

SEMESTER : I OPEN ELECTIVE 1	22PBIOO16-1: FOOD AND NUTRITION	CREDIT : 3 HOURS : 2
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COURSE OBJECTIVES

1. Understand the role of nutrition in different stages of life
2. Nutritional and dietary requirements for special events
3. Know the consequences of health due to deficiency in nutrition
4. Understand the physiological actions of food and nutrition
5. Know the quality of nutritional foods.

Unit I Introduction to Nutrition

(6 Hours)

Role of nutrition in maintaining health, basic food groups - energy yielding, body building and protective foods. Basic concepts of energy expenditure, unit of energy - Kcal - energy requirements of different categories of people - RQ of foods - Body Mass Index (BMI) - Basal Metabolic Rate (BMR) - determination and factors influencing

Unit II Nutritional significance of dietary components:

Physiological role and nutritional significance of carbohydrates, lipids, proteins, vitamins (water soluble and fat soluble) minerals and fiber, Dietary sources, Functions, Digestion, absorption and storage, metabolism of carbohydrates, lipids, proteins.

Unit III Nutritive value of proteins:

Essential amino acids, Biological values of Proteins (animal and plant proteins). Evaluation of proteins by nitrogen balance method-DC, BV, NPU and NAP of animal and plant proteins, single cell proteins, factors influencing protein requirements, Effect of excess protein intake

Unit IV Protein calorie malnutrition:

Protein malnutrition (Kwashiorkor) and under nutrition (marasmus) their preventive and curative measures - composition of balanced diet and RDA for infants, children, adolescent, adult male and female, pregnant, lactating women and geriatric

Unit V Nutrition and body defenses

Effect of drugs on food and nutrients, drug - nutrient interaction - nutritional therapy food preparation and management. Junk foods and processed foods and its effects, obesity. Role of diet and nutrition in the prevention and treatment of diseases - Diabetes mellitus, hypertension, infections, CVD, liver and kidney disorders.

Text Books

1. Srilakshmi, B. (2013) Nutrition Science Revised Fourth Edition, New Age International Publishers, New Delhi.
2. Paul, S. (2005) A Textbook of Bio-nutrition - Curing Diseases through Diet, First Edition, CBS Publishers and Distributors, New Delhi.
3. Swaminathan, M. (2004) Advanced Textbook of Food and Nutrition, Volume II, Second Edition, The Bangalore Printing and Publishing Co. Limited, India.

Supplementary Reading

1. Geissler, C. and Powers, H.(2010) Human Nutrition, Twelfth Edition, Churchill Livingstone, USA.
2. Brody, T. (2006) Nutritional Biochemistry, Second Edition, Academic Press, USA.
3. Eastwood, M. (2003) Principles of Human Nutrition, Second Edition, Wiley - Blackwell Science Ltd Publishers,

COURSE OUTCOMES

1. **CO:** Relate foods and nutrients to the biological requirements of human at different stages of the life cycle.
2. **CO2:** Explain about the nutritional requirements of humans during different stages of the life cycle.
3. **CO3:** Relate the nutrition related concerns specific to each stage of the human life cycle to consequences of health
4. **CO4:** Explain and reflect upon the consequences of physical , biochemical, physiological , social and psychological factors impacting nutritional intake and status during each stage of the human life cycle.
5. **CO5:** Relate the different nutrients and their physiological role in life

OUTCOME MAPPING

		PO1	PO2	PO3	PO4	PO5
CO1		3	2	3	3	3
CO2		2	3	3	3	3
CO3		2	3	2	3	3
CO4		3	2	3	3	3
CO5		2	3	3	3	3

SEMESTER :I	22PBIOO16-2: BIOINSTRUMENTATION	HOURS : 3
OPEN ELECTIVE -2		CREDIT:3

COURSE OBJECTIVES

1. It helps the students in understanding the basic science in a variety of applications.
2. It includes the development of different tools and methods for identification, analysis and examination of physical properties of different biochemical compositions to provide better chemical information.
3. To introduce an fundamentals of transducers as applicable to physiology
4. To explore the human body parameter measurements setups
5. To give basic ideas about how biomolecules are detected by instrumentation

UNIT 1 MICROSCOPY

6 hours

Principles and application of light phase contrast , fluorescence , scanning , and transmission electron microscope .

UNIT 2 CENTRIFUGATION TECHNIQUES

6 hours

Centrifugation : Svedberg's constant , Sedimentation Velocity and sedimentation equilibrium . Differential and density gradient centrifugation , construction of preparative and analytical ultra-centrifuge.

UNIT 3 CHROMATOGRAPHIC TECHNIQUES

6 hours

Chromatographic techniques : Principles and applications of paper , TLC , Ion exchange gel filtration , affinity GLC and HPLC .

UNIT 4 ELECTROPHORETIC TECHNIQUES

6 hours

Electrophoretic techniques: polyacrylamide gel electrophoresis, SDS PAGE, 2D electrophoresis, agarose gel electrophoresis, isoelectric focusing, and pulse field electrophoresis.

UNIT 5 SPECTROSCOPIC TECHNIQUES

6 hours

Spectroscopic techniques: principles of colorimeter , spectrophotometer , fluorimeter . Beerlambert's law and its limitations .Extinction coefficient , Atomic absorption spectroscopy , UV – Visible , spectrofluorimetry ,Flame Photometry .

COURSE OUTCOME

- **CO1.** Knowledgeable in microscopic techniques, Principles and applications
- **CO2.** Familiarise with the centrifugation techniques and their applications
- **CO3.** Well versed in chromatographic techniques which can be used in the isolation of molecules
- **CO4.** Gather knowledge with the electrophoretic techniques like agarose and PAGE
- **CO5.** Well versed with the application oriented techniques such as Spectrophotometry, fluorimetry and flame photometry

Text Books

1. L Veerakumari ., L ., Bioinstrumentation
2. Wilson,K. and Walker,J. 2005. Principles and Techniques of Practical Biochemistry, 6th Edition Cambridge University.Press. 26
3. Upadhyay,A. Upadhyay,K. and Nath,N. 2009. Biophysical Chemistry: Principles and Techniques, Third Edition, Himalaya Publishing. 11th Edition

Supplementary Reading

1. Sharma,B.K. 2004.Instrumental Methods of Chemical analysis, 23rd Edition Goel Publications.
2. Homie,D.J. and Peck,H. Analytical Biochemistry, Third Edition, Longman group,1998.
3. Physical Biochemistry – Principles and Applications, 2nd Edition, John Wiley and Sons, USA.
4. Allen, J.P. (2008) Biophysical Chemistry, 1st Edition, Markono Print Media Limited, Singapore
5. Charles, R., Cantor, I. and Schimmel, P.R. (2004) Biophysical Chemistry, Part II, W.H.Freeman & Co., New York.
6. Hunt, G and Mehta, M. (2007) Nanotechnology Risk, Ethics and Law, Earthscan, London
7. Nolting, B. (2006) Methods in Modern Biophysics, 2nd Edition, Springer Publications, New Jersey.
8. Roshan, J. K. (2008) Advanced Biophysics, Anmol Publications Pvt, Ltd, New Delhi Sheehan, D. (2009)
9. Physical Biochemistry – Principles and Applications, 2nd Edition, John Wiley and Sons, USA. 10. “Principles of Analytical Chemistry” by F W Fifeild and D Kealey

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	2	3	2	2	3
CO3	2	3	3	3	3
CO4	3	3	3	2	3
CO5	3	3	2	2	3

SEMESTER I OPEN ELECTIVE 3	22PBIOO16: MEDICAL LAB TECHNOLOGY	CREDIT 3 HOURS 2
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COURSE OBJECTIVE:

1. To impart basic knowledge of apparatus, units, equipment, and analysis in the Clinical Biochemistry.
2. To discuss the laboratory test and diagnosis of various blood components.
3. To learn about various histotechniques, handling and processing of tissue specimens as well as staining procedures.
4. To learn the different culturing techniques and its identification methods.
5. To know about the role of glycated haemoglobin, role of RBC, WBC and importance of screening test

UNIT I - LABORATORY CARE AND INSTRUMENTATION**6 hrs**

Automation in clinical lab – Instrumental concept, selection of instrument, quality assurance, control of pre analytical and analytical variables. Internal and external quality control measurements. Collection and preservation of samples.

UNIT II - HEMATOLOGY**8 hrs**

Blood grouping and Rh factor, cross matching, clotting time, bleeding time, hemoglobin estimation, total count-RBC count and WBC count, Differential WBC count, MCHC, MCH, MCV. Erythrocyte Sedimentation Rate (ESR), Hematocrit value (Packed Cell Volume). Screening test-HIV, HbsAg and TPHA. Platelet and its significance, Coombs test.

UNIT III - CLINICAL PATHOLOGY**4 hrs**

Brief outline of histopathology: Tissue cutting, fixation, embedding, tissue slicing by microtome, slide mounting and staining techniques.

UNIT IV - MICROBIOLOGY**6 hrs**

Culturing of organisms from various specimens, culture media and antibiotic sensitivity test (pus, urine, blood, sputum, throat swab). Gram stain, Ziehl-Neelson staining (TB, Lepra bacilli). Safety procedure in microbiological techniques.

UNIT V - CLINICAL BIOCHEMISTRY**6 hrs**

Biochemical parameters: Blood glucose, HbA1c, urea, uric acid, lipid profile, total protein, albumin test, A/G ratio, normal values and their significance. Enzymes: SGOT, SGPT, serum alkaline and acidic phosphates, amylase, lactic dehydrogenase test- normal values and their significance. Electrolytes: sodium, potassium, calcium, phosphorous - its role and abnormalities.

COURSE OUTCOMES:

- **CO1:** To learn about the handling of the laboratory equipments and also know about how to collect and preserve the biological samples.
- **CO2:** To gain the knowledge about accessing various blood components and predict its clinical significance.
- **CO3:** To acquire the knowledge and skill about various steps involved in the histopathological techniques.
- **CO4:** To learn the basic skills of microbial culture and its safety measures.
- **CO5:** To understand the importance of various biochemical parameters and its clinical significance.

TEXT BOOKS :

1. Kanai L. Mukherjee, Medical Laboratory Technology Vol. I.Tata McGraw Hill 1996, New Delhi.
2. Gradwohl, 2000. Clinical laboratory methods and diagnosis .Alex. C. Sonnenwirth & Leonard Jarret.M.D.B.I.Publications, New Delhi,

Supplementary Readings

1. Henry, John Bernard, Todd Sanford and Davidson, 2002. Clinical diagnosis and management by laboratory methods. W.B. Saunders & Co.
2. Fischbach Francis A, 2003. Manual of laboratory and diagnostic tests. Philadelphia,J.B.Lippincott& Co, N.Y.
3. Sood, R, 2005, Medical Laboratory methods and interpretation, Jaypee brothers medical publications, New Delhi.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	3
CO2	3	3	3	2	3
CO3	2	3	3	3	3
CO4	3	2	3	2	2
CO5	3	3	2	2	3