



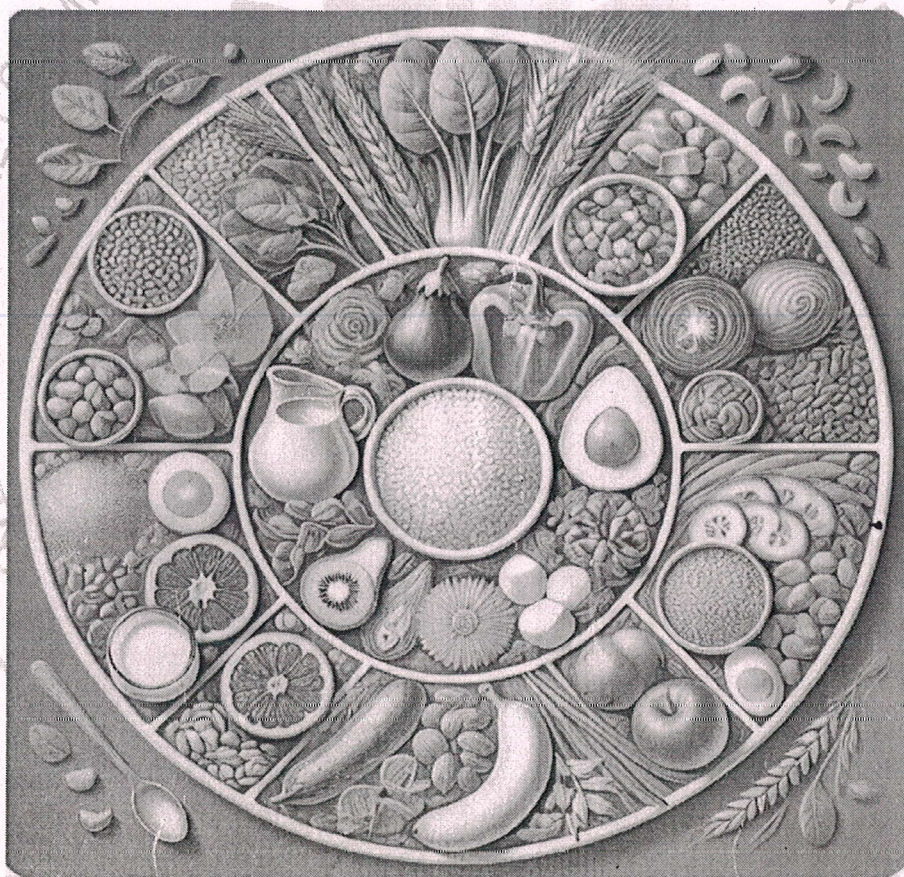
सत्यमेव जयते

National Commission for Allied and Healthcare Professions

COMPETENCY BASED CURRICULUM

for

“NUTRITION AND DIETETICS”



As per the NCAHP Act -2021

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APPROVED SYLLABUS 2025

Ministry of Health & Family Welfare



4.2 Masters in Nutrition and Dietetics

Eligibility for admission:

Bachelor of Nutrition and Dietetics in Honours or equivalent from a recognised university with a minimum 5.5 CGPA

Duration of the course

The Masters in Nutrition and Dietetics is of two years duration.

Duration of the course: 2 years or 4 semesters.

Total hours -1725 Hours

Medium of instruction:

English shall be the medium of instruction for all the subjects of study and examination.

Attendance:

A candidate has to secure a minimum

1. 75% attendance in theoretical
2. 80% in Skills training (practical) for qualifying to appear for the final examination.

Credit details:

1 hour lecture per week - 1 credit

2 hours of tutorials per week - 1 credit

2 hours of clinics per week - 1 credit

Curriculum Outline

Masters in Nutrition and Dietetics

[2 years program]

Proposed Scheme

Year	Semester	Hours
1	1	345
1	2	420
2	3	660
2	4	300
Total		1725

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	60

CL: Credit for Lecture

CP: Credit for Practical

L: Hours for Lecture

P: Hours for Practical

Curriculum Outline

First Semester

Sl.no	Course Titles	Credits			Hours /Semester (15 weeks)		
		Theory	Practical	Total	Theory	Practical	Total
MND 101	Advanced Human Nutrition and Metabolism	4	0	4	60	0	60
MND 102	Advanced Pathophysiology and Clinical Biochemistry	4	0	4	60	0	60
MND 103	Preventive & Therapeutic Dietetics	3	1	4	45	30	75
MND 104	Research Methodology for Dietetics and Public Health	4	0	4	60	0	60
MND 105	Biostatistics	2	2	4	30	60	90
TOTAL		17	3	20	255	90	345

Second Semester

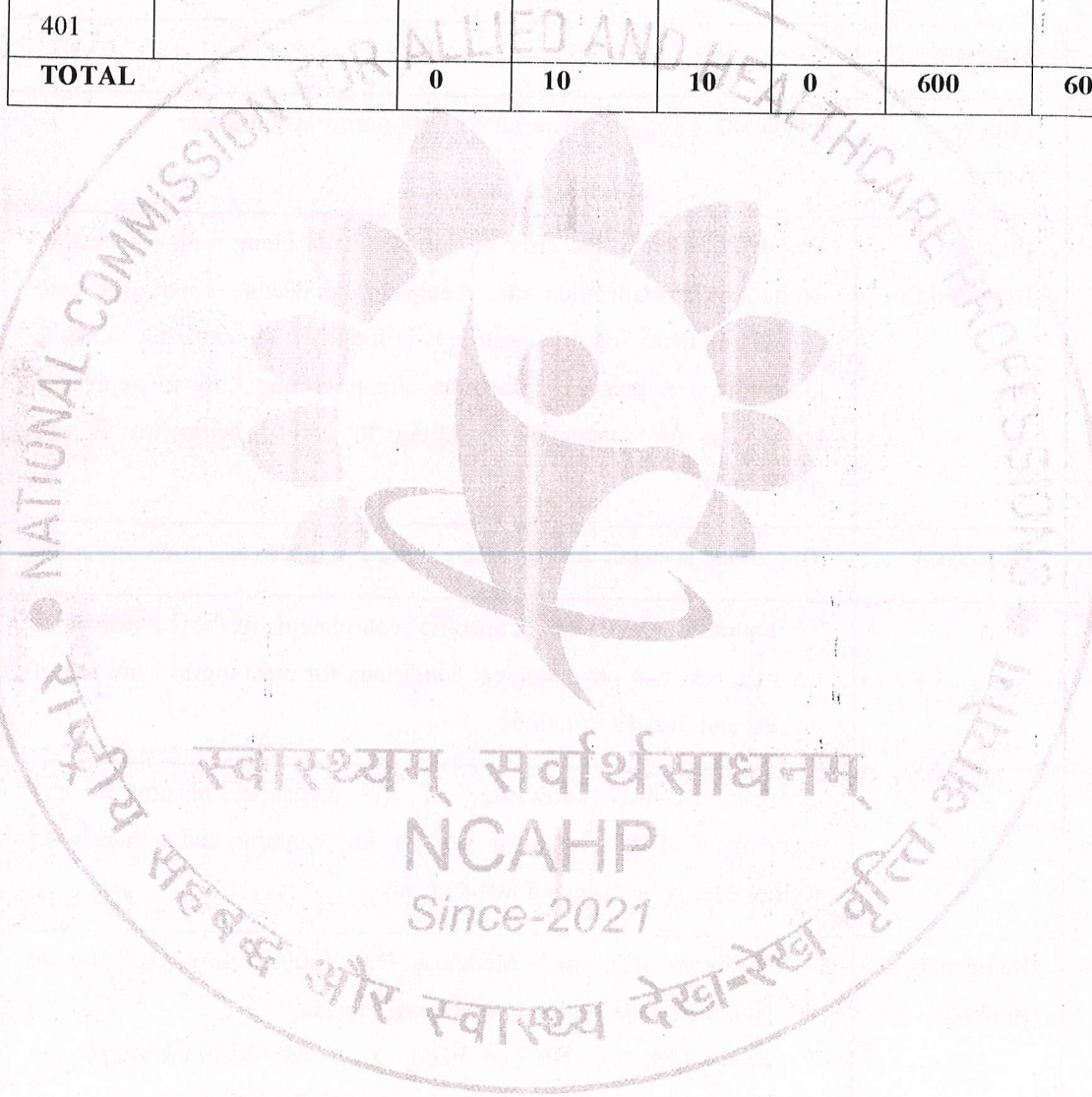
SL.no	Course Titles	Credits			Hours /Semester (15 weeks)		
		Theory	Practical	Total	Theory	Practical	Total
MND 201	Nutrition Assessment Methods & Applications for Dietitians	2	2	4	30	60	90
MND 202	Advances in Enteral and Parenteral Nutrition	2	2	4	30	60	90
MND 203	Advances in Public Health Nutrition	3	1	4	45	30	75
MND 204	Nutrition and Immunity	2	0	2	30	0	30
MND 205	Innovation in Food product development	1	3	4	15	90	105
MND 206	Scientific writing skills	2	0	2	30	0	30
TOTAL		12	8	20	180	240	420

Third Semester

Sl.no.	Course Titles	Credits			Hours /Semester (15 weeks)		
		Theory	Practical	Total	Theory	Practical	Total
MND 301	Intellectual Property Rights	2	0	4	30	0	30
MND 302	Precision Nutrition	4	0	4	60	0	60
MND 303	Institutional Food Service Management and Quantity Cookery	1	5	6	15	150	165
MND 304	Advanced Communication Skills for Nutrition Practice	1	3	4	15	90	105
MND 305	Internship	0	10	10	0	300	300
TOTAL		08	18	20	120	540	660

Fourth Semester

Sl.no.	Course Titles	Credits			Hours /Semester (15 weeks)		
		Theory	Practical	Total	Theory	Practical	Total
MND 401	Dissertation	0	20	20	0	600	600
TOTAL		0	10	10	0	600	600



First Semester

MND 101 Advanced Human Nutrition and Metabolism

CL	CP	L	P
4	0	60	0

Semester	I
Course Name	MND 101 Advanced Human Nutrition and Metabolism
Course Description	Proper nutrition is the crux of human health along with safe water, sanitation, immunization etc. Adequate knowledge about this core course on macro and micronutrients in totality will enable the students to handle a population's nutrition situations and how to apply the knowledge for sustainable handling to induce better health and productivity.
Objectives	To provide in-depth understanding related to macro and micronutrients
	To impart knowledge about specific requirements of these nutrients as per age, sex, and physiological conditions for meaningful handling of normal and disease situations.
	To gain detailed knowledge of the digestion, absorption and metabolism of carbohydrates, protein, fat, vitamins and minerals, as well as energy balance and metabolism.
Reference Books	1. Wildman REC and Medeiros DM (2000) <i>Advanced Human Nutrition</i>. CRC Press, Boca Raton, Florida. 2. Bamji MS, Rao NP and Reddy V (2003) <i>Textbook of Human Nutrition</i>. 2nd Edition, Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi. 3. Eastwood MA (1997) <i>Principles of Human Nutrition</i>. London ; Chapman & Hall.

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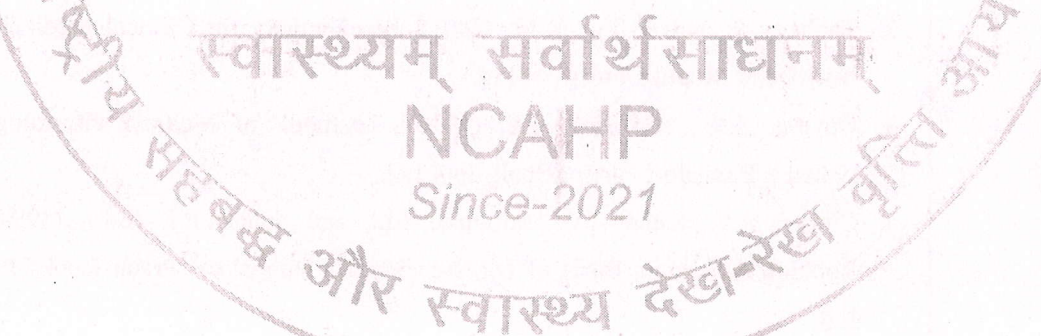
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	4. FAO (2004) <i>Human Energy Requirements -Report of a Joint FAO/WHO/UNU Expert Consultation</i>. Technical Report Series 1. Food and Agriculture Organization, Geneva. 5. FAO (2007) <i>Protein and Amino Acid Requirements - Report of a Joint FAO/WHO/UNU Expert Consultation</i>. Technical Report Series 1. Food and Agriculture Organization, Rome. 6. Berdanier, CD and Zempleni, J (2009) <i>Advanced Nutrition: Macronutrients, Micronutrients and Metabolism</i>. CRC Press, New York. 7. Groff J L and Gropper S (2012) <i>Advanced Nutrition and Human Metabolism</i>. 7th Edition, Yolanda Cossio, New York. 8. Summathi S (2017) <i>Food Chemistry and Nutrition</i>. BS Publication, Hyderabad. 9. Ross A C, Caballero B, Cousins RJ, Tucker KL and Ziegler TR (2012) <i>Modern Nutrition in Health and Disease</i>. 11th Edition, LWW, Philadelphia. 10. Whitney EN & Rolfels CR (2019) <i>Understanding Nutrition</i>. 15th Ed., West Publishing Company, USA. 11. Stipanuk MH and Caudill MA (2013) <i>Biochemical, Physiological and Molecular Aspects of Human Nutrition</i>. 3rd Edition, Elsevier Pub. 12. https://www.nutritionintl.org 13. https://www.who.int 14. https://www.hsph.harvard.edu/nutritionsource 15. http://www.min.res.in
	Prerequisites: Bachelor of Nutrition and Dietetics (Honors) (4-year program)

Course Plan		
Unit	Practical topics	Credit hours
1.	Carbohydrates Structural features, types, functions, sources, requirements, of carbohydrates; chemistry and characteristics of dietary and functional fibers, role of dietary fibre; resistant starch and fructo-oligosaccharides in various physiological disorders; Glycemic response to carbohydrates; digestion, absorption, transport, and distribution of carbohydrates.	13
2.	Fats Structure and biological importance; digestion absorption, transport and storage; lipids, lipoproteins, and cardiovascular disease risk; integrated metabolism in tissues; regulation of lipid metabolism; brown fat thermogenesis; deficiency disorders of lipids and essential fatty acids; role of omega-3 and omega 6 fatty acids in physiological disorders.	13
3.	Proteins Functional categories; protein structure and organization; digestion and absorption; amino acid metabolism; protein turnover; synthesis and catabolism of tissue proteins; evaluation of protein quality; protein deficiency/malnutrition; body composition, energy balance.	14

4.	Regulatory nutrients and water Functions, absorption, requirement, sources, deficiency, toxicity, metabolism and excretion of fat-soluble vitamins - A, D, E and K and water-soluble vitamins- thiamine, riboflavin, niacin, pyridoxine, folate, B₁₂, ascorbic acid, pantothenic acid and biotin; functions and mechanisms of action, digestion, absorption, transport, excretion, adequate intake, requirements, deficiency, toxicity of macro minerals - calcium and phosphorus and micro minerals – iron, zinc, sodium, copper, cobalt, selenium and chromium; water and electrolyte balance - functions and distribution of water in body; electrolyte composition of body fluids and electrolyte balance.	20
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MND 102 Advanced Pathophysiology and Clinical Biochemistry

CL	CP	L	P
4	0	60	0

Semester	1
Course Name	MND 102 Advanced Pathophysiology and Clinical Biochemistry
Course Description	It is a course that integrates the advanced concepts of the pathophysiology of disease with clinical biochemistry.
Objectives	1. To comprehend Normal Biochemistry, Disease Pathogenesis, Etiology, Clinical Signs & Symptoms, Diagnostic Tests, and Complications of the healthy & diseased conditions. 2. To identify and understand the importance and use of diagnostic tests in the prognosis of disease processes.
Reference Books	1. Baynes, J., and Dominiczak. M. (2002). Medical Biochemistry. London : Mosby 2. Thabrew, I. and Ayling. R.M. (2001). Biochemistry for Clinical Medicine. New Delhi: Replika Press Pvt Ltd. 3. Guyton, A.C., and Hall. J.E. (1996). Textbook of Medical Physiology (9thed.). Bangalore: Prism Books Pvt. Ltd. 4. Cotran, R.S., Kumar, V., Robbins, S.L., and Schoen.F.J. (Ed.). (1994). Robbins Pathologic Basis of Disease (5thed.). Bangalore: Prism Books Pvt Ltd. 5. Devlin, T.M. (2002). (Ed.). Textbook of Biochemistry with Clinical Correlations.(5thed.). New York: Wiley-Liss.
Prerequisites	Bachelor of Nutrition and Dietetics (Honors) (4-year program)

Course Plan	
THEORY	Hours
UNIT ONE Disorders of the Cardiovascular system: Disorders of rhythm --- Brady arrhythmias – Dysfunction of the SA and AV nodes --- Tachyarrhythmias Disorders of the heart --- Congestive heart failure --- Ischemic Heart disease (MI, Angina, Sudden cardiac death).--- Valvular heart disease –Rheumatic Heart Diseases -- Myocardial heart disease, Primary (essential) and secondary hypertension --- pathogenesis and risk factors --- effects of Hypertension on the heart, kidney, and brain. Introduction to other heart diseases: cardiomyopathies and congenital HD Atherosclerosis and other forms of Arteriosclerosis --- pathogenesis and risk factors Disorders of lipoprotein metabolism Cardiac Function tests Disorders of the respiratory system: General characteristics of respiratory disorders Classification of respiratory disorders Upper and lower respiratory tract infections: common cold, influenza, pneumonia Obstructive respiratory disorders: Bronchial asthma, bronchitis, emphysema Restrictive respiratory disorders: Pneumothorax, Atelectasis COPD, ARDS Respiratory failure Bronchiectasis --- Cystic Fibrosis --- Disorders of the pleura and the diaphragm Pulmonary Function Tests Neoplasia: Definition --- Tumors --- Benign and Malignant --- Characteristics Molecular basis of Cancers --- Oncogenes --- Activation --- Tumor Suppressor Genes Chemical carcinogenesis – stages	30

Radiation carcinogenesis Viral carcinogenesis Clinical features of cancers Host cell defenses Grading of tumors Diagnosis of cancers -- histologic and molecular methods -- Tumor markers	
UNIT TWO Disorders of the Kidney and the urinary tract Clinical Manifestations of renal diseases (overview) Types, pathogenesis and clinical manifestations of Glomerular diseases: glomerulonephritis, nephrosis, nephritic syndrome Diseases affecting the tubules and interstitium ---Pyelonephritis Diseases of the blood vessels --- Nephrosclerosis Urolithiasis Acute and chronic renal failure Voiding dysfunction, Incontinence, fluid-electrolyte balance, Renal function test Disorders of the GI tract: Pathogenesis and clinical manifestations of GERD and bile reflux- H. hernia Esophagitis Gastritis- peptic ulcer Vascular disease- Ischemic Bowel disease, haemorrhoids Enterocolitis- diarrhoea, dysentery Constipation Malabsorption syndromes-celiac sprue, Bacterial overgrowth syndrome and IIBD Colonic diverticulosis Gastric Function tests Liver disorders: Jaundice- abnormalities of bilirubin metabolism Morphology and patterns of hepatic Injury- Necrosis, degeneration and Inflammation, regeneration and fibrosis	30

Inflammatory disease- viral hepatitis

Cirrhosis- etiology, alcohol and organ damage, Portal hypertension, ascites, splenomegaly, Hepatic failure

Hepatic encephalopathy

pathogenesis and features

Cholelithiasis- pathogenesis and manifestations of cholesterol and pigment stones

Cholestasis- Cholecystitis

Pancreatitis- chronic and acute

Liver function tests.

F). Disorders of the Endocrine system:

Diseases of the thyroid ---hypo and hyperthyroidism --diagnostic tests

Diabetes Mellitus- types, pathogenesis- metabolic derangements and metabolic alterations.

Complications of DM- Micro and macroangiopathy, neuropathy, nephropathy, retinopathy, diabetic foot

Diagnostic tests

G). Disorders of Reproductive system:

Etiology, Pathogenesis, clinical manifestations, diagnosis and treatment of – Endometriosis, PCOS and STDs

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NCAHP

Since-2021

MND 103 Preventive and Therapeutic Dietetics

CL	CP	L	P
3	1	45	30

Semester	I
Course Name	MND 103 Preventive and Therapeutic Dietetics (Theory and Practical)
Course Description	It is a course that details the application of preventive and therapeutic Dietetics .
Objectives	1. Relate the physiologic role of specific nutrient & non nutrient components of food in relation to various organ systems. 2. Explain the mechanisms of disease management process and correlate it with the principles of medical nutrition therapy 3. Interpret therapeutic principles in clinical settings to develop dietary interventions.
Reference Books	1. Racz B., Duskova M., Starka L., Hainer V., Kunesova M. Links between the circadian rhythm, obesity and the microbiome. <i>Physiol. Res.</i> 2018;67:S409–S420. 2. Ceschia A, Horton R. Maternal health: time for a radical reappraisal. <i>The Lancet.</i> 2016;388(10056):2064–6. 3. Wei M, Ho E, Hegde P. Wei M, et al. An overview of percutaneous endoscopic gastrostomy tube placement in the intensive care unit. <i>J Thorac Dis.</i> 2021 Aug;13(8):5277-5296. 4. Preventive Nutrition – The Comprehensive Guide for Health Professionals (2005) ;3rd Edition; Edited by Andrienne Bendich, Richard J. Deckelbaum Human Press Inc., New Jersey.

	5. Nutrition Support for the critically ill patient – A Guide to Practice (2005); Edited by GAIL CRESCI Taylor and Francis London, CRC press, USA. 6. Dietary Fiber in Human Nutrition (2001); 3rd Edition ; Edited by Gene A. Spiller CRC press, USA. 7. Handbook of Nutrition and Food (2002); Edited by Carolyn D. Berdanier, CRC press, USA
Prerequisites	Bachelor of Nutrition and Dietetics (Honors) (4-year program)
Course Plan	
THEORY	Hours
UNIT ONE Role of macronutrients and micronutrients in therapeutic conditions Carbohydrates: Types, Mode of Action & preventive use and therapeutic use in specific disease, Proteins: Types & Role of specific amino acids- preventive and therapeutic uses in various disease states, Lipids: Types(regular/structured), Mode of action preventive and therapeutic and use in specific disease. Vitamins and Minerals: Its application in various disease conditions. Dietary fiber and Water, Its application in various disease conditions. The Immune & Inflammatory System, Introduction to the immune system. Nutrients that affect immune function & their assessment. Role of cytokines in therapeutic conditions Chrono nutrition and chronic diseases: Introduction to Chrono nutrition, Food timings, circadian rhythm and Chrono nutrition Fundamentals of nutrition therapy : - Feeding techniques, types of therapeutic diets Guidelines for nutrition therapy- hypometabolic starved patient & hypermetabolic stressed patient. Critical Care Illness & Conditions requiring intensive care: Definition- Critical Illness & Conditions requiring intensive care, Goals of Nutrition Support in critically ill. Brief about Enteral Nutrition Support	20

Burns: Definition: Burns, Types of Burns, Degree of Burns, Assessment of Burn Surface Area, Systemic Response to Burns on different organ system.

Diabetes (Type 1, Type 2, Gestational, Nephropathy and other complications.)

Obesity in different grades and age groups

Inborn Errors Of Metabolism

Phenylketonuria, glycogen storage disease, Galactosemia.

UNIT TWO

Respiratory (Pulmonary) Disorders:

Normal respiration mechanism: a brief overview of different types of ventilation

MNT Goals & Principles, Acute Exacerbation MNT, Chronic condition MNT

Immunonutrition

Gastrointestinal disorders: Gastritis, GERD, diverticular diseases, gastric surgeries.

Liver disorders: Cirrhosis of the liver, hepatic encephalopathy, Liver transplant, Gall bladder disease, Pancreatitis (acute, chronic). Metabolic liver diseases- NAFLD, hemochromatosis. Disorders of the heart, Primary (essential) and secondary hypertension

Cardiovascular disorders: Disorders of the heart, Primary (essential) and secondary hypertension

Renal Disorders: Acute renal failure, Nephrotic syndrome, Chronic kidney disease, renal replacement therapy, renal transplant

Metabolic: Diabetes (Type 1, Type 2, Gestational, Nephropathy and other complications.)

Obesity in different grades and age groups

Diabetes (Type 1, Type 2, Gestational, Nephropathy and other complications.)

Obesity in different grades and age groups

Inborn Errors Of Metabolism, Phenylketonuria, glycogen storage disease, Galactosemia.

25

PRACTICAL

30

A) Estimation of nutrient requirements- Energy, Carbohydrates, Protein etc. ,

Disease specific dietary planning & interpretation of case studies

- Cardiovascular Disease-
- Diabetes
- Obesity
- Inborn Errors Of Metabolism

B) I. Standardizing general high calorie high protein recipes.

2. Standardizing general low calorie recipes
3. Standardizing recipes based on different nutrient needs
4. Counseling Techniques and mock sessions

C) Estimation of nutrient requirements-

Critical Care

Burns (different Types & Degrees)

Cancer (dietary guidelines for different cancers & therapies)

Surgery (associated to different disease states)

D) 1. Disease-specific dietary planning & interpretation of case studies and presentations in Gastrointestinal diseases-

2. Disease-specific dietary planning & interpretation of case studies and presentations in Liver disorders

3. Disease-specific dietary planning & interpretation of case studies and presentations in Renal Disorders

4. Disease-specific dietary planning & interpretation of case studies and presentations in Pulmonary Disease

E) 1. Review& Case study presentations for therapeutic conditions

2. Review of nutrient drug interactions

3. classes for small sample case study presentations by students

MND 104 Research Methodology for Dietetics and Public Health

CL	CP	L	P
4	0	60	0

Semester	II
Course Name	MND 104 Research Methodology for Dietetics and Public Health
Course Description	This course provides students with a comprehensive understanding of research methodology in dietetics and public health with hands-on practical aspects in epidemiology, study design, statistics, body composition, physical activity assessment and dietary intake measurements as well as experience in scientific writing and detailed reviews of peer reviewed scientific papers in dietetics and public health. This course covers various aspects of research methodology, including research design, data collection, data analysis, and interpretation as well as ethical issues in conducting research. This course will enable students to design, conduct, and evaluate research studies.

Objectives	1. To understand the principles of research methodology in dietetics and public health
	2. To identify the types of research questions and designs appropriate for studies and to provide an understanding of the term epidemiological studies
	3. To introduce the important scientific concepts in study design, research protocol development and ethical issues in research
	4. To introduce different strategies and interpretation of research studies and provide an understanding of key statistical issues including sampling, study size and statistical power.
Reference Books	• McClean S. (2019) Research Methods for Public Health. Sage Publications. • Lovegrove JA., Hodson L., Sharma S. and Lanham-New SA. (2015). Nutrition Research Methodologies (The Nutrition Society Textbook). Wiley-Blackwell; 1st edition. • Susan B and Deepa H. (2012) Introduction To Epidemiologic Research Methods In Public Health Practice. Jones & Bartlett • Nelson M. (2020). Statistics in Nutrition and Dietetics. Wiley-Blackwell • Sreelatha k NT. and Sreelatha K. (2021) Research ethics and plagiarism. Ess Ess Pubns.
Prerequisites	Bachelor of Nutrition and Dietetics (Honors) (4-year program)

Course Plan		
Unit	Practical	Credit Hours
1.	Introduction to Research Methodology : Definition and importance of research methodology, Research process: problem formulation, hypothesis development, data collection, data analysis, and interpretation, Overview of research designs: descriptive, analytical, and experimental	15
2.	Epidemiological Studies and Research Design: Types of research designs: cross-sectional, longitudinal, quasi-experimental, randomized controlled trials, Factors to consider when selecting a research design, Case studies: examples of different research designs in dietetics and public health	15
3.	Data Collection Methods : Surveys: types, advantages, and limitations, Interviews: types, advantages, and limitations Observational studies: types, advantages, and limitations Case studies: examples of different data collection methods in dietetics and public health	15
4.	Statistical analysis: descriptive statistics, inferential statistics Data analysis software: examples of commonly used software (e.g., SPSS), Data visualization techniques: charts, graphs, tables	15
5	Ethical considerations in research: informed consent, confidentiality, deception, Reporting research results: introduction, methods, results, discussion, conclusions Case studies: examples of ethical dilemmas in dietetics and public health research	15

MND 105 Biostatistics

CL	CP	L	P
2	2	30	60

Semester	VI
Course Name	MND 105 Biostatistics
Course Description	Biostatistics applies statistical methods to biological and health research. The course covers data collection, analysis, and interpretation, focusing on study design, probability, hypothesis testing, regression, and survival analysis. Students learn to use statistical software, analyze real-world datasets, and apply findings to public health and clinical decision-making.
Objectives	• To understand fundamental statistical concepts and biological and health research methodologies. • To develop skills in designing and conducting epidemiological and clinical studies. • To master data collection, management, and analysis techniques using statistical software. • To learn to apply probability and hypothesis testing to real-world biological data. • To analyze and interpret results from regression models and survival analysis. • To communicate statistical findings effectively to inform public health and clinical decisions.

Reference	• Smith, G. (1998). Introduction to statistical reasoning. (No Title).
Books	• Daniel, W. W. (1978). <i>Biostatistics: a foundation for analysis in the health sciences</i> (Vol. 129). Wiley. • Kothari, C. R. (2004). Research methodology. • Bhatnagar, O. P. (1990). <i>Research Methods and Measurements in Behavioural and Social Sciences</i>. Agricole Publishing Academy.



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Instructor in charge

M.Sc. and / Ph.D. in Foods and Nutrition or equivalent

Course Plan

Unit	Topic	Hours
1.	Overview of concepts and definition in biostatistics, Various measurements and types of variables- indicators, Types of data – nominal, ordinal, interval, and ratio, Measures of central tendency and deviation: mean, median, mode, standard deviation, Z-score, Concepts of reliability and validity , Interpretation of research data	6
2.	Hypothesis and sampling: Types of hypothesis and examples for nutritional research, Sample size calculation- statistical procedures Errors in sampling- type 1 and type 2 errors, Consideration for sampling for statistical tests sample size, sample grouping	8
3.	Statistical test: Concept of bivariate and multivariate, Comparison of data set –examples for nutritional research, T-test, paired t-test, Karl Pearson, correlation coefficient test, and others, Chi-square test and other various types of test	8
4.	Statistical tests for multiple variables; F-test (ANOVA) Concept of regression analysis, line of regression, regression test Conducting statistical analysis and interpretation of data	8
	PRACTICALS - Computer programs for data analysis	
1.	Use of software in statistical analysis: Excel, SPSS, JASP, JAMOVIR, Any other software	20
2.	Qualitative data analysis: ATLAS.T1, N-VIVO	20
3.	Integrating quantitative and quantitative data	5
4.	Various ways of presenting data: tables, figures graphs, and flow charts	15

Second Semester

MND 201 Nutrition Assessment Methods & Applications for Dietitians

CL	CP	L	P
2	2	30	60

Course Description	The course shall enable the student to learn about the various methods of nutritional assessment and the skills to measure and interpret them.
Objectives	This course will enable the students to 1. Understand the nutritional assessment of patients 2. Learn the skills to measure and interpret the various indicators and indices of nutritional assessment. 3. Learn to design a nutritional assessment plan for subjects.
References	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. Vir SC. Public Health Nutrition in Developing Countries Pt 1 and 2.(2011) Wood head publishing India PVT LTD, New Delhi. Cambridge, Oxford, Philadelphia. 3. Sehgal S and Raghuvanshi Rita S Textbook of Community Nutrition. (2007) Indian Council of Agricultural Research, Published by: Directorate of Information and Publication of Agriculture, Indian Council of Agriculture Research, Krishi Anusandhan Bhavan, Pusa, New Delhi-110012 4. Bamji MS, Krishnaswamy K, Brahmam GNV (2009). Textbook of Human Nutrition, 3rd edition. Oxford and IBH Publishing Co. Pvt. Ltd. ISBN 9788120417427

	5. Jelliffe DS. The Assessment of Nutritional status of the community, (1966) WHO Geneva 6. Gopaldas T and Sheshadri S. Nutritional Monitoring and Assessment. (1987) Oxford University Press, New Delhi. 7. Gibson R.S. Principles of Nutritional Assessment (2005) - 3rd edition. Oxford University Press
Webliography	1. Nutrition Screening Tools for Hospitalized Patients, Patricia S. Anthony MS, RD 2008, https://doi.org/10.1177/0884533608321130 2. Holmes CJ, Racette SB. The Utility of Body Composition Assessment in Nutrition and Clinical Practice: An Overview of Current Methodology. <i>Nutrients</i>. 2021; 13(8):2493. https://doi.org/10.3390/nu13082493
Prerequisites	Bachelor of Nutrition and Dietetics (Honors) (4-year program)

Course Plan		
Theory		
Unit	Topic	Hours
1.	Nutritional Assessment in Clinical Practice – Introduction, relevance	3
2.	Body composition and cellular basis of growth, Significance, and methods used for measurement of body composition in nutrition. Common Biomarkers of Nutritional Status and Inflammation	12
3.	Malnutrition Universal Screening Tool, Nutritional Risk Screening 2002, Mini Nutritional Assessment®, Short Nutritional Assessment Questionnaire®, Malnutrition Screening Tool, and the Subjective Global Assessment.	4

4.	Information Sources: Screening or referral form, Interview of patient or key social support, Medical or health records , Community- or organization-based surveys and focus groups, Health surveillance data, reports, research studies	3
5.	Comparison of Food and Nutrient Intake Assessment Methods	4
6.	Websites and Apps for Tracking Nutritional Intake and Physical Activity Data	4

Practical		
Unit	Topic	Hours
1.	Using nutrition assessment tools to measure nutritional status in patients in hospital: MUST, MNA, SGA, WHO Steps for assessment of NCDs	15
2.	Assessment of Nutritional risk factor of elderly Using Mini Nutritional Assessment Cumulative Illness Rating Scale for Geriatrics	5
3.	Designing a nutritional assessment system for a group of patients in a hospital setting • The assessment system used • Type and number of measure-ments selected • Indices and indicators derived from these measure-ments • Interpretation and application of the indicators	20

4.	Case Studies to assess the nutritional status of patients in hospital using various tools Simplified nutritional appetite questionnaire (SNAQ) patient-generated subjective global assessment (PGSGA) nutrition risk screening (NRS) malnutrition screening tool (MST) Nutritional Risk Index(NRI) Biomarkers i) Cancer ii) Chronic liver Disease iii) Diabetes iv) Cardiovascular/ CHD	20
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MND 202 Advances in enteral and parenteral nutrition

CL	CP	L	P
2	2	30	60

Instructor in charge

M.Sc. and / Ph.D. in Foods and Nutrition or equivalent

Course Description

The course shall enable the student to learn about the role of enteral and parenteral nutrition in various disease and their complications.

Objectives

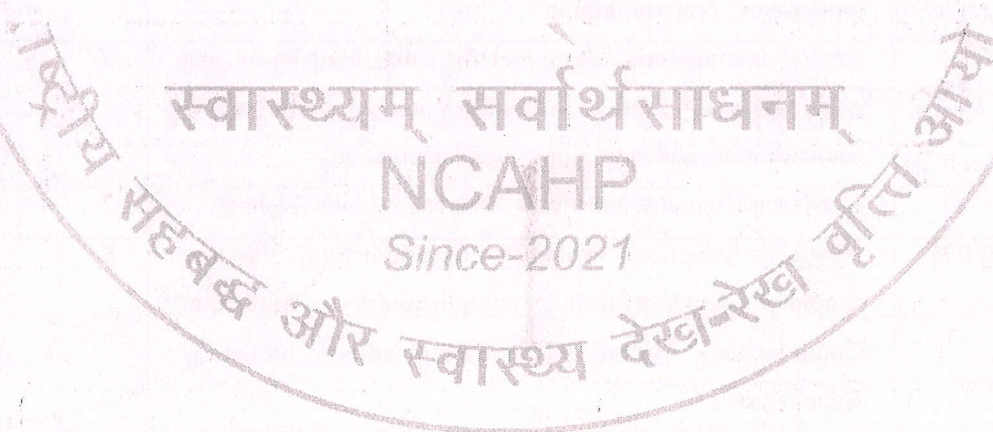
This course will enable the students to understand:

References	1. Ayers P, Bobo ES, Hurt RT, Mays AA, Worthington PH, eds.(2020) ASPEN Parenteral Nutrition Handbook, Third Edition. Silver Spring, MD: American Society for Parenteral and Enteral Nutrition; ISBN 1889622419 2. Mahan, L.K. and Escott-Stump, S. (2021): Krause's Food Nutrition and Nutrition Care Process, 16th Edition, Elsevier Pvt. Ltd.ISBN 032381025X 3. <u>Subhal Bhalchandra Dixit</u> (Author), <u>Atul Prabhakar Kulkarni</u> <u>Kapil Gangadhar Zirpe</u> (Editor) Textbook of Critical Care Nutrition (ISPEN) (2023) Jaypee Brothers Medical publishers (Pvt) Ltd .ISBN 9356963150 4. Nambiar VS and Zaveri D (2024). Nutrition Guidance After Mini Gastric Bypass Bariatric Surgery. Adhyayan Publishers and Distributors. ISBN-10 : 8119681169. 5. Nambiar VS and Zaveri D (2024).Nutrition Guidelines for Roux-en-Y Gastric Bypass Bariatric Surgery. Adhyayan Publishers and Distributors. ISBN-10 : 8119681215.
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Webliography	nutrients-06-05142.pdf Nutrients 2014, 6, 5142-5152; doi:10.3390/nu6115142
Prerequisites	Bachelor of Nutrition and Dietetics (Honors) (4-year program) and knowledge of medical nutrition therapy and advanced nutrition

Course Plan		
Theory		
Unit	Topic	Hours
1.	Important Issues in Enteral Nutrition Effect on Gut mucosa and gut-associated lymphoid tissue (GALT), Gut microbiota, Infections and Complications Refeeding Syndrome, Drug- Enteral Nutrition Interaction	5
	Role of Enteral Nutrition in the following: - Diabetes, Cancer Gastrointestinal diseases – IBD, Dementia, Paediatric critical care, Preterm infants	6
2.	Enteral immunomodulatory diet for acute lung injury and acute respiratory distress syndrome, omega-3 fatty acid, γ -linolenic acid, and antioxidant supplementation	2
3.	Home-based enteral nutrition – Blenderized tube feeding,	2
UNIT II	Issues in Parenteral Nutrition: Compounding, Vascular access device-related complications, Metabolic Complications, Hepato biliary Complications, Metabolic Bone Disease	5
4.		
5.	Role of Parenteral Nutrition in the following: Critical care, Neonates and premature infants, Bariatric surgery, Cancer	4
6.	Examining safety and ethical issues in parenteral nutrition	2
7.	Nutrition support in long-term and home care	2

Practical		
Unit	Topic	Hours
1.	Planning tube-feeding diets for the following Diabetes Cancer Gastrointestinal diseases – IBD, Dementia Paediatric critical care Preterm infants	36
2.	Parenteral nutrition support for the following- Critical care Neonates and premature infants Bariatric surgery Cancer	24



MND 203 Advances in Public Health Nutrition

CL	CP	L	P
2	2	30	60

Semester	II
Course Name	MND 203 Advances in Public Health Nutrition
Course Description	The course aims to focus on the advances in Public Health Nutrition at National level and Global level
Objectives	1. To understand and define the advanced concepts in Public Health Nutrition (PHN) 2. To understand the global importance of nutrition across the life cycle and its role in achieving Sustainable Development Goals (SDGs). 3. To assess the impact of public policies on community nutrition and global health targets. 4. To explore nutritional surveillance systems, for monitoring and evaluating public health nutrition programs. 5. To analyze epidemiological data to understand the relationship between diet and community health. 6. To emphasize the need for Health Promotion in diverse population.

Reference Book	1. Lal, S. (2018). Textbook Of Community Medicine Preventive And Social Medicine With Recent Update. CBS Publishers & Distributors Private Limited.
	2. Public Health Nutrition in Developing Countries. (2011) Edited by Sheila Vir. Woodhead Publishing India PVT. LTD.
Webliography	1. UNICEF. https://www.unicef.org/ 2. WHO. http://www.who.int/ 3. World Food Programme. http://www.wfp.org/content/about-wfp- 4. WHO. United Nations Decade of Action on Nutrition. http://www.who.int/nutrition/decade-of-action/en/ 5. Mother, Infant and Young Child Nutrition and Malnutrition. http://motherchildnutrition.org/india/overview-india.html 6. Double burden of malnutrition. http://www.who.int/nutrition/double-burden-malnutrition/en/ 7. United Nations Development Programme. Sustainable Development Goals. http://www.undp.org/content/undp/en/home/sustainable-development-goals.html 8. Global targets 2025 http://www.who.int/nutrition/global-target-2025 9. Improving breastfeeding, complementary foods and feeding practices, www.unicef.org/nutrition/index_breastfeeding.html 10. National Guidelines on Infant and Young Child Feeding. www.wcd.nic.in 11. WHO Health Statistics and Information Systems. Global Health Estimates. http://www.who.int/healthinfo/global_burden_disease/en/ 12. WHO Non-communicable diseases and risk factors. http://www.who.int/ncds/en/ 13. Overview of Non-Communicable Diseases and Related Risk Factors. https://www.cdc.gov/globalhealth/healthprotection/fetp/

Course Plan		
Unit	Topic	Hours
I	The Lancet Global Health Overview Global Nutrition Report and its relation with positive health, universal health coverage, malnutrition (under-nutrition, overweight, obesity, micronutrient malnutrition), Hidden Hunger, nutritional status, nutrition intervention, food and nutrient supplements, food substitute, nutrition education Food and nutrition security –overview, challenges and solutions (local, national, state) Poverty, hunger, HDI -components and indicators, comparison of global HDI with national and state HDI, calculations for GHI and HDI	6
2	Food Systems Approach to Sustainable Healthy Diets Knowledge, Leadership, Capacity, Coordination & Governance Steps taken by GoI such as Green Revolution, White Revolution, GMOs and bio-fortified crops Food Corporation of India - Buffer stock Public Distribution System – Strength and Weaknesses Role of World Food Programme in ensuring Food and Nutrition Security	8

3	Concept of nutrition in all child survival programs and national health and development programs Maternal health in the perinatal period and beyond A global analysis of the determinants of maternal health and transitions in maternal mortality Vulnerabilities and reparative strategies during pregnancy, childbirth, and the postpartum period: moving from rhetoric to action Best Practices – Recent National and International Examples and Case Studies from NHM and Poshan 2.0 Need for revision in nutrition programs and policies: Critique on gaps & need for regular upgrading	8
4	Mainstreaming and Nutrition at National and International Level Concepts of nutrition advocacy Concepts and practices in nutrition advocacy– steps for success; some examples from successful nutrition advocacy programs Eat right India Movement Other New Initiatives for Nutrition Advocacy Role of FAO, WHO, NGO's & United Nations in Global /National advocacy & program implementation support to Government Operationalizing national/state policies and targets – steps for advocacy and mainstreaming of nutrition at field levels in various programs	8

	PRACTICAL	60
1	To compare nutritional surveillance data sets: nutritional profile, determinants of nutritional status and gender differences, health data of MCH and other populations (at regional national and global level) and calculate trend lines of past 5 years and write a critique for way forward	10
2	• 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 • Survey to understand the health systems of India – at primordial, primary, secondary and tertiary care- issues, concerns and best practices and way forward. • Engage in understanding field level Bottom-up, inter-sectoral, multi-stakeholder collaboration at the sub-national level for any program or policy (Management, Leadership & Partnership for District Health)- - issues, concerns and best practices and way forward.	25
3	To conduct a coverage evaluation survey Using quantitative & qualitative methods) for delivery of key nutrition health interventions in a community. • collect data • analyse, • interpret, • report & • suggest recommendations for improving coverage & delivery of services	25

MND 204 NUTRITION AND IMMUNITY

CL	CP	L	P
2	0	30	0

Semester	II
Course Name	MND 204 NUTRITION AND IMMUNITY
Course Description	Introduction to basics of immunology, the role of various nutrients in modulating immune responses, and the impact on immune health.
Objectives	To gain knowledge on the immunological aspects To gain importance of nutrition immunity interactions.
Text Books	Nutrition, Immunity, and Infection by Philip C. Calder, Anil D. Kulkarni, Anil Digambar Kulkarni, CRC Press, Taylor & Francis Group, 2018 Nutrition and Immune Function by P. C. Calder, C. J. Field, H. S. Gill
Reference Books	Devereux, G., 9780851995830.0001, CABI, doi:10.1079/9780851995830.0001, (1-20), CABI Publishing, The immune system: an overview., (2002)
Prerequisites	Bachelor of Nutrition and Dietetics (Honors) (4-year program)

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MND 205 Innovation in Food Product & Development

CL	CP	L	P
1	3	15	45

Semester	II
Course Name	MND 205 Innovation in Food Product & Development
Course Description	It is a first basic course giving an insight into various aspects of Innovation, Food Ingredients and Food Formulation.
Objectives	1. To make a student understand concepts of Product Development – converting an Idea into a product and a plan to commercialize it 2. To make a student understand concepts of Product Development , Quality control and Marketing the new product
Reference Books	1. Altschul A., M. (1993). Low calorie foods. Marcel Dekker. 2. Goldberg, I. (1994). Functional foods: Designer foods, Pharma Foods, Nutraceuticals. Springer. 3. Matz, S.A. (2004). Formulating and processing of dietetic foods. CHIPS Publ. 4. Kalia, M. and Sood, S. (2010). Food preservation and processing. Revised edition, Kalyani Publishers, New Delhi.

			5. Srilakshmi, B. (2010). Food science (Fifth ed.) New Age International Pvt. Limited, Pub., New Delhi. 6. Gordon, W.F. (2011). New food product development: From concept to market place (third edition). CPR, Press
Prerequisites			Bachelor of Nutrition and Dietetics (Honors) (4-year program)
Course Plan			
Unit	Topic	Hours	
1.	A) Basic principles of food product development: Sensory properties of food and their role in product development. Evaluation of food: Objective and subjective methods, selection and training of judges, Development of score cards and analysis of data. B) Concept of New Food Product Development – General classes of New Food Products, Reasons for new food product, Stages of new product development and New Food product life cycle	5	

Course Plan		
Unit	Topic	Hours
1.	Role of Nutrition in Immunity Concept of immunity, Role of nutrition in infection, Effect of nutritional status on immunity. Immunity - Types of immunity, cells of the immune system, structure of immunoglobulins- – IgG, IgM, IgA, IgD, IgE, Immune response - humoral immunity, cell mediated immunity, immune changes in malnutrition, Immunologic effect and mechanism of different micronutrients, Clinical relevance of micronutrients., autoimmunity and hypersensitivity.	8
2.	Interactions of Nutrition, Immunity and Infection Defense mechanisms in the host cell and nutrients essential in the development of the immune system, Effect of infections on the nutritional status of an individual, Nutrient deficiencies and excesses affecting the immuno-competence and to infections. Nutrients with immuno-modulati properties - Arginine, Glutamine, Omega 3 fatty acids, sulphur containing amino acids, nucleotides, ornithine, alpha ketoglutarate and taurine; Supplementation, beneficiary effects-Prebiotics, Probiotics and symbiotics	8
3.	Nutritional Immunology in Disease Prevention and Gene Expression Role of nutrition in managing diseases, Auto Immune disorders, Designing foods for immune related disorders Fundamentals of gene structure- Principles of gene expressions, Transcription mechanism and regulation, Translation mechanism and regulation, Effects of nutrients on gene expression, Thrifty genotype – phenotype hypothesis	8

4.	Programmes on Immunization National and International, New Initiatives in Vaccines, Milestones in the Immunization program, Immunization and Child Health. Review of Research papers on Nutrition and Immunity	6
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2.	A) Consumer Surveys, Idea Generation, Sources, Screening, Translation of idea to product prototype, Product testing, Consumer research evaluation: development of schedule and data analysis. B) Market testing, Pre Commercialization, and Product launch	5
3.	A) Packaging materials and labeling Food safety and quality control issues in product development, food quality regulations and standards, quality control and HACCP B) Product formulation and development for general and therapeutic use, functional foods and Nutraceuticals	5

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Innovation in Food Product & Development (Practical-45; 90hr)

1. Sensory evaluation: Selection and Training of judges- Determination of Sensitivity Thresholds
2. Methods: Difference Test- Paired comparison- Duo-trio, Triangle test – preparation of score card and conduction of test
3. Numerical scoring, Composite scoring and Dilution tests- preparation of score card and conduction of test
4. Hedonic rating and Flavor Profile test - preparation of score card and conduction of test
5. Methods of Quantitative Descriptive Analysis - preparation of score card and conduction of test
- 6-10. Objective evaluation of Food – Physical, chemical and microbiological parameter analysis
- 10-15. Selection of Product categories, Idea generation and selection of Ingredients, Preparation of flow chart and ingredient preparation.
- 16-17. Innovative Product formulation and standardization – High Protein products
- 18-19. Innovative Product formulation and standardization – Low calorie Products
- 20-22. Innovative Product formulation and standardization – Bakery products with high fibre and low glycemic index
- 23-26. Innovative Product formulation and standardization – Food products with hypocholesterolemic property
- 27-30. Innovative Product formulation and standardization – Food products with antioxidant property
- 31-34. Innovative Product formulation and standardization – Food Product with HDL for Heart health
- 35-37. Innovative Product formulation and standardization – Food products with immunity boosting ingredients
- 38-40. Innovative Product formulation and standardization – Food products with low sodium
- 41-43. Innovative Product formulation and standardization – Food products with nutraceuticals- Food products for diabetics and obese
- 44-45. Packaging and sale of products, presentation of developed food products, Video shooting of product preparation

MDN 206 Scientific Writing Skills

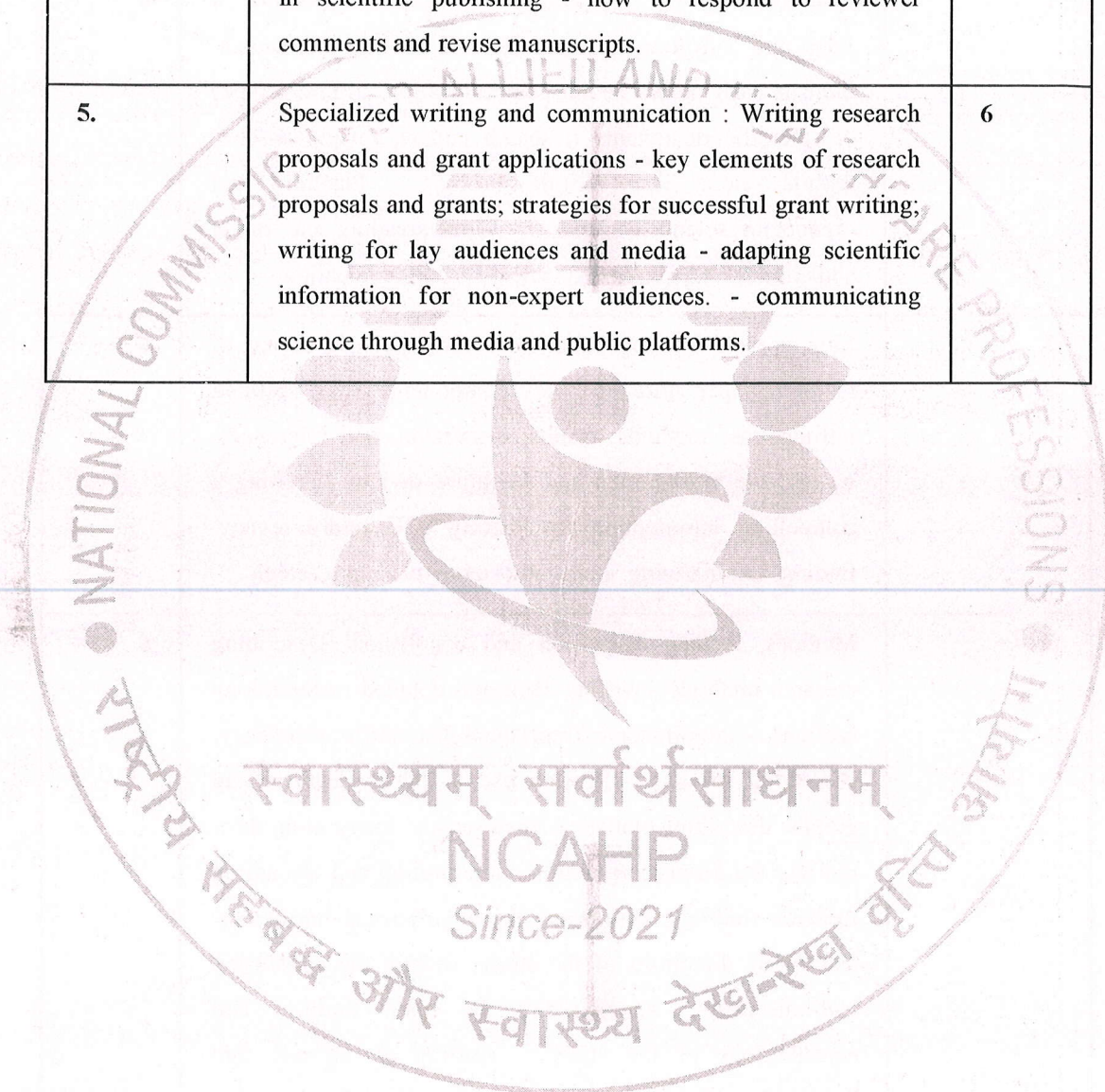
CL	CP	L	P
2	0	30	0

Semester	II
Course Name	MDN 206 Scientific Writing Skills
Course Description	This course aims to develop students' ability to write scientific papers, reports, and other professional documents. The focus will be on the principles of clear and concise scientific writing, understanding the structure of scientific papers, and developing skills for effective communication in the field of food and nutrition.
Objectives	1 To understand the structure and elements of scientific papers.
	2 To develop skills for writing clear and concise scientific texts.
	3 To learn effective methods for presenting data and research findings.
	4 To understand ethical considerations in scientific writing.
	5 To practice writing different types of scientific documents
Reference Books	1. Hofmann, A. H. (2019) Scientific writing and communication: Papers, proposals, and presentations (4th ed.). Oxford University Press. 2. Silyn-Roberts, H. (2012) Writing for science and engineering: Papers, presentations and reports(2nd ed.) Butterworth-Heinemann. 3. Alley, M. (2018). The craft of scientific writing* (4th ed.). Springer. 4. Peat, J., Elliott, E., Baur, L., & Keena, V. (2013). Scientific writing: Easy when you know how (2nd ed.). BMJ Books.

	5. Day, R. A., & Gastel, B. (2016)How to write and publish a scientific paper (8th ed.). Cambridge University Press. 6. Gopen, G. D., & Swan, J. A. (1990)The science of scientific writing. American Scientist, 78(6), 550-558. 7. Katz, M. J. (2009). From research to manuscript: A guide to scientific writing (2nd ed.). Springer. 8. https://nutrition.org/writing-publishing-nutrition-research/ 9. https://www.researcheracademy.elsevier.com/ 10. https://www.nih.gov/grants-funding/introduction-grant-writing 11. https://www.nature.com/scitable/ebooks/scientific-writing-and-publishing-14053993/ 12. https://owl.purdue.edu/owl/research_and_citation/apa_style/apa for matting and style guide/general format.html 13. https://guides.lib.berkeley.edu/evaluating-resources 14. https://writingcenter.unc.edu/tips-and-tools/scientific-writing/
Prerequisites	1. Basic understanding of food and nutrition science 2. Proficiency in written and spoken English 3. Basic research skills including familiarity with conducting literature reviews, using academic databases, and understanding primary vs. secondary sources. 4 Basic computer skills, including proficiency in word processing software (e.g., Microsoft Word, Google Docs) and familiarity with referencing software (e.g., EndNote, Mendeley, Zotero), are essential for preparing assignments and papers.

Course Plan		
Unit	Topic	Credit Hours
1.	Scientific Writing : Importance of Scientific Writing in Food and Nutrition; Role of scientific writing in research, industry, and public health communication, different types of scientific documents (research papers, review articles, reports, etc.); The Writing Process - Planning and organizing scientific papers. - Understanding the target audience and the purpose of scientific communication	6
2.	Structure and components of scientific papers :Overview of research paper structure - key components: title, abstract, introduction, methods, results, discussion, and references; writing the introduction and literature review - crafting a compelling introduction; conducting a literature review: finding, summarizing, and synthesizing relevant research.	6
3.	Methods, results, discussion and conclusion: Describing research methods - writing clear and detailed methodology sections. - importance of reproducibility and transparency; presenting results - effective use of tables, figures, and graphs; describing statistical analyses and interpreting data; crafting the discussion section - interpreting and discussing research findings; Discussing the significance, limitations, and future directions of the study; writing the conclusion and abstract - summarizing the main findings and contributions of the study. - crafting an abstract that succinctly summarizes the study's purpose, methods, results, and conclusions.	6

4.	Ethics and integrity in scientific writing: Ethical considerations - understanding plagiarism, authorship, and conflicts of interest; ethical data handling and reporting; peer review and publication process - the role of peer review in scientific publishing - how to respond to reviewer comments and revise manuscripts.	6
5.	Specialized writing and communication : Writing research proposals and grant applications - key elements of research proposals and grants; strategies for successful grant writing; writing for lay audiences and media - adapting scientific information for non-expert audiences. - communicating science through media and public platforms.	6



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Third Semester

MND 301 INTELLECTUAL PROPERTY RIGHTS

CL	CP	L	P
2	0	30	0

INSTRUCTOR IN CHARGE: Lawyer or Faculty with experience in medical law or practice

COURSE DESCRIPTION: The course is designed to introduce fundamental aspects of Intellectual Property Rights to learners who are going to play a major role in development and management of innovative process. The course is designed for increasing among a multidisciplinary audience.

OBJECTIVES:

At the end of the semester, the student should be able to:

1. Analyse various aspects of copyrights and geographical indications
2. Analyse various aspects of patents and Infer aspects of industrial designs
3. Examine various aspects of trademark, and apply the knowledge about the enforcement of intellectual property rights

Text Books and References

1. T. M. Murray, M. J. Mehlman. Encyclopedia of Ethical, Legal and Policy Issues in Biotechnology, Vol 2, John Wiley & Sons, 2010.
2. P. N. Cheremisinoff, R. P. Ouellette, R. M. Bartholomew, Biotechnology Applications and Research, Technomic Publishing Co., Inc. 1985.
3. D. Balasubramaniam, C. F. A. Bryce, K. Dharmalingam, J. Green, K. Jayaraman, Concepts in Biotechnology, 3/e University Press. 2004.
4. B. David, T. R. Jewell, R. G. Buiser, Biotechnology: Demystifying the Concepts1/e., Wesley Longman, USA, 2000.
5. Parulekar, S. D'Souza, Indian Patents Law – Legal & Business Implications, Macmillan India ltd. 2006.

6. L. Wadehra. Law Relating to Patents, Trademarks, Copyright, Designs & Geographical Indications, Universal law Publishing Pvt. Ltd., 2000.
7. P. Narayanan, Law of Copyright and Industrial Designs, 4/e., Eastern law House, Delhi. 2010.

PREREQUISITES: Medical law and Ethics.

COURSE PLAN		
UNIT	TOPIC	HOURS
1	Copyright: Definition, meaning of copyright, duration of copyright copyright protection, Related Rights : meaning, distinction between related rights and copyright, Rights covered by copyright Geographical Indications: geographical indication, geographical indication protection and its reasons.	10
2	Patents: Patents and kinds of inventions protected by a patent, patent document, and how to protect your inventions. Granting of patent, Rights of a patent, How extensive is patent protection? Drafting and Filing of a patent. Industrial Designs: Industrial design, industrial designs protection W protection provided by industrial design, duration of protection last, why to protect industrial designs	10
3	Trademarks: meaning, rights of trademark, of signs can be used as trademarks, trademark protection, trademark registration, length of trademark protection, Trade secrets, and know-how agreements. Enforcement Of Intellectual Property Rights: Infringement of intellectual property rights, Enforcement Measures	10

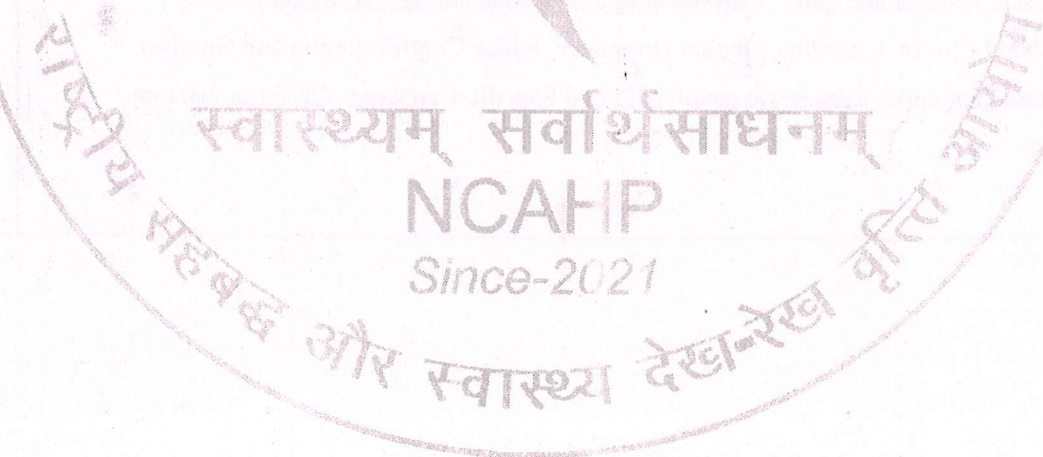
MND 302 Precision Nutrition

CL	CP	L	P
4	0	60	0

Semester	III
Course Name	MND 302 Precision Nutrition
Course Description	It is a course which covers the advanced concepts of application of principles of precision nutrition in health and disease.
Objectives	1. Integrate the concept of DNA, microbiome & metabolic responses to specific foods or dietary patterns, to determine personalized eating plan for wellness and illness. 2. Describe the principles of precision nutrition & medicine, focusing on the interaction between nutrients and human/microbial genes. 3. Identify genetic backgrounds contributing to individual differences in macro- and micronutrient metabolism 4. Comprehend the biochemical, physiological and molecular aspects of energy metabolism and inflammatory pathways that play a crucial role in the pathogenesis of metabolic diseases, including roles of diet and dietary components 5. Apply the concept of nutrigenetics for designing clinical nutrition therapies and diet plans for disease management.

Reference Books	1. Arshad, Z., Bains, V.K., Jhingran, R., Madan, R., & Srivastava, R. (2017). Nutrigenomics: An Overview. Asian Journal of Oral Health & Allied Sciences, 7(2), 52. 2. Ayesha Nasir, Mir. M. Hassan Bullo, Zaheer Ahmed, Aysha Imtiaz, Eesha Yaqoob, Mahpara Safdar, Hajra Ahmed, Asma Afreen & Sanabil Yaqoob. (2020). Nutrigenomics: Epigenetics and cancer prevention: A comprehensive review. Critical Reviews in Food Science and Nutrition, 60(8), 1375-1387. doi:10.1080/10408398.2019.1571480 3. Berná G, Oliveras-López MJ, Jurado-Ruiz E, Tejedo J, Bedoya F, Soria B, Martín F. (2014). Nutrigenetics and nutrigenomics insights into diabetes etiopathogenesis. Nutrients, 6(11), 5338-5369. doi:10.3390/nu6115338 4. Fenech M, El-Sohemy A, Cahill L, Ferguson LR, French TA, Tai ES, Milner J, Koh WP, Xie L, Zucker M, Buckley M, Cosgrove L, Lockett T, Fung KY, Head R. (2011). Nutrigenetics and nutrigenomics: viewpoints on the current status and applications in nutrition research and practice. J Nutrigenet Nutrigenomics, 4(2), 69-89. doi:10.1159/000327772 5. Ganesh S.B. & Sugumar, K. (2020). Nutrigenomics: A new direction in periodontics. International Journal of Applied Dental Sciences, 6(1), 146-149. 6. Harvard T.H. Chan School of Public Health. (2022). Precision Nutrition. The Nutrition Source. Retrieved from https://www.hsph.harvard.edu/nutritionsource/precision-nutrition/ 7. Helland MH, Nordbotten GL. (2021). Dietary Changes, Motivators, and Barriers Affecting Diet and Physical Activity among Overweight and Obese: A Mixed Methods Approach. Int J Environ Res Public Health, 18(20), 10582. doi:10.3390/ijerph182010582 8. Himanshu D, Ali W, Wamique M. (2020). Type 2 diabetes mellitus: pathogenesis and genetic diagnosis. J Diabetes MetabDisord, 19(2), 1959-1966. doi:10.1007/s40200-020-00641-x 9. Manoharan, S., & Kareem, N. (2020). Nutrigenomics In Periodontics - A Review. International Journal of Pharmaceutical Research, 12(1), 1983-1986.
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	10. Meiliana, A., & Wijaya, A. (2020). Nutrigenetics, Nutrigenomics, and Precision Nutrition. <i>Indones Biomed J</i>, 12(3), 189-200. 11. Sushrut Jangi, Katie Hsia, Naisi Zhao, Carol A Kumamoto, Sonia Friedman, Siddharth Singh, Dominique S Michaud. Dynamics of the Gut Mycobiome in Patients With Ulcerative Colitis.. <i>Clin Gastroenterol Hepatol</i>, 2023 Oct 5:S1542-3565(23)00762-0. doi: 10.1016/j.cgh.2023.09.023 12. Guojun Wu, Naisi Zhao, Liping Zhao. Microbial-host isozyme: A novel target in "drug the bug" strategies for diabetes. <i>Cell Metab</i>, 2023 Oct 3;35(10):1677-1679. doi: 10.1016/j.cmet.2023.09.008. 13. Haslberger, Alexander G. (ed.) : Advances in precision nutrition, personalization, and healthy aging [] Cham. Springer, 2022. 978-3-031-10152-6
Prerequisites	BSc Nutrition and Dietetics - 4 years Program



Course Plan

UNIT ONE

Hours

Introduction to Precision Nutrition and Nutritional Genomics :

30

The Human Genome, Introduction, Study, SNP, Definition of various terms-

Precision Nutrition, Personalized Nutrition, Nutrigenomics, Nutrigenetics, Exposome,

Epigenetics, Gene variations, mutations, Epigenetics vs Epigenomics, Genotype &

Phenotype, Differences between SNPs, Mutations and CNVs, The Genome of Rare and

Complex Diseases, Genotype and Phenotype

Precision Medicine : Influence of Genetics and Environmental Factors in Complex Diseases,

Gene- Nutrient Interaction, Need for Precision: The problem of Missing Heritability

Concept of Interaction

Precision Nutrition vs. Community Nutrition, Current Basis of Nutritional Research

Experimental Designs in Precision Nutrition, Omics Technologies and their Biomarkers,

Epigenomics, Proteomics, Metabolomics, Metagenomics, Functional Genomics,

Nutrigenetics, SNPs Associated with Nutrition-Related Diseases (Diet-Dependent), Vascular

health, Cardiovascular diseases, Oxidative stress (eNOS SOD)

ApoE Metabolic Health, Obesity (Snacking), Diabetes Type 2, Methylation

Detoxification : Liver health

Circadian Rhythm and gene : Chronobiology, Appetite and Satiety, Central Clock

Peripheral Clocks, Circadian Rhythm Hormones, Intake Control (Leptin and Ghrelin)

Exercise Genotype: Adrenergic genotype, Food Specific Genotype : Caffeine, Lactose

Gluten

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UNIT TWO

30

SNPs Predisposing to Complex Nutrition-Related Diseases - Genetic Risk Scores (GRS).
Diet-gene interaction: polygenic risk score: Type II Diabetes, Hypertension
Arteriosclerosis, Hyperlipidemia, Cancer
SNP vs. Allergies vs. Intolerances
Role of Bioactive Components of Diet on Gene Expression
The Effect of Micro and Macro Nutrients on Gene Expression
Human Microbiota Composition Enterotypes and Diet, Microbiota and Metabolic
Syndrome, Microbiota and Cardiovascular Diseases Effect of the Oral and Intestinal
Microbiota, Gut-brain Axis, Microbiota and Neurodegenerative Diseases
Microbiota and Neuropsychiatric Diseases, Schizophrenia, Anxiety, Depression, Autism,
Microbiota and Obesity
Gut microbiome and disease diagnosis and prognosis
Diet-Modulated MicroRNAs
Nutrition Systems Biology:
Integrated approach toward personalized nutrition
Role of AI in Nutrition System and Precision Health

MND 304 Advanced Communication Skills for Nutrition Practice

CL	CP	L	P
1	3	15	45

Instructor in charge

M.Sc. and / Ph.D. in Foods and Nutrition or equivalent

Course Description	The course shall enable the student to have good communication skills
Objectives	1. Learn about the various types of communication 2. Learn effective communication skills
References	1. Philipose Pamela. Media's Shifting Terrain: Five Years that Transformed the Way India Communicates,(2019) Orient Blackswan, New Delhi.ISBN 9352875346 2. Narula Uma, Mass Communication-Theory and Practice (2019) Har-Anand Publications, New Delhi ISBN 9388409361 3. Narula Uma. Communication Models (2023); Atlantic Publishers and Distributors (P) Ltd ISBN 8126906766
Prerequisites	First and Second Semester of M. Sc. Nutrition and Dietetics

Unit	Topic	Hours
1.	Relevance of communication skills for nutrition practice Five Cs of communication	2
2.	Types of Communication Written communication, Creative writing, content creation Oral communication. Non-verbal and visual communication, Design and visual communication Contextual communication. Active Listening	8
2.	Effective Communication Skills active listening observation skills Body language Focus and attention Empathy	5

Practical		
Unit	Topic	Hours
1.	Role play and simulation for effective patient counseling.	3
2.	Critical analysis of nutrition and health related messages on print, visual and social media	2
3.	Create an interactive digital media project such as an interactive quiz or mini-game.	3
4.	Designing a logo, business card and pamphlets for clients	2
5.	Content creation for topical days like obesity day, osteoporosis day etc.	4
6.	Content calendar planner for activities	4
7.	Audio creation for public service announcement, podcasts	4
8.	Content creation for digital media, print media and social media platforms for disseminating content. Analysis of algorithms of views, likes and followers.	8
9.	Create short videos with specific nutrition education message in a story format.	8
10.	Communication skills for Marketing	8
11.	Use of Instagram account for engagement, LinkedIn for business	

MND 305 Internship - MSc Nutrition and Dietetics

Name of the program	Masters in Nutrition and Dietetics
Course Title	Internship
Academic year	Second Year
Semester	03
Number of Practical Credits	10 = 20 hours x 15 = 300 hours
Duration	3 months
Course Prerequisite	Students should develop critical skills like evaluation of patients, designing meal plans, interaction with other health professionals and evaluating information received.
Course Synopsis	This module provides students with an opportunity to integrate and apply acquired knowledge and technical skills in actual clinical settings.

Course Outcomes

- Select the right practice from the acquired skills as a clinical nutritionist and Dietitian
- Demonstrate an attitude of professionalism when working with colleagues and other health professional staff of the hospital Utilize skills in record keeping, organizing material, presentation of case studies and effective communication.
- Analyse and develop the ability to work independently and as a team member to perform critical thinking and problem-solving skills in different domains.
- Design, evaluate and implement new methods or protocols in different cases.
- Evaluate the relationship between nutrition data and pathologic processes, and how nutrition data relates to health and disease
- Develop the ability to work independently and as a team member to perform critical thinking and problem-solving skills in different domains.

Content	Competencies
Orientation	Define the role of dietitian in hospitals Outline the functioning of the Dietetics Services 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,

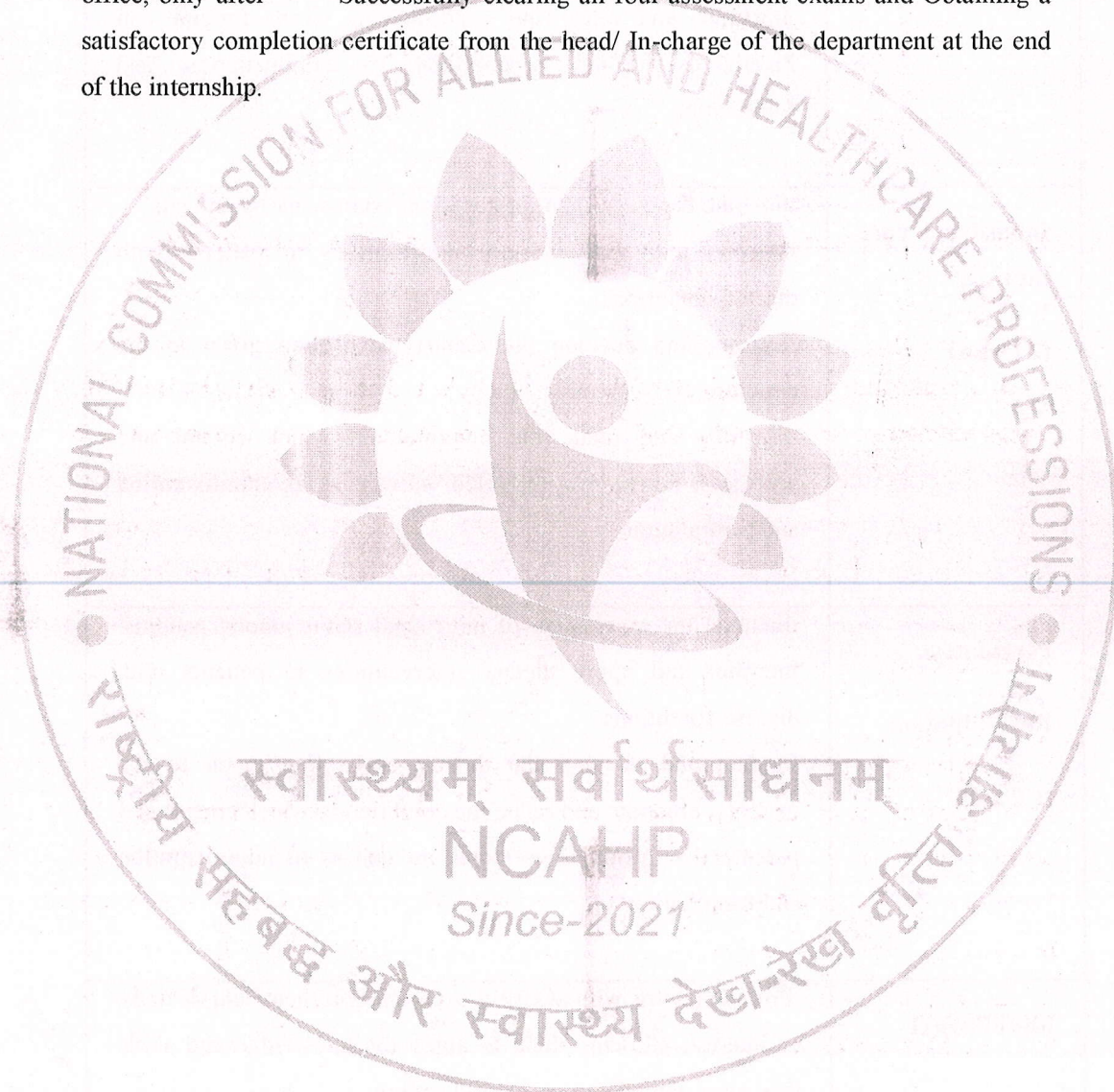
Medicine (2 cases)	Illustrate the assessment of nutritional status among patients. Interpret and apply dietary interventions to patients with disease conditions. Explain and develop the dietary counselling given to the patients. Illustrate and relate the condition in which enteral and parenteral nutrition is provided and its administration and formulation.
Nephrology and Urology (1 case)	Illustrate the assessment of nutritional status among patients. Interpret and apply dietary interventions to patients with disease conditions Explain and develop the dietary counselling given to the patients. Illustrate and relate the condition in which enteral and parenteral nutrition is provided and its administration and formulation.
Cardiology (1 case)	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.

Gastroenterology (1 case)	Illustrate the assessment of nutritional status among patients. Interpret and apply dietary interventions to patients with disease conditions 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 (1 case)	Illustrate the assessment of nutritional status among patients. Interpret and apply dietary interventions in the 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 (1 case)	Illustrate the assessment of nutritional status among patients. Interpret and apply dietary interventions to patients with disease conditions. 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.
Pediatrics (2 cases)	Illustrate the assessment of nutritional status among patients. Interpret and apply dietary interventions in the 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.

Surgery (1 Case)	Illustrate the assessment of nutritional status among patients. Interpret and apply dietary interventions to patients with disease conditions. 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 (2 Cases)	Illustrate the assessment of nutritional status among patients. Interpret and apply dietary interventions to patients with disease conditions. Explain and develop the dietary counseling given to the patients. Illustrate and relate the condition in which enteral and parenteral nutrition is provided, as well as its administration and formulation.
Psychiatry/ Rehabilitation (1 Case)	Illustrate the assessment of nutritional status among patients. Interpret and apply dietary interventions to patients with disease conditions. Explain and develop the dietary counseling given to the patients. Illustrate and relate the condition in which enteral and parenteral nutrition is provided, as well as its administration and formulation.
Mini Project	Provide interns with practical experience in their field of study or interest, allowing them to apply the knowledge and skills they have gained in a real-world setting
Standardization	Enforce a level of consistency or uniformity while giving MNT or any other operations within the selected environment.

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. 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.



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MND 401 Dissertation (3 months)

Course Objectives The Dissertation aims to develop skills in conducting a research study/ working in a project and learn the process of writing a dissertation/ project report

Course Learning Outcomes: Students will be able to

1. Know the practical aspects of, collecting data/ project work
2. Evaluate, select, and use appropriate strategies for the reduction, analysis, and presentation of data collected during the research process/ project work
3. Suitably illustrate data/ insights using various graphical and other methods.
4. Prepare a dissertation

The research will be an original work with plagiarism check and ethical clearance. document/ project report based on research process/ project work done. The student will be guided and supervised by a member of the teaching faculty of the Institute. However, the dissertation in which the research culminates should reflect the student's own work. The students will undertake an independent piece of research work on an issue of contemporary concern that contributes to the advancement of knowledge in the field of Dietetics of Clinical Nutrition.

Assessment:

Distribution of marks for Internal and External assessments will be based on the credit distribution of the theory and practical for the courses. For eg. If a course has 3 credits for Lectures and 0.5 credits for Practicals, 25 marks for theory and 5 marks for practicals will be considered for internal assessments out of the 30 marks. Similar ratios will be followed for External assessments. For Practical examinations, an internal and external examiner will assess the candidates.