Scheme and its objectives. (CO2) (L1, L2)
Q2. Differentiate between health policy and nutrition policy. (CO5) (L4)
Q3. Discuss the objectives and services of Anganwadi centres. (CO2) (L1, L2)
Q4. Explain the role of National Health Mission (NHM) in public health improvement. (CO3) (L2)
Q5. Write a short note on Anaemia Mukt Bharat programme. (CO1) (L1)
Q6. Discuss the importance of food fortification programmes in India. (CO4) (L2)
Q7. Explain the significance of nutrition education in national programmes. (CO4) (L4)
Q8. Differentiate between preventive and promotive health services. (CO1) (L1)
Q9. Discuss the role of ASHA workers in community nutrition and health services. (CO1) (L1, L2)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. Explain UNICEF. (CO1) (L1)
Q2. What is ICDS. (CO1) (L1)
Q3. Expand NHM. (CO1) (L1)
Q4. Define public health policy. (CO2) (L1)
Q5. What is Poshan Abhiyaan. (CO1) (L1)
Q6. Define food fortification. (CO1) (L1)
Q7. What is PDS. (CO1) (L1)

Model Paper

BND Semester-IV
Paper Code: BND403

Bachelor of Nutrition and Dietetics (Honours)
Semester IV
Micronutrients in Human Nutrition

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Explain the classification, functions and deficiency disorders of vitamins. (CO1) (L1)

Q2. Describe the physiological functions, dietary sources in the human body. (CO2) (L1, L2)

Q3. Describe the role of iron in human nutrition and explain the causes. (CO2) (L1, L2)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Differentiate between fat-soluble and water-soluble vitamins. (CO1) (L1)
Q2. Write a short note on vitamin A deficiency disorders. (CO2) (L1)
Q3. Explain the functions and sources of vitamin C. (CO1) (L1)
Q4. Analyze the role of iodine in thyroid function. (CO1) (L1)
Q5. Write a short note on osteoporosis and calcium deficiency. (CO4) (L1, L2)
Q6. Explain the importance of zinc in human nutrition. (CO2) (L2)
Q7. Differentiate between macro minerals and trace minerals. (CO1) (L4)
Q8. Discuss the causes and prevention of vitamin D deficiency. (CO2) (L1, L2)
Q9. Explain the role of folic acid during pregnancy. (CO3) (L2)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. Define micronutrients. (CO1) (L1)
Q2. Name two fat-soluble vitamins. (CO1) (L1)
Q3. What is anaemia. (CO1) (L1)
Q4. Define osteoporosis. (CO3) (L1)
Q5. Name two dietary sources of calcium. (CO1) (L1)
Q6. What is goitre. (CO3) (L1)
Q7. Define antioxidant. (CO1) (L1)

Model Paper

BND Semester-IV
Paper Code: BND404

Bachelor of Nutrition and Dietetics (Honours)
Semester IV
Functional Foods and Nutraceuticals

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Define functional foods and nutraceuticals. (CO3, 5) (L1, L2, L4)
Q2. Evaluate the role of probiotics and prebiotics in human health. (CO3, 5) (L4. L5)
Q3. Describe omega-3 fatty acids as functional food components. (CO3, 5) (L2, L4)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Differentiate between functional foods and nutraceuticals. (CO1) (L1, L3)
Q2. Explain the health benefits of dietary fiber as a functional food ingredient. (CO3) (L2, L4)
Q3. Write a note on phytochemicals and their importance in health promotion. (CO4) (L2, L3)
Q4. Discuss the role of functional foods in diabetes management. (CO3) (L3, L4)
Q5. Explain the applications of probiotics in gastrointestinal health. (CO 3, 4) (L3)
Q6. Write short notes on:
a) Synbiotics
b) Bioactive peptides (CO4) (L1)
Q7. Write the role of nutraceuticals in immunity enhancement. (CO2) (L2, L3)
Q8. Explain the significance of flavonoids in disease prevention. (CO3) (L4)
Q9. Write a note on fortified milk and dairy products. (CO1) (L1)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. What is a prebiotic. (CO1) (L1)
Q2. Give two examples of functional foods. (CO1) (L1)
Q3. Define antioxidants. (CO1) (L1)
Q4. What are phytosterols. (CO1) (L1)
Q5. What are synbiotics. (CO1) (L1)
Q6. Name two herbal nutraceuticals. (CO1) (L1)
Q7. Expand the term FOS. (CO1) (L1)

Model Paper

BND Semester-IV
Paper Code: BND405

Bachelor of Nutrition and Dietetics (Honours)
Semester IV
Advanced Dietetics

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Explain the principles and objectives of diet therapy. (CO1, 2) (L2)
Q2. Describe dietary management in diabetes mellitus with emphasis on meal planning. (CO1) (L2, L4)
Q3. Describe the nutritional management of cardiovascular diseases.. (CO3) (L1)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Differentiate between normal diet and therapeutic diet. (CO1) (L1)
Q2. Explain the dietary management of hypertension. (CO2) (L2)
Q3. Explain the role of nutrition in liver diseases. (CO3) (L2)
Q4. Write a note on clear fluid diet and full fluid diet. (CO1) (L2)
Q5. Explain dietary recommendations for peptic ulcer patients. (CO2) (L3)
Q6. Write short notes on: (CO1) (L1)
a) Soft diet
b) Bland diet
Q7. Discuss nutritional management in fever and infection. (CO2) (L2)
Q8. Discuss the nutritional considerations in cancer patients. (CO4) (L4)
Q9. Describe the importance of nutrition counseling in clinical practice. (CO1) (L1)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. Define therapeutic diet. (CO1) (L1)
Q2. What is enteral feeding. (CO1) (L1)
Q3. Mention two symptoms of diabetes mellitus. (CO1) (L1)
Q4. What is a soft diet. (CO1) (L1)
Q5. Name two iron-rich foods. (CO1) (L1)
Q6. Mention one dietary source of potassium. (CO1) (L1)
Q7. Expand the term DASH diet. (CO1) (L1)

Model Paper

BND Semester-IV
Paper Code: BND406

Bachelor of Nutrition and Dietetics (Honours)
Semester IV
Food Safety and Standards

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Define food safety and food standards. Discuss the importance of food safety in public health. (CO5) (L1, L4)
Q2. Discuss different types of food adulteration, their health effects, and preventive measures. (CO2) (L2)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Differentiate between food contamination and food adulteration. (CO1) (L4)
Q2. Explain the causes and prevention of food-borne diseases. (CO1, 2, 3) (L2)
Q3. Write a note on food labeling standards. (CO3, 4) (L1)
Q4. Describe the role of food preservatives in food safety. (CO3) (L2)
Q5. Explain personal hygiene practices for food handlers. (CO4) (L2)
Q6. Write short notes on: (CO3, 4) (L1, L2)
a) Good Manufacturing Practices (GMP)
b) Good Hygienic Practices (GHP)
Q7. Explain the significance of cold chain management in food safety. (CO2) (L2, 4)

Model Paper

BND Semester-V
Paper Code: BND501

Bachelor of Nutrition and Dietetics (Honours)
Semester V
Research Methodology and Statistics

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Define research methodology. Explain the different types of research with suitable examples. (CO2) (L1, 2)
Q2. What is sampling? Describe various probability and non-probability sampling techniques. (CO4) (L2, 4)
Q3. Explain measures of central tendency and measures of dispersion with their applications in research. (CO3) (L1, 2)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Differentiate between qualitative and quantitative research. (CO1) (L4)
Q2. Explain the characteristics of a good research problem. (CO4) (L2)
Q3. Write a short note on review of literature. (CO4) (L1)
Q4. Describe the importance of research ethics. (CO1) (L2)
Q5. Differentiate between primary and secondary data (CO1) (L4)
Q6. Discuss questionnaire and interview as tools of data collection. (CO4) (L4)
Q7. What is standard deviation? State its significance. (CO3) (L2)
Q8. Explain correlation and its types. (CO3) (L2)
Q9. Discuss the significance of statistics in health and social sciences research. (CO1) (L1)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. What is a variable? (CO1) (L1)
Q2. Define sampling. (CO1) (L1)
Q3. What is a pilot study? (CO1) (L1)
Q4. State any two sources of secondary data. (CO1) (L1)
Q5. Define mean. (CO1) (L1)
Q6. What is a null hypothesis? (CO1) (L1)
Q7. Define bar diagram. (CO1) (L1)

Model Paper

BND Semester-V
Paper Code: BND502

Bachelor of Nutrition and Dietetics (Honours)
Semester V
Sports Nutrition

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Define sports nutrition. Explain the role of nutrition in improving sports performance and recovery. (CO1) (L2, 4)
Q2. Q1. Design an individualized nutrition plan for an athlete based on the specific demands of their sport, including appropriate macronutrients, hydration, and timing of meals. (CO5) (L6)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Differentiate between aerobic and anaerobic exercise. (CO1) (L4)
Q2. Explain glycogen loading and its importance. (CO3) (L2)
Q3. Write a short note on BMI and body composition in athletes. (CO1, 2) (L1)
Q4. Describe the nutritional needs during training and competition. (CO2, 3) (L2)
Q5. Explain the role of protein supplements in sports nutrition. (CO3, 4) (L2)
Q6. Explain ergogenic aids and their uses. (CO4) (L2)
Q7. Write a short note on eating disorders among athletes. (CO6) (L2)

Model Paper

BND Semester-V
Paper Code: BND503

Bachelor of Nutrition and Dietetics (Honours)
Semester V
Tools and Techniques for Nutrition Counselling

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Define nutrition counselling. Explain the principles and objectives of nutrition counselling. (CO1) (L1, 2)

Q1. Explain the role of empathy, cultural competency, and interpersonal skills in effective dietary counselling and patient care. (CO4) (L2)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Differentiate between counselling and guidance. (CO1) (L4)
Q2. Explain the characteristics of an effective counsellor. (CO1) (L2)
Q3. Write a short note on motivational interviewing. (CO3) (L1)
Q4. Explain the use of food frequency questionnaire in nutrition counselling. (CO3) (L2)
Q5. Illustrate the role of verbal and non-verbal communication in counselling. (CO2) (L2)
Q6. Describe 24-hour dietary recall method. (CO3) (L2)
Q7. Explain the role of audiovisual aids in nutrition education. (CO3) (L2)

Model Paper

BND Semester-V
Paper Code: BND504

Bachelor of Nutrition and Dietetics (Honours)
Semester V
Nutritional Epidemiology and Anthropology

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Define nutritional epidemiology. Explain its scope, objectives, and importance in public health nutrition. (CO1) (L1, 2)
Q2. Discuss the epidemiological methods used in nutritional research with suitable examples. (CO4) (L3, 4)
Q3. Explain the relationship between culture, food habits, and nutritional status. (CO6) (L4)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Differentiate between incidence and prevalence. (CO1) (L4)
Q2. Explain the epidemiological triad. (CO1) (L2)
Q3. Discuss the significance of anthropometry in nutritional assessment. (CO4) (L2)
Q4. Analyze food taboos and their impact on nutrition. (CO6) (L4)
Q5. Describe the role of socioeconomic factors in nutritional status. (CO6) (L2)
Q6. Write a note on malnutrition and its types. (CO2) (L1)
Q7. Explain the importance of community-based nutritional studies. (CO3) (L2, 4)
Q8. Discuss the role of epidemiology in disease prevention. (CO3) (L4)
Q9. Describe cultural influences on infant feeding practices. (CO6) (L2)

Section C – Short Answer Questions (SAQ) (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. What is prevalence? (CO1) (L1)
Q2. Define anthropology. (CO1) (L1)
Q3. Define nutritional surveillance. (CO1) (L1)
Q4. State any two causes of undernutrition. (CO1) (L1)
Q5. Expand WHO. (CO1) (L1)
Q6. Define food culture. (CO1) (L1)
Q7. Name any two methods of dietary assessment. (CO1) (L1)

Model Paper

BND Semester-V
Paper Code: BND505

Bachelor of Nutrition and Dietetics (Honours)
Semester V
Food Analysis

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Define food analysis. Explain its importance in quality control and food safety. (CO1) (L1, 2)

Q2. Interpret and evaluate analytical results to determine the quality, safety, and acceptability of a food product. (CO6) (L5)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Differentiate between qualitative and quantitative analysis. (CO3, 4) (L4)
Q2. Explain the significance of sampling in food analysis. (CO2) (L2)
Q3. Write a short note on Kjeldahl method for protein estimation. (CO4) (L1)
Q4. Explain the determination of moisture content in foods. (CO4) (L1)
Q5. Write a note on food adulteration. (CO2) (L1)
Q6. Discuss chromatographic techniques used in food analysis. (CO4) (L1)
Q7. Demonstrate the microbiological techniques used for evaluating the microbial quality and safety of food products. (CO5) (L3)

Model Paper

BND Semester-V
Paper Code: BND506

Bachelor of Nutrition and Dietetics (Honours)
Semester V
Emerging concepts in Nutrition and Dietetics

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Define functional foods and nutraceuticals. Discuss their role in health promotion and disease prevention. (CO3) (L1, 2)
Q2. Explain the concept of personalized nutrition and its importance in modern dietetics. (CO2, 4) (L2)
Q3. Discuss the role of probiotics and prebiotics in maintaining gut health. (CO2) (L2)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Differentiate between probiotics and prebiotics. (CO2) (L4)
Q2. Explain the concept of nutrigenomics. (CO2) (L2)
Q3. Discuss the role of antioxidants in disease prevention. (CO3) (L2)
Q4. Explain intermittent fasting and its health implications. (CO2, 3) (L2)
Q5. Evaluate the importance of plant-based diets. (CO4) (L4, 5)
Q6. Write a note on dietary supplements (CO2, 4) (L1)
Q7. Discuss the role of gut microbiota in human health. (CO3) (L2, 4)
Q8. Explain food fortification and biofortification. (CO2, 4) (L2)
Q9. Evaluate the nutritional significance of millets. (CO5) (L5)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. Define nutraceuticals. (CO4) (L1)
Q2. What are probiotics? (CO3) (L1)
Q3. Define personalized nutrition. (CO2) (L1)
Q4. Expand AI. (CO1) (L1)
Q5. What is food fortification? (CO4) (L1)
Q6. Define sustainable diet. (CO1) (L1)
Q7. Define biofortification. (CO4) (L1)

Model Paper

BND Semester-VI
Paper Code: BND601

Bachelor of Nutrition and Dietetics (Honours)
Semester VI
Social Behaviour Change Communication/ Nutrition Health Promotion

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Define Social Behaviour Change Communication (SBCC). (CO1) (L1, 2)
Q2. Write the various methods and media used for nutrition education and health communication. (CO2) (L2)
Q3. Explain the role of communication strategies in promoting healthy dietary. (CO1, 2) (L2)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Differentiate between Information, Education, and Communication (IEC) and SBCC. (CO1) (L4)
Q2. Write a short note on interpersonal communication. (CO1, 2) (L1)
Q3. Discuss the role of mass media in nutrition education. (CO1, 2) (L2)
Q4. Explain the importance of behaviour change in public health nutrition. (CO1, 2) (L2)
Q5. Describe the steps involved in developing health education material. (CO2) (L1)
Q6. Write a note on counselling as a communication tool. (CO1) (L1)
Q7. Discuss the use of audiovisual aids in nutrition health promotion. (CO1) (L1)
Q8. Describe community-based approaches for nutrition awareness. (CO1) (L1)
Q9. Write a short note on advocacy in nutrition and health promotion. (CO1) (L1)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. Define SBCC. (CO1) (L1)
Q2. What is health promotion? (CO1) (L1)
Q3. Expand IEC. (CO1) (L1)
Q4. Define communication. (CO1) (L1)
Q5. Name any two audiovisual aids. (CO1) (L1)
Q6. What is mass media? (CO1) (L1)
Q7. Expand WHO. (CO1) (L1)

Model Paper

BND Semester-VI
Paper Code: BND602

Bachelor of Nutrition and Dietetics (Honours)
Semester VI
Sustainable Food Systems

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Explain the major components and principles of a sustainable food system with suitable examples. (CO1) (L1, 2)
Q2. Define the environmental impacts of modern agricultural practices.. (CO3) (L 2, 3)
Q3. Explain the concept of food security and food sustainability.. (CO6) (L4, 5)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Write a short note on organic farming. (CO3) (L1)
Q2. Explain the role of local food systems in sustainability. (CO2, 5) (L2)
Q3. Discuss climate change and its impact on food production. (CO2) (L2)
Q4. Differentiate between conventional farming and sustainable farming. (CO3) (L4)
Q5. Explain the concept of farm-to-fork approach. (CO2) (L2, 4)
Q6. Discuss the role of consumers in promoting sustainable diets. (CO2, 4) (L2)
Q7. Explain the importance of water conservation in food systems. (CO3, 4) (L4)
Q8. Write a note on sustainable fisheries and aquaculture. (CO3, 4) (L1, 2)
Q9. Discuss renewable energy use in sustainable food systems. (CO4) (L2, 4)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. Define sustainable food systems. (CO1) (L1)
Q2. What is food security? (CO1) (L1)
Q3. Mention any two principles of organic farming. (CO3) (L1)
Q4. What is carbon footprint in food systems? (CO4) (L1)
Q5. List any two causes of food wastage. (CO4) (L2)
Q6. State two advantages of local food consumption. (CO1) (L2)
Q7. What is sustainable diet? (CO1) (L1)

Model Paper

BND Semester-VI
Paper Code: BND603

Bachelor of Nutrition and Dietetics (Honours)
Semester VI
Field Practice in Public Health and Nutrition

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Explain the objectives and importance of field practice in community health. (CO1, 2, 4) (L1, 2)

Q2. Develop a comprehensive nutrition and health program plan for a sub-national level, integrating needs assessment, SMART objectives, stakeholder participation, interventions, and monitoring and evaluation. (CO6) (L6)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Explain the objectives of field practice in public health nutrition (CO2) (L1, 2)
Q2. Write a short note on community diagnosis. (CO5) (L1, 2)
Q3. Discuss the importance of rapport building during field visits. (CO4) (L2)
Q4. Explain the use of questionnaires in nutrition surveys. (CO2) (L2)
Q5. Explain the role of Anganwadi centres in nutrition programmes. (CO3) (L2)
Q6. Write a note on dietary survey methods used in field practice. (CO2) (L1, 2)
Q7. Explain the role of ASHA and ANM workers in community health services. (CO3) (L2)

Model Paper

BND Semester-VI
Paper Code: BND604

Bachelor of Nutrition and Dietetics (Honours)
Semester VI
Food Product Development

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Explain the stages involved in the development of a new food product. (CO1) (L1, 2)

Q2 Explain the importance of food quality management in ensuring food safety and maintaining product quality during processing. (CO2) (L3)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Explain the objectives of food product development. (CO1) (L1, 2)
Q2. Describe the basic entrepreneurial skills required for starting a small-scale food processing industry. (CO6) (L3)
Q3. Describe the role of preservatives in food products. (CO1, 2) (L1, 2)
Q4. State two factors affecting consumer acceptance of food products. (CO3) (L2)
Q5. Write the importance of shelf-life studies in food product development. (CO5) (L2)
Q6. Write a note on product formulation and recipe development. (CO1, 4) (L3)
Q7. Explain the significance of food labeling regulations. (CO4) (L2)

Model Paper

BND Semester-VII
Paper Code: BND701

Bachelor of Nutrition and Dietetics (Honours)
Semester VII
Subject: Information Technology in Nutrition and Dietetics

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Define Information Technology in Nutrition and Dietetics. (CO1) (L1, 2)
Q2. Discuss the importance of electronic health records (EHR) in dietetics practice. (CO2) (L2, 4)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Write a short note on nutrition-related mobile applications. (CO2) (L1, 2)
Q2. Discuss the use of spreadsheets in dietary calculations and menu planning. (CO4) (L2)
Q3. What is data confidentiality. (CO5) (L1)
Q4. Describe the applications of tele-nutrition services. (CO4, 5) (L2)
Q5. Explain the role of information technology in health education and dietetic practice. (CO6) (L2)
Q6. Write a note on statistical software used in nutrition research. (CO3) (L1, 2)
Q7. Explain the role of social media in nutrition awareness and health promotion. (CO1) (L2)

Model Paper

BND Semester-VII
Paper Code: BND702

Bachelor of Nutrition and Dietetics (Honours)
Semester VII
Entrepreneurship in Nutrition and Dietetics

Time: 3 Hours **Maximum Marks: 70**

Section A – Essay Questions (Answer any 2) **(2x10 = 20 Marks)**

Q1. Define entrepreneurship in Nutrition and Dietetics. (CO1, 2) (L1, 2)
Q2. Explain the steps involved in establishing a nutrition and dietetics enterprise. (CO3, 4) (L2, 3)
Q3. Write the importance of business planning and financial management in nutrition-related enterprises. (CO1, 2) (L2, 3)

Section B – Short Essay Questions (Answer any 7) **(7x5 = 35 Marks)**

Q1. Explain the characteristics of a successful entrepreneur. (CO4) (L2)
Q2. Write a short note on nutrition consultancy services. (CO2) (L1)
Q3. Discuss the importance of market survey before starting a business. (CO3) (L2)
Q4. Explain the concept of start-ups in the food and nutrition sector. (CO1) (L2)
Q5. Describe the role of communication skills in entrepreneurship. (CO3) (L2)
Q6. Explain the importance of branding and packaging in food business. (CO1, 5) (L2, 4)
Q7. Discuss the role of social media in promoting nutrition enterprises. (CO1) (L2, 3)
Q8. Write a note on small-scale food processing units. (CO5) (L2)
Q9. Analyze the significance of customer satisfaction in business growth. (CO3) (L4)

Section C – Short Answer Questions (Answer any 5) **(5 x 3 = 15 Marks)**

Q1. What is a business plan? (CO1) (L1)
Q2. Mention any two qualities of an entrepreneur. (CO1) (L1)
Q3. What is market survey? (CO1) (L1)
Q4. Name any two nutrition-based business opportunities. (CO1) (L1)
Q5. Define branding. (CO1) (L1)
Q6. Mention two advantages of social media marketing (CO1) (L2)
Q7. What is customer satisfaction? (CO1) (L1)

Model Paper

BND Semester-VII
Paper Code: BND703

Bachelor of Nutrition and Dietetics (Honours)
Semester VII
Nutrition in Critically ill

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Define critical illness and the metabolic changes and nutritional requirements in critically ill patients. (CO1, 2) (L1, 2)
Q2. Describe enteral nutrition in critically ill patients. (CO4) (L2)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Write a short note on stress metabolism. (CO1) (L1, 2)
Q2. Analyze the role of proteins in critical illness. (CO4) (L4)
Q3. Explain the indications for enteral nutrition. (CO2, 4) (L2)
Q4. Describe the composition of parenteral nutrition. (CO4) (L1, 2)
Q5. Explain the complications associated with enteral feeding. (CO5) (L2)
Q6. Discuss nutritional care in burn patients. (CO3, 4) (L 2)
Q7. Explain the importance of nutrition support in critically ill patients and describe the factors considered while planning their nutritional care. (CO6) (L2)

Model Paper

BND Semester-VII
Paper Code: BND704

Bachelor of Nutrition and Dietetics (Honours)
Semester VII
Management and Administration in Dietetics Services

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Explain the principles and functions of management in dietetic services. (CO2, 5) (L2, 4)
Q2. Develop a simple food production plan for a hospital, considering menu planning, food preparation, safe food handling, and nutritional adequacy. (CO6) (L6)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. What is inventory? (CO1) (L1)
Q2. Duties of food service supervisor (CO5) (L1)
Q3. Principles of menu planning in hospitals (CO3) (L1)
Q4. Importance of inventory control (CO3) (L1)
Q5. Methods of purchasing food materials (CO3) (L1)
Q6. Centralized and decentralized kitchen systems (CO2) (L1)
Q7. Standardization of recipes (CO4) (L1)

Model Paper

BND Semester-VII
Paper Code: BND705

Bachelor of Nutrition and Dietetics (Honours)
Semester VII
Nutrition in Emergencies

Time: 1.5 Hours **Maximum Marks: 40**

Section A – Essay Questions (Answer any 1) **(1x15 = 15 Marks)**

Q1. Explain the nutritional problems commonly encountered during emergencies. (CO1) (L1, 2)

Q2. Develop a simple strategy for managing malnutrition and maintaining food security during an emergency situation. (CO6) (L6)

Section B – Short Essay Questions (Answer any 5) **(5x5 = 25 Marks)**

Q1. Interpret nutritional vulnerability during emergencies (CO4) (L4)
Q2. Write a short note on the rapid nutritional assessment (CO2) (L1)
Q3. Describe about community kitchens in disaster management (CO3) (L2)
Q4. Note down the principles of emergency feeding (CO5) (L1)
Q5. Management of dehydration during emergencies (CO5) (L3)
Q6. Write down the importance of breastfeeding in emergencies (CO3) (L1)
Q7. Food fortification in relief programmes (CO3) (L1)

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