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**M.Sc.**

**NUTRITION**

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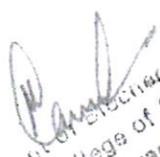
**DIETETICS**

**M.Sc. (Nutrition and Dietetics)**  
**Choice Based Credit system (CBCS) Syllabus**  
**Effective from 2022-23 admitted batch**

**COURSE OUTLINE AND SCHEME OF EXAMINATION**

**FIRST SEMESTER**

Paper No.	Title	Instruction Hrs/ Week	Duration of Examination (Hrs)	Credits	Maximum Marks
<b>Theory</b>					
ND 101 T (CORE)	Human Nutrition	3	3	3	100 (70+30)
ND 102 T (CORE)	Nutritional Biochemistry I	3	3	3	100 (70+30)
ND 103 T (CORE)	Human Physiology	3	3	3	100 (70+30)
ND 104 T (CORE)	Principles of Dietetics	3	3	3	100 (70+30)
<b>Practical</b>					
ND 151 P	Human Nutrition	4	3	2	50
ND 152 P	Nutritional Biochemistry	4	3	2	50
ND 153 P	Human Physiology	4	3	2	50
ND 154 P	Principles of Dietetics	4	3	2	50
	<b>Total</b>	<b>28</b>		<b>20</b>	<b>600</b>

  
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**SEMESTER I**  
**ND 101 T Human Nutrition (CORE)**  
**(5credits: Theory credit= 3 + Practical credits =2 )**

**Objectives:**

- To understand the role of adequate nutrition in stages of life cycle.
- To know the nutritional requirement and meal management of athletes.

**UNIT I: PRINCIPLES OF NUTRITION (15 h)**

Energy value of foods

- Estimation of energy value of foods by Bomb Calorimeter and
- Estimation of energy value of foods Benedict's oxy Calorimeter
- Measurement of Basal metabolism- Atwater and Benedicts Roth

Factors affecting energy requirements;

- Factors affecting BMR, SDA,
- Energy requirement during work, physical activity ratio and physical activity level
- RDA and derivation of RDA.

Basic food groups

- Four, Five Food groups, Nutritional contribution from each group,
- Balanced diet, My Food Pyramid, Food plate
- Food composition tables and Food Exchange list

Basics of meal planning

- Steps in meal planning
- Principles of meal planning
- Guidelines for planning a menu

Nutritional requirements of

- Dietary guidelines for Indians
- An adult man and
- An adult woman

**UNIT II: NUTRITION DURING THE PHASES OF - PREGNANCY, LACTATION AND INFANCY 15 ( h)**

Changes during Pregnancy:

- Pre conceptual nutrition
- Physiology of pregnancy (stages of human fetal changes)
- Maternal Physiological changes and Maternal weight gain

Nutritional requirement and complications

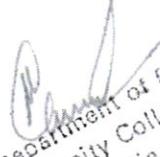
- Nutritional requirements during pregnancy
- Diet and eating pattern during pregnancy
- Complications of pregnancy

Lactation:

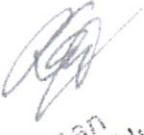
- Development of breast, Physiology of lactation
- Nutritional requirements during lactation, Lactogogues
- Nutritional component of colostrum and mature milk

Breast Feeding

- Composition of different types of milk – cow, buffalo, goat and camel, formula milk
- Breast feeding Vs bottle feeding- advantages and disadvantages
- Feeding of Low birth weight and premature infants, Human Milk Banks

  
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**ND 102 T NUTRITIONAL BIOCHEMISTRY- I (CORE)**  
(5credits: Theory credit= 3 + Practical credits =2)

**Objectives:**

- To enable students to understand the role of nutrients in the body.
- To know the classification, functions and metabolism of carbohydrates, amino acids, proteins and nucleic acids.

**UNIT I: CARBOHYDRATES AND THEIR METABOLISM (15h)**

**Carbohydrates:**

Classification and functions

- Nutritional Classification and sources
- Chemical classification and sources
- functions and requirements of carbohydrates

Utilization

- Digestion, absorption and maintenance of blood glucose levels
- factors affecting absorption
- Transport ( GLUT's ) and storage

Metabolism of simple sugars:

- Glycolysis
- TCA cycle
- Electron transport chain

Metabolism other sugars

- Pentose phosphate pathway
- Glycogenesis and Glycogenolysis
- alcohol metabolism

Inborn errors of Carbohydrate Metabolism-

- Glycogen storage diseases
- Lactose intolerance and Galactosemia
- Fructose intolerance

**UNIT II: AMINO ACIDS AND THEIR METABOLISM (15h)**

Classification and functions of Amino Acids

- Chemical composition- Based on solubility, Polarity, Chemical Nature
- Nutritional classification
- Specific nutritional functions

Oxidation of Amino acids (glycogenic and ketogenic)

- Transamination
- Oxidative deamination and non oxidative deamination and decarboxylation
- Urea cycle

Metabolism of Aromatic Amino Acids

- Phenylalanine
- Tyrosine
- Tryptophan

Metabolism of Branched chain amino acids

- Leucine
- Isoleucine
- Isoleucine

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Infancy:

- Growth and development during infancy
- Nutritional Requirement during infancy
- Weaning: Homemade foods Vs commercial foods

### **UNIT III: NUTRITION DURING THE PHASES OF GROWTH - PRE SCHOOLERS, SCHOOLGOING CHILDREN, ADOLESCENTS AND OLD AGE (15 h)**

Growth and development

- Milestones
- Growth Chart
- Immunization Schedule

Preschoolers:

- Nutritional requirements
- Food habits and dietary guidelines
- Children with feeding disorders

School going children:

- Nutritional requirements
- Packed lunch and Factors to be considered while planning diet for school going children
- Influence of television on eating habits of school going children

Adolescence:

- Nutritional requirements
- Eating behaviour
- Nutrition related health problems: weight control, eating disorders, alcohol and drug abuse, adolescent pregnancy

Geriatric:

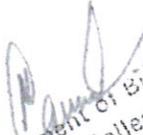
- Physiological changes in aging
- Nutritional requirements and Dietary modification
- Major nutrition related problems

### **BOOKS RECOMMENDED**

- Text Book of Human Nutrition- Suryatapa Das, 1<sup>st</sup> edition, February-2021
- Modern Nutrition in Health & Diseases – Eds – Maurice E. Shils, James A. Olson, Moshe Shike, 8th edition, Vol I and II, Williams & Wilkins Publication.
- Nutrition and Dietetics – Shubhangini A Joshi, 2nd edition, Tata Mc Graw Hill publication.
- Food, Nutrition and Diet Therapy – Kathleen Mahan & Krause, Sylvia Escott Stump.

### **SUGGESTED REFERENCES FOR ADDITIONAL READING**

- Perspectives in Nutrition – Gordon M. Wardlaw, Margaret Kessel, 5th edition, Mc Graw Hill Publication.
- Nutrition and Metabolism – Nutrition Society Textbook, Eds – Michael J. Gibrey, Ian A Macdonald and Helen, Blackwell publishing.
- Decisions in Nutrition – Vincent Hegarty.
- Human Nutrition – Geissler & Powers, 11th edition, Elsevier Publications.
- Dietetics – B Srilakshmi, 5th edition, New Age International Publishers

  
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#### Inborn errors of amino acid metabolism

- PKU
- Tyrosinemia, Maple syrup urine disease
- Homocystinuria, Alkaptonuri

### UNIT III: PROTEINS AND THEIR METABOLISM (15h)

#### Classification and functions of Proteins:

- Chemical Classification
- Nutritional classification
- Sources and functions

#### Utilisation

- Digestion and absorption
- Transport and storage
- Factors affecting protein utilisation

#### Protein synthesis

- Genetic code
- Types and site of protein synthesis
- Components required

#### Steps in protein synthesis

- Initiation of peptide chain -
- Elongation of Peptide chain
- Termination of peptide Chain

#### Post translational changes

- Acetylation and Glycosylation
- Hydroxylation and Phosphorylation,
- Chaperones and Inhibitors of protein synthesis

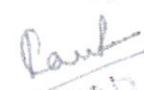
### BOOKS RECOMMENDED

- Nutritional Science – B. Srilakshmi, New Age International Publishers, 2nd edition.
- Textbook of Medical Biochemistry – MN Chatterjee, Rana Shinde, 7th edition, jaypee Brothers.
- A textbook of Biochemistry – A V S S Rama Rao, 9th edition, UBS Publisher's Distribution Pvt. Ltd.
- Textbook of biochemistry by K A Rambabu - 1<sup>st</sup> Edn 2007, AITBS publishers

### SUGGESTED REFERENCES FOR ADDITIONAL READING

- Nutritional Biochemistry – Tom Brody, 2nd edition, Academic Press.
- Text Book of Human Nutrition – Mahtab S. Bamji, N Prahlad Rao, Vinodini Reddy, 2<sup>nd</sup> edition, Oxford & IBH Publishing Co. Pvt. Ltd.
- Textbook of Medical Biochemistry – S Ramakrishnan, K G Prasannan, R Rajan, 3rd edition, Orient Longman, Harper's Illustrated Biochemistry – Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, 26th edition, Mc Graw Hills.
- Experimental Biochemistry – A Student Companion – B Sashidhar Rao, Vijay Deshpande, IK International Pvt. Ltd.
- Biochemistry – U Satyanarayana, U Chakrapani, Books & Allied (P) Ltd.
- Clinical Biochemistry – Nagini
- Principles of Biochemistry – Lehninger A L, CBS Publishers and Distributors.
- Textbook of Biochemistry (for Medical students) – DM Vasudevan and S Sreekumari, 4<sup>th</sup> edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.

  
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**ND 103 T HUMAN PHYSIOLOGY (CORE)**  
**(5credits: Theory credit= 3+ Practical credits =2)**

**Objectives:**

- To enable the students to understand the functions of various systems in the body.
- To acquaint the students with abnormalities of endocrine system.

**UNIT I: DIGESTIVE AND EXCRETORY SYSTEM (15h)**

**Gastrointestinal tract**

- Structure and functions
- Secretory function
- Hormones and their functions

**Liver, gallbladder and Pancreas**

- Structure
- functions
- composition and functions of bile and pancreatic juice

**Kidney**

- Structure
- functions
- Structure of Nephron

**Urine**

- Urine formation
- Organic and inorganic constituents of urine
- Water and electrolyte balance

**Disorders of fluid imbalance**

- Dehydration
- Odema
- Role of hormones in regulation of fluid balance

**UNIT II: BLOOD, CIRCULATORY SYSTEM AND RESPIRATORY SYSTEM (15h)**

**Heart**

- Structure and functions
- Pulmonary, Systemic and Portal circulation
- Blood pressure, Heart rate, Factors affecting BP and heart rate, Regulation of Cardiac output

**Blood**

- Composition
- Structure of blood vessels
- Haemoglobin- structure and function

**Plasma**

- Plasma proteins- Functions, role in fluid balance
- Organic and Inorganic compounds in plasma
- Blood Lipids – Chylomicrons, VLDL, LDL, HDL, Cholesterol, Triglycerides

**Blood coagulation**

- Hemostasis
- Clotting factors
- Mechanism

**Respiratory System**

  
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- Structure and functions
- Mechanism of respiration, Respiratory rate
- Respiratory abnormalities- Hypoxia, Hypercapnia & Asphyxia

### UNIT III: ENDOCRINE SYSTEM (15 h )

#### Endocrine glands

- Types and secretion of hormones
- Control of hormone secretion
- mechanism of hormone action

#### Pituitary gland:

- Structure , Anterior Pituitary : hormones secreted and functions
- Posterior Pituitary- Hormones secreted and their functions
- Abnormalities

#### Thyroid gland and Parathyroid gland:

- Structure and functions
- Abnormalities: hypothyroidism, hyperthyroidism,
- Hypo and hyper secretion of parathormone

#### Adrenal gland:

- Structure
- secretions of adrenal cortex and their functions, hypoadrenalism, hyperadrenalism
- Secretions of adrenal medulla and their functions

#### Islets of Langerhans, Testes and Ovaries

- Structure
- Functions of Insulin and glucagon, deficiency of insulin,
- Functions of testosterone, estrogens and progesterone

### BOOKS RECOMMENDED

- Textbook of Medical Physiology – Guyton, 8th edition, HBJ International Edition, WB Sanders.
- Essentials of Medical Physiology – Anil Baran Singha Mahapatra, 2nd edition, Current Books International.

### SUGGESTED REFERENCES FOR ADDITIONAL READING

- Human Physiology – An Integrated Approach – DU Silverthorne, Prentice Hall.
- Human Physiology – from cells to system – L Sherwood, 6th edition.
- Textbook of Biochemistry (for Medical Students) – DM Vasudevan and S Sree Kumari,
- 4th edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi

  
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**ND 104 T Principles of Dietetics (CORE)**

**(5credits: Theory credit= 3 + Practical credits =2)**

**Objectives:**

- To impart in depth knowledge regarding prevalence, etiology, diagnosis, diet and life style management in different diseases.
- To gain knowledge on the methods of assessment of nutritional status among individuals and interaction of drugs and nutrients.

**CREDIT I: Nutritional Assessment, Specialised feeding methods and Critical care (15h)**

Nutritional Assessment of hospitalised patients

- SGA,
- MNA,
- MUST

Specialized feeding methods

Enteral Nutrition:

- Types – Short term feeding methods : Nasogastric, Nasoduodenal, Nasojejunal
- Long term feeding methods: Gastrostomy, Percutaneous Endoscopic Gastrostomy, Percutaneous Endoscopic Jejunostomy
- Formula feeds; Advantages, Disadvantages and complications of enteral nutrition

Parenteral Nutrition:

- Types – Total Parenteral Nutrition, Peripheral Parenteral Nutrition
- Advantages, Disadvantages and Complications of parenteral nutrition.
- Composition of parenteral nutrition solutions

Surgery: Physiological response

- Endocrine response
- metabolic changes
- Nutritional care in pre and post operative conditions

Burns:

- Assessment of severity of burns
- Metabolic changes in burns
- Nutritional support in burns

**CREDIT II: ENERGY IMBALANCE AND FEBRILE CONDITIONS (15 h )**

**Energy Imbalance:**

Obesity:

- Definition, types
- Aetiology, Fat cell theory and Set point theory
- Assessment and complications

Management of obesity

- Diet – reducing, very Low calorie and energy deficit calculations.
- Exercise and behavior modification,
- Pharmacotherapy and surgery

Leanness:

- Etiology,

  
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- complications
- Dietary management

Febrile conditions:

- Host defence mechanism
- Metabolic changes during fever
- General dietary considerations

Short duration and Intermittent duration fevers

- Typhoid -Causes and clinical features, Dietary Management
- Influenza- Causes and clinical features, Dietary Management
- Malaria- Causes and clinical features, Dietary Management

Long duration – Tuberculosis

- Causes and clinical features
- Dietary Management of long duration fevers
- Treatment and Dietary guidelines

### **CREDIT III: Gastrointestinal Disorders (15 h )**

Gastritis and Peptic ulcer

- Etiology, Mechanism of Ulcer Formation , symptoms,
- diagnosis, treatment,
- dietary management

Diarrhea

- Etiology, symptoms,
- Types, treatment - ORS
- dietary management

Constipation

- Etiology, symptoms,
- Types
- dietary management

Ulcerative colitis, Crohn's disease, irritable bowel disease

- Etiology, symptoms,
- diagnosis, treatment
- dietary management

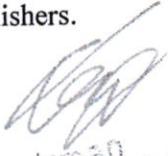
Lactose intolerance and celiac disease; Diverticular diseases

- Etiology, symptoms,
- diagnosis, treatment
- dietary management

### **BOOKS RECOMMENDED**

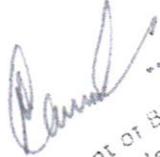
- Clinical Nutrition – Ed Michael J Gibney, Marinos Elia, Olle Ljungqvist and Julie Dowsett.
- Text Book of Human Nutrition – Mahtab S Bamji, N Prahlad Rao, Vinodini Reddy, 2<sup>nd</sup> edition, Oxford & IBH Publishing Co. Pvt. Ltd.
- Food, Nutrition and Diet Therapy – Kathleen Mahan & Krause, Sylvia Escott Stump.
- Normal and Therapeutic Nutrition - Robinson & Lawler, 17th edition, Mac Millan Publishers.

  
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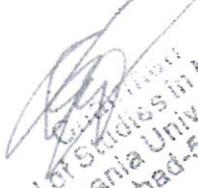
  
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### SUGGESTED REFERENCES FOR ADDITIONAL READING

- Foods – Nutrition and Health – Dr. Vijaya Khader, Kalyani Publishers.
- Nutrition in Health and Diseases – Anderson, 17th edition.
- Modern Nutrition in Health & Disease – Eds – Maurice E. Shils, James A. Olson,
- Moshe Shike, 8th edition, Vol I and II, Williams & Wilkins Publication.
- Nutrition in clinical Practice – David L. Katz, Lippincott, Williams & Wilkins.
- Clinical Dietetics and Nutrition – F P Antia and Philip Abraham.
- Biochemistry – U Satyanarayana, U Chakrapani, Books & Allied (P) Ltd.
- Perspectives in Nutrition – Wardlaw Kessel, Mc Graw Hills.

  
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## ND 151 P Human Nutrition PRACTICALS (30 hrs)

### Objectives:

- To familiarize the students with newer concepts in standardisation of recipes and planning of balanced menus for different age groups
1. Cereal and Pulse- Rice, Upma , Phulka,Chapathi, Kichidi, Idli, Dosa, Dhal with Green Leafy Vegetable
  2. Beverages and Desserts - Tea, Soup, Juices, Milk Shakes, Porridges, Plain Custard
  3. Vegetable and fruits- Vegetable curries and salads
  4. Plan a day's diet , Calculate Nutritive value & cost of the menu planned for Adult man/ woman
  5. Preparation of the planned diet for Adult man/ woman
  6. Plan a day's diet, Calculate Nutritive value & cost of the menu planned Pregnant woman/ Lactating woman
  7. Preparation of the planned diet for Pregnant woman/ Lactating woman
  8. Plan , calculate the nutritive value and cost of a weaning mix
  9. Preparation of the planned weaning mix
  10. Plan a day's diet , Calculate Nutritive value & cost of the menu planned Preschool/ School going
  11. Preparation of the planned diet for School going
  12. Plan a day's diet ,Calculate Nutritive value & cost of the menu planned Adolescent Girl/ Boy
  13. Preparation of the planned diet for Adolescent Girl/ Boy
  14. Plan a day's diet, Calculate Nutritive value & cost of the menu planned Geriatric Woman / Man
  15. Preparation of the planned diet for Geriatric Woman / Man

  
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**ND 152 P NUTRITIONAL BIOCHEMISTRY  
PRACTICALS (30 hrs)**

**Objectives:**

- To acquaint the students with principles, techniques and application of different methods of food analysis

**I Qualitative analysis of Carbohydrate**

1. Glucose
2. Fructose
3. Xylose
4. Sucrose
5. Maltose
6. Lactose
7. Starch

**II . Qualitative analysis of protein and Amino acids**

8. Albumin
9. Aliphatic Amino acids – Alanine
10. Aromatic Amino acids – tyrosine
11. Sulphur containing - Cysteine
12. Guanido group- Arginine

**III. Estimation of Total Sugar**

13. Estimation of Reducing sugars by Lane and Eyon Method / DNase Method

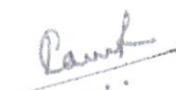
**IV. Quantitative analysis of Protein**

14. Biurette method

**V. Separation of Amino acids**

15. Separation of amino acids by paper chromatography

  
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**ND 153 P HUMAN PHYSIOLOGY  
PRACTICALS (30 hrs)**

**Objectives:**

- **To acquaint the students with principles, techniques and application of different methods of biological fluids analyses and to understand the disorders associated with the deviation.**

**I. Microscopic Examination of various tissues and blood vessels**

1. Epithelial b. Muscular c. Connective d. Bone e. Artery f. Vein (Specimens)

**II. Estimation of blood sample**

2. Determination of blood group and Rh factor
3. For RBC
4. For WBC
5. For PCV
6. For Haemoglobin by Sahil's Method
7. Blood glucose by glucometer method

**III. Estimation of Urine sample**

8. Sugar (Benedicts test)
9. Albumin
10. Bile salts

**IV. Measurement of VITALS**

11. Measurement of blood pressure by Digital BP monitor
12. Measurement of pulse rate using pulse oxy meter.
13. Measurement of oxygen saturation using pulse oxy meter.

**V. Demonstration –**

14. Cholesterol estimation by kit method
15. Triglycerides Estimation by Kit Method

  
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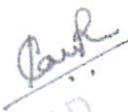
  
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## ND 154 P Principles of dietetics PRACTICALS (30 hrs)

### Objectives:

- To familiarize the students with newer concepts in dietary management of Various disorders and diseases.
1. Plan a day's diet and Calculate Nutritive value & cost of the menu planned for Burns
  2. Preparation of the planned diet for Burns
  3. Plan a day's diet, Calculate Nutritive value & cost of the menu planned Peptic Ulcer
  4. Preparation of the planned diet for Peptic Ulcer
  5. Plan a day's diet , Calculate Nutritive value & cost of the menu planned Diarrhoea
  6. Preparation of the planned diet for Diarrhoea
  7. Plan a day's diet, Calculate Nutritive value & cost of the menu planned Constipation
  8. Preparation of the planned diet for Constipation
  9. Plan a day's diet , Calculate Nutritive value & cost of the menu planned Ulcerative colitis
  10. Preparation of the planned diet for Ulcerative colitis
  11. Plan a day's diet , Calculate Nutritive value & cost of the menu planned for Obesity
  12. Preparation of the planned diet for Obesity
  13. Plan a day's diet , Calculate Nutritive value & cost of the menu planned for Leanness
  14. Preparation of the planned diet for Leanness
  15. Plan a day's diet, Calculate Nutritive value & cost of the menu planned Typhoid/ tuberculosis
  16. Preparation of the planned diet for Typhoid/ tuberculosis

  
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