

SEVA MANDAL EDUCATION SOCIETY'S
DR. BHANUBEN MAHENDRA NANAVATI COLLEGE OF HOME SCIENCE
(AUTONOMOUS)

NAAC Re-accredited 'A+' Grade with CGPA 3.69 / 4 (3rd Cycle)
 UGC Status: College with Potential for Excellence
 BEST COLLEGE AWARD 2016-17: Adjudged by S.N.D.T. Women's University
 338, R.A. Kidwai Road, Matunga, Mumbai – 400019

Department of Post Graduate Studies

PROGRAMME: M.Sc. CLINICAL NUTRITION AND DIETETICS

Duration of the course: 2 years (4 semester) + Internship

Type of Course: Full time Degree Course

Semester I

Sr. No.	Course	No of lecture	T.C.	Th Cr.	Pr. Cr	Internal marks	External marks	Total marks
<i>Core component</i>								
1	Nutritional Biochemistry	60	4	4	~	50	50	100
2	Macronutrients	60	4	4	~	50	50	100
3	Advanced Nutrition Pr	120	4	~	4	50	50	100
4	Medical Nutrition Therapy- I (Th)	60	4	4	~	50	50	100
5	Medical Nutrition Therapy- I (Pr)	120	4	~	4	50	50	100
6 A	CBCS- Functional Foods	60	4	4	~	50	50	100
6 B	CBCS-SWAYAM courses/ Coursera							
<i>Value-Added Courses</i>								
1	Human Anatomy and Physiology	30	2	2	~	50	50	100
2	Bridge Course*	60	4	4	~	50	50	100

*Compulsory for students from non-nutrition background

CBCS: Choice Based Credit System

Course Title: NUTRITIONAL BIOCHEMISTRY – (Th)

Course Code: MCND101

Course Description:

- This course provides introduction to biochemistry of macro- and micronutrients with a limited focus on medical aspects of nutrient deficiencies and metabolism

Course Outcome:

At the end of the course, the learner will be able to:

- Analyze and identify structure and related biochemical properties of nutrients, DNA & RNA compounds.
- Develop an insight into interrelationships between various metabolic pathways of nutrients and other related compounds.
- Understand and implement the integration of cellular level metabolic events to nutritional disorders and imbalances.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND101	Nutritional Biochemistry	60	4	4	~	50	50	100

Evaluation:

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	Total marks	100

Contents:

Module 1:
Introduction to Cell Chemistry, Enzymes, Acid-base balance
(15 Lectures)

Objectives	Content	Evaluation
<p>This module enables students to:</p> <ul style="list-style-type: none"> Understand basic of human cell structure Understand functioning, regulation and structure of enzymes 	<p>Biochemistry of Cell Membrane Membrane structure, composition and Transport of metabolites across membranes</p> <p>Enzymes</p> <ul style="list-style-type: none"> Kinetics of monosubstrate and bisubstrate catalysed reactions (including inhibition) Enzyme specificity, regulation of enzyme activity and synthesis Enzymes in clinical diagnosis <p>Acid base balance</p> <p>Free radicals, ROS and oxidative damage</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

Module 2:
Metabolism of Macronutrients & Biological Oxidation
(20 Lectures)

Objectives	Content	Evaluation
<p>This module enables students to:</p> <p>Understand structure, metabolic pathways, disorders related to carbohydrate metabolism</p> <ul style="list-style-type: none"> Understand chemical structure and property of proteins and lipids, their related disorders Understand process and pathways 	<p>Review of</p> <p>Carbohydrate Metabolism: Intestinal transport of carbohydrates, Transport of glucose across various cells, Cellular metabolism of carbohydrates Glycogen metabolism Regulation of carbohydrate metabolism at substrate level, enzyme level, hormonal level and organ level, Disorders of carbohydrate metabolism. Definition, classification, structure and properties of glycoproteins and proteoglycans</p> <p>Metabolism of Lipids : Metabolism is to be discussed with reference to: Intestinal transport of lipids, Cellular uptake and metabolism of lipids(beta-oxidation, denovo synthesis of fatty acids, synthesis and breakdown of unsaturated fatty acids, cholesterol, phospholipids and triacylglycerol) Lipoprotein metabolism, VLDL and LDL ('Forward' Cholesterol transport)VLDL and LDL (Endogenous TAG transport),HDL ('Reverse' Cholesterol transport), Regulation of lipid metabolism at substrate level, enzyme level, hormonal level and organ level, Disorders of lipid metabolism, Dyslipidemias, Lipid storage diseases</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

with regards to metabolism of proteins and lipids	<p>Protein Metabolism: Metabolism of amino acids- biosynthesis and catabolism - energy, glucose and ketone bodies, protein amino acids, non-protein amino acids (including urea cycle, transamination, one-carbon metabolism), Creatine and creatinine, Plasma proteins – Nature, properties and functions, Biologically active peptides, polypeptides and transport proteins, Inborn errors of amino acid metabolism</p> <p>Intermediary Metabolism: Review of regulation of intermediary metabolism- equilibrium and non-equilibrium reactions, committed steps, allosteric modifications, covalent modulation, hormonal induction and repression, cross-over theorem, starve-feed cycle, caloric homeostasis and futile cycles, Tricarboxylic acid cycle</p> <p>Biological Oxidation: Electron transport chain and oxidative phosphorylation</p>	
---	--	--

Module 3:
Xenobiotics and Cellular Signaling
(10 Lectures)

Objectives	Content	Evaluation
<p>This module enables students to:</p> <ul style="list-style-type: none"> • Understand basics and advances in xenobiotic and cellular signaling pathway • Understand mechanism of action of free radicals in human body • Understand homeostatic mechanism for acid base balance in human body 	<p>Xenobiotics</p> <p>Detoxification in the body-metabolism of xenobiotics (Phase I and Phase II enzymes)</p> <p>Cell Signaling: Overview of extracellular cell signaling, G protein couple receptors and their effectors, enzyme linked receptors and their effectors, second messengers, map kinase pathways</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

Module 4:
Molecular Biology
(15 Lectures)

Objectives	Content	Evaluation
<p>This module enables students to:</p> <ul style="list-style-type: none"> Understand advances in molecular biochemistry Understand structure, metabolism of nucleotides and its related disorders <p>Understand gene expression and factors involved in its regulation.</p>	<p>Biochemical aspects of purine and pyrimidines</p> <ol style="list-style-type: none"> Metabolism of purines Metabolism of pyrimidines Role of purine and pyrimidine nucleotides in metabolism. <p>Biochemistry of Nucleic Acids</p> <ol style="list-style-type: none"> Metabolism of DNA Metabolism of RNAs DNA replication, mutation, repair and recombination concepts Disorders of nucleic acid metabolism <p>Protein Biosynthesis</p> <ol style="list-style-type: none"> Gene expression and its regulation, transcription, translation, post-translational modification Inhibitors of protein biosynthesis Gene expression in mitochondria Systems Biology including Metabolomics and Proteomics 	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

References:

- Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2000): 25th Ed. Harpers Biochemistry. Macmillan Worth Publishers.
- Nelson, D.L. and Cox, M.M. (2000): 3rd Ed. Lehninger's Principles of Biochemistry, Macmillan Worth Publishers.
- Devlin, T.M. (1997): 4th Ed. Text book of Biochemistry with Clinical Correlations, Wiley LissInc
- Stryer, L. (1998): 4th Ed. Biochemistry, WH Freeman and Co.
- Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H. (2001): 5th Ed. Outlines of Biochemistry, John Wiley and Sons.
- Voet, D. Voet, J.G. and Pratt, C.W. (1999). Fundamentals of Biochemistry.
- Tietz, N.W. (1976) Fundamentals of Clinical Chemistry. WB Saunders Co.
- King, E.J. and Wootton, I.D.P. (1956). 3rd ed. Micro-Analysis in Medical Biochemistry. J and A Churchill Ltd.
- Plummer, D.T. (1987). 3rded. An Introduction to Practical Biochemistry. McGraw-Hill Book Co.

COURSE TITLE: MACRONUTRIENTS (Th)
Course Code: MCND102

Course Description: This course is designed to impart knowledge about the metabolism and functions of macronutrients. It allows the learner to gain knowledge about the metabolic and pharmacological role of macronutrients on human health and its implication in clinical disorders.

Course Outcome:

At the end of the course, the learner will be able to:

- Describe the metabolism of macronutrients and their physiological and metabolic role in the human body.
- Estimate the nutritional requirements and recommendations for individuals throughout the life cycle.
- Apply the knowledge of dietary guidelines and recent advances in nutrition for developing therapeutic plans and public health programmes
- Explain the concept of body composition, its effect on the nutritional status for an individual.
- Examine the need and requirement for individuals living in special climatic conditions.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND102	Macronutrients	60	4	4	~	50	50	100

Evaluation

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	Total marks	100

Module 1:
Human Nutritional Requirements, Body Composition and Energy
(20 lectures)

Objectives	Content	Evaluation
<p>This module will enable students to:</p> <ul style="list-style-type: none"> Understand various nutritional guidelines and techniques used to derive nutritional requirement for humans. Gain knowledge about methods to assess body components of individuals. Understand the significance of body composition through different life stages. To understand methods of assessing energy needs and its application for energy regulation for humans 	<p>Development and recent concepts in Human nutrition:</p> <ol style="list-style-type: none"> Description of basic terms and concepts in relation to human nutritional requirements. Methods of determining human nutrient needs Guidelines and Recommendations Development of International and National Nutritional Requirements Translation of nutritional requirements into Dietary Guidelines <p>Body Composition</p> <ol style="list-style-type: none"> Significance of body composition and changes through the life cycle Methods for assessing body composition (both classical and recent) and their applications. <p>Energy</p> <ol style="list-style-type: none"> Components of energy requirements: BMR, RMR, thermic effect of feeding, physical activity. Factors affecting energy requirements, methods of measuring energy expenditure. Estimating energy requirements of individuals and groups. Regulation of energy metabolism and body weight: Control of food intake – role of leptin and other hormones. 	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

MODULE 2:
Carbohydrates & Proteins
(20 lectures)

Objectives	Content	Evaluation
<p>This module will enable students to:</p> <ul style="list-style-type: none"> Understand metabolism, functions of carbohydrates. 	<p>2.1 Carbohydrates</p> <ol style="list-style-type: none"> Review of nutritional significance of carbohydrates and changing trends in dietary intake of different types of carbohydrates and their implications 	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/</p>

<ul style="list-style-type: none"> Review and search recent trends in carbohydrate related research Understand concept of glycemic index and load and its application in practical setting. Gain knowledge about application of fiber in therapeutic conditions. To understand the correlation between carbohydrates and human genotype and phenotype. Understand metabolism, functions of protein and its therapeutic application in human health 	<ul style="list-style-type: none"> ii. Dietary fiber: Types, sources, role and mechanism of action iii. Chemical composition and physiological significance of: <ul style="list-style-type: none"> Resistant starch & fructo-oligosaccharides iv. Glycemic Index and glycemic load v. Carbohydrates and gene expression <p>2.2. Proteins</p> <ul style="list-style-type: none"> i. Overview of role of muscle, liver and G.I. tract in protein metabolism ii. Amino acid and peptide transporters iii. Therapeutic applications of specific amino acids iv. Peptides of physiological significance <p>Proteins, amino acids and gene expression</p>	Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module
---	---	---

MODULE 3:
Lipids & Nutrition in Special Condition
(20 lectures)

Objectives	Content	Evaluation
<p>This module will enable students to:</p> <ul style="list-style-type: none"> Understand the function of lipid and related compounds in human body Gain knowledge about application of lipids in therapeutic conditions. Understand nutritional requirements for individuals exposed to different environmental conditions 	<p>3.1 Lipids</p> <ul style="list-style-type: none"> i. Nutritional significance of fatty acids – SFA, MUFA, PUFA: functions and deficiency ii. Role of n-3 and n-6 fatty acids iii. Prostaglandins iv. Trans Fatty Acids v. Conjugated linoleic acid vi. Nutritional Requirements and dietary guidelines (International & National) for visible and invisible fats in diets. vii. Lipids and gene expression <p>3.2 Nutrition in Special Conditions:</p> <ul style="list-style-type: none"> i. Space Travel, ii. High Altitudes iii. Low Temperature & Submarines 	Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module

References:

1. Annual Reviews of Nutrition. Annual Review Inc, California, USA
2. David Bender, 5th edition (2017), Introduction to Nutrition and metabolism, CRC press
3. Martha Stipanuk and Marie Caudil, 3rd edition (2012), Biochemical, Physiological And Molecular Aspects of Human Nutrition, Saunders.
4. Sareen Gropper and Jack Smith, 6th edition (2012), Advance Nutrition and Human Metabolism, Cengage Learning Custom Publishing.
5. Sareen Gropper and Jack Smith, 7th edition (2016), Advance Nutrition and Human Metabolism, Cengage Learning Custom Publishing.
6. Somdat Mahabir and Yashwant Pathak, 1st edition (2014), Nutraceuticals and Health: Review of Human Evidence, CRC Press
7. Susan A Lanham et al, 2nd edition (2011), Nutrition and metabolism, Blackwell Publishing

Journals:

1. Nutrition Reviews
2. Journal of Nutrition
3. American Journal of Clinical Nutrition
4. British Journal of Nutrition
5. European Journal of Clinical Nutrition
6. International Journal of Vitamin and Nutrition Research
7. International Journal of Food Science and Nutrition
8. Nutrition Research
9. Annals of Nutrition and Metabolism

Course Title: Advanced Nutrition (practical)

Course Code: MCND103

Course Description:

The course is designed to understand the fundamentals in human nutrition and macronutrient metabolism and its implication in human health and disease.

Course Outcomes:

At the end of the course, the learner will be able to:

- List and design the ABCD of Nutritional assessment techniques.
- Apply the skill of nutritional assessment techniques to evaluate health status of individual and group.
- Record the effect of an intervention program to understand the prognosis of the disease.
- Diagnose malnutrition, nutrient deficiency and other nutritional related disorders.
- Interpret laboratory/ research reports and data to design a suitable diet plan.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND103	Advanced Nutrition (P)	120	4	~	4	50	50	100

EVALUATION

Evaluation	Details	Marks
Internal	Journal work & assignment/ project submission	50
External	Practical examination test & Viva Voce	50
	Total marks	100

Module 1:
Assessment of Nutritional Status & Body Composition
(40 lectures)

OBJECTIVES	CONTENT	EVALUATION
<p>This module enables students to:</p> <p>a. Understand the process of nutritional status assessment and its application in clinical set-up and community</p> <p>Develop skills for nutritional assessment techniques aiding in research data collection</p>	<p>Assessment of Nutritional Status</p> <ol style="list-style-type: none"> Reliability, validity accuracy, precision of nutritional assessment techniques Measurement of weight and height for young, old children and adults. Calculation of BMI and its interpretation Use of WHO reference standards Wasting, stunting, underweight, severe and moderate malnutrition Calculation of z-scores and use of software Circumference Measurements – chest, head, mid arm. Waist, hip and ratios wherever applicable <p>1.2 Body Composition Analysis</p> <ol style="list-style-type: none"> Use of skinfold technique. bioelectric impedance DEXA Calculation of body fat 	<p>Students will be evaluated on exercise completion, report and journal writing/ presentations & Demonstrations</p>

Module 2:
Energy Analysis & Dietary Assessment Techniques
(40 lectures)

Objectives	Content	Evaluation
<p>This module enables students to:</p> <p>Develop assessment skills to identify energy balance for individuals by evaluating energy components in detail</p>	<p>2.2 Energy intake & expenditure Analysis</p> <ol style="list-style-type: none"> Indirect calorimetry: use of ergometer, treadmill, heart rate monitoring Recording physical activities Factorial estimation of energy expenditure: MET, PAL Study of food labels- calculation of DV In vitro starch digestibility <p>2.2 Dietary assessment:</p> <ol style="list-style-type: none"> Food frequency questionnaire 24-diet recall, 24-hour diet record Weighment method 	<p>Students will be evaluated on exercise completion, report and journal writing/ presentations & Demonstrations</p>

Module 3:
Biomarkers of Macronutrients
(40 lectures)

Objectives	Content	Evaluation
<p>This module enables students to:</p> <p>Understand assessment techniques used for biochemical marker evaluation of carbohydrates and lipids</p>	<p>3.1 Dietary Protein Evaluation and Assessment of Protein Status:</p> <ol style="list-style-type: none"> Chemical Score for proteins PDCAAS index In vitro protein digestibility Estimation of serum albumin, globulin and albumin: globulin ratio <p>3.2: Biomarkers of Carbohydrate & lipids</p> <ol style="list-style-type: none"> Fasting and Postprandial Blood Glucose estimation OGTT Glycosylated Hemoglobin, Glycemic index and glycemic load Insulin index Measurement of lipid levels in serum and its Interpretation 	<p>Students will perform and submit report on following:</p> <ul style="list-style-type: none"> Calculating chemical score of different protein rich food sources. Survey on PDCAAS index of protein powders available in the market for different target audience like children, adults, clinical condition, muscle building, meal replacers etc. Interpretation report for abnormal serum albumin, globulin levels and their ratio. Normal values of blood glucose, HbA1c and interpretation of the results Preparation of Carbohydrate counting chart for different community Calculation of glycemic index of a meal Interpretation of abnormal blood lipid profile with possible cause and consequences

COURSE TITLE: MEDICAL NUTRITION THERAPY I (TH)

Course Code: MCND104

Course Description:

- The course is designed to provide concepts of an intermediate study of nutritional therapy of disease. Course content includes evidence-based practice in prevention and nutritional management of diseases.
- Patient assessment and medical chart documentation will be covered. Elements of pathology and biochemistry of the nutrition related problems are integrated into course topics.

Course Outcome:

At the end of the course, the learner will be able to:

- Describe the role of diet in disease prevention and treatment across the continuum of diet-related health conditions from primary, secondary and tertiary care.
- Explain the pathophysiology of diet-responsive diseases and other conditions, and how these conditions affect nutritional status.
- Utilize all elements of nutrition screening and assessment within context of the Nutrition Care process.
- Demonstrate comprehension of medical terminology associated with each disease condition and also utilize course resources to identify nutritional side effects and food/nutrient/drug interactions of common medications prescribed to treat the disease condition.
- Apply appropriate communication, counseling and education skills to patient care with specific disease conditions

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND104	MNT I (T)	60	4	4	~	50	50	100

EVALUATION

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	Total marks	100

Contents

Module 1: The Nutrition Care Process & Nutrition Support (15 lectures)

Objectives	Content	Evaluation
<p>This module enables students to:</p> <p>a) To understand the basics of Nutritional Care (NCP) and its application as a preliminary step in a diseased individual.</p> <p>b) To gain knowledge and skills to identify an individual who is at risk of and who would benefit the most from NCP.</p> <p>c) To understand the various methods available for delivery of nutritional support.</p>	<p>Nutritional (and dietary) care Process</p> <p>A) in health</p> <ul style="list-style-type: none">- Depending on the state of growth & development of the individual- at various activity levels and socioeconomic status. <p>B) in disease</p> <ul style="list-style-type: none">- Nutritional screening/ assessment and identification of nutritional problem- Nutritional Intervention and Diet Modification based on interpretation of- Patient data- clinical, biochemical and other relevant data- Nutrition Education and Counseling-Evaluation of Nutritional care <p>Delivery of Nutritional Support – Meeting nutritional needs</p> <p>A. Enteral tube feeding Different Enteral feeding access routes Practical Aspects</p> <p>B. Parenteral nutrition</p> <p>Exchange lists as a tool in planning diets</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

Module 2: Nutrition for Weight Management (20 lectures)

Objective	Content	Evaluation
<p>This module enables students to:</p> <p>a) To understand the basics of body components,</p>	<p>Nutrition for weight management: Disorders of energy balance</p> <p>A. Obesity</p> <p>Components of body weight</p> <p>Adipose tissue- structure, regional distribution and storage</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/</p>

<p>adipose tissue and methods available for the assessment of obesity.</p> <p>b) To understand the etiological factors and health risk associated with Obesity and Underweight.</p> <p>c) To understand the multi- dimensional approach for the treatment of obesity and underweight.</p> <p>To understand the various eating disorders, its prevalence and a multi- dimensional approach for its treatment.</p>	<p>Regulation of body weight</p> <p>Types of obesity Assessment of obesity</p> <p>Health risks</p> <p>Causes of obesity: neural, hormonal, and psychological</p> <p>Management of obesity</p> <ul style="list-style-type: none"> - Dietary Modification: past and present approach - Psychology of weight reduction: psychotherapy and behavior modification Physical activity and exercise - Pharmacological treatment - Surgical treatment effect on satiety and other factors - Maintenance of Reduced weight <p>B. Underweight/Excessive Leanness/ Under nutrition</p> <ul style="list-style-type: none"> - Pathophysiology, Causes and assessment including fever and infectious diseases (Tuberculosis, AIDS) - Health risks and effect on nutritional status - Dietary Management - Psychotherapy <p>Eating disorders: Anorexia Nervosa and Bulimia Nervosa</p>	<p>Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>
--	--	---

Module3:
Nutrition for Digestive system
(25 lectures)

Objective	Content	Evaluation
<p>This module enables students to:</p> <p>1. To understand the pathophysiology and symptoms associated with various gastro intestinal and hepato biliary disorders.</p> <p>2. To explain the interrelationship between the disease conditions and nutritional status</p> <p>To understand the therapeutic role of</p>	<p>Medical Nutrition therapy for Upper Gastrointestinal tract Diseases /Disorders</p> <p>a) Diagnostic Tests for the G.I. diseases</p> <p>b) Pathophysiology and Nutritional care and diet therapy in</p> <p>i) Diseases of esophagus; esophagitis, Hiatus hernia</p> <p>ii) Disorders of stomach: Indigestion, Gastritis, Gastric and duodenal ulcers</p> <p>Management: associated with H. pylori infection, NSAIDS</p> <p>Dietary management: traditional approach and liberal approach</p> <p>c) Gastric Surgery: Nutritional care, dumping syndrome</p> <p>Medical Nutrition therapy for Lower gastrointestinal tract Diseases/Disorders</p> <p>Common Symptoms of Intestinal dysfunction</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/</p>

diet in the treatment of these disorders.	<ul style="list-style-type: none"> - Flatulence, constipation, haemorrhoids, diarrhoea, steatorrhoea, typhoid b) Diseases of the large intestine: <ul style="list-style-type: none"> - Diverticular disease, irritable bowel syndrome, inflammatory bowel disease c) Malabsorption Syndrome/Diseases of Small intestine <ul style="list-style-type: none"> - Celiac (Gluten –induced) sprue, tropical sprue, intestinal brush border enzyme deficiencies, Lactose intolerance, protein- losing enteropathy d) Principles of dietary Care: Fibre, residue Modified fibre diets e) Intestinal surgery: short bowel syndrome, Ileostomy, Colostomy, Rectal surgery Medical Nutrition therapy for Diseases of the Hepato - Biliary Tract <ul style="list-style-type: none"> a. Nutritional care in liver disease in context with results of specific liver function tests - Dietary care and management in viral hepatitis (different types), cirrhosis of liver, hepatic encephalopathy, Wilson's disease Dietary care and management in diseases of the gall bladder and pancreas i.e., biliary dyskinesia, cholelithiasis, cholecystitis, cholecystectomy, pancreatitis, Zollinger-Ellison syndrome 	conducted for each module
---	--	---------------------------

References:

1. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Ltd.
2. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (1999): Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.
3. Escott-Stump, S. (1998): Nutrition and Diagnosis Related Care, 4th Edition, Williams and Wilkins.
4. Garrow, J.S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10th Edition, Churchill Livingstone.
5. Williams, S.R. (1993): Nutrition and Diet Therapy, 7th Edition, Times Mirror/Mosby College Publishing.
6. Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2nd Edition, W.B. Saunders Co.
7. Walker, W.A. and Watkins, J.B. (Ed) (1985): Nutrition in Pediatrics, Boston, Little, Brown & Co.
8. Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9th Edition, W.B. Saunders Co.
9. Ritchie, A.C. (1990): Boyd's Textbook of Pathology, 9th Edition, Lea and Febiger, Philadelphia.
10. Fauci, S.A. et al (1998): Harrison's Principles of Internal Medicine, 14th Edition, McGraw Hill.
11. World Cancer Research Fund (1997). Food, Nutrition and the Prevention of Cancer- A Global perspective, Washington E.D. WCRF.

Journals and Other Reference Series

1. Nutrition Update Series
2. World Review of Nutrition and Dietetics
3. Journal of the American Dietetic Association
4. American Journal of Clinical Nutrition
5. European Journal of Clinical Nutrition
6. Nutrition Reviews

COURSE TITLE: MEDICAL NUTRITION THERAPY I (PR)

Course Code: MCND105

Course Description:

- The course is designed to provide concepts of an intermediate study of nutritional therapy of disease. Course content includes evidence based practice in prevention and nutritional management of diseases.
- Patient assessment and medical chart documentation will be covered. Elements of pathology and biochemistry of the nutrition related problems are integrated into course topics.

Course Outcome

At the end of the course, the learner will be able to:

- Create a therapeutic diet according to the individual or patient's requirement in diseased conditions.
- Analyze the assessment report to understand the inter-relations of the metabolic disturbance and overall health status of the individual.
- Construct new ideas and solutions for dietetic problems based on their knowledge and experience

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND105	MNT I (P)	60	4	~	4	50	50	100

EVALUATION

Evaluation	Details	Marks
Internal	Journal	40
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	10
External	Practical Examination & Viva Voce	50
	Total marks	100

Module 1:
Diet Therapy: Introduction, Standardization, Nutrition Care Process & Exchange list
(30 lectures)

Objectives	Content	Evaluation (50 M)
<p>This module enables students to:</p> <p>a) To understand the basics of portion size and standardization of common recipes and gain knowledge about existing products used for different nutritional purpose in Indian Market</p> <p>b) To understand the basics of Nutritional Care (NCP) and its application as a preliminary step in a diseased individual.</p> <p>c) To gain knowledge and skills to identify an individual who is at risk of and who would benefit the most from NCP.</p> <p>d) To understand the various methods available for delivery of nutritional support</p>	<p>Collection and storage of biological samples for clinical investigations</p> <p>Standardisation of food groups and preparation of tube feed</p> <p>Market survey of commercial nutritional supplements and nutritional support substrates</p> <p>Nutritional (and dietary) care Process</p> <p>A) in health</p> <ul style="list-style-type: none"> - Depending on the state of growth & development of the individual - at various activity levels and socioeconomic status. <p>The Nutritional care process</p> <p>B) in disease</p> <ul style="list-style-type: none"> - Nutritional screening/ assessment and identification of nutritional problem - Nutritional Intervention and Diet Modification based on interpretation of - Patient data- clinical, biochemical and other relevant data - Delivery of Nutritional Support – Meeting nutritional needs and practical aspects <p>a) Enteral tube feeding b) Parenteral Nutrition</p> <ul style="list-style-type: none"> - Nutrition Education and Counseling -Evaluation of Nutritional care <p>Exchange list as a tool in planning diets</p>	<p>Students will be evaluated on basis of diet plan submission/ journal competition/ assignments/ planning exams</p>

Module 2:
Nutrition for Weight Management
(15 lectures)

Objective	Content	Evaluation
<p>This module enables students to:</p> <p>a) To understand the multi-dimensional approach for weight management.</p> <p>To focus on Nutrition as a part of management of Obesity and Underweight.</p>	<p>Nutrition for weight management: Disorders of energy balance</p> <p>B. Obesity</p> <p>Assessment of obesity</p> <p>Management of obesity</p> <ul style="list-style-type: none"> - Dietary Modification : past and present approach - Psychology of weight reduction : psychotherapy and behavior modification - Physical activity and exercise - Maintenance of Reduced weight <p>B. Underweight/Excessive Leanness/Under nutrition including Tuberculosis and AIDS</p> <ul style="list-style-type: none"> - assessment - Dietary Management - Psychotherapy <p>Eating disorders: Anorexia Nervosa and Bulimia Nervosa</p>	<p>Students will be evaluated on basis of diet plan submission/ journal competition/ assignments/ planning exams</p>

Module 3:
Nutrition for Digestive system
(30 lectures)

Objective	Content	Evaluation
<p>This module enables students to:</p> <p>a) To understand the interrelationship between the disease conditions and nutritional status</p> <p>To understand the therapeutic role of diet in the treatment of these disorders</p>	<p>Medical Nutrition therapy for Upper Gastrointestinal tract Diseases /Disorders</p> <p>a) Diagnostic Tests for the G.I. diseases</p> <p>b) Pathophysiology and Nutritional care and diet therapy in</p> <p>i) Diseases of esophagus; esophagitis, Hiatus hernia</p> <p>ii) Disorders of stomach: Indigestion, Gastritis, Gastric and duodenal ulcers</p> <p>Management: associated with H. pylori infection, NSAIDS</p> <p>Dietary management: traditional approach and liberal approach</p> <p>c) Gastric Surgery: Nutritional care, dumping syndrome</p> <p>Medical Nutrition therapy for Lower gastrointestinal tract Diseases/Disorders</p> <p>Common Symptoms of Intestinal dysfunction</p> <ul style="list-style-type: none"> - Flatulence, constipation, haemorrhoids, diarrhoea, steatorrhoea, 	<p>Students will be evaluated on basis of diet plan submission/ journal competition/ assignments/ planning exams</p>

	<p>b) Diseases of the large intestine:</p> <ul style="list-style-type: none"> - Diverticular disease, Irritable bowel syndrome, inflammatory bowel disease <p>c) Malabsorption Syndrome/Diseases of Small intestine</p> <ul style="list-style-type: none"> - Celiac (Gluten –induced) sprue, tropical sprue, intestinal brush border enzyme deficiencies, Lactose intolerance, protein- losing enteropathy <p>d) Principles of dietary Care: Fibre, residue Modified fibre diets</p> <p>e) Intestinal surgery: Short bowel syndrome, Ileostomy, Colostomy, Rectal surgery</p> <p>MNT for Diseases of the Hepato - Biliary Tract</p> <p>a) Nutritional care in liver disease in context with results of specific liver function tests</p> <ul style="list-style-type: none"> - Dietary care and management in viral hepatitis(different types) , cirrhosis of liver, hepatic encephalopathy, Wilson's disease <p style="padding-left: 40px;">Dietary care and management in diseases of the gall bladder and pancreas i.e. biliary dyskinesia, cholelithiasis, cholecystitis, cholecystectomy, pancreatitis, Zollinger-Ellison syndrome</p>	
--	--	--

Course Title: FUNCTIONAL FOODS (CBCS)

Course Code: MCND106A

Course Description: This course is designed to explore research based knowledge about specific food products or nutrients having health benefits that can prevent, manage clinical conditions

OBJECTIVES:

This course is designed to enable students to:

1. Gain knowledge about functional foods, biodynamic principles and nutraceuticals
2. Have thorough understanding about the health effects
3. Be familiar with applications in industry.

Learning outcomes:

After completion of the course students will be able to:

1. Understand the concept of functional food and active components of food
2. Have research-based knowledge and evidence-based facts for functional foods
3. Understand the mechanism of action for functional food and its safe intake levels
4. Have knowledge for application of these food components in therapeutic conditions

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
	Functional Foods	4	4	4	~	2/50	2/50	100 Marks

EVALUATION:

Evaluation	Details	Marks
Internal	Unit test, presentation/ class quizzes/ projects/ assignments	50
External	Written Examination	50
	Total marks	100

Contents:

Module 1:

Introduction to Functional Foods, Prebiotic and Probiotic

15 lectures

Objectives	Topics and Details	Evaluation
To learn about the functioning and benefits for prebiotics, probiotics and symbiotics	<p>Introduction: Definition, history, classification – Type of classification (Probiotics, probiotics and synbiotics; Nutrient vs. Non-nutrient; according to target organ; according to source or origin).</p> <p>Probiotics</p> <p>a. Taxonomy and important features of probiotic micro-organisms.</p> <p>b. Health effects of probiotics including mechanism of action.</p> <p>c. Probiotics in various foods: fermented milk products, non-milk products etc.</p> <p>d. Quality Assurance of probiotics and safety.</p> <p>Prebiotics</p> <p>Unit 1. Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases, perspective for food -applications for the following:</p> <ul style="list-style-type: none">• Non-digestible carbohydrates/oligosaccharides:• Dietary fibre• Resistant starch• Gums <p>Application for gut microflora, GI dysfunctions, Immune related disorders and infections</p>	Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module

Module 2:
Biodynamic principles and their Health benefits
30 lectures

Objectives	Topics and Details	Evaluation
<p>To understand plant based functional ingredients and food's chemistry and benefits</p> <p>To learn their application in suitable clinical conditions</p>	<p>Potential health benefits of the following biodynamic principles:</p> <p>Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and potential</p> <ul style="list-style-type: none"> • Polyphenols: Flavonoids, catechins, isoflavones, tannins Curcumin, Resveratrol • Phytoestrogens/ Isoflavones • Phytosterols • Glucosinolates • Pigments : Lycopene, Carotenoids • Organo sulphur compounds • Other components – Phytates, Protease inhibitors, saponins, Amylase inhibitors, haemagglutinins 	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

Module 3:
Spices, Condiments and other plant materials and their therapeutic application
15 lectures

Objectives	Topics and Details	Evaluation
<p>To learn about the active ingredient, present naturally in spices, herbs and other plant based foods, their implication and benefits for clinical conditions, sports etc.</p>	<p>Active biodynamic principles in spices, condiments and other plant materials and their evidence-based effects</p> <p>Application of functional food(s) for:</p> <ol style="list-style-type: none"> 1. Communicable and infectious diseases AIDS/ HIV, air-borne, vector-borne, food-borne, water- borne diseases 2. Non communicable diseases: obesity and metabolic syndrome, cardiac disorder, liver and kidney issues, endocrine abnormalities 3. Cancer prevention and management of symptoms 4. At different life stages 5. Sports athletes 6. Neurological health 	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

References:

1. Cho S. S. and Dreher, M.L. (2001): Handbook Dietary Fibre, Marcel Dekker Inc., New York.
2. Yurawecz, M.P., M.M. Mossoba, J.K.G. Kramer, M.W. Pariza and G.J. Nelson eds (1999) Advances in Conjugated Linoleic Acid Research, Vol. 1. AOCS Press, Champaign.
3. Wildman, R.E.C. ed. (2000) Handbook of Nutraceuticals and Functional Foods, CRC Press, Boca Raton.
4. Fuller, R. ed. (1992) Probiotics the scientific basis, London: Chapman and Hall, New York.
5. Fuller, R. ed. (1997) Probiotics Applications and Practical Aspects, London: Chapman and Hall, New York.
6. Salminen, S. A. Von Wright (eds) (1998): Lactic acid bacteria: microbiology and functional aspects, 2nd edition, Marcell Dekker Inc. New York.
7. Goldberg, I. Ed (1994): Functional Foods: Designer Foods, Pharma Foods, Nutraceuticals, Chapman & Hall, New York.
8. Wood, B.J.B. ed. (1992): The lactic acid bacteria in health and disease, Elsevier Applied Science, London.
9. Gibson, G., Williams, C. eds (2000): Functional Foods. Woodhead Publishing Ltd. U.K.
10. Young, J. (1996): Functional Foods: Strategies for successful product development. FT Management Report Pearson Professional Publishers, London.
11. Frei, B. (1994): Natural antioxidants in human health and disease. Academic Press, San Diego.
12. Tannock, G.W. (1999): Probiotics: A critical review, Horizon Scientific Press, UK