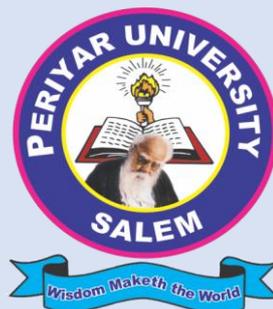


**PERIYAR UNIVERSITY**  
**Periyar Palkalai Nagar, Salem-636011**

**Department of**  
**Nutrition and Dietetics**



**M.Sc. Clinical Nutrition and Dietetics**  
[Choice Based Credit System (CBCS)]

**REGULATIONS AND SYLLABUS**

**(w.e.f. 2023-2024)**

## **VISION**

To impart a solid understanding of standards of clinical nutrition and dietetics practice and develop essential leadership skills to play a pivotal role to promote nutrition and healthy lifestyle choices in our society and beyond.

## **MISSION**

- To develop experts in clinical nutrition practice from a wide range of perspectives within the health system, from disease prevention to palliation.
- To generate a team of well-equipped clinical nutrition practitioners to help the community in maintenance of optimal health and well-being.
- To expose students to research and practice in the field of nutrition and dietetics by developing newer food formulas in the prevention and treatment of lifestyle diseases.

## **PROGRAM SPECIFIC OUTCOME (PSO)**

The Post Graduates of Clinical Nutrition and Dietetics Program will be

**PSO1:** Using domain knowledge and procedural assertiveness of clinical nutrition and dietetics and relevant disciplines to develop robust society.

**PSO2:** Applying principles of diet when planning food and nutrition programmes and supervising meal preparations in hospitals and other food service establishments.

**PSO3:** Educating the community on recommended dietary modifications based on the severity of illness and complications of disease.

**PSO4:** Exhibiting constant enhancement in their profession through life-long learning thereby escalating human wellness either as sovereign patient counsellors or as a team with multidisciplinary healthcare approach.

## **Graduate Attributes (GA) for Clinical Nutrition and Dietetics Programme**

- 1. GA1:** Obtain the knowledge of clinical nutrition and dietetics, and work independently as self-driven, lifelong learners and innovators so as to prevent or treat diseases being faced by the humans.
- 2. GA2:** Work in association with the health care team and apply the knowledge of the subject in novel situations to solve new problems.
- 3. GA3:** Think critically and apply appropriate contemporary research techniques, resources and modern devices to compute nutritional needs with appropriate consideration for public health and safety, food safety and security.
- 4. GA4:** Identify and evaluate the needs of the society significant with food in all contexts, like food safety and security, health and sanitation, environment, and gender concerns.
- 5. GA5:** Dynamic involvement in the community settings and working towards the attainment of wholesome nutritious communal along with the administrators.

## **Programme Outcomes (PO) for Clinical Nutrition and Dietetics**

On completion of M.Sc. programme, the students are expected to

**PO1: Critical Thinking:** Acquire the knowledge of clinical nutrition and dietetics, relate to scientific issues so as to prevent or treat diseases being faced by the humans. Identify, formulate, research literature, and solve nutritional deficiencies using fundamentals of clinical nutrition and dietetics, physiology, food science and biochemistry and relevant domain disciplines. Create, select,

adapt and apply appropriate techniques, resources and modern devices to compute nutritional needs with a thoughtfulness of the limitations.

**PO2: Effective Communication:** Researching and informing the patient and the healthcare team the complexity of the disease, the burdens of feeding and the decisions that may help determine the route of care for the patient, such as more aggressive or palliative care. Also, by effective report writing, presentations and documentations, communicate efficiently with the needy about the importance of healthy individual and society.

**PO3: Social Interaction:** Recognize and assess societal, environmental, health, safety, and cultural issues related to food within local and global contexts.

**PO4: Effective Citizenship:** Active in the patients care as the consultant dietician or community dietician or in a medical team reporting on the nutritional status of the patient or community to the health governing bodies.

**PO5: Professional Ethics:** Hold up and commit to professional ethics and ethical regulations, responsibilities, and norms of professional nutrition and dietetics practice.

**PO6: Sustainability:** Develop innovative food products or substitutes or alternate solutions to create value and wealth for the betterment of the individual and society at large.

**PO7: Self Directed and Life Long Learning:** Recognize the need and have the ability, to engage in independent learning for continual development as a health professional.

**PSO-PO Mapping:**

PSO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
PSO1							
PSO2							
PSO3							
PSO4							

**PO-GA Mapping:**

PO/GA	GA1	GA2	GA3	GA4	GA5
PO1					
PO2					
PO3					
PO4					
PO5					
PO6					
PO7					

**Program Educational Objectives (PEO):**

At the end of the program the students will obtain:

**PEO1: Technical Proficiency**

Succeed as clinical nutritionist, dieticians and will become productive and valued professionals in the sphere of Medical Nutrition Therapy.

**PEO2: Professional Growth**

Continue to develop as promising healthcare connoisseurs through life-long learning and higher education in the field of nutrition and dietetics.

**PEO3: Management skills**

Exercise entrepreneurial qualities in a responsive, ethical and innovative manner by setting up own diet clinics.

**POs Consistency with PEOs**

PEO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
PEO1	✓	✓	✓	✓	✓	✓	
PEO2	✓	✓	✓	✓	✓	✓	✓
PEO3							✓

## M.Sc. CLINICAL NUTRITION AND DIETETICS

### SYLLABUS (2023-2024) - Choice Based Credit system (CBCS)

Subject code	Title of the Paper	Weekly contact Hours	L	T	P	Credits	Internal Marks	External Marks	Total Marks
<b>SEMESTER –I</b>									
23UPCND1C01	Human Physiology	7	5	2	-	5	25	75	100
23UPCND1C02	Clinical Biochemistry	7	5	2	-	5	25	75	100
23UPCND1L01	Human Physiology and Clinical Biochemistry Practical	6	-	-	6	4	40	60	100
<b>Elective (Discipline Centric)-I (23UPCND1E01 or 23UPCND1E02)</b>									
23UPCND1E01	Contemporary Nutrition	5	4	1	-	3	25	75	100
23UPCND1E02	Food Properties								
23UPCND1E03	Elective (Generic)-II Applied Food Science	5	4	1	-	3	25	75	100
<b>Total</b>		<b>30</b>				<b>20</b>	<b>140</b>	<b>360</b>	<b>500</b>
<b>SEMESTER –II</b>									
23UPCND1C03	Human Development and Nutrition	5	4	1	-	5	25	75	100
23UPCND1C04	Clinical Nutrition and Dietetics-I	5	4	1	-	5	25	75	100
23UPCND1L02	Computer Applications in Clinical Nutrition and Dietetics-I Practical	6	-	-	6	4	40	60	100
<b>Elective (Discipline Centric)-III (23UPCND1E04 or 23UPCND1E05)</b>									
23UPCND1E04	Public Health Nutrition	4	3	1	-	3	25	75	100
23UPCND1E05	Food Analysis and Instrumentation								
23UPCND1E06	Elective (Generic)-IV Nutraceuticals and Functional Foods	4	3	1	-	3	25	75	100
23UPCND1N01	Non Major Elective-I (Swayam/MOOC/NPTEL)	4	4	-	-	2	-	100	100
23UPPGC1H01	Fundamentals of Human Rights	2	2	-	-	1	25	75	100
<b>Total</b>		<b>30</b>				<b>23</b>	<b>165</b>	<b>535</b>	<b>700</b>
<b>SEMESTER –III</b>									
23UPCND1C05	Research Methods and Statistical Applications	6	5	1	-	5	25	75	100
23UPCND1C06	Clinical Nutrition and Dietetics-II	6	5	1	-	5	25	75	100
23UPCND1C07	Hospital Administration and Practices	6	5	1	-	5	25	75	100
23UPCND1L03	Computer Applications in Clinical Nutrition and Dietetics-II Practical	6	-	-	6	4	40	60	100
<b>Elective (Discipline Centric)-V (23UPCND1E07 or 23UPCND1E08)</b>									
23UPCND1E07	Diet Counselling Tools and Techniques	3	2	1	-	3	25	75	100

23UPCND1E08	Food Microbiology and Safety								
23UPCND1N02	Non Major Elective-II	3	3	-	-	2	25	75	100
23UPCND1I01	Internship/Industrial Activity 30 days internship in dietary department (Second Semester Holidays)	-	-	-	-	2	-	-	-
<b>Total</b>		<b>30</b>				<b>26</b>	<b>165</b>	<b>435</b>	<b>600</b>
<b>SEMESTER –IV</b>									
23UPCND1C08	Food Service Management	6	5	1	-	5	25	75	100
23UPCND1C09	Nutrition for Sports and Exercise	6	5	1	-	5	25	75	100
23UPCND1P01	Project with Viva-Voce Proof of Concept/Prototype for a diet related problem	10	-	10	-	7	50	150	200
23UPCND1E09	Elective –VI (Industry/ Entrepreneurship) Therapeutic Food Formulation	4	3	1	-	3	40	60	100
23UPCND1S01	Skill Enhancement Course-Professional Competency Skill Entrepreneurship in Health Care	4	1	3	-	2	25	75	100
23UPCND1X01	Extension Activity Nutrition/Diet Counselling to Individuals	-				1	100	-	100
<b>Total</b>		<b>30</b>				<b>23</b>	<b>265</b>	<b>435</b>	<b>700</b>
<b>Total</b>						<b>92</b>	<b>735</b>	<b>1765</b>	<b>2500</b>

\*Total weekly contact hours: 120

Total number of credits: 92

#### List of Non-Major Elective Papers for other PG courses

Subject code	Title of the Paper	Weekly contact Hours	Credits	Internal Marks	External Marks	Total Marks
23UPCND1N01	NME I (Swayam/MOOC/NPTEL)	4	2	-	100	100
23UPCND1N02	NME II Life Cycle Nutrition/ Nutrition Science	3	2	25	75	100

#### SCHEME OF EXAMINATIONS

The scheme of examinations for different semesters shall be as follows:

##### Theory Paper

External: 75 Marks

**Internal:** 25 Marks  
Total : 100 Marks  
Time : 3 hours

**Pattern of Question Paper:**

PART – A -Objective type; answer all questions 20 X 1 =20 Marks  
PART – B -Analytical Questions (3 out of 5) 3X 5 =15 Marks  
PART – C -Either or type descriptive questions 5 X8 =40 Marks

**Procedure followed for Internal Marks:**

**For Theory Papers**

Best two out of three tests: 10 Marks  
Seminar : 5 Marks  
Assignment : 5 Marks  
Attendance : 5 Marks  
**Total : 25 Marks**

**For Practical's**

Practical Internal  
Best two out of three tests : 40 Marks  
**Total : 40 Marks**  
External : **60 Marks**

**For Project and *viva voce***

Components of evaluation are as follows

Component – I (C1): Periodic Progress and progress reports (25 marks)

Components – II (C2): Results of work and draft report (25 marks)

Components – III (C3): Final evaluation and viva-voce (150 marks). The dissertation report evaluation is for 100 marks and the Viva-voce examination is for 50 marks.

Total : 200 Marks

**RANKING**

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking / Distinction. Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations under “Requirements for Proceeding to subsequent Semester” are only eligible for classification.

**M.Sc. Clinical Nutrition and Dietetics Course  
SEMESTER-I**

<b>Course Code &amp; Title</b>	<b>23UPCND1C01-Human Physiology</b>		
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>	<b>I</b>
<b>Cognitive Level</b>	<b>K-1, K-2, K-3 &amp; K-4</b>		
<b>Course Objectives</b>	<p><b>The Course aims</b></p> <ul style="list-style-type: none"> <li>• To understand the structure and functions of systems in human body.</li> <li>• To understand the integrated function of all systems and disease conditions.</li> <li>• To correlate the normal and diseased conditions.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<p><b>Immunology</b></p> <p>a) Definition, components of the immune system  b) Development of cellular and humoral immunity  c) Antigen and antibodies  d) Immune deficiency diseases, auto immune diseases  e) Allergy and immunology  f) Hyper sensitivity reactions</p>	25
<b>II</b>	<p><b>Respiratory, Digestive and Excretory system</b></p> <p>a) Physiology of respiration  b) Mechanism of respiration  c) Measurement of Respiratory parameters  d) Anatomy of digestive tract and process of digestion  e) Absorption and assimilation of food  f) Composition and functions of secretion of digestive juices and accessory organs and glands- Salivary, liver, gall bladder, intestine and pancreas  g) Physiology of kidney and nephron  h) Formation of urine  i) Voiding of urine</p>	26
<b>III</b>	<p><b>Endocrine and Reproduction</b></p> <p>a) Structure and functions of endocrine glands  b) Mechanism of hormonal action  c) Structure and functions of male and female reproduction  d) Pregnancy, Parturition, Menopause, Mammary glands and location  e) Hypo and Hyper secretions of glands</p>	25

<b>IV</b>	<p><b>Heart and Blood Circulation</b></p> <p>a) Anatomy of Heart  b) Components of cardiovascular system  c) Cardiac cycle  d) Cardiac Arrest  e) Heart rate and regulation</p> <p><b>Blood</b></p> <p>a) Composition of Blood  b) Structure and functions of erythropoiesis, hemoglobin  c) Structure and functions of WBC  d) Blood groups and coagulation of blood</p>	25
<b>V</b>	<p><b>Nervous System and Special Senses</b></p> <p>a) Spinal cord: Structure and functions, ascending and descending tracts, reflex action.  b) Brain: Structure and functions of cerebrum, optic thalamus, mid brain, pons, medulla oblongata, hypothalamus, cerebellum.</p> <p><b>Special Senses</b></p> <p>a) Physiology of Eye: structure of eye, dark and light adaptation, common defects due to abnormalities- presbyopia, cataract, astigmatism, blindness.  b) Structure and physiology of hearing.</p>	25
<b>Total Hours</b>		<b>126</b>

## References

### Textbooks

- Sembulingam, K, Prema Sembulingam (2019)- 9th Edition “Human Physiology: From Cells to Systems”, Cengage Learning.
- Ganong, W.F. (2010): Review of Medical Physiology, 23rd Edition, Lange Medical Publication.
- Guyton, A.G. and Hall, J.B. (2010): Text Book of Medical Physiology, 23rd Edition, W.B.Sanders Company, Prism Books (Pvt.) Ltd., Bangalore.
- Wilson, K.J.W and Waugh, A. (2022): Ross and Wilson Anatomy and Physiology in Health and Illness. 14th Edition, Churchill Livingstone.
- Jain, A.K.: Textbook of Physiology. Vol. I and II. Avichal Publishing Co., New Delhi -9th edition, 2021.
- McArdle, W.D., Katch, F.I. and Katch V.L (2022): Exercise Physiology. Energy, Nutrition and Human Performance, 9th Edition, Williams and Wilkins, Baltimore.
- Datta, Chandrani Sanyal (2018): Essentials of human physiology: AITBS.
- Marieb, Elaine N. (2021): Pearson Human anatomy & physiology, 11th edition.
- GK Pal- Textbook of Physiology, Vol 1& 2,3 -4th edition 2022, Jaypee Brothers Medical Publishers.
- Essentials of Medical Physiology – Anil Baran Singha Mahapatra, 5th edition, 2021.

### Web Resources

- <http://physiology.forumshealth.com/>
- <https://www.pdfdrive.com/physiology-books.html>
- <https://www.ncbi.nlm.nih.gov>

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Outline the important components of human physiology.</p> <p><b>CO2:</b> Discuss the cellular functions and explain its importance in healthy life.</p> <p><b>CO3:</b> Describe organ systems and its functions.</p> <p><b>CO4:</b> Explain the role and functions of sense organs.</p>
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**COs Consistency with POs and PSOs**

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
<b>CO1</b>	S	S	S	S	N	N	M	S	M	S	S
<b>CO2</b>	S	S	S	S	N	N	M	S	L	S	M
<b>CO3</b>	S	S	S	S	N	N	M	S	M	S	M
<b>CO4</b>	S	S	S	S	N	N	M	S	S	S	M

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	10	10	20	20
<b>Understand</b>	10	10	15	15
<b>Apply</b>	20	20	25	25
<b>Analyse</b>	10	10	15	15
<b>Evaluate</b>	-	-	-	-
<b>Create</b>	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1C02- Clinical Biochemistry</b>		
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>	<b>I</b>
<b>Cognitive Level</b>	<b>K-1, K-2, K-3, K-4, K-5</b>		
<b>Course Objectives</b>	<p><b>The course aims</b></p> <ul style="list-style-type: none"> <li>• To enable the students to understand the various mechanism adopted by the human body for the regulation of metabolic cycles.</li> <li>• To learn the interrelationship between various metabolic pathways.</li> <li>• To skill the sources, functions and deficiency conditions of macro and micro nutrients.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<p><b>Blood, Enzymes and its relevant diseases</b></p> <p>a) Structure and function of haemoglobin, abnormal haemoglobins.</p> <p>b) Disorders of haemoglobin</p> <p>c) Mechanism of blood clotting- intrinsic and extrinsic pathway</p> <p>d) Disturbances in blood clotting mechanisms – haemorrhagic disorders– haemophilia, vonWillebrand’s disease, purpura, Rendu-Osler- Werber disease, thrombotic thrombocytopenic purpura, disseminated intravascular coagulation, acquired prothrombin complex disorders, circulating anticoagulants.</p> <p><b>Enzymes</b></p> <p>a) Mechanism of enzyme action</p> <p>b) Factors influencing enzyme action</p> <p>c) Enzymes of clinical interests</p>	25
<b>II</b>	<p><b>Carbohydrates</b></p> <p>a) Occurrence, Classification and Structure, Physio-chemical properties of carbohydrates</p> <p>b) Metabolism of carbohydrates -Glycolysis Conversion of pyruvate to acetyl co A, Krebs-cycle, Glycogenesis and Glycogenolysis, Gluconeogenesis, Glycogen metabolism, Pentose phosphate pathway, Cori’s cycle, Factors influencing blood glucose level, pentosuria, Galactosemia and Glycogen storage diseases.</p>	25
<b>III</b>	<p><b>Metabolism of Proteins</b></p> <p>a) Classification, structure and properties of proteins</p> <p>b) Classification, structure and properties of amino acids,</p> <p>c) General reactions of protein metabolism</p> <p>d) Inborn errors of protein metabolism - Phenylketonuria, alkaptonuria, albinism, tyrosinosis, maple syrup urine disease, Lesch-Nyhan syndrome, sickle cell anemia, Histidinemia.</p> <p><b>Metabolism of amino acids -</b></p>	26

	<p>a) Amino acid pool, Decarboxylation, Transamination, Deamination, Glycine, Tyrosine, Tryptophan, Methionine and urea cycle.</p> <p>b) Nucleic acids- Biosynthesis and degradation of purines and pyrimidine's and their regulation.</p>	
<b>IV</b>	<p><b>Lipids</b></p> <p>a) Classification, General structure and properties of fats and fatty acids.</p> <p>b) Metabolism of Lipids – Biosynthesis of saturated and unsaturated fatty acids, <math>\beta</math>-Oxidation of fatty acid.</p> <p>c) Biosynthesis of glycerides, phospholipids and cholesterol.</p> <p>d) Regulation of lipid metabolism and ketone bodies.</p> <p>e) Disorders of lipid metabolism, lipoproteins and their significance.-, hyperlipidemia, hyperlipoproteinemia Gaucher's disease, Tay-Sach's and Niemann-Pick disease, ketonebodies, fatty acid oxidation defects, Abetalipoproteinemia.</p>	25
<b>V</b>	<p><b>Vitamins</b></p> <p>a) Absorption, Transport, Mobilization and Biochemical Functions of Vitamin A,C, &amp; D,</p> <p>b) Absorption, Transport, Storage and Biochemical Functions of Vitamin E , K, Folic acid &amp; Cobalamin</p> <p>c) Chemistry and Biochemical Functions of thiamin, Riboflavin, Niacin, Biotin &amp; Pantothenic acid</p> <p><b>Minerals</b></p> <p>a) Biochemical Functions - Calcium, Phosphorous, Magnesium, Sodium, Potassium, Chloride, Sulfur, Iron, Zinc and Selenium</p>	25
	<b>Total Hours</b>	<b>126</b>

## References

### Text Books

- Ambika Shanmugam- Fundamentals of Biochemistry for Medical Students, 8<sup>th</sup> edition, 2016, Wolters Kluwer India Pvt. Ltd
- Lehinger et al. – Principles of Biochemistry, 7<sup>th</sup> ed. 2017 WH Freeman.
- Michael Murphy, Rajeev Srivastava, Kevin Deans, Clinical Biochemistry An Illustrated Colour Text, 7th Edition, June 13, 2023
- Satyanarayana.U, Essentials of Biochemistry, 2<sup>nd</sup> edn, 2008, Books And Allied(p) Ltd
- Devlin: Textbook of Biochemistry with clinical correlation, 7<sup>th</sup> Edn, 2010, John Wiley and Sons Publishers.
- Zubay's Principles of Biochemistry 5th edition Rastogi, Aneja. Meditech, 2019.
- Harpers Illustrated Biochemistry, Victor W., Ph.D. Rodwell, David A., Ph.D. Bender, Kathleen M., Ph.D. Botham, Peter J., Ph.D. Kennelly, P. Anthony, Ph.D. Weil, 31st edition, McGrawHill, LANGE, 2015.

### Reference Books

- Berg, Jeremy M. et al. "Biochemistry", 6<sup>th</sup> Edition, W.H. Freeman and Co., 2006.
- Voet, D. and Voet, J.G., "Biochemistry", 4<sup>th</sup> Edition, John Wiley and Sons Inc., 2011.
- Murray, R.K., et al "Harper's Illustrated Biochemistry", 30th Edition, McGraw-Hill, 2015
- Devin.T.M- Textbook of Biochemistry with Clinical Correlations, 1997, 4<sup>th</sup> Ed.,

Wiley LissInc.

- Voet and Prat- Fundamentals of Biochemistry, 8<sup>th</sup> Edn, 2004, John Wiley& Sons
- Conn, stumpt.et.al. Outlines of Biochemistry, 2001, 5<sup>th</sup> Ed John Wiley and Sons.
- Murrayet.al.–Harpers Illustrated Biochemistry, 2000, 25<sup>th</sup> Edn, Macmillan Worth Publishers.
- Henry. R. D: Clinical Chemistry- Principles and Techniques (Harfer and Row)

**Web Resources**

- www.virutallibrarybiochemistry
- <http://themedicalbiochemistrypage.org>

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Summarize the Functions of Blood &amp; Enzymes.</p> <p><b>CO2:</b> Explain the metabolism of Carbohydrate, Protein &amp; Lipids</p> <p><b>CO3:</b> Describe the Absorption, Transport, Mobilization and Biochemical Functions of Vitamins</p> <p><b>CO4:</b> Determine the inborn errors of metabolism.</p> <p><b>CO5:</b> Discuss the Biochemical Functions of minerals.</p>
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**COs Consistency with POs and PSOs**

CO/PO/PSO	PO							PSO				
	1	2	3	4	5	6	7	1	2	3	4	
<b>CO1</b>	S	S	S	M	L	M	M	M	M	M	M	M
<b>CO2</b>	S	S	S	M	L	L	M	M	L	S	L	L
<b>CO3</b>	S	S	S	S	L	L	M	S	L	S	L	L
<b>CO4</b>	S	S	S	S	L	L	S	S	M	M	L	L
<b>CO5</b>	S	S	S	S	L	M	S	S	S	S	M	M

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	10	10	20	20
<b>Understand</b>	10	15	25	25
<b>Apply</b>	15	10	10	10
<b>Analyse</b>	10	10	10	10
<b>Evaluate</b>	5	5	10	10
<b>Create</b>	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Title</b>	<b>Code&amp;</b>	<b>23UPCND1L01- Human Physiology and Clinical Biochemistry Practical</b>	
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>	<b>I</b>
<b>Cognitive Level</b>	<b>K-1,K-2,K-3,K-4&amp;K-5</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• To provide practical experience on physiological concepts.</li> <li>• To govern measurement techniques and investigations in blood and urine samples.</li> <li>• To provide practical laboratory training in the estimation of various nutritional parameters in blood and urine.</li> <li>• Acquire skills in using laboratory instruments.</li> </ul>		

### Human Physiology Practical

<b>S. No</b>	<b>Content</b>	<b>Number of Hours</b>
1.	Microscopic study of epithelial and connective tissue.	10
2.	Microscopic study of muscular and nervous tissue	
3.	Determination of bleeding time	11
4.	Determination of clotting time	
5.	Determination of blood group.	11
6.	Determination of heart rate and pulse rate.	
7.	Recording of blood pressure.	
8.	Estimation of haemoglobin content	11
9.	Determination of blood group.	
10.	Determination of erythrocyte sedimentation rate (ESR).	
<b>Total Hours</b>		<b>54</b>

### Clinical Biochemistry Practical

<b>S. No</b>	<b>Content</b>	<b>Number of Hours</b>
1.	Estimation of Blood Glucose	11
2.	Estimation of Total Protein	
3.	Estimation of Cholesterol in Blood	11
4.	Determination of Serum Creatinine	
5.	Estimation of Serum Iron	11
6.	Estimation of Serum Urea	
7.	Estimation of Calcium in Urine	
8.	Estimation of Urea in Urine	11
9.	Estimation of Creatinine in Urine	
10.	Determination of PH in urine	10
<b>Total Hours</b>		<b>54</b>

**References****Text Books**

- Ghai – A Textbook of Practical Physiology, Jaypee Brothers Medical Publishers
- G.K.Pal - Textbook of Practical Physiology, Jaypee Brothers Medical Publishers

**Reference Books**

- Stirling, William – Outlines of Practical Physiology, Blakiston & Co.
- Manual of Practical Physiology- A.K.Jain, Mittal books.

**Web Resources**

- [www.tnmgrmu.ac.in](http://www.tnmgrmu.ac.in)

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Explain the physiology of tissues.</p> <p><b>CO2:</b> Apply the principles to estimate various parameters in blood.</p> <p><b>CO3:</b> Apply the principles to estimate various parameters in urine.</p>
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**COs Consistency with POs and PSOs**

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
<b>CO1</b>	S	S	S	S	S	M	S	S	S	S	S
<b>CO2</b>	S	S	S	S	S	L	S	M	M	L	L
<b>CO3</b>	S	S	S	S	S	L	S	M	M	L	L

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	15	10	10	10
<b>Understand</b>	15	10	15	15
<b>Apply</b>	10	15	10	10
<b>Analyse</b>	10	15	10	10
<b>Evaluate</b>	10	10	15	15
<b>Create</b>	-	-	-	-
<b>Total</b>	<b>60</b>	<b>60</b>	<b>60</b>	<b>60</b>

<b>Course Code&amp; Title</b>	<b>23UPCND1E01- Contemporary Nutrition</b>		
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>	<b>I</b>
<b>Cognitive Level</b>	<b>K-1,K-2,K-3&amp;K-4</b>		
<b>Course Objectives</b>	<p><b>The Course aims</b></p> <ul style="list-style-type: none"> <li>• To understand the pathway to healthy lifestyle through contemporary nutrition.</li> <li>• To skill the sources, functions and deficiency conditions of macro and micro nutrients.</li> <li>• To identify nutritive and non-nutritive components of food.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<p><b>Contemporary Nutrition</b></p> <p>a) Definition and Contemporary Issues in Nutrition</p> <p><b>Recommended Dietary Allowances</b></p> <p>a) Definition, Factors affecting RDA, Principles of deriving RDA, Determination of RDA, ICMR RDA –July, 2023 Guidelines, revised RDA.</p> <p><b>Energy</b></p> <p>a) Determination of energy value of food</p> <p>b) Total energy requirement - Basal Metabolic Rate- Definition, Measurement of basal metabolism, Factors affecting BMR. Physical activity- Physical activity ratio and Physical activity level, Factors affecting physical activity. Thermic effect of food, Factors affecting thermic effect of food.</p> <p>c) Measurement of energy expenditure, Resting energy expenditure</p> <p><b>Carbohydrates</b></p> <p>a) Classification, Functions, Sources, Glycemic index of foods</p> <p>b) Fibre- Components of dietary fibre, Physiologic and metabolic effect, Role of fibre in disease prevention, RDA, Sources.</p>	18

<b>II</b>	<p><b>Proteins</b></p> <p>a) Classification of proteins and amino acids.  b) Functions of proteins and amino acids, Protein and amino acid requirements and sources.  c) Protein quality, methods of evaluating protein quality.  d) Therapeutic applications of specific amino acid.  e) Protein-Energy Malnutrition.</p> <p><b>Lipids</b></p> <p>a) Classification, Types of fats in the body and food.  b) Functions, requirements and sources.  c) Role of essential fatty acids.  d) Effect of deficiency and excess of fats.</p>	18
<b>III</b>	<p><b>Vitamins</b></p> <p>a) Fat-soluble Vitamins: A, D, E, &amp; K - Functions, Requirements, Sources, Deficiency and Toxicity.  b) Water Soluble vitamins B complex and Vitamin C - Functions, Requirements, Sources, Deficiency and Toxicity.</p>	18
<b>IV</b>	<p><b>Macro minerals</b></p> <p>a) Calcium, Phosphorus, Magnesium, Sodium, Potassium, and Chloride - Functions, Requirements, Sources, Deficiency and Toxicity.</p> <p><b>Micro minerals</b></p> <p>a) Iron, copper, iodine, fluoride, chromium, and zinc - Functions, Requirements, Sources, Deficiency and Toxicity.  b) Other trace elements.</p>	18
<b>V</b>	<p><b>Water</b></p> <p>a) Distribution, Function, Requirements, Sources.  b) Water balance, Maintenance of water balance, Water depletion, Intoxication.</p> <p><b>Antioxidants</b></p> <p>a) Free radicals and Reactive Oxygen Species- Definition, Sources, Prevention.  b) Antioxidant defence systems. Antioxidants and Disease.</p>	18
<b>Total Hours</b>		<b>90</b>

**References**

**Text Books**

- Indian Council of Medical Research Nutrient Requirements and Recommended Dietary Allowances for India, A Report of the Expert Group of the Indian Council of Medical Research, New Delhi; ICMR. July 2023 Revised.
- Srilakshmi B. (2021): Nutrition Science, 7<sup>th</sup> Edn. New Age International (P) Ltd.

Publishers, New Delhi.

- Matab S. Bamji, N. Prahlad Rao, Vinodini Reddy (2019)-Fourth Edition: Text Book of Human Nutrition, Oxford & IBM Publishing Co. Pvt. Ltd., New Delhi.
- Swaminathan M. (1991): Advanced Text Book on Food & Nutrition, Vol. I & II (2nd Edition, Revised), Bangalore printing & Publishing Ltd.

#### Reference Books

- Kathleen Mahan and Sylvia Escort – Stump (2008)- 12th Edition: Food, Nutrition & Diet Therapy 11th Edition, W.B. Saunder's Company London.
- Scrimshaw, N.S. and Gleason, G.R. (1992) Assessment Procedures. Qualitative Methodologies for Planning and Evaluation of Health related Programmes. International Nutrition foundation for Developing Countries, Boston.
- Roach Benyan (2003) Metabolism and Nutrition Elsevier Science Ltd. Philadelphia. U.S.A.
- Susan G. Dudek (2017)- 8th edition-Nutrition Essentials for Nursing Practice, Lippincot Willeams d Wilkias, Philadelphia.
- Z.S.C.Okoye: Biochemical Aspects of Nutrition, Prentice - Hall of India Private Limited, New Delhi.
- S.P.Singh:7th edition-2020, A Text Book of Biochemistry, Published by S.K.Jain, CBS publishers, New Delhi
- Shilo, M.E., Olson, J.A. and Shike, M. (1994): Modern Nutrition in Health and Disease, 8th Edition, Philadelphia; Lea and Febiger (Vol. I & II).
- Michael J. Gibney, Hester V Vorster and Frans J Kok (2003) Introduction to Human Nutrition. Blackwell publishing Oxford, U.K.

#### Web Resources

- <https://www.mheducation.com/highered/product/wardlaw-s-contemporary-nutrition-spees-smith/M9781260695489.html#toc>
- [https://www.academia.edu/42263763/Contemporary\\_Nutrition\\_Seventh\\_edition](https://www.academia.edu/42263763/Contemporary_Nutrition_Seventh_edition)

<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <b>CO1:</b> Discuss the basic concepts of recommended dietary allowances. <b>CO2:</b> Explain the classification, functions and role of carbohydrate and protein. <b>CO3:</b> Describe the fatty acids and its effects. <b>CO4:</b> Summarize the functions, requirements, sources, deficiency and toxicity of vitamins and minerals. <b>CO5:</b> Determine the distribution, function, requirements, sources of water and antioxidant defence systems.
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### COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
<b>CO1</b>	S	S	S	M	L	M	M	M	M	M	M
<b>CO2</b>	S	S	S	M	L	L	M	M	L	S	L
<b>CO3</b>	S	S	S	S	L	L	M	S	L	S	L
<b>CO4</b>	S	S	S	S	L	L	S	S	M	M	L
<b>CO5</b>	S	S	S	S	L	M	S	S	S	S	M

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

### Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	10	10	20	20
<b>Understand</b>	10	15	25	25
<b>Apply</b>	15	10	10	10
<b>Analyse</b>	10	10	10	10
<b>Evaluate</b>	5	5	10	10
<b>Create</b>	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1E02- Food Properties</b>		
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>	<b>I</b>
<b>Cognitive Level</b>	<b>K-1,K-2, K-3,K-4&amp;K-5</b>		
<b>Course Objectives</b>	<p><b>The Course aims</b></p> <ul style="list-style-type: none"> <li>• To provide a fundamental understanding of physical properties of foods.</li> <li>• To enable students gain knowledge on different method of measuring physical properties in food.</li> <li>• To understand the relationship between physical and functional properties of raw, semi-finished and processed food to obtain products with desired shelf-life and quality.</li> </ul> <p>To</p>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<p><b>Physical Attributes of foods</b></p> <p>a) Size, Shape, Particle Size Distribution,  b) Volume - Methods of measurement (Liquid Displacement, Gas Displacement, Solid Displacement )  c) Expressions of volume, density, specific gravity, porosity and shrinkage.  d) General principles of sampling of foods for analysis.  e) Brix value–Importance of brix, calculation of brix in food samples. Hand refractometer  f) Salt determination</p>	18
<b>II</b>	<p><b>Rheological Properties of Foods</b></p> <p>a) Introduction to Rheology  b) Flow of Material-Newtonian &amp; Non-Newtonian Fluids,  c) Viscosity Measurement- Capillary Flow Viscometers, Orifice Type Viscometers,  d) Texture of Foods - Compression, Snapping-Bending, Cutting Shear, Puncture, Penetration, Texture Profile Analysis.  e) Dough Testing Instruments- Farinograph and Mixograph, Extensograph and Alveograph, Amylograph.</p>	18
<b>III</b>	<p><b>Water Activity of Foods</b></p> <p>a) Determination of water activity in food,  b) Importance of water activity in food.  c) Factors affecting and influencing the water activity in food, Relationship between water content and water activity in food products.  d) Methods of measuring water activity.</p>	18

<b>IV</b>	<b>Color measurements</b> a) Color–Measurements(Spectrophotometers &Colorimeters) Color Systems- b) Importance of color measurement in food products c) Various measurement methods,-Reflection, transmission, transmittance	18
<b>V</b>	<b>Thermal Properties of Foods</b> a) Fourier’s Law of Heat Conduction; Thermal Conductivity -Measurement of Thermal Conductivity (Steady State &Unsteady-State Methods); b) Specific Heat - Measurement of Specific Heat (Differential Scanning Calorimeter/DSC), Method of Calculated Specific Heat; c) Thermal Diffusivity (Indirect Prediction Method & Direct Measurement Methods).	18
	<b>Total Hours</b>	90

**Reference**

**Text books**

- Sahil S and Sumnu S. Physical Properties of Foods, Springer Science, Business Media, NewYork.2006.
- Figura L and Teixeira AA. Food Physics: Physical properties-Measurement and application, Springer Verlag, Berlin, Heidelberg. 2007.
- Vliet TV. Rheology and Fracture Mechanics of Foods, CRC Press, Boca Raton: US.2014. Applicable from 1st June, 2018 and onwards Page 86

**Reference Books**

- Fellows PJ. Food Processing Technology: Principles and Practice. Ellis Horwood Ltd, USA, 1998.
- Ramaswamy H and Marcotte M. Food Processing- Principles and Applications, Taylor and Francis group, Florida. 2006.

<b>Course Outcomes</b>	On completion of the course, students should be able <b>CO1:</b> Assess the rheological properties of foods. <b>CO2:</b> Analysis methods of food samples. <b>CO3:</b> Compile the physical and functional properties of food. <b>CO4:</b> Describe the factors influencing and affecting the measurements of food samples.
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**\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation**

**COs Consistency with POs and PSOs**

CO/PO/PSO	PO						PSO				
	1	2	3	4	5	6	7	1	2	3	4
<b>CO1</b>	L	L	L	L	M	M	M	L	L	L	L
<b>CO2</b>	L	L	L	L	M	M	M	L	L	L	L
<b>CO3</b>	L	L	L	L	M	M	M	L	L	L	L
<b>CO4</b>	L	L	L	L	L	L	L	L	L	L	L

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests(Marks)			Terminal Examination(Marks)
	I	II	III	
<b>Remember</b>	15	10	20	20
<b>Understand</b>	15	15	20	20
<b>Apply</b>	10	15	15	15
<b>Analyse</b>	5	5	10	10
<b>Evaluate</b>	5	5	10	10
<b>Create</b>	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code&amp; Title</b>	<b>23UPCND1E03- Elective (Generic)-II- Applied Food Science</b>		
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>	<b>I</b>
<b>Cognitive Level</b>	<b>K-1,K-2,K-3&amp;K-4</b>		
<b>Course Objectives</b>	<p><b>The Course aims</b></p> <ul style="list-style-type: none"> <li>• To assist the students to apprehend the composition, classification and function of various food groups.</li> <li>• To analyse the factors affecting cooking and keeping quality of food.</li> <li>• To impart the scientific knowledge of food principles required to become successful food scientists and nutritionist who can work in industry, government or academia or as entrepreneurs.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<p><b>Cereals and Millets</b></p> <p>a) Structure of wheat</p> <p>b) Composition, Nutritive Value and Functionality of rice and wheat in food system.</p> <p>c) Composition, and Nutritive Value of millets</p> <p><b>Starch Cookery</b></p> <p>a) Types of starch</p> <p>b) Gluten formation and Factors affecting gluten formation</p> <p>c) Gelatinization and Factors affecting gelatinization</p> <p>d) Dextrinization and Changes in cooked starch.</p> <p><b>Pluses</b></p> <p>a) Important pulses, Composition, and Nutritive value</p> <p>b) Methods of processing</p> <p>c) Toxic constituents, Pulse cookery</p> <p>d) Soyabean- Processed Soyabean Products, Extracted Soyabean Proteins, Fermented Products of Soyabean</p>	18
<b>II</b>	<p><b>Milk and milk products</b></p> <p>a) Composition, Nutritive value, Properties.</p> <p>b) Milk Cookery, Milk Processing</p> <p>c) Fermented and Non-fermented Milk products.</p> <p><b>Eggs</b></p> <p>a) Structure, Composition and Nutritive value</p> <p>b) Quality grading, changes during storage</p> <p>c) Egg cookery</p> <p>d) Egg processing</p> <p>e) Egg products</p>	18
<b>III</b>	<p><b>Flesh foods</b></p> <p><b>Meat</b></p> <p>a) Structure, Composition and Nutritive value</p> <p>b) Post-mortem changes, Ripening of meat and Tenderizing of meat</p>	18

	<p>c) Cooking of meat, Changes produced during cooking of meat</p> <p><b>Poultry</b></p> <p>a) Desi Birds, Classification, Poultry Processing b) Composition and Nutritive Value c) Poultry Cooking</p> <p><b>Marine foods (Fish and Seaweeds)</b></p> <p>a) Types, Composition and Nutritive value b) Criteria for fish and seaweed selection c) Fish and seaweed products d) Fish Spoilage, Preservation and Processing</p>	
<b>IV</b>	<p><b>Vegetables and Fruits</b></p> <p>a) Structure, Composition b) Pectins and Plant acids c) Types of pigments. d) Effect of cooking on colour and texture of vegetables. e) Browning reactions-Enzymatic &amp; non-enzymatic and its prevention.</p> <p><b>Fats and Oils</b></p> <p>a) Composition of food fats b) Functions of Oil and Fats in Foods c) Processing of Oil and Fats d) Fat substitutes and Trans fatty acids e) Rancidity- Types, Mechanism and prevention. f) Nutritional Food Mixes from Oilseeds - Processing of Oilseeds for Food Use , Protein Rich Foods, Protein Enriched Cereal Foods</p> <p><b>Sugar and Jaggery</b></p> <p>a) Nutritive value, Properties, Sugar related products b) Reactions of sugar- Caramelization, Hydrolysis, Crystallization c) Stages of cookery and role in Indian traditional sweet preparations</p>	18
<b>V</b>	<p><b>Evaluation of Food Quality</b></p> <p>a) Sensory characteristics of foods - Appearance, Colour and Flavor b) Types of sensory test, sensitivity test and objective evaluation.</p> <p><b>Food additives</b></p> <p>a) Definition and Needs for food additives b) Different food additives and food safety c) Unintentional additives</p> <p><b>Packaging and Labelling</b></p> <p>a) Importance, functions &amp; types of packaging and labelling material.</p>	18

	<b>Post-Harvest Technology</b> a) Post-harvest losses, reasons for losses, techniques to overcome losses.	
	<b>Total Hours</b>	<b>90</b>

## References

### Text Books:

- Srilakshmi B. (2018): Food Science, New Age International (P) Ltd. Publishers, New Delhi.
- N. Shakuntala Manay and M. Shadaksharaswamy (2020): Foods, Facts and Principles, New Age International (P) Ltd., New Delhi.
- Potter, N. and Hotchkiss, J.H. (1998): Food Science, Fifth ed., CBS Publishers and Distributors, New Delhi.

### Reference Books

- Meyer L.J. (2006): Food Chemistry, CBS Publishers and Distributors, New Delhi.
- Lee Frank A. (2007): Basic Food Chemistry, Westpot Connecticut: AVI Publishers.
- Swaminathan M (1979) : Food Science And Experimental Foods, Ganesh And Company Madras,
- Peckham G. And Freei and-Graves, G.H. (1979) : Foundation of Food Preparation, Mac Millian Company
- Griswold, R.M. (1979): The Experimental Study of Food, Houghton Mifflim Boston.
- Girdharilal, G.S. Sidappa and G.L. Tandon (1986): Preservation of Fruits and Vegetables, (2nd Ed), New Delhi: Indian Council of Agricultural Research.
- Charley M. J (1982): Food Science (2nd Ed), John Wiley and Sons.
- Belle Lowe (1963) : Experimental Cookery, John Wiley And Sons Inc., New York
- Paul P.C. And Palmer H.H. (1972) : Food Theory And Application John Wiley And Sons, London
- Bennion, Marion and O. Hughes (1986): Introductory Foods, Edi: mac millian N. Y.
- Mahindru, S.N.: Food Additives, Characteristics, Detection and Estimation, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
- Acharya, K.T.: A Historical Dictionary of Indian Foods, Oxford Publishing Co.
- Belitz, H.D. and Grosch W., (1999) : Food Chemistry, (2nded), Springer, New York.

### Web Resources

- Food Technology Abstracts, Central Food Technological Research Institute Mysore.
- Food Technology, Journal of the Institute Of Food Technology, Illinois, USA.
- Food Digest, CFTRI Mysore.
- Journal of Agriculture and Food Chemistry.
- Cereal Science.
- Indian Food Industry AFSTI, CFTRI, Mysore.
- Journal of Food Science and Technology CFTRI, Mysore.
- Indian Food Packer, All Indian Food Preserves Association, Delhi.
- Journal of Dairy Science.10. Advances in Food Research.

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Cite and explain the chemistry, structure and composition underlying the properties of various food components.</p> <p><b>CO2:</b> Ascertain the major chemical reactions that occur during food preparation and storage.</p> <p><b>CO3:</b> Apply food science knowledge to describe functions of ingredients in food.</p> <p><b>CO4:</b> Plan appropriate sensory evaluation tests to answer specific questions regarding food attributes or consumer preferences.</p> <p><b>CO5:</b> Describe techniques that can be used to monitor quality of raw ingredients and final packaged products.</p>
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#### COs Consistency with POs and PSOs

CO/PO/PSO	PO						PSO				
	1	2	3	4	5	6	7	1	2	3	4
<b>CO1</b>	S	S	S	L	L	M	L	S	S	L	L
<b>CO2</b>	S	S	S	S	M	L	M	S	S	M	L
<b>CO3</b>	S	S	S	S	N	M	M	S	S	S	M
<b>CO4</b>	S	S	S	M	L	S	S	S	S	S	L
<b>CO5</b>	S	S	S	S	M	S	N	S	S	S	S

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation,

N- No correlation Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	5	10	20	20
<b>Understand</b>	15	10	15	15
<b>Apply</b>	10	15	15	15
<b>Analyse</b>	10	10	15	15
<b>Evaluate</b>	10	5	10	10
<b>Create</b>	-	-	-	-
<b>Total</b>	50	50	75	75

## SEMESTER-II

<b>Course Code &amp; Title</b>	<b>23UPCND1C03 -Human Development and Nutrition</b>		
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>	<b>II</b>
<b>Cognitive Level</b>	<b>K-1, K-2, K-3, &amp;K-4</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• To know the importance of nutrition during life span and dietary modifications for different age groups.</li> <li>• Develop aptitude to learn the stages of growth and development of different age groups</li> <li>• To familiarize the theories of growth and development of all ages.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<b>Nutrition in Pregnancy</b> <ol style="list-style-type: none"> <li>a) Physiology of Pregnancy</li> <li>b) Stages of Gestation, Maternal Weight Gain</li> <li>c) Nutritional requirements and dietary guidelines during Pregnancy</li> <li>d) High risk Pregnancies and Complications during Pregnancy</li> <li>e) Role of Exercise &amp; Fitness during Pregnancy</li> <li>f) Hyperglycaemia in pregnancy</li> </ol>	18
<b>II</b>	<b>Nutrition during Lactation</b> <ol style="list-style-type: none"> <li>a) Breast feeding biology, Psycho - physiological aspects of Lactation, Factors affecting Lactation Capacity.</li> <li>b) Nutritional requirements &amp; Dietary Guidelines</li> <li>c) Galactogogues</li> <li>d) Lactation Management in Normal &amp; Special conditions</li> <li>e) Effect of Breast Feeding on Maternal Health</li> </ol> <b>Nutrition in Infancy</b> <ol style="list-style-type: none"> <li>a) Growth and Development and Nutrient Needs</li> <li>b) Infant feeding, Volume and Composition of Breast Milk, Human Milk Vs. Artificial Formula.</li> <li>c) Weaning Foods and Feeding Problems</li> <li>d) Common Nutrition Problems</li> <li>e) Preterm and LBW infants: Consequences, Implications for Feeding and Management.</li> </ol>	18
<b>III</b>	<b>Nutrition in Childhood</b> <ol style="list-style-type: none"> <li>a) Growth and Development – Stage, Theories – Maturationist theory, Behaviorist theory, Eriksons psycho analytical theory, Piagets cognitive theory, Vygotsky’s theory.</li> <li>b) Nutritional requirements for Preschool and School Children</li> <li>c) Micronutrient Malnutrition among Preschool Children</li> </ol>	18

	<p>d) Nutrition for Special Children- Autism</p> <p>e) Feeding Problems</p> <p>f) Healthy food choices during Childhood</p> <p>g) Factors to be considered for planning a School Lunch</p>	
<b>IV</b>	<p><b>Adolescence</b></p> <p>a) Growth and Development – Stages, Theories – Freud’s psychosexual stage theory, Kohlberg’s moral understanding stage theory, and Bronfenbrenner’s ecological theory.</p> <p>b) Physiological and Psychological changes</p> <p>c) Nutritional requirements of Adolescents</p> <p>d) Nutritional issues and eating disorders in Adolescence</p> <p><b>Adulthood</b></p> <p>a) Theories of Adult Development: Levinson, Vaillant &amp; Neugarten</p> <p>b) Physiological and Psychosocial changes</p> <p>c) Common Nutritional Concerns and Diet</p> <p>d) Nutritional requirements for Adult Man and Woman</p> <p>e) Physical Activity in Adulthood</p>	18
<b>V</b>	<p><b>Elderly</b></p> <p>a) Theories of Aging –</p> <ul style="list-style-type: none"> <li>- Theory Building in Aging- Historical Development of Theories of Aging, Models and Explanation, Theory Development and Research Design in Aging.</li> <li>- Biological Theories of Aging - Biological Theories of Senescence, Stress Theories of Aging.</li> <li>- Psychological Theories of Aging- Theories of Cognition, Theories of Everyday Competence, Social-Psychological Theories.</li> <li>- Sociological Theories of Aging - Anthropological Theories, Life Course Theories, Social Theories of Aging.</li> </ul> <p>b) Nutritional requirements of the Elderly</p> <p>c) Effects of Aging on organ functions and Nutritional Health of Elderly</p>	18
	<b>Total</b>	<b>90</b>
	<b>Hours</b>	

### References

#### Text Books

- Brown, J. E-Nutrition through the Life Cycle, 7th edition, 2019, Cengage Learning.
- Mahan L. K. & Stump S.E Krause’s - Food Nutrition and Diet Therapy, 12th edition, 2008, Saunders.
- B.Srilakshmi - Nutrition Science, 7th edition-2021, New Age International.
- Bajaj.M, 1st edition-2023, Two lives- Twice as precious, Aditi lakshmi bajaj.

### Reference Books

- Groff, J. L and Gropper, S. S- Advanced Nutrition and Human Metabolism, 5th edition- 2009, Belmont CA: Wads worth/Thomson Learning.
- Goodhart, R. S. S. and Shils, M. E - Modern Nutrition in Health and Disease, Philadelphia: Lea and Febiger.
- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, And A.E., Carwick: Normal And Therapeutic Nutrition, 17th Edn, Macmillan Publishing Company.
- Krause's., Kathleen Mahan., Marian T. Arlin: Food Nutrition & Diet Therapy, 8th Edition 1992, W.B. Saunders Company. 5. Jackson, M. S - Adolescent Nutritional Disorders, 1997, The New York Academy of Science.
- Jellife D.B- Assessment of Nutrition Status of the Community, 1966, WHO, Geneva.

### Web Resources

- <https://www.universalclass.com/articles/health/nutrition/nutritional-needs-for-different-ages>.
- <https://www.nutrition.org.uk/nutritionscience/life.html>.
- <http://www.open.edu/openlearncreate/mod/oucontent/view.php>.

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Define the nutritional needs of each age group.</p> <p><b>CO2:</b> Infer the appropriate theories to distinguish the developmental milestones.</p> <p><b>CO3:</b> Co-relate the physiological and psychological changes adhering to all age groups.</p> <p><b>CO4:</b> Interpret the nutritional problems pertaining to different ages.</p>
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### COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO				
	1	2	3	4	5	6	7	1	2	3	4	
<b>CO1</b>	S	S	S	S	S	S	S	S	S	S	S	S
<b>CO2</b>	S	S	S	S	M	M	S	S	S	S	S	S
<b>CO3</b>	S	S	S	S	L	L	S	S	S	S	S	S
<b>CO4</b>	S	S	S	S	S	S	S	S	S	S	S	S

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

### Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	10	10	20	20
<b>Understand</b>	10	10	20	20
<b>Apply</b>	15	15	15	15
<b>Analyse</b>	15	15	20	20
<b>Evaluate</b>	-	-	-	-
<b>Create</b>	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1C04- Clinical Nutrition and Dietetics-I</b>		
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>	<b>II</b>
<b>Cognitive Level</b>	<b>K-1, K-2, K-3, K-4&amp; K-5</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• To facilitate the students to realize the principles of diet.</li> <li>• To expertise in the dietary modifications for different diseases.</li> <li>• To develop the proficiency of becoming successful clinical dieticians.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<b>Clinical Nutrition and Dietetics</b> <ol style="list-style-type: none"> <li>a) Definition and history of dietetics.</li> <li>b) Dietitian as part of the Medical Team</li> <li>c) Nutritional Screening and care <ul style="list-style-type: none"> <li>- Nutritional Assessment</li> <li>- Diagnosis</li> <li>- Intervention and evaluation.</li> </ul> </li> <li>d) RDA and its guidelines</li> </ol> <b>Diet, Nutrient and Drug Interaction</b> <ol style="list-style-type: none"> <li>a) Effect of drugs on ingestion, Digestion, Absorption and metabolism of nutrients.</li> <li>b) Drug - Nutrient interaction</li> <li>c) Drug –drug interaction</li> </ol> <b>Artificial Intelligence</b> <ol style="list-style-type: none"> <li>a) In use of digital technologies in clinical nutrition</li> <li>b) In Dietary assessment</li> <li>c) In Nutrients Science Research <ul style="list-style-type: none"> <li>- In health care</li> </ul> </li> </ol>	18
<b>II</b>	<b>Diet Modifications</b> <ol style="list-style-type: none"> <li>a) Normal diet as a basis for therapeutic diets</li> <li>b) Routine Hospital Diet</li> <li>c) Feeding methods <ul style="list-style-type: none"> <li>- Enteral Nutrition- Site, Different tube sizes, Different types of feeds, Composition and Delivery methods and its complications.</li> <li>- Parenteral Nutrition- Type of access, Parenteral nutrition solutions/composition, Administration methods, Monitoring &amp; complications.</li> <li>- Immune nutrients</li> </ul> </li> </ol> <b>Dietary management in febrile condition</b> <ol style="list-style-type: none"> <li>a) Classification and etiology of fever/infection, symptoms, diagnostic tests, Metabolic changes during infection and dietary treatment for <ul style="list-style-type: none"> <li>- Typhoid, Influenza, Malaria, Tuberculosis and AIDS</li> </ul> </li> </ol> <b>Diet for weakened immune system</b>	18

	<p>a) Neutropenic diet, COVID and Dengue</p> <p><b>Dietary management in allergy</b></p> <p>a) Definition, Symptoms and Diagnostic tests</p> <p>b) Types of reaction</p> <p>c) Common food allergens and Mechanism of food allergy</p> <p>d) Elimination diets and Treatment</p> <p>e) Prevention of food allergy</p>	
<b>III</b>	<p><b>Dietary management in Surgery</b></p> <p>a) Nutrition in wound healing</p> <p>b) Stage of Convalescence</p> <p>c) Dietary management for pre-and post-surgical diets.</p> <p><b>Dietary management in Burns</b></p> <p>a) Classification and Complications</p> <p>b) Metabolic changes in protein and electrolytes</p> <p><b>Dietary management in Trauma</b></p> <p>a) Physiological, metabolic and hormonal response to injury</p> <p>b) Dietary management in trauma</p> <p><b>Dietary management in Sepsis</b></p> <p>a) Definition and Dietary management of Sepsis with or without Multiple Organ Dysfunction Syndrome (MODS)</p>	18
<b>IV</b>	<p><b>Nutrition for weight management: Disorders of energy balance</b></p> <p><b>Obesity</b></p> <p>a) Components of body weight</p> <p>b) Regulation of body weight-hunger, satiety and role of neurotransmitters</p> <p>c) Obesity: causes, types, assessment and health risks</p> <p>d) Management and treatment of obesity</p> <p>- Dietary Modification,</p> <p>-Physical activity</p> <p>- Behavioral therapies</p> <p>- Pharmacological treatment and</p> <p>-Surgical treatment</p> <p>e) Prevention</p> <p><b>Underweight</b></p> <p>a) Pathophysiology</p> <p>b) Causes, assessment, health risks and effect on nutritional status</p> <p>c) Dietary Management, Psychotherapy</p>	18
<b>V</b>	<p><b>Dietary Management in Musculoskeletal disorders</b></p> <p><b>Gout</b></p> <p>a) Aetiology, Role of proteins and purines, clinical features and complications, Management of gout</p> <p><b>Osteoporosis and Osteomalacia</b></p> <p>a) Prevalence, Types and Etiology and Role of Calcium, Phosphate&amp; Vitamin D in Osteoporosis and Osteomalacia.</p> <p><b>Rheumatoid disorders-Osteo arthritis, rheumatic arthritis and scleroderma</b></p> <p>a) Aetiology, dietary management and prevention</p>	18
<b>Total Hours</b>		<b>90</b>

## References

### Text Books

- B.Srilakshmi- Dietetics, 2023, 9<sup>th</sup> Edn, New Age International Pvt .Ltd. New Delhi.
- Kumud Khanna, Sharda Gupta, Santosh jain Passi and Rama Seth-Textbook of Nutrition and Dietetics - 2nd Edition, Elite Publishing House Pvt. Ltd, Delhi
- Anita Jatana- Clinical Nutrition Handbook, 2022, Jaypee Brothers Medical Publishers, New Delhi
- Dharsan Sohi-A Comprehensive Textbook of Applied Nutrition and Dietetics, 3<sup>rd</sup> Edition, 2022, Jaypee Brothers Medical Publishers, New Delhi
- Antia F.P. And Philip Abraham- Clinical Nutrition and Dietetics,4th edition- 2001, Oxford Publishing Company.
- Swaminathan S- Advanced Textbook On Food& Nutrition, 2015, Bappco

### Reference Books

- Mahan L.K., Sylvia Escott-Stump - Krause's Food Nutrition and Diet Therapy 11th Edition,2016 ,W.B. Saunders Company London.
- Passmore P. And M.A. EastWood- Human Nutrition and Dietetics, Churchill Living Stone.
- Raheena M. Begum - A Text Book of Foods Nutrition and Dietetics , 3 edition 2009, Sterling Publishers Pvt. Ltd
- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, and A.E., Carwick: Normal and Therapeutic Nutrition,17th Edn, Macmillan Publishing Company.
- Krause's., Kathleen Mahan., Marian T. Arlin: Food Nutrition & Diet Therapy, 8th Edition 1992, W.B. Saunders Company.
- Shills and Young Modern Nutrition in Health and Disease, 2012, Lippincott Williams and Wilkins.
- Bennion M.: Clinical Nutrition,2nd edition-2013, John Wiley& Sons.
- Whitney, E. N. and C. B.Cataldo, Understanding Normal and Clinical Nutrition, 8th edition-2008, West Pub.
- Williams S.R. Essentials of Nutrition and Diet Therapy, 12th edition, 2018, Mosby College Pub.S.Louis.

### Web Resources

- [www.anme.com.mx/libros/PrinciplesofNutrition.pdf](http://www.anme.com.mx/libros/PrinciplesofNutrition.pdf)
- <https://2012books.lardbucket.org/pdfs/an-introduction-to-nutrition.pdf>
- [krishikosh.egranth.ac.in](http://krishikosh.egranth.ac.in)

<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <b>CO1:</b> Elucidate the importance of interdisciplinary approaches to the management of nutritional problems and the promotion of nutritional health and well -being. <b>CO2:</b> Assess the nutritional status of critically ill patients <b>CO3:</b> Determine the dietary essentials for recovery and maintenance of various systems. <b>CO4:</b> Describe the etiology, symptoms and dietary management of deficiency diseases and febrile conditions. <b>CO5:</b> Explain, analyze, diagnose and causes of allergy.
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### COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
CO1	S	S	S	S	L	S	M	S	S	S	S
CO2	S	S	S	S	L	S	M	S	S	S	S
CO3	S	S	S	S	L	S	M	S	S	S	S
CO4	S	S	S	S	L	S	M	S	S	S	S
CO5	S	S	S	S	L	S	M	S	S	S	S

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

### Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	10	5	20	20
Understand	10	15	20	20
Apply	20	15	15	15
Analyse	5	10	10	10
Evaluate	5	5	10	10
Create	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1L02- Computer Applications in Clinical Nutrition and Dietetics-I Practical</b>		
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>	<b>II</b>
<b>Cognitive Level</b>	<b>K-3, K-4, K-5 &amp; K-6</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>To provide training in the planning and preparation of therapeutic diets using software.</li> <li>Expertise in various feeding formulas and techniques.</li> </ul>		

<b>S. No</b>	<b>Content</b>	<b>Number of Hours</b>
1.	Nutrition assessment screening-MNA, MUST, Lifestyle Assessment tools	9
2.	Preparation, physical testing and laboratory trail of formulas for enteral feeding and parenteral feeding formulas-Home based and commercial supplement feeds.	8
3.	Menu planning and software computation of nutrients for Diet Therapy: Clear fluid diet, Full liquid diet and soft diet	9
4.	Menu planning and software computation of nutrients for Kwashiorkor, marasmus and vitamin A deficiency	8
5.	Menu planning and software computation of nutrients for Anaemia, Typhoid and Influenza	8
6.	Menu planning and software computation of nutrients for Malaria, Tuberculosis and AIDS	8
7.	Menu planning and software computation of nutrients for weakened immune system- Neutropenic diet, COVID, Dengue and allergy	8
8.	Menu planning and software computation of nutrients for Pre & post-surgery patients	9
9.	Menu planning and software computation of nutrients for post burn condition patients with different percentage of burns	8
10.	Menu planning and software computation of nutrients for obese subjects with and without diabetes, and underweight with and without TB	9
11.	Menu planning and software computation of nutrients the pseudogout and gout patient.	8
12.	Menu planning and software computation of nutrients for osteopenia and osteoporosis	8
13.	Menu planning and software computation of nutrients the Osteo arthritis, and rheumatic arthritis patient	8
<b>Total hours</b>		<b>108</b>

### References

#### Text Books

- Akansha Yadav, Monika Arora, Swayam Siddha-Practical Manual of Nutrition and Dietetics, 2019, Kalpaz Publications, New Delhi
- Supriya V - Clinical Nutrition and Dietetics Manual for Nurses, 2017, 1<sup>st</sup> Edition, Jaypee Brothers Medical Publishers, New Delhi
- Dr. S Nasreen, Syeda Uzma Nabeela, Zainab Bano- Clinical Dietetics (Theory & Practical), <https://www.flipkart.com/clinical-dietetics-theory-practical/p/itm872d1dadf5abf>

- Antia F.P. And Philip Abraham-Clinical Nutrition and Dietetics, 2001, Oxford Publishing Company.
- Swaminathan S- Advanced Textbook On Food & Nutrition, 2015, Bappco
- B. Srilakshmi- Dietetics, 2019, 8<sup>th</sup>Edn, New Age International Pvt. Ltd. New Delhi.

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- Mahan L.K., Sylvia Escott-Stump - Krause's Food Nutrition and Diet Therapy 10th Edition, 2001, W.B. Saunders Company London.
- Passmore P. And M.A. East Wood - Human Nutrition and Dietetics, Churchill Living Stone.
- Raheena M. Begum - A Text Book of Foods Nutrition and Dietetics, 3<sup>rd</sup> edition 2009, Sterling Publishers Pvt. Ltd
- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, and A.E., Carwick: Normal and Therapeutic Nutrition, 17<sup>th</sup> Edn, Macmillan Publishing Company.
- Krause's., Kathleen Mahan., Marian T. Arlin: Food Nutrition & Diet Therapy, 8<sup>th</sup> Edition 1992, W.B. Saunders Company.
- Shills and Young- Modern Nutrition in Health and Disease, 2012, Lippincott Williams and Wilkins.
- Bennion M.: Clinical Nutrition, John Wiley & Sons.
- Whitney, E. N. and C. B.Cataldo, Understanding Normal and Clinical Nutrition, 1983, West Pub.
- Williams S. R. Essentials of Nutrition and Diet Therapy, 4th edn, 1986, Mosby College Pub. S. Louis.

#### Web Resources

- [www.anme.com.mx/libros/PrinciplesofNutrition.pdf](http://www.anme.com.mx/libros/PrinciplesofNutrition.pdf)
- <https://2012books.lardbucket.org/pdfs/an-introduction-to-nutrition.pdf>
- [krishikosh.egranth.ac.in](http://krishikosh.egranth.ac.in)

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Assess the nutritional status using various nutritional assessment tools.</p> <p><b>CO2:</b> Develop a ready –reckoner for calculating nutrient content of various foods in normal persons and the ability to modify for given disease conditions.</p> <p><b>CO3:</b> Apply the principles of diet and determine the dietary essentials for recovery from critical illness.</p> <p><b>CO4:</b> Plan menu for the given disease condition and compare and contrast with R.D.A using software.</p>
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#### COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
<b>CO1</b>	S	S	S	S	S	M	S	S	S	S	S
<b>CO2</b>	S	S	S	S	S	S	S	S	S	S	S
<b>CO3</b>	S	S	S	S	S	S	S	S	S	S	S
<b>CO4</b>	S	S	S	S	S	S	S	S	S	S	S

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

### Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	-	-	-	-
<b>Understand</b>	-	-	-	-
<b>Apply</b>	15	10	10	10
<b>Analyse</b>	15	15	10	10
<b>Evaluate</b>	15	15	15	15
<b>Create</b>	15	20	25	25
<b>Total</b>	<b>60</b>	<b>60</b>	<b>60</b>	<b>60</b>

<b>Course Code&amp; Title</b>	<b>23UPCND1E04- Public Health Nutrition</b>		
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>	<b>II</b>
<b>Cognitive Level</b>	<b>K-1,K-2,K-3,K-4&amp;K-5</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• To understand the nutritional problems.</li> <li>• To gain knowledge on the nations effort in combating community nutrition problems.</li> <li>• To educate the community on the importance of nutrition.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<b>Concept of Public Health Nutrition</b> <ol style="list-style-type: none"> <li>a) Relationship between health and nutrition, determinants and indicators of health and nutrition.</li> <li>b) Role of public nutritionist in the health care delivery system.</li> </ol> <b>Population Dynamics</b> <ol style="list-style-type: none"> <li>a) Demographic processes and Demographic cycle</li> <li>b) Demographic profile- population trends in India, density of population, Demographic transition, population structure, sex ratio, family size, literacy and education, morbidity rate and life expectancy.</li> </ol>	15
<b>II</b>	<b>Assessment of Nutritional Status</b> <ol style="list-style-type: none"> <li>a) Methods of Nutritional assessment – Direct and Indirect methods</li> <li>b) Nutrition monitoring - Objectives, Components of nutrition monitoring and key indicators.</li> <li>c) Current programmes of Nutrition monitoring in India</li> </ol> <b>Nutritional surveillance</b> <ol style="list-style-type: none"> <li>a) Nutritional surveillance system (NSS)- Objectives, Triple A approach, Methodology of Nutrition Surveillance system</li> <li>b) Indicators of successful nutrition surveillance system</li> <li>c) Uses of nutrition surveillance system</li> </ol>	14
<b>III</b>	<b>Food Security Programmes-</b> <ol style="list-style-type: none"> <li>a) Dimensions of food security</li> <li>b) Public distribution system, Buffer stock</li> <li>c) National food security Act</li> <li>d) The organizations fighting hunger in India and around the world</li> <li>e) Famous Food security Revolutions</li> <li>f) Challenges to food security in India</li> </ol>	15
<b>IV</b>	<b>Strategies to combat public nutrition problems</b> <ol style="list-style-type: none"> <li>a) Prevalence of malnutrition in India–</li> <li>b) Common nutritional problems–</li> <li>c) Causes and preventive measures- PEM, VAD, IDA, IDD, VDD, Obesity and fluorosis.</li> <li>d) Primary Health Care(PHC) and its role in preventing communicable diseases</li> </ol>	14

<b>V</b>	<b>Nutrition &amp; Health Education Communication Process</b> a) Communication - Definition, Components of Communication Process b) Nutrition Education – Objectives of Nutrition Education, c) Principles of conducting nutrition education, d) Steps for planning of Nutrition Education Programme e) Methods of conducting nutrition education.	14
<b>Total Hours</b>		<b>72</b>

### References

#### Text Books

- Sehgal S and Raghuvanshi Rita S. Textbook of Community Nutrition, 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, 2011.
- Suryatapas- Textbook of Community Nutrition, 2016, Academic Publishers
- Prabha Bisht-Community Nutrition in India, 2017, Star Publications.
- B.Srilakshmi-Nutrition Science, 2006, New Age International.
- Swaminathan.M-Advanced Textbook on Food&Nutrition Vol1 & 2, Bappco.

#### Reference Books

- Park A., Textbook of Preventive and Social Medicine, Twenty Third edition, 2015, Bhanot.
- Gibney M J-Public Health Nutrition, 2<sup>nd</sup> Edn, John Wiley & Sons.
- Jelliffe D.B- Assessment of Nutrition Status of the Community, 1966, WHO, Geneva.

#### Web Resources

- <https://www.nutrition.gov>
- <http://www.ninindia.org/community.htm>
- <https://www.nhp.gov.in/healthyliving/healthy-diet>

<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <b>CO1:</b> Assess the nutritional status of individuals. <b>CO2:</b> Relate health, nutrition and population dynamics of a community. <b>CO3:</b> Compile the nutritional interventions provided by the government. <b>CO4:</b> Describe the public nutritional problems and appraise strategies to combat malnutrition.
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### COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO				
	1	2	3	4	5	6	7	1	2	3	4	
<b>CO1</b>	S	S	S	S	S	S	S	S	S	S	S	S
<b>CO2</b>	S	S	S	S	M	S	S	S	S	S	S	S
<b>CO3</b>	S	S	S	S	M	S	S	S	S	S	S	S
<b>CO4</b>	S	S	S	S	S	S	S	S	S	S	S	S

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

### Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	15	10	20	20
<b>Understand</b>	15	15	20	20
<b>Apply</b>	10	15	15	15
<b>Analyse</b>	5	5	10	10
<b>Evaluate</b>	5	5	10	10
<b>Create</b>	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1E05- Food Analysis and Instrumentation</b>		
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>	<b>II</b>
<b>Cognitive Level</b>	<b>K-1,K-2,K-3,&amp;K-4</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• Theory, potentials and applications of advanced analytical and instrumental techniques employed in food analysis.</li> <li>• The course will focus on providing graduate students with a detailed knowledge of modern techniques used in research and development as well as inspection of food products in industry, analytical laboratory and government.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<b>Introduction to food analysis</b> a) Types of samples and sampling techniques b) Storage and preservation of samples, expression of results c) Proximate analysis of foods: Principles of moisture, fat, protein, carbohydrates, crude fiber and vitamins in foods.	15
<b>II</b>	<b>Sensory analysis of foods:</b> a) Overview of the sensory principles and practices b) Selection and screening of the sensory panel, types of panel(trained, semi trained) c) Methodology of sensory evaluation: discriminative tests: difference tests, paired comparison, duo trio, triangle; descriptive tests.	15
<b>III</b>	<b>Instrumentation in food analysis: principles, types and applications</b> a) Colorimetric and spectroscopy b) Photometry, electrophoresis c) Chromatography d) Atomic absorption spectro photometry.	14
<b>IV</b>	<b>Instrumentation in food analysis: color measurement in foods</b> a) X-ray analysis of foods and its applications b) Mass spectroscopy; c) Nuclear magnetic resonance(NMR) d) Differential scanning calorimetric (DSC).	14
<b>V</b>	<b>Refractometry and Ultra Sonics in food analysis</b> a) Texture analysis in foods b) Sensory versus instrumental analysis of texture c) Rapid methods of microbial analysis; immune assays methods	14
	<b>Total Hours</b>	<b>72</b>

## References

### Text Books

- Ronald S. Kirk, Ronald Sawyer, (1991). Pearson's Composition & Analysis of foods, 9<sup>th</sup> Edition Longman Scientific & Technical, U.K.
- Gruenwedel, D.W.; Whitaker, J.R. (editors) (2017): Food Analysis Principles and techniques, Volumes 1 to 8, Marcel Dekker, Inc., New York.
- Pomeranz, Y. & Merloan (1978). Food Analysis: Theory and Practice, Westport, Connecticut: AVI.
- Amerine, M.A. Pangborn, R.M., and Rossler, E.B. 1965. Principles of Sensory Evaluation of Food. Academic Press, New York.
- Frazier, R.A., Ames, J.M. and Nursten, H.E. (Eds.). 2000. Capillary electrophoresis for food analysis: method development. Cambridge: The Royal Society of Chemistry. 127p.  
UBC Woodward Library (QP519.9.C36F732000)

### Reference Books

- Horwitz, W. and Latimer, G.W. (Eds.). 1998. Official methods of analysis of AOAC International. 16th ed. Gaithersburg: AOAC International. UBC Woodward Library [electronic resource] (S587.A7 CD-ROM)
- MacRae, R. (Ed.). 1988. HPLC in food analysis. London: Academic Press.

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Apply valid sampling techniques to food materials having widely diverse properties and volumes.</p> <p><b>CO2:</b> Select appropriate analytical techniques for specific food components.</p> <p><b>CO3:</b> Compare advanced and conventional techniques and instruments to analyse chemical and physical properties of foods.</p> <p><b>CO4:</b> Apply a range of chemical analyses of food components.</p> <p><b>CO5:</b> Analyse, interpret and report on results obtained in a scientific format.</p>
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### COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
CO1	M	M	M	L	S	S	M	S	S	N	S
CO2	M	M	M	L	S	S	L	S	S	N	S
CO3	M	M	M	L	S	S	S	S	S	N	S
CO4	M	M	M	L	S	S	S	S	S	N	S
CO5	M	M	M	L	S	S	L	S	S	N	S

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

### Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	20	20	30	20
Understand	10	10	15	20
Apply	10	10	15	15
Analyse	10	10	15	15
Evaluate	-	-	-	-
Create	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1E06- Elective (Generic)-IV- Nutraceuticals and Functional Foods</b>		
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>	<b>II</b>
<b>Cognitive Level</b>	<b>K-1, K-2, K-3, K-4 &amp;K-5</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• To learn the principle compounds available in various food groups in aiding good health.</li> <li>• To gain insights into the functional foods which are in nature to prevent and treat diseases.</li> <li>• To vision the impact of globalization on health and food products.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<b>Introduction to functional foods and nutraceuticals</b> <ol style="list-style-type: none"> <li>a) Definition, history and classification</li> <li>b) Modification in the definition of nutraceutical</li> <li>c) Perceived Effects of Functional Foods</li> <li>d) Nutraceuticals- The link between nutrition and medicine</li> <li>e) Basis of claims for a compound as a nutraceutical</li> <li>f) Natural antioxidants as nutraceuticals</li> </ol>	14
<b>II</b>	<b>Properties, structure and functions of various Nutraceuticals</b> <ol style="list-style-type: none"> <li>a) Pigments– Carotenoids, chlorophyll, anthocyanin, anthoxanthin, curcumin</li> <li>b) Functional lipids</li> <li>c) Flavor and odor compounds- Alkaloids, Terpenoids, Glycosides, Polyphenols</li> <li>d) Probiotics: definition, characteristics, types, Important sources, features&amp; health benefits of probiotic microorganisms</li> <li>e) Probiotic foods– Dairy and Non-dairy probiotics, ICMR guidelines for evaluation of probiotics in food</li> <li>f) Prebiotics: Non-Digestible Carbohydrates- Oligosaccharides, Dietary Fiber, Resistant Starch, Gums</li> </ol>	15
<b>III</b>	<b>Functional components and health effects of</b> <ol style="list-style-type: none"> <li>a) Turmeric, fenugreek, black cumin, soya, olive oil, tea, common beans, capsicum annum, mustards, garlic, grapes, citrus fruits, Fish oils, Sea foods, Mushroom</li> <li>b) Functional foods for infants and children</li> <li>c) Bioavailability and safety issues of functional foods</li> <li>d) Applications of herbs to functional foods</li> </ol>	14

<b>IV</b>	<b>Concept and the role of nutraceuticals/ functional foods in health</b> a) Nutraceuticals for - Cardiovascular diseases, Cancer, Diabetes, Cholesterol management, Obesity, thyroid, Age related macular degeneration, Immune enhancement. b) Mood disorders - Compounds and their mechanisms of action c) Adverse effects and toxicity of nutraceuticals	15
<b>V</b>	<b>Recent advancements in Nutraceuticals and functional foods</b> a) Dietary supplements- GMPS and shelf life of dietary supplements. b) Role of changing food preferences and globalization on selection of nutraceutical products c) Nutrigenomics- An introduction and its relation to nutraceuticals d) Recent advancements and techniques in the formulation and processing of functional foods e) Nutraceutical market scenario and Challenges for Nutraceutical	14
<b>Total Hours</b>		<b>72</b>

## References

### Text Books

- Rekha Sharma, 2023, Introduction to Functional Foods and Nutraceuticals, PharmaMed Press / BSP Books.
- Vattem, Dhiraj A. and Vatsala Maitin. 2016. Functional Foods, Nutraceuticals and Natural Products, Concepts and Applications. USA: DEStech Publications, Inc.
- Boye, Joyce I. 2015. Nutraceutical and Functional Food Processing Technology. New Jersey: Wiley Blackwell.
- Iwu, Maurice M. 2017. Food as Medicine: Functional Food Plants of Africa. US: CRC Press.
- Mary, K. Schmidl - Essentials of Functional Foods, 2000, Culinary and hospitality industry publication services.
- Robert E.C. Wildman - Handbook of Nutraceuticals and Functional Foods, 2001, Culinary and hospitality industry publication services, 2000.

### Reference Books

- Nutraceuticals and Functional Foods in Human Health and Disease Prevention, Anand Swaroop (Editor), Debasis Bagchi (Editor), Harry G. Preuss (Editor), 2015, Apple Academic Press Inc.
- Wildman, 2016, Handbook of Nutraceuticals and Functional Foods, Second Edition, 2016, CRC Press.
- Chatwick, R - Functional Foods, 2003, Springer.

- Mazza, G. - Functional Foods- Biochemical and processing aspects, 1998, Culinary and hospitality industry publication services.
- Paresh, C. Dutta, Phytosterols as Functional Food Components and Nutraceuticals, 2004, Marcel DehkerInc, New York.
- Guo M. - Functional Foods – Principles and technology, 2009, Wood head publishing company, UK.

**Web Resources**

- <https://www.nutraceuticalsworld.com/>
- <https://www.nutraingredients.com/>

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Compile the updates on link between nutrition and medicine.</p> <p><b>CO2:</b> Assess the properties and functions of nutraceuticals.</p> <p><b>CO3:</b> Classify the nutraceuticals and comprehend their role in health promotion.</p> <p><b>CO4:</b> Describe the dietary supplements.</p> <p><b>CO5:</b> Determine the role of globalisation in food choices.</p>
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**COs Consistency with POs and PSOs**

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
<b>CO1</b>	S	S	S	S	S	S	S	S	S	S	S
<b>CO2</b>	S	S	S	S	M	M	S	S	S	S	S
<b>CO3</b>	S	S	S	S	L	L	S	S	S	S	S
<b>CO4</b>	S	S	S	S	S	S	S	S	S	S	S
<b>CO5</b>	S	S	S	S	S	S	S	S	S	S	S

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	10	15	15	15
<b>Understand</b>	15	10	15	15
<b>Apply</b>	15	15	15	15
<b>Analyse</b>	5	5	15	15
<b>Evaluate</b>	5	5	10	10
<b>Create</b>	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1N01- Non Major Elective-I (Swayam/MOOC/NPTEL)</b>		
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>	<b>II</b>

<b>Course Code &amp; Title</b>	<b>23UPPGC1H01- Fundamentals of Human Rights</b>										
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>				<b>II</b>					
<b>Subject Code</b>	<b>Subject Name</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>O</b>	<b>Credits</b>	<b>Inst. Hours</b>	<b>Marks</b>		
									<b>CIA</b>	<b>External</b>	<b>Total</b>
<b>23UPPGC1H01</b>	<b>Fundamentals of Human Rights</b>	Compulsory Paper	Y	-	Y	-	1	2	25	75	100

#### Learning Objectives

LO1	To learn about Basic Facets of Human Rights.
LO2	To understand the development of human rights in India.
LO3	To know the various rights pertaining to marginalized and other disadvantaged people.
LO4	To help the students to know various human rights movements.
LO5	To make the students to be aware of human rights redressal mechanisms.

<b>UNIT</b>	<b>Details</b>	<b>No. of Hours</b>	<b>Learning Objectives</b>
I	<b>Introduction:</b> Meaning and Definitions of Human Rights – Characteristics and Importance of Human Rights – Evolution of Human Rights – Formation, Structure and Functions of the UNO - Universal Declaration of Human Rights – International Covenants – Violations of Human Rights in the Contemporary Era.	4	LO1
II	<b>Human Rights in India:</b> Development of Human Rights in India – Constituent Assembly and Indian Constitution – Fundamental Rights and its Classification – Directive Principles of State Policy – Fundamental Duties.	4	LO2
III	<b>Rights of Marginalized and other Disadvantaged People:</b> Rights of Women – Rights of Children – Rights of Differently Abled – Rights of Elderly - Rights of Scheduled Castes – Rights of Scheduled Tribes – Rights of Minorities – – Rights of Prisoners – Rights of Persons Living with HIVAIDS – Rights of LGBT.	4	LO3
IV	<b>Human Rights Movements:</b> Peasant Movements	4	LO4

	(Tebhaga and Telangana) – Scheduled Caste Movements (Mahar and Ad-Dharmi) – Scheduled Tribes Movements (Santhal and Munda) – Environmental Movements (Chipko and Narmada Bachao Andolan) – Social Reform Movements (Vaikom and Self Respect).		
V	<b>Redressal Mechanisms:</b> Protection of Human Rights Act, 1993 (Amendment 2019) – Structure and Functions of National and State Human Rights Commissions – National Commission for SCs – National Commission for STs – National Commission for Women – National Commission for Minorities – Characteristics and Objectives of Human Rights Education.	4	LO5
<b>Total</b>		<b>20</b>	
<b>Course Outcomes</b>			
<b>Course Outcomes</b>	On completion of this course, students will / can;		
<b>CO1</b>	Understand the basic facets of human rights	PO4, PO6, PO1	
<b>CO2</b>	Comprehend the Constitutional provisions of human rights in India	PO1, PO2	
<b>CO3</b>	Grasp the rights of the marginalized and other disadvantaged people in India	PO4, PO5	
<b>CO4</b>	Know the historical background of the various human rights movement in India.	PO6	
<b>CO5</b>	Understand the redressal mechanism of the human rights violations	PO3, PO8	
<b>References Books (Latest Editions)</b>			
1	Sudarshanam Gankidi, Human Rights in India: Prospective and Retrospective, Rawat Publications, Jaipur, 2019.		
2	Satvinder Juss, Human Rights in India, Routledge, New Delhi, 2020.		
3	Namita Gupta, Social Justice and Human Rights in India, Rawat Publications, Jaipur, 2021.		
4	Mark Frezo, The Sociology of Human Rights, John Willy & Sons, U.K. 2014.		
5	Chiranjivi J. Nirmal, Human Rights in India: Historical, Social and Political Perspectives, Oxford University Press, New York, 2000.		
<b>Text Books</b>			
1	Dr. S. Mehartaj Begum, Human Rights in India: Issues and perspectives, APH Publishing Corporation, New Delhi, 2010.		
2	Asha Kiran, The History of Human Rights, Mangalam Publications, Delhi, 2011.		
3	Bani Borgohain, Human Rights, Kanishka Publishers & Distributors, New Delhi-2, 2007.		
4	Jayant Chudhary, A Textbook of Human Rights, Wisdom Press, New Delhi, 2011.		

5	Anju Soni, Human Rights in India, Venus Publication, New Delhi, 2019.	
<b>Web Resources</b>		
1	<a href="http://www.un.org/rights/HRToday">www.un.org/rights/HRToday</a>	
2	<a href="http://www.amnesty.org">www.amnesty.org</a>	
3	<a href="http://www.hrweb.org">www.hrweb.org</a>	
4	<a href="https://www.youtube.com/watch?v=vDizUvyQTuo">https://www.youtube.com/watch?v=vDizUvyQTuo</a>	
5	<a href="https://www.youtube.com/watch?v=WJsUfck01Js">https://www.youtube.com/watch?v=WJsUfck01Js</a>	
<b>Methods of Evaluation</b>		
<b>Internal Evaluation</b>	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
<b>External Evaluation</b>	End Semester Examination	75 Marks
	Total	100 Marks
<b>Methods of Assessment</b>		
<b>Recall (K1)</b>	Simple definitions, MCQ, Recall steps, Concept definitions	
<b>Understand/ Comprehend (K2)</b>	MCQ, True/False, Short essays, Concept explanations, short summary or overview	
<b>Application (K3)</b>	Suggest idea/concept with examples, suggest formulae, solve problems, Observe, Explain	
<b>Analyze (K4)</b>	Problem-solving questions, finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
<b>Evaluate (K5)</b>	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
<b>Create (K6)</b>	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

#### Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
<b>CO 1</b>	3	3	3	3	2	3	3	3	3	3
<b>CO 2</b>	3	3	3	3	3	3	2	3	3	3
<b>CO 3</b>	3	2	3	3	3	3	3	3	3	3
<b>CO 4</b>	2	3	3	3	3	3	3	2	3	3
<b>CO 5</b>	3	3	3	3	2	3	2	3	3	3

### SEMESTER-III

<b>Course Code &amp; Title</b>	<b>23UPCND1C05- Research Methods and Statistical Applications</b>		
<b>Class</b>	<b>II M.Sc.</b>	<b>Semester</b>	<b>III</b>
<b>Cognitive Level</b>	<b>K-1, K-2, K-3, &amp;K-4</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• To provide sound knowledge on the fundamental principles and techniques of methodology concerning research in nutrition and dietetics.</li> <li>• To familiarize the type of research tools and techniques applicable to a research problem.</li> <li>• To acquaint with the statistical methods for testing of hypothesis.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<b>Research Methodology</b> <ol style="list-style-type: none"> <li>a) Meaning, Objectives and Significance in Research</li> <li>b) Forms of research- Basic, Applied, Action, Evaluation</li> <li>c) Criteria of good research</li> <li>d) Problems encountered by researchers in India</li> </ol> <b>Research Process</b> <ol style="list-style-type: none"> <li>a) Meaning, Selection of a research problem</li> <li>b) Steps involved in research process</li> <li>c) Formulating hypothesis and deciding variables</li> <li>d) Need for research in Clinical Nutrition and Dietetics</li> <li>e) Ethics in research</li> </ol>	22
<b>II</b>	<b>Research Design</b> <ol style="list-style-type: none"> <li>a) Meaning, Need, Features, Concepts</li> <li>b) Types of Research Design – Case Study Design, Causal Design, Longitudinal Design, Cross-Sectional Design, Cohort Design, Epidemiological Surveillance, <i>In-vivo</i>, <i>In-vitro</i>, Experimental Design, Exploratory Design, Historical Design, and Meta-Analysis Design</li> </ol>	21
<b>III</b>	<b>Sampling Design</b> <ol style="list-style-type: none"> <li>a) Terms and Concepts used in sampling and sample design</li> <li>b) Steps in sampling design</li> <li>c) Criteria and Characteristics of a good sample design</li> <li>d) Types of Sampling               <ol style="list-style-type: none"> <li>i) Probability Sampling Techniques – Definition, Types, Merits and Demerits</li> <li>ii) Non-Probability Sampling Techniques - Definition, Types, Merits and Demerits</li> </ol> </li> <li>e) Measurement scale and Scaling techniques               <ol style="list-style-type: none"> <li>i. Fundamental and Comparative scales- Nominal, Ordinal, Interval and Ratio scales, Paired Comparison, Rank order, Constant sum, Q-Sort</li> <li>ii. Non- Comparative scales- Continuous rating scale, Itemized rating scale- Likert scale, Semantic</li> </ol> </li> </ol>	22

	differential scale- Stapel scale	
<b>IV</b>	<b>Research Tools and Techniques</b> <ol style="list-style-type: none"> <li>a) Research tools – Meaning and Purpose</li> <li>b) Methods of data collection- Primary and Secondary</li> <li>c) Types of tools and their uses <ol style="list-style-type: none"> <li>i. Primary tools- Questionnaires and Schedule, Interviews, Observation</li> <li>ii. Secondary tools</li> </ol> </li> <li>d) Processing of data- Editing, Coding and Tabulation</li> <li>e) Report writing–Introduction, Steps, Layout, Types, Mechanics and Precautions</li> </ol>	21
<b>V</b>	<b>Statistical Testing of Hypothesis</b> <ol style="list-style-type: none"> <li>a) Descriptive Analysis- Graphical and Diagrammatic Presentations, Central Tendency – Mean, Median &amp; Mode, Dispersion -Standard Deviation</li> <li>b) Meaning- Hypothesis, Hypothesis Statement, Hypothesis Testing, Null Hypothesis.</li> <li>c) Types of Hypothesis Testing- <ol style="list-style-type: none"> <li>i) Parametric Tests or Standard Tests of Hypothesis–Definition, Merits and Demerits, Types and its Applications - Student’s T test (Independent, Paired, One tailed and two tailed), ANOVA, Z-test.</li> <li>ii) Non-Parametric or Distribution Free Tests – Definition, Merits and Demerits, Types and its Applications- Chi- square, Spearman’s Rank Correlation, Kruskal Wallis or H test.</li> </ol> </li> <li>d) Difference between parametric and non-parametric tests.</li> </ol>	22
	<b>Total Hours</b>	<b>108</b>
<b>References</b> <b>Text Books</b> <ul style="list-style-type: none"> <li>• Kothari.C.R -Research Methodology, Methods and Techniques, Fourth edition, 2019, New Age International Publisher.</li> <li>• Gupta.S.C - Fundamentals of Applied Statistic, Sultan Chand and Sons, Fourth Edition,</li> </ul>		

2014, Sultan Chand & Sons.

- Gupta.S.P., Statistical Methods, 46<sup>th</sup> revised edition, 2021, Sultan Chand and Sons.
- Chawla,Deepak and Neena Sondhi Research Methodology, -Concepts and Cases, 2<sup>nd</sup>Edn,2018, Vikas Publishing House Pvt Ltd.Noida
- Copper, H.M Intergrating Research: A guide for literature reviews. 2nd Edition 2002, California: Sage.

#### Reference Book

- Van Maanen - Qualitative Methodology, 1983, Sage Publication
- Kerlinger - Foundation of Educational Research, Wadsworth Publishing Company
- Bryman A. and Cramer D - Quantitative Data Analysis for Social Scientist, Rev.Ed.
- Ranjithkumar- Research Methodology, 4th Ed. Edition, 2014, Sage Publishing.
- Danial, Wayne W and Chad L Cross Biostatistics – Basic Concepts and Methodology for the Health Sciences – International Student Version, 2014, 10th Ed.

#### Web Resources

- <https://explorable.com/research-methodology>
- <https://www.mbaknol.com/research-methodology/the-basic-types-of-research>

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b>Elaborate on research methodology and research process</p> <p><b>CO2:</b> Draft a research design for problem solving.</p> <p><b>CO3:</b> Apply the appropriate sampling techniques for projects.</p> <p><b>CO4:</b> Plan and design tools for data collection.</p> <p><b>CO5:</b> Interpret the results by performing statistical analysis.</p>
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#### COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
CO1	M	M	S	S	S	M	S	M	M	L	L
CO2	M	S	S	S	S	L	S	M	L	L	L
CO3	M	S	S	S	S	L	S	M	L	L	L
CO4	M	L	S	S	S	L	S	L	L	L	L
CO5	M	S	S	S	S	L	S	M	L	L	L

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

#### Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	10	10	20	20
Understand	10	5	20	20
Apply	15	20	20	20
Analyse	15	15	15	15
Evaluate	-	-	-	-

<b>Create</b>	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1C06- Clinical Nutrition and Dietetics –II</b>		
<b>Class</b>	<b>II M.Sc.</b>	<b>Semester</b>	<b>III</b>
<b>Cognitive Level</b>	<b>K-1, K-2, K-3, K-4&amp; K-5</b>		
<b>Course Objectives</b>	<p><b>The Course aims</b></p> <ul style="list-style-type: none"> <li>• To apprehend the etiology, symptoms and complications of diseases.</li> <li>• To enable the students to recommend and provide appropriate nutritional care for prevention and treatment of the various diseases.</li> <li>• To gain efficacy in principles of diet therapy for metabolic and degenerative diseases.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<p><b>Nutrition in Cardiovascular Diseases</b></p> <p><b>Blood Pressure-</b> Regulation, Short term (sympathetic nervous system) and long-term (kidneys)</p> <p><b>Hypertension</b></p> <p>a) Definition, Classification and Causes</p> <p>b) Signs &amp; Symptoms and Complications</p> <p>c) Dietary management</p> <p style="padding-left: 20px;">- Diet related factors influencing hypertension, DASH diet</p> <p><b>Cardio Vascular Diseases</b></p> <p>a) Prevalence, Etiology and Risk Factors</p> <p>b) Clinical diagnostic tests and dietary management for</p> <p style="padding-left: 20px;">- Hyperlipidemia and Hyperlipoproteinemia, Atherosclerosis, Angina Pectoris and Myocardial Infarction (MI), Congestive Cardiac Failure (CCF) and Cardiac Cachexia</p>	22

	c) Prevention through life style modifications	
<b>II</b>	<p><b>Dietary Management of Upper Gastro Intestinal Diseases</b></p> <p>a) Etiology, signs &amp; symptoms, diagnostic test and complications</p> <p>b) Dietary management for</p> <ul style="list-style-type: none"> <li>- Gastritis, Peptic ulcer, Dyspepsia, Esophagitis and Dumping Syndrome.</li> </ul> <p><b>Dietary Management of Lower Gastro Intestinal Diseases</b></p> <p>a) Etiology, signs &amp; symptoms, diagnostic test and complications</p> <p>b) Dietary management for</p> <ul style="list-style-type: none"> <li>- Diarrhea, Dysentery, Constipation, Celiac disease, Steatorrhea, Irritable bowel syndrome, Diverticular disease, Ulcerative colitis and Crohn's Disease.</li> </ul>	21
<b>III</b>	<p><b>Dietary Management of Hepato-Biliary Tract Diseases</b></p> <p><b>Liver Disease</b></p> <p>a) Types, Etiology, Symptoms and Complications</p> <p>b) Functions of the liver and liver function tests</p> <p>c) Metabolic consequences of alcohol consumption</p> <p>d) Dietary management for</p> <ul style="list-style-type: none"> <li>- Hepatitis, Cirrhosis and Hepatic coma, Liver transplant.</li> </ul> <p><b>Gall Bladder Diseases</b></p> <p>a) Functions of Gall Bladder</p> <p>b) Gall bladder function tests</p> <p>c) Dietary management for</p> <ul style="list-style-type: none"> <li>- Cholecystitis, Cholelithiasis, Acute Cholangitis and Cholestasis</li> </ul> <p><b>Pancreatic Disorders</b></p> <p>a) Functions of Exocrine Pancreas</p> <p>b) Pancreatic function tests</p> <p>c) Dietary management for</p> <ul style="list-style-type: none"> <li>- Pancreatitis (Acute and chronic) and Zollinger- Ellison Syndrome</li> </ul>	22
<b>IV</b>	<p><b>Dietary Management of Diabetes Mellitus</b></p> <p>a) Prevalence, Types, Aetiology and Signs and Symptoms</p> <p>b) Factors affecting normal blood glucose levels</p> <p>c) Diagnostic test for Diabetes</p> <p>d) Complications of Diabetes - Macro-vascular and Micro-vascular</p> <p><b>Management of Diabetes</b></p> <p>a) Food exchange list</p> <p>b) Glycaemic index of foods, Carbohydrate counting and Resistant starch</p> <p>c) Sweeteners and sugar substitutes</p> <p>d) Meal planning approaches</p> <ul style="list-style-type: none"> <li>- With and without Insulin and during sickness.</li> </ul>	22

	<p>e) Medications - Oral hypoglycaemic drugs and Insulin.</p> <p>f) Lifestyle modification and exercise to manage Diabetes Mellitus.</p> <p><b>Management of Hypoglycaemia</b></p> <p>a) Types, symptoms and fasting state hypoglycemia</p> <p>b) Dietary treatment</p> <p><b>Dietary Management of Cancer</b></p> <p>a) Types, Etiology and Signs and symptoms, and diagnosis of Cancers.</p> <p>b) Cancer therapy and its complications - Chemotherapy, Radiation therapy and Surgery.</p> <p>c) Dietary management to Cancer patient, Recent developments in Nutrition and Cancer.</p>	
<b>V</b>	<p><b>Dietary Management of Renal Diseases</b></p> <p>a) Aetiology, Clinical signs &amp; Symptoms</p> <p>b) Functions of kidney</p> <p>c) Kidney function tests.</p> <p>d) Types of Kidney Diseases - Glomerulonephritis, Nephrotic Syndrome, Acute Renal Failure (ARF), Chronic Renal Failure (CRF), End Stage Renal Disease (ESRD)- Dialysis and Kidney Transplant, Nephrolithiasis.</p> <p>e) Dietary Management and Use of sodium, potassium and phosphorus exchange lists in diet planning of kidney diseases patient.</p>	21
	<b>Total Hours</b>	<b>108</b>

## References

### Text Books

- Antia F.P. And Philip Abraham-Clinical Nutrition and Dietetics, 2002 , 4th edition.
- Swaminathan S- Advanced Textbook On Food & Nutrition, 2015, Bappco
- B. Srilakshmi- Dietetics, 2023, 9th Edition, New Age International Pvt. Ltd. New Delhi.
- RSSDI Diabetes Update 2020, Banshi Saboo, Ch Vasanth Kumar, Sanjay Agarwal.
- Timmanpyati.S, 2nd edition-2022, Clinical nutrition in cancer, Practical guidelines and dietary Recommendations.
- T.Alp Ikizler, Willian E.Mitch, 7th edition-2018, Handbook of nutrition and the kidney, Wolters Kluwer.

### Reference Books

- Mahan L.K., Sylvia Escott- Stump - Krause's Food Nutrition and Diet Therapy 11th Edition, 2016, W.B. Saunders Company London.
- Passmore P. And M.A. East Wood - Human Nutrition and Dietetics, 2007, Churchill Living Stone.
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- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, and A.E., Carwick: Normal and Therapeutic

Nutrition, 17th Edn, Macmillan Publishing Company.

- Shills and Young- Modern Nutrition in Health and Disease, 2013, 11th edition, Lippincott Williams and Wilkins.
- Bennion M.: Clinical Nutrition, John Wiley & Sons.
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- Sharon RadyRolfes, Eleanor Noss Whitney, Kathryn Pinna , Understanding Normal and Clinical Nutrition 12th edition, 2021.
- Williams S. R. Essentials of Nutrition and Diet Therapy, 12th edn, 2018, Mosby College Pub. S. Louis.
- Krause's., Kathleen Mahan., Marian T. Arlin: Food Nutrition & Diet Therapy, 8<sup>th</sup> Edition 1992, W.B. Saunders Company. H

#### Web Resources

- [www.anme.com.mx/libros/PrinciplesofNutrition.pdf](http://www.anme.com.mx/libros/PrinciplesofNutrition.pdf)
- <https://2012books.lardbucket.org/pdfs/an-introduction-to-nutrition.pdf>
- [krishikosh.egranth.ac.in](http://krishikosh.egranth.ac.in)
- <https://kdigo.org/guidelines/>
- <https://www.kidney.org/professionals/guidelines>
- <https://www.espen.org/guidelines-home/espen-guidelines>
- [https://www.nutritioncare.org/Guidelines\\_and\\_Clinical\\_Resources/Clinical\\_Guidelines/](https://www.nutritioncare.org/Guidelines_and_Clinical_Resources/Clinical_Guidelines/)
- <https://diabetes.org/newsroom/press-releases/2022/american-diabetes-association-2023-standards-care-diabetes-guide-for-prevention-diagnosis-treatment-people-living-with-diabetes>
- <https://www.ahajournals.org/doi/10.1161/CIR.0000000000001063>

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Elucidate the aetiology, signs and symptoms of diseases.</p> <p><b>CO2:</b> Explain the different diseases affecting the organs.</p> <p><b>CO3:</b> Describe the diagnostic test.</p> <p><b>CO4:</b> Deliver nutritional management for metabolic and degenerative disease conditions.</p> <p><b>CO5:</b> Determine the dietary essentials for recovery and maintenance of various diseases.</p>
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#### COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
CO1	S	S	S	S	L	M	M	S	S	S	S
CO2	S	S	S	S	L	L	M	S	S	S	S
CO3	S	S	S	S	S	L	M	S	S	S	S
CO4	S	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	S	S	L	S	S	S	S	S

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

#### Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	5	10	20	20
Understand	10	5	20	20
Apply	15	15	15	15
Analyse	10	10	10	10
Evaluate	10	10	10	10
Create	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1C07- Hospital Administration and Practices</b>		
<b>Class</b>	<b>II M.Sc.</b>	<b>Semester</b>	<b>III</b>
<b>Cognitive Level</b>	<b>K-1, K-2, K-3, &amp;K-4</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• To understand the hospital administration practices.</li> <li>• To comprehend patient data maintaining practices followed in hospitals.</li> <li>• To acquaint with biomedical waste management.</li> </ul>		

Unit	Content	Number of Hours
<b>I</b>	<b>Introduction to Hospital Administration</b> <ol style="list-style-type: none"> <li>a) Hospital- Definition, Classification, Functions, Organogram and functions of organisation staff, hospital planning and design, Physical environment, Building elements and materials, installations.</li> <li>b) Hospital Administration- Introduction, Role towards patients, Organisation, Community.</li> <li>c) Attributes, Quality and Skills of a hospital administrator, Challenges and conflicts in hospital administration</li> <li>d) Public relations- Principles of public relations, Responsibility and functions of PRO.</li> </ol>	22
<b>II</b>	<b>Quality Management in Hospital</b> <ol style="list-style-type: none"> <li>a) Definition, Concept of Total Quality Management, importance of TQM, Principle of Total Quality management, basic elements of TQM</li> <li>b) Critical Factors Influencing TQM, Total Quality Management Practices in Healthcare, Measuring the Quality in Healthcare Service</li> <li>c) Relationship between Hospitals and Medical Staff</li> </ol>	21

<b>III</b>	<b>Biomedical Waste Management</b> a) Meaning – Categories of Biomedical wastes b) Disposal of biomedical waste products c) Incineration and its importance d) Standards for Waste Autoclaving e) Micro Waving and Deep Burial – Segregation – Packaging – Transportation – Storage.	22
<b>IV</b>	<b>Health Records</b> a) Health record- Types, Functions, privacy, confidentiality and security, Advantages and Disadvantages of the paper record b) Optically scanned records c) The Electronic Health Record – Implementation of EHR – Advantages and disadvantages of the EHR – Bedside or point-of-care systems – Human factors and the EHR – Roadblocks and challenges to EHR implementation	22
<b>V</b>	<b>Telemedicine</b> a) Telehealth- Historical perspectives and Types of Technology, Clinical initiatives and Administrative initiatives, Advantages and Hurdles of Telehealth. b) Globalization of Information in Telehealth - Technology in Electronic communication, Knowledge management, Advances in public health, Speech recognition, Wireless computing, Informatics Education and Barriers to Information Technology implementation	21
<b>Total Hours</b>		<b>108</b>

## References

### Text Books

- Sakharkar B M –Principles of Hospital Administration and Planning, 2010, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
- Kelkar S.A- Hospital Information Systems, 2010, Prentice Hall India Learning Private Limited.
- D.C. Joshi and Mamta Joshi - Hospital Administration, 2017, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
- Joydeep Das Gupta, 3<sup>rd</sup> Edition, 2023, Hospital Administration and Management: A Comprehensive Guide;, Jaypee Publishers

### Reference Books

- Syed Amin Tabish - Hospital and Health Services Administration Principles and Practice, 2001, Oxford Publishers, New Delhi.
- Sharma Madhuri, 2nd edition, 2017, Hospital Waste Management and Its Monitoring, Jaypee Brothers Medical Publishers.
- Sharma - Holistic approach to Hospital Waste Management, 2006, AIIMS, New Delhi.
- Arun Kumar - Encyclopaedia of Hospital Administration and Development, 2000, Anmol

Publications, New Delhi.

**Web Resources**

- <https://www.telehealth.net>
- <http://www.internetmedicine.com/telemedicine>

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Compile the duties and responsibilities of administrators in hospitals.</p> <p><b>CO2:</b> Assess the total quality management.</p> <p><b>CO3:</b> Classify the bio medical waste and explain disposal methods.</p> <p><b>CO4:</b> Describe the types and uses of health records.</p> <p><b>CO5:</b> Determine the role of technology in patient care.</p>
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**COs Consistency with POs and PSOs**

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
<b>CO1</b>	S	S	S	S	S	L	S	M	M	M	M
<b>CO2</b>	S	S	L	L	M	L	S	M	M	M	M
<b>CO3</b>	S	S	M	M	M	S	S	N	N	N	N
<b>CO4</b>	S	S	L	L	L	L	S	L	L	L	L
<b>CO5</b>	M	M	M	M	S	L	S	L	L	N	M

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	15	15	20	20
<b>Understand</b>	15	10	20	20
<b>Apply</b>	10	15	20	20
<b>Analyse</b>	10	10	15	15
<b>Evaluate</b>	-	-	-	-
<b>Create</b>	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1L03 - Computer Applications in Clinical Nutrition and Dietetics-II Practical</b>		
<b>Class</b>	<b>II M.Sc.</b>	<b>Semester</b>	<b>III</b>
<b>Cognitive Level</b>	<b>K-3, K-4, K-5&amp;K-6</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• To provide training in the planning and preparation of diets for different disease conditions using computers.</li> <li>• Expertise in various feeding formulas and techniques.</li> </ul>		

<b>S. No</b>	<b>Content</b>	<b>Number of Hours</b>
1	Menu planning and software computation of Nutrients for Cardio vascular disease patients – Hyperlipidemia and Hyperlipoproteinemia, Atherosclerosis, Angina Pectoris	9
2	Menu planning and software computation of Nutrients for Cardio vascular disease patients – Myocardial Infarction, Congestive Cardiac Failure and Cardiac Cachexia	8
3	Menu planning and software computation of Nutrients for Hypertension patients – mild, moderate and severe hypertension.	8
4	Menu planning and software computation of Nutrients for Upper Gastro Intestinal Disorders- Gastritis, Peptic ulcer, Dyspepsia, Esophagitis and Dumping Syndrome.	9
5	Menu planning and software computation of Nutrients for Lower Gastro Intestinal Disorders- Diarrhea, Dysentery, Constipation, Celiac disease, Steatorrhea	8
6	Menu planning and software computation of Nutrients for Lower Gastro Intestinal Disorders- Irritable bowel syndrome, Diverticular disease, Ulcerative colitis and Crohn's Disease	8
7	Menu planning and software computation of Nutrients for the Liver - Hepatitis, Cirrhosis and Hepatic coma, Liver transplant.	8

8	Menu planning and software computation of Nutrients for the Gall bladder disorders- Cholecystitis, Cholelithiasis, Acute Cholangitis and Cholestasis	9
9	Menu planning and software computation of Nutrients for the Pancreatic disorders- Acute and chronic Pancreatitis and Zollinger- Ellison Syndrome	8
10	Menu planning and software computation of Nutrients for the Individuals with Diabetes Mellitus - Type I Diabetes, Type II Diabetes and Gestational Diabetes.	9
11	Menu planning and software computation of Nutrients for Cancer patients.	8
12	Menu planning and software computation of Nutrients for Renal Disorders- Glomerulonephritis, Nephrotic Syndrome, Acute Renal Failure and Chronic Renal Failure	8
13	Menu planning and software computation of Nutrients for Renal Disorders- End Stage Renal Disease- Dialysis and Kidney Transplant, Nephrolithiasis	8
<b>Total Hours</b>		<b>108</b>

## References

### Text Books

- Antia F.P. And Philip Abraham-Clinical Nutrition and Dietetics, 2001, Oxford Publishing Company.
- Swaminathan S- Advanced Textbook On Food & Nutrition, 2015, Bappco
- B. Srilakshmi- Dietetics, 2019, 8<sup>th</sup>Edn, New Age International Pvt. Ltd. New Delhi.

### Reference Books

- Mahan L.K., Sylvia Escott-Stump - Krause's Food Nutrition and Diet Therapy 10th Edition, 2001, W.B. Saunders Company London.
- Passmore P. And M.A. East Wood - Human Nutrition and Dietetics, Churchill Living Stone.
- Raheena M. Begum - A Text Book of Foods Nutrition and Dietetics , 3 edition 2009, Sterling Publishers Pvt. Ltd
- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, and A.E., Carwick: Normal and Therapeutic Nutrition, 17<sup>th</sup> Edn, Macmillan Publishing Company.
- Krause's., Kathleen Mahan., Marian T. Arlin: Food Nutrition & Diet Therapy, 8<sup>th</sup> Edition 1992, W.B. Saunders Company.
- Shills and Young- Modern Nutrition in Health and Disease, 2012, Lippincott Williams and Wilkins.
- Bennion M.: Clinical Nutrition, John Wiley & Sons.
- Whitney, E. N. and C. B.Cataldo, Understanding Normal and Clinical Nutrition, 1983, West Pub.
- Williams S. R. Essentials of Nutrition and Diet Therapy, 4th edn, 1986, Mosby College Pub. S. Louis.

### Web Resources

- [www.anme.com.mx/libros/PrinciplesofNutrition.pdf](http://www.anme.com.mx/libros/PrinciplesofNutrition.pdf)
- <https://2012books.lardbucket.org/pdfs/an-introduction-to-nutrition.pdf>
- [krishikosh.egranth.ac.in](http://krishikosh.egranth.ac.in)

<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <b>CO1:</b> Apply the principles of diet and determine the dietary essentials for recovery from critical illness <b>CO2:</b> Apply the principles of diet and determine the dietary essentials for recovery from metabolic diseases. <b>CO3:</b> Plan and prepare menu for the given disease condition. <b>CO4:</b> Compare and contrast the derived nutritive values with R.D.A using software.
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**COs Consistency with POs and PSOs**

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
CO1	S	S	S	S	S	M	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	-	-	-	-
Understand	-	-	-	-
Apply	15	10	10	10
Analyse	15	15	10	10
Evaluate	15	15	15	15
Create	15	20	25	25
<b>Total</b>	<b>60</b>	<b>60</b>	<b>60</b>	<b>60</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1E07 – Diet Counselling Tools and Techniques</b>		
<b>Class</b>	<b>II M.Sc.</b>	<b>Semester</b>	<b>III</b>
<b>Cognitive Level</b>	<b>K-1, K-2, K-3, K-4 &amp;K-5</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• To enable students gain knowledge on counselling process and techniques.</li> <li>• To familiarise with counselling skills.</li> <li>• To enable students gain knowledge on health psychology and health behaviour</li> <li>• To apprehend on skills of stress management.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<b>Counselling Process</b> a) Counselling – Definition, Expectations, Goals, Scope and Limits. Counsellor – Characteristics of an effective counsellor. The Client – Characteristics, Expectations b) Stages in Counselling – Establishing Rapport, Understanding and Assessing the Problem, Goal Setting, Counselling Intervention Strategies, Termination and Follow up c) Nutrition care process d) Ethics in Counselling	11
<b>II</b>	<b>Counselling Approaches: Key Concepts and Techniques</b> a) Counselling techniques, Strategies and Counselling skills- Rapport building and Opening techniques, Questioning, Listening, Reflecting, Acceptance, Silence, Leading reassurance, Non-verbal behaviour, Terminating skills. b) Group Counselling.	10
<b>III</b>	<b>Nutrition Counselling</b> a) Definition, History, Theories – Behavior modification (Cognitive Behavior therapy, Rational- Emotive therapy, Disinhibition), Standard behavioral therapy, Social learning theory, Transtheoretical model, and Person- centered therapy. b) Counselling skills to facilitate self- Management- Stages of change- Pre-contemplation, Contemplation, Preparation, Action, Maintenance and Relapse and Motivational interviewing	11
<b>IV</b>	<b>Health Psychology and Health Behaviour</b> a) Health Psychology- Health Behaviour- Definition of Health Psychology. The Need for Health Psychology, Introduction to Health Behaviour, Factors Influencing the Practice of Health. b) Modification of Health Behaviour – The Patient/Practitioner relationship, Changing Health Behaviour by Changing Health Beliefs, Cognitive Behavioral Approaches to Health Behaviour Change.	11

<b>V</b>	<b>Stress Management and Health Care Intervention</b> a) Stress and Stress Management- Definition of stress, Categories of stressors, Predisposing factors, Effects of Stress: GAS, Type A behaviour and stress, Methods of Coping with stress b) Health Care Intervention and Prevention- Health enhancing behavior – Diet, Exercise, Weight control, Yoga, Meditation, Development of Healthy Life Style.	11
	<b>Total Hours</b>	<b>54</b>

## References

### Text Books

- Judy Gable (2016), Counselling skills for dietitians, 3rd edition, Blackbail publications.
- Soundarrajan, R. (2012), Counselling – Theory, skills and practice, Tata McGraw Hill publications.
- Lewis E. Patterson (2005), The counselling Process, 6th Edition, Wadsworth, USA.
- Kathleen Bauer, Doreen Liou 2020. Nutrition counselling and education skill development 4th edition, WadsworthCenage Learning.
- Linda Sretselaar, 2009. 4th edition, Nutrition counselling skills for the Nutrition care process. Jones and Bartlett pub, Canada
- Betsy B.Holli and Judita A.Beto, 2020, 7th edition, Nutrition counselling and education skills doe dietetics professionals, 6th ed, Lippinkott Williams and Wilkins, Philadelphia.

### Reference Books

- Richard Nelson- jones (2021), Basic counselling skills: A Helper, 4th Edition, SAGE Publications India Pvt Ltd.
- GPH panel of experts (2018), Counselling Psychology Notes, Gullybaba Publishing House (P) Ltd.
- Isobel R. Contento. 2011. Nutrition Education. Linking Research, Theory and Practice, Second Edition, Jones and Barlett publishers, Canada.
- David F Marks, Michael Murray, Brian Evans, Carla Willig, Cailine Woodall and Catherine M.Sykes, Health Psychology: Theory, Research and Practice. 6th edition. New Delhi: Sage Publications, 2020.
- Calabrese, Richard J., Holli, Betsy B., Beto, Judita A., Maillet, Julie O’Sullivan. 2009. Communication and education skills for dietetics professionals, 5 Edition. Philadelphia, Pa: London: Wolters Kluwer/ Lippincott Williams & Wilkins
- Shelley E.Taylor., Health Psychology. 10th edition. Tata McGraw Hill edition, 1995. Edward P.Sarafino. Health Psychology. Joha Wiley and Sons, 2018.

### Web Resources

- <https://basicmedicalkey.com/patient-counselling-settings-and – techniques/>
- <https://fadic.net/>
- [www.medpub.com](http://www.medpub.com)

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Acquire knowledge on counselling skills.</p> <p><b>CO2:</b> Apply technical skills and tools in professional counselling.</p> <p><b>CO3:</b> Offer personalized counselling based on patient needs.</p> <p><b>CO4:</b> Educate community on health psychology.</p> <p><b>CO5:</b> Acquire knowledge on stress management and health care intervention.</p>
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#### COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
<b>CO1</b>	S	S	S	S	S	S	S	S	S	S	S
<b>CO2</b>	S	S	S	S	S	S	S	S	S	S	S
<b>CO3</b>	S	S	S	S	S	S	S	S	S	S	S
<b>CO4</b>	S	S	S	S	S	S	S	S	S	S	S
<b>CO5</b>	S	S	S	S	S	S	S	S	S	S	S

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

#### Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	20	20	15	15
<b>Understand</b>	10	10	15	15
<b>Apply</b>	10	10	15	15
<b>Analyse</b>	5	5	15	15
<b>Evaluate</b>	5	5	10	10
<b>Create</b>	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1E08- Food Microbiology and Safety</b>		
<b>Class</b>	<b>II M.Sc.</b>	<b>Semester</b>	<b>III</b>
<b>Cognitive Level</b>	<b>K-1, K-2, K-3, &amp;K-4</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• To enable the students to learn the methods used for quality assessment of food.</li> <li>• To know about various pathogenic microbes responsible for illness.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<b>Introduction</b> <ol style="list-style-type: none"> <li>a) Historical development of food microbiology.</li> <li>b) Morphology, general characteristics and classification of bacteria, fungi and algae.</li> <li>c) Viruses: structure and replication with particular reference to food borne viruses.</li> <li>d) Primary sources of microorganisms in food.</li> </ol>	11
<b>II</b>	<b>Microbial growth</b> <ol style="list-style-type: none"> <li>a) Growth of microorganisms-physiological and nutritional need, growth curve and methods of measuring microbial growth.</li> <li>b) Role of intrinsic and extrinsic parameters that affect microbial growth in foods.</li> </ol>	10
<b>III</b>	<b>Microbial spoilage of foods</b> <ol style="list-style-type: none"> <li>a) Causes of food spoilage; Microbial contamination of water;</li> <li>b) Spoilage of different group of foods-Milk and milk products;</li> <li>c) Cereals and cereal products , Fruits, vegetables and their products; Meat and meat products;</li> <li>d) Fish and fish products; Poultry and eggs; Canned foods.</li> </ol>	11
<b>IV</b>	<b>Food preservation and Quality control</b> <ol style="list-style-type: none"> <li>a) Physical: Low temperature; High temperature (pasteurization, canning); Irradiation (UV, microwave, ionization); Drying; High pressure processing.</li> <li>b) Chemical preservatives and natural antimicrobial compounds Microbiological quality standards of food, FDA, Hazard Analysis Critical Control Point (HACCP).</li> </ol>	11
<b>V</b>	<b>Food Safety</b> <ol style="list-style-type: none"> <li>a) Food borne hazards</li> <li>b) Microbial hazards:</li> <li>c) Bacterial food poisoning and infections ( Bacillus, E.coli,Staphylococcal,Campylobacter,Salmonella,Shigella,Listeria,Clostridium, Vibrio,Mycobacterium)</li> <li>d) Viral food borne disorders; mycotoxins</li> <li>e) Chemical hazards: Food adulterants, Pesticide residues</li> <li>f) Physical hazards</li> <li>g) Food Safety principles: Importance and principles of food hygiene and sanitation; Basic principles of food plant sanitation.</li> </ol>	11
<b>Total hours</b>		<b>54</b>

**Reference****Text books**

- Fundamental Food Microbiology, Fifth Edition, Bibek Ray, Arun Bhunia, 2014 , CRC Press
- Talaro Kand Talaro A., Foundations in Microbiology 10th Ed, WCB publications, USA. 2018.
- Jay, James, M. Modern Food Microbiology, 7<sup>th</sup> Ed, Aspen publishers, Inc., Maryland. 2005.
- Roday, S. Food Hygiene and sanitation, 2<sup>nd</sup> Edition. Tata Mc Graw Hill, New Delhi. 2011.
- Hogg S., Essential Microbiology 1st Ed, John Wiley & Sons, Ltd. England 2005.

**Reference Books**

- Doyle P. Michael, Beuchat R.L. and Montville J.T. Food Microbiology Fundamentals & Frontiers, 4<sup>th</sup> Ed, ASM Press, Washington D.C. 2013.
- Banwart, G. Basic Food Microbiology, 2<sup>nd</sup> Ed, CBS Publisher. 2004.
- S J Forsythe, Microbiology of Safe Food, Blackwell Science, 2010.

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Explain the concepts of food microbiology and food safety. <b>CO2:</b> Determine the causes of food spoilage in different food groups. <b>CO3:</b> Discuss the concepts of food borne diseases. <b>CO4:</b> Elaborate on Food adulteration and adulterants. <b>CO5:</b> Apply the techniques of HACCP.</p>
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**COs Consistency with POs and PSOs**

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
<b>CO1</b>	L	L	L	L	M	M	M	L	L	L	L
<b>CO2</b>	L	L	L	L	M	M	M	L	L	L	L
<b>CO3</b>	L	L	L	L	M	M	M	L	L	L	L
<b>CO4</b>	L	L	L	L	M	M	M	L	L	L	L
<b>CO5</b>	L	L	L	L	M	M	M	L	L	L	L

\*S- Strong Correlation, M-Medium Correlation, L-Low correlation, N- No correlation

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests(Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	20	20	15	15
<b>Understand</b>	10	10	20	20
<b>Apply</b>	10	10	15	15
<b>Analyze</b>	10	10	25	25
<b>Evaluate</b>	-	-	-	-
<b>Create</b>	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1N02- Non Major Elective-II- Life Cycle Nutrition</b>		
<b>Class</b>	<b>II M.Sc.</b>	<b>Semester</b>	<b>III</b>
<b>Cognitive Level</b>	<b>K-1, K-2, K-3, &amp;K-4</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• To familiarize the concept of balanced diet.</li> <li>• To discern the importance of nutrition during life span and dietary modifications for different age groups.</li> <li>• Develop aptitude to learn the nutritional problems of different age groups.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<b>Introduction to foods</b> <ol style="list-style-type: none"> <li>a) Functions of food</li> <li>b) Food groups</li> <li>c) Food in relation to health</li> <li>d) Explanation of terms</li> <li>e) Planning balanced diets</li> <li>f) Food guide</li> <li>g) Vegan diets</li> </ol>	10
<b>II</b>	<b>Nutritional and food requirements of expectant mother and lactating mother</b> <ol style="list-style-type: none"> <li>a) Expectant mother- preconception nutrition, nutritional requirements, food requirements, general problems</li> <li>b) Lactating women – nutritional requirements, food requirements</li> </ol>	12
<b>III</b>	<b>Nutritional and food requirements for infants and preschool children</b> <ol style="list-style-type: none"> <li>a) Growth and development during infancy</li> <li>b) Nutritional requirements for infants</li> <li>c) Food requirements for infants</li> <li>d) Low birth weight, preterm baby</li> <li>e) Weaning</li> <li>f) Nutritional requirements for pre-schoolers</li> <li>g) Food requirements, nutrition related problems of pre-schooler</li> </ol>	12
<b>IV</b>	<b>Nutritional and food requirements for school children and adolescents</b> <ol style="list-style-type: none"> <li>a) School children – nutritional requirements, food requirements, packed lunch, school lunch programmes</li> <li>b) Adolescents – nutritional requirements, food requirements, nutritional problems</li> </ol>	10
<b>V</b>	<b>Nutritional and food requirements of adults and during old age</b> <ol style="list-style-type: none"> <li>a) Adult – nutritional requirements, food requirements</li> <li>b) Old age – nutritional requirements, food requirements, nutritional related problems of old age, degenerative.</li> </ol>	10
	<b>Total</b>	<b>54</b>
	<b>Hours</b>	

## References

### Text Books

- Brown, J. E-Nutrition through the Life Cycle, 7th Edition-2017, Cengage Learning.
- Mahan L. K. & Stump S.E Krause's - Food Nutrition and diet Therapy, 12th edition- 2007, Saunders.
- B.Srilakshmi - Nutrition Science, 7th edition-2021, New Age International.
- Indian Council of Medical Research Nutrient Requirements and Recommended Dietary Allowances for India, A Report of the Expert Group of the Indian Council of Medical Research, New Delhi; ICMR. July 2023 Revised.
- Bajaj.M, Diet metrics, hand book of food exchanges, 1st edition- 2019, Notion press.

### Reference Books

- Groff, J. L and Gropper, S. S-7th edition-2017, Advanced Nutrition and Human Metabolism, Belmont CA: Wads worth/Thomson Learning.
- Goodhart, R. S. S. and Shils, M. E - Modern Nutrition in Health and Disease, Philadelphia: Lea and Febiger.
- Jackson, M. S - Adolescent Nutritional Disorders, 1997, The New York Academy of Science.
- Jelliffe D.B- Assessment of Nutrition Status of the Community, 1966, WHO, Geneva.

### Web Resources

- <https://www.universalclass.com/articles/health/nutrition/nutritional-needs-for-different-ages>.
- <https://www.nutrition.org.uk/nutritionscience/life.html>
- <http://www.open.edu/openlearncreate/mod/oucontent/view.php>

<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <b>CO1:</b> Define the nutritional needs of each age group. <b>CO2:</b> Infer and apply the appropriate concepts of balanced diet. <b>CO3:</b> Interpret the nutritional problems pertaining to different ages.
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### Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	20	15	20	20
<b>Understand</b>	20	15	25	25
<b>Apply</b>	5	10	15	15
<b>Analyse</b>	5	10	15	15
<b>Evaluate</b>	-	-	-	-
<b>Create</b>	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1N02- Non Major Elective-II- Nutrition Science</b>		
<b>Class</b>	<b>II M.Sc.</b>	<b>Semester</b>	<b>III</b>
<b>Cognitive Level</b>	<b>K-1, K-2, K-3, &amp;K-4</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• To enable the students to learn about the concepts in nutrition science.</li> <li>• To recognize the significance of diet in nutritional problems.</li> <li>• To understand the role of food and nutrients in infections and fever.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<b>Introduction to Nutrition Science</b> <ol style="list-style-type: none"> <li>a) History</li> <li>b) Nutrition research in India</li> <li>c) Nutrients- Classification</li> <li>d) Functions of macro and micro nutrients</li> <li>e) Food sources of macro and micro nutrients</li> </ol>	10
<b>II</b>	<b>Protein Energy Malnutrition</b> <ol style="list-style-type: none"> <li>a) Etiology and clinical features</li> <li>b) Nutritional requirement</li> <li>c) Treatment and Prevention</li> </ol> <b>Nutritional anaemia</b> <ol style="list-style-type: none"> <li>a) Prevalence and causes</li> <li>b) Types – Iron Deficiency, Megaloblastic, differentiating</li> <li>c) Prevention</li> </ol>	12
<b>III</b>	<b>Vitamin A Deficiency Disorders</b> <ol style="list-style-type: none"> <li>a) Etiology and clinical features</li> <li>b) Nutritional requirement</li> <li>c) Evaluation of Vitamin A status</li> <li>d) Treatment and Prevention</li> </ol>	12
<b>IV</b>	<b>Obesity and Underweight</b> <ol style="list-style-type: none"> <li>a) <b>Obesity</b> <ol style="list-style-type: none"> <li>i. Aetiology and theories</li> <li>ii. Assessment, types, treatment</li> <li>iii. Complications, Weight management guidelines, eating disorders</li> </ol> </li> <li>b) <b>Underweight</b> Aetiology, Nutritional and food requirements</li> </ol>	10
<b>V</b>	<b>Infections and fever</b> <ol style="list-style-type: none"> <li>a) Host defence mechanism</li> <li>b) Causes, Types</li> <li>c) General dietary considerations-Typhoid, Influenza, Malaria, Tuberculosis and AIDS</li> <li>d) Nutritional requirements</li> </ol>	10
	<b>Total Hours</b>	<b>54</b>

## References

### Text Books:

- Antia F.P. And Philip Abraham-Clinical Nutrition and Dietetics, 2001, Oxford Publishing Company.
- Swaminathan S- Advanced Textbook On Food & Nutrition, 2015, Bappco
- B. Srilakshmi- Nutrition Science, 2021, 6th Edition, New Age International Pvt. Ltd. New Delhi.
- B. Srilakshmi- Dietetics, 2023, 9th Edition, New Age International Pvt. Ltd. New Delhi.
- Bajaj.M, Diet metrics, hand book of food exchanges, 1st edition- 2019, Notion press.

### Reference Books:

- Mahan L.K., Sylvia Escott-Stump - Krause's Food Nutrition and Diet Therapy 12th Edition, 2008, W.B. Saunders Company London.
- Passmore P. And M.A. East Wood - Human Nutrition and Dietetics, Churchill Living Stone, 8th edition- 1986
- Raheena M. Begum - A Text Book of Foods Nutrition and Dietetics , 3 edition 2009, Sterling Publishers pvt. Ltd
- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, and A.E., Carwick: Normal and Therapeutic Nutrition, 17th Edn, Macmillan Publishing Company.
- Shills and Young- Modern Nutrition in Health and Disease, 2012, Lippincott Williams and Wilkins.
- Bennion M.: Clinical Nutrition, John Wiley & Sons.
- Whitney, E. N. and C. B. Cataldo, Understanding Normal and Clinical Nutrition, 3rd edition- 1991, West Pub.
- Williams S. R. Essentials of Nutrition and Diet Therapy, 12th edn, 2018, Mosby College Pub. S. Louis.

### Web Resources:

- [www.anme.com.mx/libros/PrinciplesofNutrition.pdf](http://www.anme.com.mx/libros/PrinciplesofNutrition.pdf)
- <https://2012books.lardbucket.org/pdfs/an-introduction-to-nutrition.pdf>
- [krishikosh.egranth.ac.in](http://krishikosh.egranth.ac.in)

<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <b>CO1:</b> Understand the concepts in nutrition science. <b>CO2:</b> Identify and describe the etiology, symptoms and complications for common nutritional problems. <b>CO3:</b> Relate the role of food and nutrients in obesity and underweight. <b>CO4:</b> Apply the principles of diet and determine the dietary essentials for recovery from infectious diseases.
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## Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	15	15	20	20
Understand	15	15	25	25
Apply	10	10	15	15
Analyse	10	10	15	15
Evaluate	-	-	-	-
Create	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1I01- Internship/Industrial Activity- Hospital Dietary Internship</b>		
<b>Class</b>	<b>I M.Sc.</b>	<b>Semester</b>	<b>III (2<sup>nd</sup> Semester Summer Vacation)</b>
<b>Cognitive Level</b>	<b>K-3, K-4, K-5 &amp; K-6</b>		
<b>Course Objectives</b>	<p><b>The Course aims</b></p> <ul style="list-style-type: none"> <li>• To create opportunities to explore the interests of students in clinical nutrition and dietetics.</li> <li>• To develop professional skills and competencies as clinical dieticians.</li> <li>• To apply what is learnt theoretically to actual practice.</li> <li>• To infer with career development by providing real work experiences.</li> </ul>		

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Identify the different disease conditions.</p> <p><b>CO2:</b> Interpret the relevance of food and nutrition for the disease.</p> <p><b>CO3:</b> Devise an individualized diet plan for patients.</p> <p><b>CO4:</b> Compare and contrast the derived nutritive values with R.D.A using software.</p> <p><b>CO5:</b> Persuade the patients with appropriate diet counselling techniques.</p>
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#### COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO				
	1	2	3	4	5	6	7	1	2	3	4	
<b>CO1</b>	S	S	S	S	S	S	S	S	S	S	S	S
<b>CO2</b>	S	S	S	S	S	S	S	S	S	S	S	S
<b>CO3</b>	S	S	S	S	S	S	S	S	S	S	S	S
<b>CO4</b>	S	S	S	S	S	S	S	S	S	S	S	S
<b>CO5</b>	S	S	S	S	S	S	S	S	S	S	S	S

**\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation**

## SEMESTER IV

<b>Course Code &amp; Title</b>	<b>23UPCND1C08- Food Service Management</b>		
<b>Class</b>	<b>II M.Sc.</b>	<b>Semester</b>	<b>IV</b>
<b>Cognitive Level</b>	<b>K-1,K-2,K-3,K-4&amp;K-5</b>		
<b>Course Objectives</b>	<p><b>The Course aims</b></p> <ul style="list-style-type: none"> <li>• To develop core knowledge in key areas of various Food Service Systems, its development and also in administration.</li> <li>• To gain efficacy in principles of management.</li> <li>• To progress in food production, standardization and serving techniques.</li> </ul>		

Unit	Content	Number of Hours
<b>I</b>	<p><b>Food service Institutions and management</b></p> <ol style="list-style-type: none"> <li>a) History and development</li> <li>b) Definition and importance</li> <li>c) Factors affecting development of Food Service institutions</li> <li>d) Principles, tools (tangible and intangible) and functions of organizations</li> <li>e) Recent trends in food service institutions</li> </ol> <p><b>Various types of food service institutions</b></p> <ol style="list-style-type: none"> <li>a) Commercial and Non-commercial conventional, commissary, ready prepared and assembly/serve. Miscellaneous- Contract and Outdoor.</li> <li>b) Theories of management and approaches -Classical or traditional theory, Neoclassical approach, Quantitative approach, MBO approach, System approach, Contingency approach, JIT approach, Total quality management approach, Management science or operation research.</li> </ol>	22
<b>II</b>	<p><b>Food Service Unit Layout and Design</b></p> <ol style="list-style-type: none"> <li>a) Steps and different types of Planning,</li> <li>b) Site Selection.</li> <li>c) Various Phases of layout and Various factors influencing layout design</li> <li>d) Impact of Design on Efficiency and Safety</li> <li>e) Work pattern.</li> </ol> <p><b>Equipments</b></p> <ol style="list-style-type: none"> <li>a) Classification, Selection and Design</li> <li>b) Factors influencing selection of various equipments</li> <li>c) Equipment Layout 1. Effective Layout 2. Hot Food Prep</li> <li>d) Base materials and finishes in food industries</li> <li>e) Installation and operation</li> <li>f) Care and maintenance of equipments.</li> </ol>	22

<b>III</b>	<b>Food production&amp; service</b> <ul style="list-style-type: none"> <li>a) Type of menu, techniques of menu writing</li> <li>b) Importance, principles of Menu Planning in Food Service institutions</li> <li>c) Procedures and techniques used in Institutional and Commercial Food Production</li> <li>d) Standardization of recipe, food cost, unit cost, SWOT Analysis and portion control</li> <li>e) Principles involved in large Scale Cooking Factors in menu planning for large groups, and utilization of left over foods in food service institutions.</li> </ul>	21
<b>IV</b>	<b>Material management</b> <ul style="list-style-type: none"> <li>a) Principles of quantity food purchase <ul style="list-style-type: none"> <li>- Selection, Methods of buying and Receiving</li> <li>- Dry storage and cold storage</li> <li>- Methods of delivery and accounting of different foods</li> </ul> </li> <li>b) Inventory management <ul style="list-style-type: none"> <li>- Types and methods of inventory management</li> <li>- Assessing requirements and Receiving and release of stocks</li> <li>- Safety stocks and Dead stocks</li> </ul> </li> <li>c) Types of Storage, maintenance of food quality in Storage and store record maintenance</li> <li>d) Marketing and E-Marketing – definition, function, marketing mix, sales promotion, selling techniques and advertisement</li> <li>e) Franchise systems in the hospitality industry.</li> </ul>	21
<b>V</b>	<b>Personnel management</b> <ul style="list-style-type: none"> <li>a) Definition, development and policies</li> <li>b) Staffing - Sources of recruitment, Selection, Induction, training, wages, salaries, incentives, work appraisals. Promotion, demotion, transfer, dismissal. Managerial problems of Food Service Unit.</li> <li>c) Directing and Controlling – Direction, leadership, delegation, decentralization, centralization, supervision, human relations in industry, authority and responsibility, motivation, communication, evaluation techniques</li> </ul> <b>Financial management</b> <ul style="list-style-type: none"> <li>a) Types of budget, Records for purchase, Receiving, Storage and Production</li> <li>b) Service and income and expenditure record.</li> <li>c) Costing and cost control- <ul style="list-style-type: none"> <li>- Concept and Measurement of Cost of Capital</li> <li>- Factors affecting cost control</li> <li>- Determining Selling Price of Food</li> <li>- Checklist for Cost Control</li> </ul> </li> </ul>	22
<b>Total Hours</b>		<b>108</b>

## References

### Text Books

- West, B. B. and Wood, L. - Food Service in Institutions, 6 th edition, 1988, John Wiley, New York
- Wood, C; Kluge, E, Annsem, P.E-The Anatomy of Food Service Design, 1978, C.B.I. Publishing Co Inc.
- Sethi, M; Malhan, S. - Catering Management; An integrated approach, 1997, New Age International.
- Kotler,P., (2019), Principles of Marketing, 13<sup>th</sup> edition, Pearson.
- Kinton, R., Cessarani, V and Foskett, D, the Theory of Catering, Hodder and Stoughton, 2000.
- Tripathi, P.C. Personnel Management and Industrial Relations, Sultan Chand and Sons, 2000.

### Reference Books

- Food service Organizations: A Managerial and Systems Approach, (9th ed.), Pearson, London (2017)
- Livingston,G.E.-Food Service Systems-Analysis, Design and Implementation, 1979, Academic press
- Powers, T. F. and Powers, T. M. - Food Service Operations Planning and Control, 1984, John Wiley& Sons.
- Buchanan, R.D- The Anatomy of Food Service Design, 1975, CAHNERS Publ. Co. Inc.
- Boella, M. J. - Personnel Management in the Hotel and Catering Industry, 1983, Hutchinson, London.
- Yadav, C, P. Management of Hotel and Catering Industry, Anmol publications Pvt
- T.Ramaswamy- Principles of Management, 2014, Himalaya publishing house. Methodological Approaches to Designing Integrated Systems of Management of Food Service Enterprises.
- Hitchcock, M.J-Food Service Systems Administration, 1980, Prentice Hall.

### Web Resources

- <https://theicn.org/management-and/inventory-tracking-and-managment-guide.pdf>
- <https://www.scribd.com/document/119449120/History-of-Food-Service-Industry>
- [cte.sfasu.edu](http://cte.sfasu.edu) Hospitality and Tourism› Practicum in Culinary Arts

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Differentiate and contrast the types of food service offered in a variety of food service settings.</p> <p><b>CO2:</b> Relate food services technology to design layout and operate industry equipment.</p> <p><b>CO3:</b> Apply nutritional standards as expected in Food Service Management Fields.</p> <p><b>CO4:</b> Demonstrate an understanding of human resource management, financial management, and quality control.</p> <p><b>CO5:</b> Perform essential food production and cost control skills.</p>
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#### COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
<b>CO1</b>	M	M	M	L	S	S	M	S	S	N	S
<b>CO2</b>	M	M	M	L	S	S	L	S	S	N	S
<b>CO3</b>	M	M	M	L	S	S	S	S	S	N	S
<b>CO4</b>	M	M	M	L	S	S	S	S	S	N	S
<b>CO5</b>	M	M	M	L	S	S	L	S	S	N	S

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

#### Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	10	10	20	20
<b>Understand</b>	10	10	15	15
<b>Apply</b>	15	20	15	15
<b>Analyse</b>	10	5	15	15
<b>Evaluate</b>	5	5	10	10
<b>Create</b>	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code&amp; Title</b>	<b>23UPCND1C09- Nutrition for Sports and Exercise</b>		
<b>Class</b>	<b>II M.Sc.</b>	<b>Semester</b>	<b>IV</b>
<b>Cognitive Level</b>	<b>K-1,K-2,K-3&amp; K-4</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• To develop knowledge of the macronutrient principles of sports nutrition for different types of athletes based on their goals, specifically related to energy and recovery.</li> <li>• To gain knowledge about special topics in the field of sports nutrition.</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<b>Introduction</b> <ol style="list-style-type: none"> <li>a) Nutritional intake concerns for athletes in sport and exercise.</li> <li>b) Types of exercise (aerobic and anaerobic) and limiting factors, Exercise intensity and duration</li> <li>c) Quantity of carbohydrate intake in Resistance training and Endurance training;</li> <li>d) Fluid balance in sports and exercise, importance, symptoms and prevention of dehydration, Sports drink</li> <li>e) Diet for junior athlete.</li> </ol>	22
<b>II</b>	<b>Macro Nutrients</b> <ol style="list-style-type: none"> <li>a) Carbohydrate as an energy source for sport and exercise.</li> <li>b) Carbohydrate stores and supplements</li> <li>c) Fuel utilization during rest and exercise.</li> <li>d) CHO Loading- ATP-PC Changes and lactate changes</li> <li>e) CHO composition for pre exercise, during and recovery period.</li> <li>f) Diets for persons with - High energy requirements, Stress, Fracture and Injury</li> </ol>	22
<b>III</b>	<b>Protein and amino acid requirements</b> <ol style="list-style-type: none"> <li>a) Protein turnover during endurance versus resistance training; Amount of protein recommended for varying level of training during endurance exercise</li> <li>b) Significance of protein in Resistance exercise and recovery process.</li> <li>c) Protein supplement</li> <li>d) Protein needs on vegetarian diet</li> </ol>	21
<b>IV</b>	<b>Role of Fat as an energy source for sports and exercise</b> <ol style="list-style-type: none"> <li>a) Fat stores</li> <li>b) Regulation of fat metabolism</li> <li>c) Factors affecting fat oxidation (intensity, duration , training status, CHO feeding)</li> <li>d) Dietary Fat and Utilization During Exercise</li> <li>e) Amount of fat recommended for varying level of training.</li> </ol>	21

<b>V</b>	<b>Important micronutrients for exercise</b> a) B complex vitamin and specific minerals. b) Antioxidant effects to reduce exercise induced oxidative stress;-Antioxidant requirements for exercise. c) Female athletic triad and Sports anemia-Assessment for fat; Dietary guidelines and suggestions for fat. Eating disorder. d) Ergogenic Supplements. e) Doping control and Supplement testing.	22
	<b>Total Hours</b>	<b>108</b>

## References

### Text Books

- Srilakshmi et al. - Exercise Physiology, Fitness and Sports Nutrition, 2016, New Age International Private Limited.
- Dan Benardot – Advanced Sports Nutrition, 2011, 2<sup>nd</sup> edition Human Kinetics, Inc.
- Suzanne Girard Eberle – Endurance Sports Nutrition, 2013, 3rd edn. Human Kinetics, Inc.

### Reference Books

- Nancy Clarke’s- Sports Nutrition Guidebook, 2015, 3rd edn. Human Kinetics, Inc.
- Anita Bean – A Complete Guide to Sports Nutrition, 8 edition, 2017, Bloomsbury Sport.
- Louise Burke – Clinical Sports Nutrition, 2018, 5th edn. Human Kinetics, Inc.

### Web Resources

- American Society for Nutrition: [www.nutrition.org](http://www.nutrition.org)
- Australian Sport Institute: [www.ausport.gov.au/ais/nutrition](http://www.ausport.gov.au/ais/nutrition)
- The Canadian Nutrient File is a searchable database containing average values for nutrients in foods: [www.hc-sc.gc.ca/fn-an/nutrition/fiche-nutri-data/user\\_guide\\_d\\_utilisation01-eng.php](http://www.hc-sc.gc.ca/fn-an/nutrition/fiche-nutri-data/user_guide_d_utilisation01-eng.php)
- <http://www.aco.org.nz/pdf/nutrition-for-sports>
- [https://www.researchgate.net/publication/258630492\\_Sports\\_Nutrition\\_Book\\_2013](https://www.researchgate.net/publication/258630492_Sports_Nutrition_Book_2013)
- <http://themedicalbiochemistrypage.org>

<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <b>CO1:</b> Apply the art and science of sports nutrition for the wellness of sports personnel. <b>CO2:</b> Relate the role and importance of macro and micro nutrients in body maintenance of sports enthusiastic. <b>CO3:</b> Describe the dietary supplements for different sports activities. <b>CO4:</b> Discuss the role of nutrition in physical performance, recovery and adaptations to exercise.
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### COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
CO1	S	S	S	M	L	M	M	S	M	M	M
CO2	S	S	S	M	L	M	M	M	L	S	M
CO3	S	S	S	S	L	M	M	S	L	S	M
CO4	S	S	S	S	L	M	S	S	M	M	M

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

### Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	15	15	20	20
Understand	15	10	25	25
Apply	10	15	15	15
Analyse	10	10	15	15
Evaluate	-	-	-	-
Create	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1P01- Project with Viva-Voce Proof of Concept/Prototype for a diet related problem</b>		
<b>Class</b>	<b>II M.Sc.</b>	<b>Semester</b>	<b>IV</b>
<b>Cognitive Level</b>	<b>K-1, K-2, K-3, K-4, K5 &amp; K-6</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>• To synthesise knowledge from all disciplines of learning.</li> <li>• To creatively apply the concepts of nutrition and dietetics in practice.</li> <li>• To enhance the skills of independent thinking and learning.</li> <li>• To develop aptitude to solve hitches during applications.</li> <li>• To create innovative solutions to existing nutrition problems in community.</li> </ul>		

<b>Course Outcomes</b>	<b>On completion of the course, students should be able to</b> <b>CO1:</b> State a nutritional problem prevalent in local community settings and draft a research design for solving. <b>CO2:</b> Determine the etiological factors. <b>CO3:</b> Plan and design tools for data collection. <b>CO4:</b> Apply the appropriate nutritional concepts to research techniques. <b>CO5:</b> Conceive solutions to the defined problems.
<b>Total Hours</b>	<b>180</b>

#### COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO				
	1	2	3	4	5	6	7	1	2	3	4	
<b>CO1</b>	S	S	S	S	S	S	S	S	S	S	S	S
<b>CO2</b>	S	S	S	S	S	S	S	S	S	S	S	S
<b>CO3</b>	S	S	S	S	S	S	S	S	S	S	S	S
<b>CO4</b>	S	S	S	S	S	S	S	S	S	S	S	S
<b>CO5</b>	S	S	S	S	S	S	S	S	S	S	S	S

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

#### Assessment Pattern

<b>Bloom's Category</b>	<b>Terminal Examination (Marks)</b>
<b>Remember</b>	10

<b>Understand</b>	10
<b>Apply</b>	20
<b>Analyse</b>	30
<b>Evaluate</b>	30
<b>Create</b>	100
<b>Total</b>	<b>200</b>

<b>Course Code &amp; Title</b>	<b>23UPCND1E09– Elective –VI (Industry/ Entrepreneurship) Therapeutic Food Formulation</b>		
<b>Class</b>	<b>II M.Sc.</b>	<b>Semester</b>	<b>IV</b>
<b>Cognitive Level</b>	<b>K-3, K-4, K-5&amp;K-6</b>		
<b>Course Objectives</b>	<b>The Course aims</b> <ul style="list-style-type: none"> <li>To provide training in the planning and preparation of diets for different disease conditions using computers.</li> <li>Expertise in various feeding formulas and techniques.</li> </ul>		

<b>S. No</b>	<b>Content</b>	<b>Number of Hours</b>
1.	Introduction and documentation of several therapeutic foods available in the market	6
2.	Formulation and estimation of allyl sulfur rich therapeutic foods	5
3.	Preparation and valuation of beta glucan rich therapeutic foods	5
4.	Formulation and estimation of lycopene rich therapeutic foods	6
5.	Preparation and assessment of probiotic rich therapeutic foods	6
6.	Formulation and calculation of prebiotic rich therapeutic foods	6
7.	Preparation and calculation of omega 3 rich therapeutic foods	6
8.	Formulation and evaluation of vitamin A rich therapeutic foods	5
9.	Preparation and estimation of soy protein rich therapeutic foods	5
10.	Formulation and evaluation of both dairy and non-dairy calcium rich foods	6
11.	Formulation and valuation of herbal foods	5
12.	Formulation and evaluation of Isothiocyanates rich therapeutic foods	5
13	Formulation and evaluation of whey protein rich therapeutic foods	6
<b>Total Hours</b>		<b>72</b>

<b>Reference Books</b>
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- Nisha Maimun- Diet Planning for Diseases,2020, Kalpaz Publications, New Delhi
- Luxita Sharma, Clinical Studies and Diet Plans for Common Diseases, 2020, Dreamtech Press, New Delhi
- Jeffery Horst, Methods of Analysis for Functional Foods and Nutraceuticals, 2002, CRS Press.
- AOAC International. Official methods of analysis of AOAC International
- Linden G. -Analytical Techniques for Foods and Agricultural Products.
- Ranganna. S.- Handbook of Analysis and Quality Control for Fruit and Vegetable Products

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b>Identify and analyse the various nutraceuticals and functional foods available in the market</p> <p><b>CO2:</b> Develop and evaluate functional foods products.</p> <p><b>CO3:</b> Comprehend the formulations of sports drink.</p> <p><b>CO4:</b> Describe the role of nutraceuticals in herbs.</p>
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**COs Consistency with POs and PSOs**

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
<b>CO1</b>	S	S	S	S	S	S	S	S	S	S	S
<b>CO2</b>	S	S	S	S	M	M	S	S	S	S	S
<b>CO3</b>	S	S	S	S	L	L	S	S	S	S	S
<b>CO4</b>	S	S	S	S	S	S	S	S	S	S	S

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

**Assessment Pattern**

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	5	5	5	5
<b>Understand</b>	5	5	5	5
<b>Apply</b>	5	10	10	10
<b>Analyse</b>	15	10	10	10
<b>Evaluate</b>	15	15	15	15
<b>Create</b>	15	15	15	15
<b>Total</b>	<b>60</b>	<b>60</b>	<b>60</b>	<b>60</b>

<b>Course Code&amp; Title</b>	<b>23UPCND1S01- Skill Enhancement Course-Professional Competency Skill-Entrepreneurship in Health care</b>		
<b>Class</b>	<b>II M.Sc.</b>	<b>Semester</b>	<b>IV</b>
<b>Cognitive Level</b>	<b>K-1,K-2,K-3,K-4&amp; K-5</b>		
<b>Course Objectives</b>	<p><b>The Course aims</b></p> <ul style="list-style-type: none"> <li>• To introduce the basic principal of innovation and entrepreneurship</li> <li>• To describe the healthcare value chain and the different types of healthcare innovation</li> <li>• To provide an overview of innovation and Entrepreneurial Management</li> <li>• To describe strategy, Venture capital and complex system</li> <li>• To Explore how the main industries involved in healthcare</li> </ul>		

<b>Unit</b>	<b>Content</b>	<b>Number of Hours</b>
<b>I</b>	<p><b>Introduction to Entrepreneurship</b></p> <p>a) Entrepreneurship -Definition and process  b) Competencies of an Entrepreneur  c) Types of Entrepreneurs  d) Self-Assessment of Qualities, Skills and Resources  e) Advantages and Disadvantages of Entrepreneurship  f) Entrepreneurial Motivation</p> <p><b>Entrepreneurial Opportunity</b></p> <p>g) Define Entrepreneurial opportunity  h) Environment Scanning, Problem Identification &amp;Idea Generation  i) Innovative Efforts, Transformation of Ideas into Opportunities and Idea and Opportunity Assessment  j) Market Assessment, Trend Spotting &amp;Creativity  k) Misconceptions about Generating Ideas for Entrepreneurial Opportunities</p>	15
<b>II</b>	<p><b>Entrepreneurial Planning</b></p> <p>a) Definition of MSME Enterprises, types of enterprises,  b) Five Basic Legal Forms of Organization and about company</p> <p><b>Commercialization process and strategy</b></p> <p>c) Strategy for Commercialization  d) Market for Ideas v/s Market for Products  e) Decision-making for Commercialization  f) Technological Innovation vis-à-vis Business Models  g) Process of Commercialization and its options</p>	14

<b>III</b>	<b>Management of Intellectual Property Rights</b> <ol style="list-style-type: none"> <li>a) Patents, Trademarks, copyrights, Industrial designs, Geographical Indications, trade secrets</li> <li>b) Other aspects - International Perspective on Patents, IP Analytics, IPR Protection: Start from the Idea Stage and Licensing</li> <li>c) Entrepreneurs acquiring Technologies, Innovation Management and Developing an IP Portfolio</li> </ol> <b>Financial management</b> <ol style="list-style-type: none"> <li>d) Considerations in Managing Capital, Approaches to Managing Capital and Calculating the Cost of Capital</li> <li>e) Cost of Equity and Risk, Working Capital and Financial Planning and Budgets</li> </ol>	14
<b>IV</b>	<b>Human Resource Management</b> <ol style="list-style-type: none"> <li>a) The link between Human Resources and Business Strategy, Workforce Planning, HRM - Policies to Close the Workforce Gap, Human Resource Management Functions, Compensation</li> <li>b) Environmental and Organizational Challenges for HR Managers, Requirements of a Human Resource Manager, Training and Development</li> </ol> <b>Marketing strategy</b> <ol style="list-style-type: none"> <li>c) Define marketing, Marketing vs. Selling, Information required for Business and Marketing and Recognizing Market Segments</li> <li>d) Understanding, and stages of the Product Life Cycle</li> <li>e) Branding as a Concept and Marketing Limitations for Startups</li> </ol>	15
<b>V</b>	<b>Telemedicine for healthcare</b> <ol style="list-style-type: none"> <li>a) Introduction to telemedicine</li> <li>b) Capabilities and features of telemedicine when used in healthcare management system</li> <li>c) The treatment work flow process as being used in telemedicine care</li> <li>d) Barriers for the adoption of telemedicine practices in making healthcare services effective</li> <li>e) Telemedicine in healthcare: significant application areas</li> <li>f) Telemedicine applications areas for the Healthcare sector</li> <li>g) Limitations of telemedicine in healthcare</li> <li>h) Future of telemedicine in the healthcare sector</li> </ol>	14
	<b>Total Hours</b>	<b>72</b>

**References**

- Innovation and Entrepreneurship in Biotechnology – An International Perspective Concepts, Theories and Cases, Damian Hine (Senior Lecturer, University of Queensland, Australia) John Kapeleris (Deputy CEO, Australian Institute for Commercialisation, Brisbane, Australia) 2006.
- The Business of Biosciences – What makes a biotech entrepreneur? Springer 2009.
- Building a conducive environment for life science-based entrepreneurship and industry clusters Mark J. Ahn and Michael Meeks, Journal of Commercial Biotechnology. Vol 14. No 120–30

January 2008 <http://www.springer.com/978-1-4419-0063-0>.

- Report of the Expert Committee on Innovation and Entrepreneurship, NITI Aayog, New Delhi, August 2015.
- India is the nesting ground for young entrepreneurs and new start-ups Nikita Agarwal International Journal of Applied Research 2015; 1(7): 578-582.
- National Biotechnology Development Strategy – Promoting bioscience research, education and entrepreneurship Department of Biotechnology, Ministry of Science & Technology, Government of India, 2015.

<b>Course Outcomes</b>	<p><b>On completion of the course, students should be able to</b></p> <p><b>CO1:</b> Elucidate the importance of Innovation and Entrepreneurship</p> <p><b>CO2:</b> Define the management of Innovation and Entrepreneurship</p> <p><b>CO3:</b> Determine Venture Capital and Entrepreneurial Strategies</p> <p><b>CO4:</b> Describe health innovation sector and government initiatives</p> <p><b>CO5:</b> Explain complex system and leading innovation</p>
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#### COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
<b>CO1</b>	S	S	S	L	L	S	M	S	S	L	L
<b>CO2</b>	S	S	S	L	L	S	M	S	S	L	L
<b>CO3</b>	S	S	S	L	L	S	M	S	S	L	L
<b>CO4</b>	S	S	S	L	L	S	M	S	S	L	L
<b>CO5</b>	S	S	S	L	L	S	M	S	S	L	L

\*S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation

#### Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
<b>Remember</b>	15	20	20	20
<b>Understand</b>	15	15	20	20
<b>Apply</b>	10	15	15	15
<b>Analyze</b>	5	10	10	10
<b>Evaluate</b>	5	5	10	10
<b>Create</b>	-	-	-	-
<b>Total</b>	<b>50</b>	<b>50</b>	<b>75</b>	<b>75</b>

<b>Course Code&amp; Title</b>	<b>23UPCND1X01-Extension Activity Nutrition/Diet Counselling to Individuals</b>		
<b>Class</b>	<b>II M.Sc.</b>	<b>Semester</b>	<b>IV</b>