

Ordinance Governing
Master of Science in Nutrition and Dietetics
Syllabus / Curriculum
2018-19



Accredited 'A' Grade by NAAC (2nd Cycle)

Placed in Category 'A' by MHRD (GoI)

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RESEARCH

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SECTION – I

PREAMBLE

- The Master's program of Nutrition and Dietetics provides professional education for those who wish to develop a career in Dietetics, Community Nutrition, Food industry or Nutrition research. The aim of the course is to impart a comprehensive knowledge, skills and to ensure that the students acquire competence including public health, medical nutrition therapy, food service management, communication, management, research and evaluation in nutrition. The candidate will be able to assist Medical and Allied Health Professionals to understand the principles of dietary management and apply, while providing Quality service in relation to nutrition in the Hospital and Community
- Why Master of Science in Nutrition and Dietetics?
- Many corporate laboratories industries and R & D centers are establishing branches in India. There is always increased demand, competition & urge to improve their own quality in nutrition. Hence there is lots of scope and opportunity for those who are willing to perceive this course. They can always utilize the skills for kitchen management and meal planning.

SECTION – II

VISION:

To create a cadre of nutritional professionals and integrate nutritional therapy widely in health care.

MISSION:

The Department of Nutrition and dietetics is committed to:

- Create and share nutritional knowledge to ensure healthy and quality life
- Promote quality nutritional research

This shall be achieved by following objectives:

Objectives:

- To impart knowledge and develop capacities of the students through higher education in the areas of human nutrition viz. food science, food safety, quality control and food product development.
- Enable the students to assess, evaluate, monitor and interpret the nutritional problems of different disease conditions of the patients or interpretations of various nutritional case studies in the hospitals, community.
- To plan a therapeutic diet according to the individual's requirement in health and disease conditions
- To provide adequate nutritional counseling and to evaluate the nutritional needs of people of all age group. Therapeutic diet counseling of patients in the outpatient department

SECTION-III

Regulations Governing MSc Degree Semester Course

3.1. Eligibility for Admission:

3.1.1 Eligibility: Candidates must have a bachelor's degree from a recognized university in Home Science or Nutrition or Dietetics or Food Science or Biology or Microbiology or Clinical Biochemistry or Life Sciences or BNYS (Naturopathy) or BAMS (Ayurveda) or BHMS (Homeopathy) or PG Diploma in Dietetics with a minimum of 50% marks in aggregate.

3.1.2 The degree should have been obtained from any University recognized by UGC, established by law in India and the medium of instruction for the degree should be English. For international candidates their degree should be recognized by AIU and where medium of instruction may not be English they should have passed any International proficiency test like IELTS, TOEFL etc.

3.1.3 A Candidate who has scored a minimum of 50% of the marks (aggregate of three/four years for graduate degree holders) prescribed for the qualifying examination shall be eligible for the admission to this Course.

3.2. Proposed Intake of Candidates: 20

3.3. Duration of the Course:

The course of study including submission of dissertation on the topic registered shall be semester based, that includes 4 semesters each extending for six months from the commencement of academic semester. At the end of each semester, there shall be a University examination. At the end of Semester IV, there shall be a Final University Examination. Candidate shall submit a dissertation on the topic approved by the University five months prior to Semester IV Examination.

Medium of Instruction and Examination shall be English

Nature of Course: Full Time Course

3.4. Requirement to Complete the Course:

Semester I	+	Semester II	+	Semester III	+	Semester IV	+	Dissertation	+	Intern ship	=	MSc Degree
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3.5. Training, Teaching and Learning Activities:

A candidate pursuing the course shall work in the Department as a full time candidate. No candidate shall be permitted to run a clinic/ laboratory/ nursing home while studying.

Every candidate shall take part in seminars, group discussions, journal review meetings etc. Every candidate shall attend teaching and learning activities during each semester as prescribed by the Department and not absent himself /herself without valid reasons.

A list of teaching and learning activities designed to facilitate acquiring of essential knowledge and skills outlined is given below:

Lectures & Practical's: For all subjects lectures and practical (concerned subject) shall be conducted by the faculty.

Journal Club: Recommended to be held once a week. All the MSc candidates are expected to attend and actively participate in discussion and enter the relevant details in the log book. Further, every candidate must make a presentation from the allotted journal(s), selected articles with special emphasis on public health nutrition related topics, at least two times a year.

Subject Seminar: Recommended once a week. All the MSc candidates are expected to attend and actively participate in discussion and enter in the log book the relevant details. Further, every candidate shall present a seminar on selected topics at least four times a year and have a total of 4 seminars in two years. The presentations would be evaluated using checklist and would carry weightage for internal assessment. A timetable with the subjects and the names of the candidate and the moderator will be scheduled at the beginning of each semester.

Field Visit: Food manufacturing industries, tertiary care hospitals, hotels, food science labs, CDPO office, milk diary and other nutritional departments.

3.6. Attendance and Monitoring Progress:

3.6.1 Attendance:

3.6.1.1 A candidate pursuing MSc Course shall study for the entire period as full time candidate. No candidate shall join any other course of study or appear for any other examination conducted by this University or any other University in India or abroad during the period of registration.

3.6.1.2 Each semester shall be considered as a unit for the purpose of calculating attendance.

3.6.1.3 Every candidate shall attend symposia, seminars, conferences, journal review meetings, dissertation review meetings and lectures during each year as prescribed by the Department/College/University and not absent himself / herself without valid reasons.

3.6.1.4 Candidate who has put in a minimum of 75% of attendance in the theory and practical assignments separately shall be permitted to appear for University examination at the end of each semester.

3.6.1.5 Candidate will be allowed to appear the Semester IV examination only if the dissertation submitted is accepted.

3.6.1.6 Any candidate who fails to complete the course in the manner stated above shall not be permitted to appear for the semester University examinations.

3.6.2 Monitoring Progress of Studies

3.6.2.1 *Log Book:* Every candidate shall maintain a log diary and record his/her participation in the training programs conducted by the Department such as journal reviews, seminars, etc. Special mention shall be made of the scientific presentations in conference by the candidate as well as details of assessment works like essay writing, etc submitted by the candidate. A separate practical book should be maintained for each practical subjects signed by the concerned faculty. The work diary and practical books shall be scrutinized and certified by the Head of the Department and presented in the University viva-voce examination.

3.6.2.2 *Sessional Examination:* Records and marks obtained in sessional test shall be maintained by the Head of the Department and sent to the University, when called for.

3.6.2.3 *Records:* Records and marks obtained in sessional tests, seminars, journal club, field activities, and weekly written assignments which shall be maintained by the Head of the Department and shall be made available to the University.

3.7. Dissertation

3.7.1 *Synopsis:* Every candidate shall submit a synopsis of the intended dissertation work through the guide to the Director Academic Affairs of KAHER through the HOD and Head of the institution, not later than five months from the date of admission to MSc. (Nutrition and Dietetics). The date will be notified by KAHER.

3.7.2 Such synopsis will be reviewed and the dissertation topic will be registered by the University. No change in the dissertation topic or guide shall be made without prior approval of the University.

3.7.3 Every candidate pursuing MSc. Nutrition and Dietetics course is required to carry out work on a selected research project under the guidance of a recognized guide. The results of such work shall be submitted in the form of a dissertation.

3.7.4 The dissertation is aimed to train the candidate in research methodology. It includes identification of the problem, formulation of a hypothesis, review of literature, getting acquainted with recent

advances, designing of a research study, collection of data, critical analysis and comparison of results and drawing conclusions.

3.7.5 Dissertation shall require approval of the Institutional Ethics Committee (IEC) prior to initiation of any dissertation work. Candidate shall work under the supervisor to attain IEC approval. Student shall maintain regular contact with the guide during his/her dissertation work.

3.7.6 The dissertation should be written under the following headings:

Introduction

Objectives

Review of literature

Material and Methods

Results – including tables & graphs

Discussion

Conclusion

Summary

References

Annexures

3.7.7 The written text of dissertation shall be not less than 50 pages and shall not exceed 150 pages excluding references, tables, questionnaires and other annexures. It should be neatly typed with double line spacing on one side of the bond paper (A4 size, 8.27” x 11.69”) and bound properly. Spiral binding is not permitted. The dissertation shall be certified by the guide and co-guide if any, Head of the Department and Head of the Institution.

3.7.8 The dissertation shall be valued by examiners appointed by the University.

3.7.9 A guide shall be a full time postgraduate teacher of a constituent college of KAHER and recognized by KAHER as a guide for supervision of dissertation work.

3.7.10: Change of Guide: Guide may be changed with prior permission from the University.

3.7.11 Submission of Dissertation: Two copies of the dissertation duly certified by the Guide, the Head of Department shall be submitted to the Controller of Examinations, KAHER, through the Head of the Department at least five months before University Examination of semester IV.

3.8 Internship:

Every candidate shall undergo field training for a period of two months in fourth semester at an organization of national recognition for field experience.

Candidate should submit two copies of the training report duly certified by the authorities of the training center in which he/she has undergone training duly accepted and certified by the Head of the Department.

3.9. Schedule of Examination

There shall be a University examination at the end of each semester for all four semesters, Practical and viva-voce. There shall be a dissertation presentation at the end of semester IV in addition to viva voce.

3.10. Scheme of Examination

3.10.1 Sessional Examination

There shall be a minimum of two sessional examinations in each subject conducted by the Department at midterms and before term end in theory and viva-voce.

The sessional marks shall be awarded out of a maximum of 80 for theory and 50 for viva-voce separately as follows and shall be calculated out of 20 marks and 10 marks respectively.

Theory

Written examination 80 marks
The total marks obtained have to be calculated out of 10.

Seminar 10 marks

Journal Club 10 marks

Reports of field visits 10 marks

Practical log book 10 marks

The total marks obtained have to be calculated out of 10.

2 marks will be given to candidates who make scientific presentations in National Conferences

A cumulative total will be calculated out of 20 as “Internal Assessment” (IA) marks

3.10.2 University Examinations

3.10.2.1 Theory:

There shall be four University examinations for the entire course namely I, II, III, IV semester examination. The examination will be conducted at the end of each semester. There shall be three (3) core theory papers and elective papers. All core subjects will have University exam and electives will have college exam. Each theory paper shall be of 3 hours duration carrying 80 marks each.

3.10.2.2 Practical & Viva-voce:

Each candidate shall give practical examination with viva-voce in all semester.

SCHEME OF EXAMINATION FOR THEORY

Question	Number of Questions	Marks	Maximum Marks	Total Marks
Long Essay Questions	2	15	30	80
Short Essay Questions	5	10	50	

(A) MSc. Semester I Theory:

Paper No.	Paper		Max. Internal Assessment marks	Max. University marks	Total maximum marks	Minimum Marks to Pass
NADI-1	Paper 1T	Human Physiology and Nutrition Science	20	80 (35 + 45)	100	50
NADI-2	Paper 2T	Research Methodology and Biostatistics	20	80 (45+35)	100	50
NADI-3	Paper 3T	Advanced Human Nutrition	20	80	100	50
NADI-5	Elective-1		10	40	50	25
	Elective-2		10	40	50	25

(B) MSc. Semester II Theory:

Paper No.	Paper	Subjects	Max. Internal Assessment marks	Max. University marks	Total maximum marks	Minimum Marks to pass
NADII-1	Paper 1T	Nutritional Biochemistry	20	80	100	50
NADII-2	Paper 2 T	Principles of Food Science	20	80	100	50
NADII-3	Paper 3 T	Food Microbiology and Safety	20	80	100	50
NADII-4	Elective 2		10	40	50	25
	Elective 2		10	40	50	25

(C) MSc Semester III Theory:

Paper No.	Paper	Subjects	Max. Internal Assessment marks	Max. University marks	Total maximum marks	Minimum Marks to pass
NADIII-1T	Paper 1T	Food Service Management	20	80	100	50
NADIII-2 T	Paper 2T	Therapeutic Nutrition -I	20	80	100	50
NADIII-3 T	Paper 3T	Community Nutrition	20	80	100	50
NADIII-4 T	Elective 1		10	40	50	25
	Elective 2		10	40	50	25

(D) MSc Semester IV Theory

Paper No.	Paper	Subjects	Max. Internal Assessment marks	Max. University marks	Total maximum marks	Minimum Marks to pass
NADIV-1T	Paper 1T	Therapeutic Nutrition -II	20	80	100	50
NADIV-2 T	Paper 2T	Nutraceuticals and Functional Food	20	80	100	50
NADIV-3 T	Elective 1		10	40	50	25
	Elective 2		10	40	50	25

(D) Practical Examination

All Practical will have University examinations.

Sr. no	Theory	Practical + IA + Viva	Grand Total
1	Practical (Major 40 + Minor 20)	60 + 20 + 20	100

3.10.3. Dissertation Valuation:

The examiners appointed by the University shall evaluate the dissertation. Approval of dissertation work is an essential prerequisite for a candidate to appear in the semester IV University examination. The dissertation shall be valued by two evaluators (examiners) one within the University and one outside. Any one-evaluator acceptance will be considered as a prerequisite for eligibility to take up the examination.

3.10.3.1 Viva-Voce and Defense Examination: The viva-voce and defense examination shall aim at assessing the depth of knowledge, logical reasoning, confidence and oral communication skills.

The viva – voce and defense examination shall be held after the submission of dissertation. If a candidate fails to submit the dissertation on or before the date prescribed, his/her viva-voce and defense shall be conducted during the subsequent University examination.

3.10.3.2 Examiners: There shall be at least two examiners, out of them one shall be external examiner and the other internal examiner.

3.11. Criteria for Declaring Pass

3.11.1 A candidate shall be declared to have passed MSc if all the conditions below are fulfilled:

MSc. (Nutrition and Dietetics)-Semester I:

- Candidate who secures Grade B or above in each subject in theory & practical of University examinations

MSc. (Nutrition and Dietetics)-Semester II

- Candidate who secures Grade B or above in each subject in theory & practical of University examinations

MSc. (Nutrition and Dietetics)-Semester III

- Candidate who secures Grade B or above in each subject in theory & practical of University examinations

MSc. (Nutrition and Dietetics)-Semester IV

- Candidate who secures Grade B or above in each subject in theory & practical of University examinations
- Candidate shall further obtain Grade B or above in viva-voce.

Candidate has to pass practical and theory examinations separately. (eg: If a candidate fails in theory examination but passes in practical examination, he/she has to appear for theory examination only.)

3.11.2 Carry over:

At any given point of time a candidate shall have subjects pending to clear of only previous semester in addition to the subjects of the current semester that he is appearing for. e.g:

- If the candidate has not passed semester I, he/she can appear for semester II and pending subjects of semester I simultaneously.
- Appearing for semester III he/she should have passed semester I and can appear for papers pending from semester II along with semester III subjects.
- Appearing for semester IV he/she should have passed semester II completely and can appear pending papers of semester III simultaneously.

Cumulative Grade Point Average (CGPA)

Letter Grades and Grade Points equivalent to percentage of marks and performances

10 Point Grade Scale

Percentage of marks obtained	Letter Grade	Grade Point	Performance
90.00 - 100	O	10	Outstanding
80.00 -89.99	A+	9	Excellent
70.00-79.99	A	8	Good
60.00-69.99	B+	7	Fair
50.00-59.99	B	6	Average
Less than 50	F	0	Fail
Absent	AB	0	Fail

1. Conversion of Grades in to GPA:

GPA= Credits x Grade Points / Total Credits

2. **Cumulative Grade Point Average (CGPA)** of all 4 Semester will be calculated as:

Total No. GPA / No. of Semester

**SECTION-IV
COURSE CONTENT**

4.1 SEMESTER I

Sr. no	Subject Code	Theory	Subjects	Credit Points
1	NADI-1T	Paper 1	Human Physiology and Nutrition Science	4
2	NADI-2 T	Paper 2	Research Methodology and Biostatistics	4
3	NADI-3 T	Paper 3	Advanced Human Nutrition	6
4	NADI-PI	Practical 1	Advanced Human Nutrition	2
5	NADI-4	Electives		4
6	Dissertation (Synopsis development)		Practical	2
Total				22

**Note- Choose 2 electives (from List of Electives) amounting to total of 2 CREDITS each.*

THEORY

Semester I

NAD-I-1T Human Physiology

Section A

Subject: Human Physiology

Theory 60 Hours

General Physiology (3 Hours):

- Structure of Cell membrane and Cell Organelles
- intercellular junctions.

Blood (6 Hours) :

- Composition and functions of blood and plasma proteins
- Erythropoiesis & its regulation, Anemia
- Leucopoiesis and its regulation
- Blood Groups: ABO and Rh blood group systems
- Hemostasis
- Immunity
 - Immune System
 - Classification

- Specific and Non Specific Defense Mechanisms
- Antibodies

Cardiovascular System (6 Hours):

- Physiological Anatomy of Heart
- Cardiac Cycle – Definition and Phases
- Cardiac Output - Definition, factors and measurement of cardiac output
- Blood pressure - Definition, Determinants & factors affecting blood pressure, regulation of blood pressure, Hypertension
- Normal Electrocardiogram – Definition, Waves and Uses

Respiratory System (5 Hours):

- Physiological Anatomy of Respiratory System and Functions,
- Concept of Dead Space,
- Mechanism of Respiration,
- Lung volume and capacities,
- Surfactant, definition of compliance,
- Transport of Oxygen, ODC Curve and CO₂ transport,
- Neural and Chemical Regulation of Respiration ,
- Cyanosis, Dyspnea, Apnea, Hypoxia – definition and types

Digestive System (5 Hours):

- Functional Anatomy of GIT
- Composition & functions of saliva
- Composition of gastric juice, mechanism & regulation of HCL secretion
- Composition and functions of pancreatic juice
- Functions of Liver and bile Juice
- Jaundice and it types
- Movements of GI Tract - Deglutition, Movements of Small Intestine.

Excretory System (5 Hours):

- Functional anatomy of kidneys,
- Structure of a nephron,
- Features of renal circulation,
- Juxtaglomerular apparatus,
- Mechanism of Urine formation,
- Micturation: Muscles of the bladder, nerves of bladder, pressure rise in bladder, control of micturation, Cystomatrogram, Diuretics & concept of Artificial Kidney

Reproductive System (5 Hours):

- Sex determination& differentiation
- Development of gonads & genitalia
- Puberty, Pubertal changes
 - Male Reproductive System:
 - Male reproductive organs

- Spermatogenesis
- Morphology of a sperm, Semen
- Factors influencing spermatogenesis
- Functions of testosterone
- Female Reproductive System:
 - Female reproductive organs
 - Oogenesis
 - Ovulatory cycle with its hormonal basis
 - Tests for Ovulation Menstrual cycle with its hormonal basis
 - Functions of Estrogen & Progesterone

Nervous System (5 Hours):

- Organization of CNS-
- Introduction, Structure of neuron
- Properties of nerve fiber, Axonal Transport, Classification of nerve fibers
- Nerve injury – degeneration & regeneration
- Definition of synapse, receptor & reflex
- Functions of Various parts of Brain:
 - Cerebellum
 - Basal ganglia
 - Hypo thalamus
 - Thalamus
 - Autonomic Nervous System
- Temperature Regulation:
 - Normal temperature of body
 - Regulation of body temperature & Fever

Endocrines (5 Hours): Major Endocrine glands

- Pituitary Gland: Anterior & Posterior Pituitary Hormones and functions
- Thyroid Gland: Hormones Secreted and Functions, Goiter
- Adrenal Gland: Hormones secreted by adrenal cortex and medulla and their functions
- Pancreas: Endocrine Hormones of Pancreas and their functions, Diabetes Mellitus
- Parathyroid Gland: PTH, calcitonin and its actions

Suggested Readings:

- Guyton and Hall. Medical physiology, 12th edition.
- Saunder- An imprint of Elsevier. 2003.
- Anil Baran Singha Mahapatra. Essentials of Medical physiology. Second edition. Kolkata, Mumbai. Current Books International, 2006. p.300 14.
- Chandi Charan Chatterjee, Human Physiology, Vol. 2. Calcutta, Medical Allied Physiology, 2004.
- Review of medical physiology, Ganong 23rd edition. Blood as circulating fluid. 2010.
- K Sembulingam, Prem Sembulingam. Essentials of Medical Physiology.

NAD-I-1T Nutrition Science:

Section B

Nutrition Science:

Theory 45 Hours

- **Introduction to Nutritional Science:**
 - Definitions,
 - History,
 - Nutrition research in India
- **Recommended Dietary Allowances:**
 - Factors affecting RDA
 - general principles
 - determination of RDA
 - Requirements and RDA
 - Reference man and reference woman
- **Energy Metabolism and basics of nutrition:**
 - Energy requirement in humans: Basal metabolic rate (BMR), physical activity, and thermic effect of food (formerly termed specific dynamic action)
 - Basal metabolic rate: Definition, factors affecting and measurement
- **Carbohydrates:**
 - Classification: Monosaccharide's, Oligosaccharides, Polysaccharides,
 - Nutritional importance,
 - Dietary carbohydrate (dietary sources) type of carbohydrate in commonly used food items, dietary fibers.
- **Lipids:**
 - Classification of lipids general and Properties,
 - Plasma lipids classification,
 - Nutritional importance,
 - Role to provide energy, Dietary lipids sources.
 - Type of lipids in commonly used food items.
- **Proteins:**
 - Amino Acids**
 - Classification and Properties
 - Proteins**
 - Classification and Properties
 - Structure of Proteins (overview)
 - Role in the body
 - Assessment of nutritional value of proteins
 - Limiting amino acids and mutual supplementation
 - Nitrogen balance : Positive and negative nitrogen balance

- **Vitamins:**
 - fat and water Soluble - Sources, RDA, Functions, Absorption in GIT, Deficiency manifestations, Toxicity if any
- **Minerals:**
 - Calcium, Phosphorus, Magnesium, Iron, Iodine, Zinc, Selenium, Copper, Chromium, Cobalt, Manganese
 - Fluoride - Sources, RDA, Functions, Absorption in GIT, Deficiency manifestations, Toxicity if any
- **Water and electrolytes in diet:**
 - Intake and output of water,
 - Distribution of water in the body (ICF & ECF),
 - Electrolyte composition of body fluids,
 - Isotonic/hypotonic/hypertonic contraction and expansion of ECF

NAD-I-2T

Subjects: Research Methodology and Biostatistics

Theory 60 Hours

Research Methodology:

- Introduction to Research Methodology
- Developing a Research Plan
 - Research Problem
 - Research Question
 - Research Hypothesis
 - Variables
- Study designs (Qualitative & Quantitative)
 - Epidemiological study designs: Cross Sectional, Cohort, Case Control
 - Experimental Design: Randomized, Non randomized,
 - Causal association
- Overview of Qualitative Research Methods
 - Comparing Quantitative and Qualitative Research
 - Sampling in Qualitative Research
 - Recruitment in Qualitative Research
 - Participant Observation
 - In-Depth Interviews
 - Focus Groups

Bio- Statistics:

- Introduction to Biostatistics
- Data – Definition and Types
- Methods of data collection
- Organization of data
- Measures of central Tendency and dispersion
- Sample size and Sampling method

- Testing of Hypothesis
- Parametric methods
- Non parametric methods

Suggested Readings:

- Research Methodology By C. R Kothari Publisher : NEW AGE (2013-09-01)
- Leon gordis : Epidemiology, 5th edition, Elsevier saunders, 1600 John F Kennedy. Blvd. Ste.1800, Philadelphia, PA 19103-2899
- World Health Organization: Health Research Methodology A Guide for Training in Research Methods

NAD-I-3T Advanced Human Nutrition

Theory : 60 hours

PAPER: NADI-1

Unit 1- Introduction to Nutrition

- Definitions
- History
- Nutrition research in India
- Future research

Unit 2- Nutritional Requirements and Food Security for Adults

- Nutritional Requirements
- Food Security
- Low Cost Balanced Diets

Unit 3- Nutritional and Food Requirements for Infants

- Growth and Development during Infancy
- Nutritional Requirements
- Food Requirements

Unit 4- Nutritional and Food Requirements for Preschool Children (1-6 years) and School Children (6-12 years)

- Nutritional Requirements
- Factors affecting Nutritional Status
- Food Requirements
- Nutrition Related Problems of Preschoolers
- Packed Lunches
- School Lunch Programmes

Unit 5 - Nutritional and Food Requirements during Adolescence

- Nutritional Requirements
- Food Habits
- Nutritional Problems

Unit 6 - Nutritional and Food Requirements for Expectant Mothers

- Physiological Changes
- Nutritional Requirements
- Dietary Modifications
- General Dietary Problems
- Complications

- Nutritional Problems

Unit 7 - Nutritional and Food Requirements for Lactating Women

- Role of Hormones
- Nutritional Requirements
- Food Requirements
- Indian Nursing Mothers

Unit 8 - Nutritional and Food Requirements during Old Age

- Process of Ageing
- Nutritional Requirements
- Food Requirements
- Nutritional Related Problems of old age
- Degenerative Diseases

Suggested Readings:

- Briggs, G. M. &Doirs K. Collaway: Bogery Nutrition And Physical Fitness (9th Ed.) Saunders, Philadelphia, 1979.
- Chaney, M. S. Rose M.L. & Wischi J. C. Nutrition, Houghton Mifflin, Boston, 1979.
- Guthrie H.: Introductory Nutrition (6th Ed.) Times Mirror/Mostry College Publishing, 1986.
- Robinson, Lawler: Normal & Therapeutic Nutrition (17th Ed.) Macmillan Publishing Co. 1986.
- Swaminathan S.: Advanced Textbook On Food & Nutrition Vol. 1 & N (2nd Ed. Revised _ Enlarged) Bapp Co. 1985.
- Robinson. Basic Nutrition And Diet Therapy (8th Edition)
- Krause' s Food and Nutrition Therapy 2010, 12th Edition
- Wildman, R.E.C. ed. (2000) Handbook of Nutraceuticals and Functional Foods, CRCPress, Boca Raton.
- Indian Council of Medical Research. Nutritive Value of Indian Foods –Latest Publication.
- Indian Council of Medical Research. Recommended Dietary Intakes for Indians – Latest Recommendations.

NAD-I- P Advanced Human Nutrition

- Preparation of Standardized Recipes
- Planning of Protein and Energy rich dish.
- Planning of Vitamin A rich dish.
- Planning of Vitamin B1 rich dish.
- Planning of Vitamin B2 rich dish.
- Planning of Vitamin B3 rich dish.
- Planning of Vitamin C rich dish.
- Planning of Calcium rich dish.
- Planning of Iron rich dish.
- Planning of weaning food for infants (6 -12 months)
- Planning of mid-day meal for school children
- Planning of low cost nutritious recipe for pregnant women.
- Planning of low cost nutritious recipe for lactating mothers

NAD-I-4 & 5

Subject: Electives

SEMESTER II

Sr. no	Subject Code	Theory/ Practical	Subjects	Credit Points
1	NADII-1 T	Paper 1	Nutritional Biochemistry	4
2	NADII-2 T	Paper 2	Principles of Food Science	4
3	NADII-3 T	Paper 3	Food Microbiology and Safety	4
4	NADII PI	Practical I	Principles of Food Science	2
5	NADII-4 T	Elective 2		4
6	NAD II P	Practical	Dissertation (Synopsis development)	6
Total				24

**NOTE: Choose 2 electives (from List of Electives) amounting to total of 2 CREDITS each*

NAD-II-1 T Nutritional Biochemistry

Subject: Nutritional Biochemistry

Theory 50 Hours

- **Digestion, Absorption and Transport** of Carbohydrates, Proteins and Lipids and related disorders.
- **Metabolisms:**
- Carbohydrate :
 - Glycolysis – Pathway, Energy Production, Regulation, Oxidation of Pyruvate to Acetyl CoA
 - Citric Acid Cycle: Pathway and its regulation, Significance, Energy Production
 - Gluconeogenesis: Gluconeogenesis-Substrates, Gluconeogenesis-Pathway, Regulation of Gluconeogenesis
 - Metabolism of Glycogen: Glycogenesis and Glycogenolysis, Regulation, Glycogen Storage Disorders
 - HMP shunt pathway (over view) and Essential pentosuria
 - Metabolism of fructose and galactose and related disorders
 - Regulation of Blood Glucose level

- **Lipids:**
 - Lipid Metabolism: Oxidation of Fatty Acids- Energetics, Regulation of beta oxidation and related disorders
 - Ketone body metabolism- Denovo Synthesis of Fatty Acids , Regulation
 - Metabolism of Triacylglycerols (over view), Metabolism of Cholesterol- Regulation, Lipoprotein Metabolism (over view), Dyslipidemia
- **Amino Acid Metabolism:**
 - Transamination Reaction, Deamination Reaction
 - Urea Cycle and related disorders, Metabolism of Glycine, Branched chain Amino Acids, Aromatic amino acids, Sulphur containing Amino Acids, Histidine
 - Synthesis of Specialized Products from Amino Acids: Thyroxine, Melanin, Serotonin, Histamine, Melatonin, Dopamine.
 - Disorders associated with amino acid metabolism : Phenylketonuria (Phenylpyruvic Oligophrenia), Maple Syrup Urine Disease (MSUD)
- **Nucleotide Metabolism:**
 - Purine Nucleotide Synthesis-De Novo Synthesis (over view), Salvage Pathway for Purines (over view), Degradation of Purine Nucleotides, Pyrimidine Metabolism (over view)
- **Antioxidants :**
 - Antioxidants and Free Radicals, Production of Oxygen Free Radicals,
 - Physiological Mechanisms to Limit Free Radical Damage, Free Radical in Human Pathology and Disease,
 - Natural and Diet-Derived Antioxidants
- **Enzymes and Coenzymes:**
 - Definition Nomenclature and Classification of Enzymes, Specificity of Enzymes, Mechanism of Enzyme Activity, Factors Affecting Enzyme Activity, Enzyme Inhibition. Role of Coenzymes and cofactors in enzyme activity.
- **Vitamins in nutrition:**
 - Water soluble vitamins :
 - Vitamin C, thiamin, riboflavin, niacin, pantothenic acid, biotin, folic acid.(Physicochemical properties, stability, biochemical indicators).
 - Fat soluble vitamins :
 - Vitamin A, D, E and K (.(Physicochemical properties, stability, biochemical indicators, factors affecting requirements
 - Vitamin A – role in visual cycle.
 - Vitamin D- Formation in the skin, photochemical regulation and factors affecting synthesis of vitamin D3 in human body.
 - Vitamin E – Vitamin E as a part of endogenous antioxidant system
 - Vitamin K – Role in blood clotting process.
- **Minerals in Nutrition:**
 - Macro Minerals: (Physicochemical properties, stability, biochemical indicators).
 - Micro minerals: (Physicochemical properties, stability, biochemical indicators).
 - Ultra-trace minerals – (Physicochemical properties, stability, biochemical indicators).

Suggested Readings

- Harvey, Richard A., and Denise R. Ferrier. Biochemistry. Sixth Edition Lippincott Williams & Wilkins, 2011.
- Orten, James M., and Otto Wilhelm Neuhaus. Human biochemistry. CV Mosby
- Vasudevan, D. M., and S. Sreekumari. "Text book of Biochemistry. Eight Edition Jay Pee Brothers." (2016).
- AOAC, 1995, Association of Official Analytical Chemists. Washington, DC.
- Gruenwedels, D.W. and Whitakor, J.R., 1984, Food Analysis: Principles and Techniques. Vols. I-VIII. Marcel Dekker.
- Joslyn, M.A., 1970, Methods in Food Analysis: Physical, Chemical and Instrumental Methods of Analysis. Academic Press.
- Pomeranz, Y. and Molean, C.E., 1977, Food Analysis Theory and Practice. AVI Publ.
- Sawhney, S.K. and Singh, R., 2000. Introductory Practical Biochemistry. Narosa.

NAD-II-2 T Principles of Food Science

Subject: Principles of Food Science

Theory 45 Hours

Unit 1: Introduction to Food Science

Unit2: Simple sugars and polysaccharides

- Chemistry, Functionality and their role in food industry
- Characteristics and Functional Properties of Starches

Unit3: Lipids

- Classification and Composition
- Functional properties
- Deep fat frying
- Deteriorative changes in fats and oils

Unit 4: Proteins

- Classification and composition and biological functions
- Functional properties
- Protein concentrates, hydrolysates and isolates

Unit 5: Vitamins and Minerals

- Vitamin A
- Vitamin B complex
- Vitamin C
- Vitamin D
- Vitamin E
- Vitamin K
- Minerals
- Classification
- Nutritional and functional role
- Effect of processing on minerals

Unit 6: Properties Of foods

- Quality Attributes
- Gustation
- Texture
- Colour

Unit7: Introduction to Food processing

- Traditional Methods of food processing
- Methods of Food processing:
Thermal processing, dehydration, Microwave Processing, Fermentation, Deep fat frying

Unit 8: Effect of Processing and storage on foods

- Alteration occurring in fruits and vegetables
- Alteration occurring in milk and milk products
- Alteration occurring in meat and poultry, fish and eggs
- Alteration occurring in cereals and legumes
- Alteration occurring in nuts and oilseeds

Suggested Readings:

- Paul P.C. And Palmer H.H. (1972) : Food Theory And Application John Wiley And Sons, London
- Griswold, R.M. (1979) : The Experimental Study Of Food, Houghton Mifflin Boston.
- PeckhamG.C.and Freeland-Graves, J.H. (1979) : Foundation Of Food Preparation, 4th Edition Macmillan Publishing Co .Inc .New York
- Bennion, Marion And O. Hughes (1986) : Introductory Foods, Macmillan, New york
- Maryland R.E and Welsby D.A (1980), Basic Cookery, Fundamental Recipes and variations, William Heinemann Ltd. London
- Charley M. J (I 982) : Food Science (2ndEd), John Wiley And Sons.
- Finch C.F. (1984), Food Preparations, MacDonald and Evans Ltd. Plymouth.
- McGee, H (1984): Food and Cooking, Charles Scribers and Sons, New York.
- Achayya, K.T.:(1998) A Historical Dictionary Of Indian Foods, Oxford Publishing Co.
- 10.Belitz, H.D. and Grosch W., (1999): Food Chemistry, (2nded), Springer, New York

NAD-II-3 T

Subject: Food Microbiology and Safety

Theory 45 Hours

Food Microbiology:

- Basic Concept, History of Food Microbiology
- Role of Microbiology in Biotechnology
- Role of Microorganisms in Fermented Food:
 - Fermented Baked Preparations
 - Fermented Vegetable Foods
 - Fermented Soya Bean Products
 - Fermented Dairy Products
 - Other Fermented Food Preparations

- Economically Important Fermentation Products
- Other Uses of Microbes in Industry

Occurrence and Growth of Microorganisms in Foods:

- Introduction, Microbiology of Air, Water and Soil
- Sources of Foods Contamination
- Factors affecting the growth of Microorganisms :
 - Nutrition, Oxygen, Temperature, Moisture Requirement - The Concept of Water Activity, Osmotic Pressure, Hydrogen Ion Concentration –Ph , Light,
- Control and Destruction of Microorganisms

Food Hazards of Microbial Origin:

- Introduction, Types of Food Borne Diseases,
- Food Borne Intoxications - Staphylococcal Poisoning, Bacillus Cereus Poisoning & Botulism,
- Food Borne Infections – Salmonellosis, Shigellosis(Bacillary Dysentery), Vibrio Parahaemolyticus Gastroenteritis, Enter Pathogenic Escherichia Coli Diarrhoea, Hepatitis A & Shellfish Poisoning,
- Food Borne Toxic Infections - Clostridium Perfringens Gastroenteritis, Enterotoxigenic Escherichia Coli Gastroenteritis, Cholera, Listeriosis, Yersinia Enterocolitica Gastroenteritis & Campylobacter Jejuni Diarrhoea,
- Mycotoxins – Aflatoxicosis, Deoxynivalenol Mycotoxicosis, Ergotism,
- Food Borne Diseases due to Naturally Occurring Toxicants - Lathyrism, Veno-Occlusive Diseases (Vod), Epidemic Dropsy

Food Spoilage:

- Introduction, Factors Responsible for Food Spoilage, Chemical Changes due to Spoilage,
- Spoilage of Different Foods –
 - Meat,
 - Poultry and Poultry Products
 - Fish and Other Sea foods
 - Fruit and Vegetables
 - Cereals and Cereal Products
 - Milk and Milk Products
 - Soft Drinks, Fruit Juices, and Fruit Preserves
 - Miscellaneous Products

Food Contaminants:

- Introduction, Food Contamination, Naturally Occurring Toxicants in Animal Foods and Plant Foods
- Anti-Nutritional Factors in Foods
- Environmental Contaminants -Biological Contaminants, Pesticide Residues, Veterinary Drug Residues, Heavy Metals & Miscellaneous Contaminants

Food Adulteration:

- Introduction, Food Adulteration
- Food Commonly Adulterated

- Common Adulterants,
- Classification of Adulterants,
- Harmful effects of Adulterants
- Methods for Detection of some Adulterants

Food Safety:

- Introduction, Factors Affecting Food Safety - Physical Hazard, Biological Hazard & Chemical Hazard, Microorganisms in Foods: Bacteria, Fungi, Yeasts, Moulds, Viruses, Parasites. Recent Concerns of Food Safety: Prions, Concerns of Genetically Modified Foods, Concern of Dioxin-Contaminated Foods
- Natural toxins in food- An overview, Regulatory concerns.
- Food laws and regulations – concepts and trends in Food Legislation.
- International and Federal standards – WHO, FAO, Codex, ISO series. Food laws in India, Governing bodies- Bureau of India standards (BIS), AGMARK, Food Safety and Standards Act, 2006 (FSSAI), Prevention of Food Adulteration Act (PFA), Milk and Milk Products order (MMPO), Meat Food Products Order (MFPO), Fruits Products order (FPO). Food policies, Food certification, Nutritional labelling
- Exposure, estimation, toxicological requirements.
- Safety aspects of water and beverages such as soft drinks, tea, coffee, cocoa.
- Safety assessment of food contaminants and pesticide residues.
- Safety evaluation of heat treatments and related processing techniques

Food Regulations

- Standards and Quality Control: Introduction,
- The Prevention of Food Adulteration Act 1954,
- Compulsory National Legislations
- Voluntary Based Product Certifications.
- **HACCP :**
 - Food Regulations – Standards and Quality Control,
 - The HACCP Status in India.
 - A Food Safety Assurance System:
 - Need for HACCP,
 - Benefits of HACCP,
 - Principle of HACCP,
 - Guidelines for Application of HACCP Principles

Suggested Readings:

- Frazierw. C. and Westhoff D. C. Food Microbiology, 4th ed., 1988 New York.
- Pelezar, M. (1988) Microbiolqgy V ed., McGraw Hill, N. Y.
- James, M. Jay. Modern Food Microbiology 4th ed., CBS Publishers, New Delhi
- Frobisher M. et. AI. (1974) Fundamentals of Microbiology -9th ed., W.Savenders Co.
- Baanwart,G.J.(1987) Basic Food Microbiology CBS Publishers, New Delhi

NAD-II-1 P**Food Science****Practical: 45 Hours****PRACTICALS:**

- Sensory Evaluation of Food – Score Card Preparation
- Study of preparation variables and quality factors of products from the following food commodities
- Cereal cookery:
 - Preparation of different types of rice to study the effect on cooking time and volume of water absorbed.
 - Factors affecting gluten formation
- Pulses and legumes
 - Effects of various methods of cooking and processing on characteristics of pulses.
- Preparation of soya milk and tofu.
- Milk and egg
 - Preparation of chana
 - Preparation of khoa
 - Studying the textural characteristics of curds prepared using different milk (cow, buffalo and dairy milk)
- Flesh foods
 - Determining the storage stability of eggs stored at – room temperature, refrigerated temperature and fresh eggs
 - Preparation of products to determine the functionality of egg in cookery
- Sugar and jaggery
 - Preparation of fondants
 - Preparation of sugar and jaggery based Indian sweets.

NAD-II-4 & 5 T**Electives**

One week Workshop and Exams have to be conducted at the end of workshops at College level.

SEMESTER III

Sr. no	Subject Code	Theory	Subjects	Credits
1	NADIII-1T	Paper 1	Food Service Management	4
2	NADIII-2 T	Paper 2	Therapeutic Nutrition -I	6
3	NADIII-3 T	Paper 3	Community Nutrition	4
4	NADIII-1 PI	Practical I	Food Service Management	2
5.	NADIII- PII	Practical II	Therapeutic nutrition-I	2
6	NADIII- 4T	Elective 2		4
7	NADIII P2		Dissertation (Data collection and analysis)	2
Total				24

** NOTE: Choose 2 electives (from List of Electives) amounting to total of 2 CREDITS each*

NAD-III-1T Food Service Management

Theory 45 Hours

Institutional Food Management

- Evolution of food service industry
- Principles of Management
- Functions of Management
- Organization Chart
- Leadership

Management of Spaces

- Kitchen Spaces
- Storage Spaces
- Service Spaces

Equipment

- Catering Equipment
- Selection of Equipment
- Equipment Design, Installation and Operation
- Purchasing Equipment
- Care and Maintenance of Equipment

Food Management

- Characteristic of foods
- Food Purchasing
- Menu Planning
- Food Production
- Food Service
- Dishwashing

Financial Management

- Definition and Scope

- Cost Concepts
- Cost Control
- Pricing

Personnel Management

- Introduction
- Recruitment, Selection and Induction
- Training and Development

Hygiene, Sanitation and Safety

- Hygiene and Sanitation
- Safety
- Food Standards in India

Suggested Readings:

- Sethi Mohini. 2nd Edition. (2016) Institutional Food Management, New Age International Publishers.
- Sethi M. and Malhan S.– 3rd Edition (2015) – Catering Management An Integrated Approach. New Age International Publishers.
- Arora R. K. (2007). Food Service and Catering Management. A.P.H. Publishing Corporation, New Delhi.
- Kinton R. and Ceserani V. (1992). The Theory of Catering. ELBS with Hodder and Stoughton.
- Scanlon N.L. (2007). Catering Management. John Wiley and Sons, Inc.

NAD-III-1 P Food Service Management

Food service management

Quantity Cooking: Basic Principles

- Market Survey
- Analysis of the relationship between the purchased amount, edible portion and cooked weight of foodstuffs
- Standardized Recipe

Planning Meals for Institutional Feeding:

- Planning a Mid-Day Snack for preschool Children.
- Planning Meals for College Canteen
- Planning meals for College Hostel Mess
- Planning meals for Working Women Hostel.

Planning and Organization for Industrial Catering:

- Planning Meals for Industrial Canteen.
- Planning Meals for Railway Base Kitchen.

Catering for Special Occasions and Events:

- Planning Meals for a Birthday party.
- Planning Meals for a Cocktail party.
- Planning Meals for a Convention/ Conference.
- Visit to a food service establishment to study its planning and functioning

NAD-III-2 T Therapeutic Nutrition-I

Theory 45 Hours Therapeutic Diets:

- Basic Concept
- Therapeutic Adaptation of Normal Diet
- Factors Considered
- Routine Hospital Diets
- Mode of feeding methods
- Role of dietitian in the Hospital and Community
- Patient Care and Counseling

Diet in Weight Imbalance and Counseling:

- Obesity and Underweight
 - Causes
 - Health Risk
 - Dietary Treatment
 - Psychotherapy

Diet, Nutrient and Drug Interaction:

- Effect of drugs on ingestion, digestion, absorption and metabolism of nutrients.
- Effect of food, nutrients and nutritional status on drug dosage and efficacy.

Diet in Fever:

- Nutrition and Infection
- Metabolic changes during Infection
- Typhoid fever
- Tuberculosis
- HIV Infection and AIDS

Anemia

- Resulting from Acute Hemorrhage
- Nutritional anemia
- Sickle cell anemia
- Thalassemia
- Pathogenesis and dietary management in the above conditions

Food Intolerances and Food Allergy:

- Adverse food reactions
- Treatment and Management
- Prevention

Nutritional Requirement for Special Conditions

- Introduction, Calamity and emergency management, Nutritional requirements for extreme environments,
- Health Hazards associated with high altitude, Nutritional requirements in high altitude,
- Nutritional requirements in cold and polar and hot environment, Nutritional requirements for space missions, Nutritional considerations in brief for Military, naval personnel etc
- Starvation in emergencies arising out of drought, floods, earthquakes, locust, war, wrong policies and poverty – historical perspectives
- Effect of inflation: short medium and long term emergencies on food & nutrient intake.

Precautions against food shortage

- Food needs at national level during emergencies, major nutritional deficiency diseases in emergencies, mobilization of local resources, general fund distribution, mass and supplementary feeding, therapeutic feeding,

Diet in Diseases of Gastro Intestinal Tract and Counseling:

- Upper GI Tract Disorders
 - Disorders of Esophagus
 - Disorders of Stomach
- Lower GI Tract Disorders
 - Common Intestinal Disorders
 - Disorders of Small Intestine
- Intestinal Brush Border Enzyme Deficiencies
- Inflammatory Bowel Diseases
- Disorders of Large Intestine

Suggested Readings:

- Mahan L. K., Escott- Stump, S. and Raymond J. L. (2012): “Krause’s Food and the Nutrition Care Process”, 13th Edition, Elsevier.
- Ross, A.C., Caballero B., Cousins R. J., Tucker K.L. and Ziegler T. (2014) Modern Nutrition in Health and Disease. Wolters Kluwer Health/ Lippincott Williams and Wilkins. Ed 11th
- Garrow, J. S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics. 10th Edition, Churchill Livingstone.
- Nix Staci (2013) William’s Basic Nutrition and Diet Therapy. Elsevier Ed. 14th.
- Antia F. P.: Clinical Dietetics and Nutrition, 3rd ed., Oxford University, Press, Delhi, Reprinted in 1989.
- Hui, Y. H.: Human Nutrition and Diet Therapy, Wadsworth Health ScL Divs. 1983.
- Karran, S. J. and K. G. M. M. Alberti (ed): Practical Nutritional Support, John Wiley and Sons. Inc. N. Y. 1980.
- Modern Nutrition in Health and Disease 10th edition by Maurice E. Shils
- Alfred H.Katz, Prevention and health, the Haworth, Press, New York 1999
- Williams S. R.: Essentials of Nutrition and Diet Therapy, 4th ed., Mosby College Pub. S. Louis, 1986.
- Thomas, B.: Manual of Dietetic Practice, 1996.

NAD-III- 2 P Therapeutic Nutrition I

Standardization of portion sizes for different food preparations.

Routine Hospital Diets

- To plan a Clear Liquid diet.
- To plan a Full Liquid Diet.
- To plan a Soft Diet.

Diet In Weight Imbalance And Counseling:

- To plan a diet for Obesity.
- To plan a diet for Underweight.

Diet In Fever:

- To plan a diet for Typhoid fever.
- To plan a diet for Tuberculosis.
- To plan a diet for HIV Infection and AIDS.

To plan a diet for Nutritional Anemia

Diet in Diseases of Gastro Intestinal Tract and Counseling:

- To plan a diet for Peptic Ulcer.
- To plan a diet for Lactose Intolerance.
- To plan a diet for Coeliac Disease.
- To plan a diet for Constipation.
- To plan a diet for Diarrhea.
- To plan a diet for Ulcerative Colitis.

NAD-III-3 T Community Nutrition

Theory 45 Hours

Public Nutrition:

- Concept
- Scope
- Future Projections
- Health Care
- Role Of Public Nutritionists In Health Care Delivery

Nutritional Problems in India:

- Protein Energy Malnutrition
- Micronutrient Deficiencies
- Vitamin Deficiencies

Population Dynamics:

- Demography, Demographic Transition and Demographic Cycle
- Population Structure
- Vital Statistics and Implications of Vital Statistics in Population Growth
- Population Policy
- Relationship between Fertility, Nutrition and Quality of Life

Assessment of Nutritional Status:

- Population Sampling
- Anthropometry
- Clinical Assessment
- Biochemical Assessment
- Dietary Assessment

Nutrition Monitoring And Nutrition Surveillance

- Nutrition Monitoring And Its Current Programmes
- Nutrition Surveillance System

Nutrition Policy and Programmes:

- Integrated Child Development Services (ICDS) Programme
- Nutrient Deficiency Control Programme
- Supplementary Feeding Programme
- Food Security Programme
- Self-Employment and Wage Employment Schemes

Strategies to Combat National Nutritional Problems

- Introduction
- Diet Or Food Based Strategies
- Nutrient Based Strategies
- Immunization

Nutrition and Health Education:

- Definition
- Importance
- Nutrition Education Methods
- Teaching aids used in Nutrition Education
- Mass communication media used in Nutrition Education
- Nutrition Education through Educational Institutions
- Role of Nutrition Education Programs in Eradication of Malnutrition

Suggested Reading:

- Suryatapa Das.:Text book of Community Nutrition, Academic Publishers.
- Elizabeth Eilender.: Public Health and Community Nutrition Paperback – September 28, 2016, Momentum press Health.
- Dr. Jaysheela Manohar.: Food and Community Nutrition., Indian books and Periodicals

NAD-III-4 & 5**Electives**

One week Workshop and Exams have to be conducted at the end of Postings/ Lectures/workshops on following Topics

PRACTICAL

MSc-III- P Dissertation Data Collection and Entry.

SEMESTER IV

Sr. no	Subject Code	Theory	Subjects	Credits
1	NADIV-1T	Paper 1	Therapeutic Nutrition –II	6
2	NADIV-2T	Paper 2	Nutraceuticals and Functional Food	4
3	NADIV-PI	Practical	Therapeutic Nutrition –II	2
4	NADIV-PII	Practical	Master Dissertation – Part II – Evaluation	08
5	NADIV-3	Elective 2		4
6		Internship		06
Total				30

** NOTE: Choose 2 electives (from List of Electives) amounting to total of 2 CREDITS each*

NAD-IV-1 T Therapeutic Nutrition –II

Theory 50 Hours

Diet in Liver Diseases and Counseling:

- Hepatitis
- Cirrhosis of Liver
- Hepatic coma
- Diseases of Gall Bladder
- Diseases of Pancreas

Diet in Kidney Diseases and Counseling:

- Glomerulonephritis
- Nephrotic Syndrome
- Acute Renal Failure,
- Chronic Renal Failure
- End Stage Renal Diseases
- Urolithiasis

Nutrition in Eating Disorders and Counseling:

- Introduction
- Anorexia Nervosa
- Bulimia Nervosa
- Binge Eating Disorders

Nutrition and Neurological Disorders and Counseling:

- Parkinson's disease
- Alzheimer's disease

- Epilepsy
- Migraine
- Multiple Sclerosis
- Neurotrauma
- Spine trauma
- Feeding problems of patients with neurological disorders

Diseases of Metabolic Disorder and Counseling:

- Diabetes Mellitus
- Gout

Diet in Cardiovascular Diseases and Counseling:

- Coronary Heart Diseases (CHD)
 - Prevalence
 - Risk Factors
 - Pathophysiology
- Dyslipidemia
- Atherosclerosis
- Hypertension & Hypotension
- Angina Pectoris
- Myocardial infarction
- Congestive Cardiac Failure

Diet in Cancer and Counseling:

- Risk factors
- Metabolic Alterations and Nutritional Problems related to Cancer
- Nutritional requirements of Cancer patients related to Cancer Therapy
- Cancer Prevention

Sports Nutrition:

- Introduction
- Evaluation and growth of sports nutrition
- Importance of carbohydrate loading,
- Pre-game and post-game meals,
- Approaches to the management of fitness and health:
- Nutrition, exercise, physical fitness and health--- their inter relationship.
- Parameter of fitness and Fitness tests
- Significance of physical fitness and nutrition in prevention and management of weight control regimes.
- Nutrition guidelines for maintenance of health and fitness.
- Nutritional requirements of exercise:
- Dietary supplements and Ergogenic aids

Suggested Readings:

- Mahan L. K., Escott- Stump, S. and Raymond J. L. (2012): “Krause’s Food and the Nutrition Care Process”, 13th Edition, Elsevier.
- Ross, A.C., Caballero B., Cousins R. J., Tucker K.L. and Ziegler T. (2014) Modern Nutrition in Health and Disease. Wolters Kluwer Health/ Lippincott Williams and Wilkins. Ed 11th
- Garrow, J. S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics. 10th Edition,

Churchill Livingstone.

- Nix Staci (2013) William's Basic Nutrition and Diet Therapy. Elsevier Ed. 14th.
- Antia F. P.: Clinical Dietetics and Nutrition, 3rd ed., Oxford University, Press, Delhi, Reprinted in 1989.
- Hui, Y. H.: Human Nutrition and Diet Therapy, Wadsworth Health ScL Divs. 1983.
- Karran, S. J. and K. G. M. M. Alberti (ed): Practical Nutritional Support, John Wiley and Sons. Inc. N. Y. 1980.
- Modern Nutrition in Health and Disease 10th edition by Maurice E. Shils
- Alfred H.Katz, Prevention and health, the Haworth, Press, New York 1999
- Williams S. R.: Essentials of Nutrition and Diet Therapy, 4th ed., Mosby College Pub. S. Louis, 1986.
- Thomas, B.: Manual of Dietetic Practice, 1996.

NAD-IV- 2 T Nutraceuticals and Functional Foods

Theory: 45 Hours

Unit 1: Introduction to Functional Foods and Nutraceuticals: Definition, History and Classification, Perceived Effects of Functional Foods

Unit 2: Introduction to Probiotics, Prebiotics and Synbiotics. Probiotics: Taxonomy and Important Features of Probiotic Microorganisms, Health Effects of Probiotic Microorganisms

Unit 3: Probiotics in Various Foods Quality Assurance of Probiotics and Safety

Unit 4: Prebiotics: Non Digestible Carbohydrates/ Oligosaccharides, Prebiotics: Dietary Fiber, Prebiotics, Resistant Starch, Prebiotics: Gums

Unit 5: Polyphenols: Flavonoids, Catechins, Isoflavones, Tannins, Phytoestrogens, Phytosterols, Glucosinolates

Unit 6: Pigments: Carotenoids, Lycopene, Curcumin, Organosulphur Compounds

Unit 7: Introduction to Anti-nutritional Factors, Enzymes, Protease inhibitors, Amylase inhibitors, Phytates, Saponins, Haemagglutinins

Unit 8: Active Biodynamic Principles in Spices, Active Biodynamic Principles in Condiments, Active Biodynamic Principles in Other Plant Materials, Non Nutrient Effect of Specific Nutrients

Suggested Readings:

- Wildman, R. E. (2016). Handbook of Nutraceuticals and Functional Foods. CRC Press
- Gibson, G. R. and Williams, M. C. (2001). Functional Foods Concept to Product. CRC Press.
- Vattem, D.A. and Maitin V.(2016). Functional Foods, Nutraceuticals and Natural Products, Concepts and Applications. DEStech Publications, Inc
- Gupta, R. C. (2016). Nutraceuticals: Efficacy, Safety and Toxicity. Academic Press.

NAD-IV P I Therapeutic Nutrition -II
Theory 45 Hours

Diet In Liver Diseases And Counseling:

- To plan a diet for Hepatitis.
- To plan a diet for Cirrhosis of Liver.
- To plan a diet for Hepatic coma.
- To plan a diet for Cholelithiasis and Cholecystitis.
- To plan a diet for Pancreatitis.

Diet in Kidney Diseases and Counseling:

- To plan a diet for Nephrotic Syndrome.
- To plan a diet for Acute Renal Failure.
- To plan a diet for End Stage Renal Diseases.
- To plan a diet for Urolithiasis.

Diseases of Metabolic Disorder and Counseling:

- To plan a diet for IDDM.
- To plan a diet for NIDDM.
- To plan a diet for Gout.

Diet in Cardiovascular Diseases and Counseling:

- To plan a diet for Dyslipidemia.
- To plan a diet for Hypertension.
- To plan a diet for Myocardial infarction.

To plan a diet for Cancer.

NAD - IV-3 & 4 T Electives

Theory: 15 hours

- One week Workshop and Exams have to be conducted at the end of Postings/ Lectures/workshops on following Topics:

NAD - IV- P II

Master Dissertation – Part II – Evaluation

Presentation of Final results and evaluation

LIST OF ELECTIVES

Sl.No.	Elective	Credit
1.	Computer Skills	2
2.	Communication Skills	2
3.	NSS (I,II,III,IV)	2
4.	Leadership skills	2
5.	Library dissertation	2
6.	General Psychology	2
7.	Personality Development	2
8.	Counselling	2
9.	Critical Appraisal	2
10.	Health education and health promotion	2

<p>1. Computer Skills Introduction to Information Technology Introduction to MS Office: MS Word, MS Excel, MS PowerPoint Presentation Skills Internet</p> <ul style="list-style-type: none"> ▪ Search Strategies ▪ Email and Email etiquettes <p>Online survey development tools</p>	<p>2. Communication skills Introduction and definition of communication Process and types of communication Models of communication Essentials of effective communication</p>
<p>3.1 NSS I UNIT 1: Introduction and Basic Concepts of NSS (4)</p> <ul style="list-style-type: none"> • History, philosophy, aims & objectives (1) • Emblem, flag, motto, song, badge (1) • Organizational structure, roles & responsibilities of various NSS functionaries (2) <p>UNIT 2: NSS Programmes and Activities (10)</p> <ul style="list-style-type: none"> • Concept of regular activities, special camping, day camps (3) • Basis of adoption of village/slums, methodology of conducting survey (2) • Financial pattern of the scheme (1) • Other young prog./schemes of GoI (2) • Coordination with different agencies (1) • Maintenance of the diary (1) <p>UNIT 3: Understanding Youth (5)</p> <ul style="list-style-type: none"> • Definition, profiles, categories of youth (2) • Issues, challenges and opportunities of youth (2) • Youth as an agent of social change (1) <p>UNIT 4: Health, Hygiene & Sanitation (7)</p> <ul style="list-style-type: none"> • Definition, needs and scope of health education (1) • Food and nutrition (1) • Safe drinking water, water borne diseases and sanitation (SBA) (2) • National Health Programme (2) • Reproductive Health (1) <p>UNIT 5: Volunteerism and Shramdaan (7)</p> <ul style="list-style-type: none"> • Indian Tradition of volunteerism (1) • Needs & importance of volunteerism (2) • Motivation and constraints of volunteerism (2) • Shramdaan as part of volunteerism (2) 	<p>3.2 NSS II UNIT 1: Importance and Role of Youth leadership (6)</p> <ul style="list-style-type: none"> • Meaning and types of leadership (2) • Qualities of good leaders; traits of leadership (2) • Importance and role of youth leadership (2) <p>UNIT 2: Life Competencies (11)</p> <ul style="list-style-type: none"> • Definition and importance of life competencies (2) • Communication (3) • Inter Personal (3) • Problem-solving and decision-making (3) <p>UNIT 3: Social Harmony and National Integration (9)</p> <ul style="list-style-type: none"> • Indian history and culture (2) • Role of youth in peace-building and conflict resolution (5) • Role of youth in Nation Building (2) <p>UNIT 4: Youth Development Programmes in India (9)</p> <ul style="list-style-type: none"> • National Youth Policy (3) • Youth development programmes at the National level, State level and voluntary sector (4) • Youth-focused and Youth-led Organizations (2)

3.3 NSS III

UNIT 1: Citizenship (7)

- Basic Features of Constitution of India (2)
- Fundamental Rights and Duties (2)
- Human Rights (1)
- Consumer awareness and legal rights of consumer (1)
- RTI (1)

UNIT 2: Family and Society (6)

- Concept of family, community, (PRIs & other community-based organizations) and society (2)
- Growing up in the family- dynamics and impact (1)
- Human Values (1)
- Gender Justice (2)

UNIT 3: Community Mobilization (9)

- Mapping of community stakeholders (3)
- Designing the message in the context of the problem and culture of community (1)
- Identifying methods of mobilization (3)
- Youth-adult partnership (2)

UNIT 4: Environment Issues (11)

- Environment conservation, enrichment and sustainability (2)
- Climate change (2)
- Waste management (2)
- Natural resource management (5)

UNIT 5: Project Cycle Management(10)

- Project Planning (2)
- Project Implementation (3)
- Project monitoring (2)
- Project evaluation: impact assessment(3)

UNIT 6: Documentation and Reporting (7)

- Collection and analysis of data (3)
- Preparation of documentation/ reports (2)
- Dissemination of documents/reports (2)

UNIT 7: Additional Life Skills (7)

- Positive Thinking (1)
- Self Confidence and Self Esteem (2)
- Setting Life Goals and working to achieve them (2)
- Management of Stress including Time Management (2)

3.4 NSS IV

UNIT 1: Youth Health and Yoga (15)

- Healthy lifestyles (yoga as a tool), substance abuse, HIV, home nursing, first aid (8)
- Yoga: history, concept, misconceptions, traditions, impacts (5)
- Yoga as preventive, promotive and curative method (2)

UNIT 2: Youth and Crime (7)

- Sociological and psychological factors influencing youth crime (2)
- Peer mentoring in preventing crimes (1)
- Awareness about anti-ragging (1)
- Cyber crime and its prevention (2)
- Juvenile Justice (1)

UNIT 3: Civil/ Defense (5)

- Positive Thinking (1)
- Self Confidence and Self esteem (2)
- Setting Life Goals and working to achieve them (2)
- Management of Stress including Time Management (2)

UNIT 4: Entrepreneurship Development (8)

- Definition & Meaning (1)
- Qualities of good entrepreneur (2)
- Steps/ ways in opening an enterprise (3)
- Role of financial and support service institutions (2)

UNIT 5: Resource Mobilization (3)

- Writing a Project Proposal (2)
- Establishment of SFUs (1)

UNIT 6: Disaster Management (7)

- Introduction to Disaster Management, classification of disasters (4)
- Role of youth in disaster management (3)

<p>4. Leadership Skills SWOC Analysis Leadership Qualities and Challenges Motivation Ethics and responsibilities Communication Management Team Building</p>	<p>5. Library Dissertation Conducting a systematic literature review on the topic given Submission of the dissertation (5000 words) in bind</p>
<p>6. Health education and Health Promotion Introduction to health education and health promotion: definition and principles</p> <ul style="list-style-type: none"> • Health promotion needs assessment • Health promotion • Health Education and Health Promotion • Role of theory in health education and promotion • Alma Ata Declaration • Theories of health education • Health Communication • Communication process • Types of communication • Functions of health communication • Health education • Approaches • Models of health education • Contents of health education • Practice of health education • Health belief model • Child to Child Approach 	<p>7. Personality Development</p> <ul style="list-style-type: none"> • Personality development • Personality development • Types of personality • Influencing factors • Leadership qualities • Five factor model • Freud’s tripartite theory • Developmental stage theories • Motivation and confidence
<p>8 .Counselling</p>	<p>9.Critical Appraisal</p>