



திருவள்ளூர் பல்கலைக்கழகம்

**THIRUVALLUVAR UNIVERSITY**

(State University Accredited with "B+" Grade by NAAC)

Serkkadu, Vellore - 632 115, Tamil Nadu, India.

**Postgraduate Programme  
In  
Foods and Nutrition**

**Curriculum and Syllabus  
(With Effect from the Academic Year 2023-2024)**

**June 2023  
Learning Outcome Based Curriculum Framework  
(M.Sc. – Foods and Nutrition)  
First Year**

## INTRODUCTION

Home Science is both multidisciplinary and interdisciplinary in its context encompassing major disciplines which includes Foods and Nutrition, Nutrition, Food Service Management & Dietetics, Clinical Nutrition & Dietetics, Food Science Technology and Nutrition and Nutrition & Dietetics with hospitality management, Hospital Administration, Food Service Management and Food Processing. Each area has one or more specific areas of specialization. Each specialization under Home Science offers a wide array of courses that prepares students for employment or setting up an enterprise in a wide range of sectors such as healthcare, childcare, food and hospitality, textiles, home and office interiors. Further, all courses of the programme are designed to improve the lifestyle of the individual, family and society that could most certainly contribute to the holistic development of the community.

The primary **objective** of this course curriculum was to introduce the fundamental concepts of nutrition by exploring current nutritional issues of relevance in their lives. Students are prepared for a wide range of careers as health educators, researchers, personal trainers, public health planners and more. The course curriculum for this programme has been planned to improve the employability potential and increase the scope for higher education. This programme facilitates action-based research in the various fields with the advantage of nurturing critical and analytical thinking that pave the way for innovation and entrepreneurship.

### **Highlights of the Revamped Curriculum**

- The curriculum focusses on meeting the demands of the Food industry, Entrepreneurs, Public health sector, Hospitality industries, Healthcare and social welfare sectors.
- This student centric programme ensures knowledge and skill development by providing hands on training, on-the-job internships, projects, lab practices, experiential activities ,exposure to entrepreneurial skills and training for competitive examinations.
- The course content is comparable to world class curriculum.
- The courses are updated to include recent developments in the field of Home Science-Food science Nutrition and Dietetics.
- References are updated and web resources are cited.
- Each course in the curriculum carries either a practical/activity or experiential learning component to ensure skill development along with acquiring knowledge in the subject.
- Potential for employability has been enhanced through mandatory internships.
- Digital literacy and competency is ensured using ICT enabled learning environment.

**TANSICHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM  
FRAMEWORK FOR POSTGRADUATE EDUCATION**

<b>Programme</b>	<b>M.Sc., Food Science Nutrition and Dietetics</b>
<b>Programme Code</b>	
<b>Duration</b>	<b>2 years for PG</b>

<p><b>Programme Outcomes (Pos)</b></p>	<p><b>PO1: Problem Solving Skill</b> Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.</p> <p><b>PO2: Decision Making Skill</b> Foster analytical and critical thinking abilities for data-based decision-making.</p> <p><b>PO3: Ethical Value</b> Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.</p> <p><b>PO4: Communication Skill</b> Ability to develop communication, managerial and interpersonal skills.</p> <p><b>PO5: Individual and Team Leadership Skill</b> Capability to lead themselves and the team to achieve organizational goals.</p> <p><b>PO6: Employability Skill</b> Inculcate contemporary business practices to enhance employability skills in the competitive environment.</p> <p><b>PO7: Entrepreneurial Skill</b> Equip with skills and competencies to become an entrepreneur.</p> <p><b>PO8: Contribution to Society</b> Succeed in career endeavors and contribute significantly to society.</p> <p><b>PO 9 Multicultural competence</b> Possess knowledge of the values and beliefs of multiple cultures and a global perspective.</p> <p><b>PO 10: Moral and ethical awareness/reasoning</b> Ability to embrace moral/ethical values in conducting one's life.</p>
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<p><b>Programme Specific Outcomes (PSOs)</b></p>	<p><b>PSO1 – Placement</b></p> <p>To prepare the students who will demonstrate respectful engagement with others’ ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.</p> <p><b>PSO 2 - Entrepreneur</b></p> <p>To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.</p> <p><b>PSO3 – Research and Development</b></p> <p>Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development.</p> <p><b>PSO4 – Contribution to Business World</b></p> <p>To produce employable, ethical and innovative professionals to sustain in the dynamic business world.</p> <p><b>PSO 5 – Contribution to the Society</b></p> <p>To contribute to the development of the society by collaborating with stakeholders for mutual benefit.</p>
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## Template for P.G., Programmes

Semester-I	Credit	Hours	Semester-II	Credit	Hours
Core-I	5	7	Core-IV	5	6
Core-II	5	7	Core-V	5	6
Core – III	4	6	Core – VI	4	6
Elective -I Discipline Centric	3	5	Elective – III Discipline Centric	3	4
Elective-II Generic:	3	5	Elective -IV Generic:	3	4
			Skill Enhancement I	2	4
	<b>20</b>	<b>30</b>		<b>22</b>	<b>30</b>

**Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework  
(LOCF) Guideline Based Credits and Hours Distribution System  
for all Post – Graduate Courses including Lab Hours**

**First Year – Semester – I**

<b>Part</b>	<b>List of Courses</b>	<b>Credits</b>	<b>No. of Hours</b>
	Core – I	5	7
	Core – II	5	7
	Core – III	4	6
	Elective – I	3	5
	Elective – II	3	5
		<b>20</b>	<b>30</b>

**Semester-II**

<b>Part</b>	<b>List of Courses</b>	<b>Credits</b>	<b>No. of Hours</b>
	Core – IV	5	6
	Core – V	5	6
	Core – VI	4	6
	Elective – III	3	4
	Elective – IV	3	4
	Skill Enhancement Course [SEC] - I	2	4
		<b>22</b>	<b>30</b>

## M.Sc., FOODS AND NUTRITION

### SEMESTER –I

Part	Course component	Subject	Credits	Hours per week (L/T/P)
	Core 1	Advanced Food science	5	7
	Core 2	Macronutrients	5	7
	Core 3	Advanced Food science practical	4	6
	Elective 1	Advanced Human Physiology	3	5
	Elective 2	Food processing and technology	3	5
		Total	20	30

### SEMESTER II

Part	Course component	Subject	Credits	Hours per week (L/T/P)
	Core 4	Advanced Dietetics	5	6
	Core 5	Nutritional Biochemistry	5	6
	Core 6	Advanced Dietetics Practical	4	6
	Elective 3	Research methods in Nutrition	3	4
	Elective 4	Food Preservation	3	4
	SEC I	Perspectives of Home science	2	4
		Total	22	30



## 1.1 CORE I

### ADVANCED FOOD SCIENCE

**CREDIT: 5**

**SEMESTER :1**

**YEAR :1**

**HOURS PER WEEK :7**

#### **COURSE OBJECTIVES:**

- To enable the students
- Gain knowledge on the source and properties of food
- Familiarize students with changes occurring in various foodstuffs as a result of processing and cooking.
- Enable students to use theoretical knowledge in various applications and food preparations.

#### **COURSE OUTCOME:**

On successful completion of the course, the students will be able to

<b>CO No.</b>	<b>CO Statement</b>
CO1	Overview the relationship between the chemical structure and the properties of the main components in food like starch, protein and lipids.
CO2	Understand the Composition and characteristics of various food commodities.
CO3	Explain the cooking quality of foods and apply food science knowledge in food industries
CO4	Identify and understand the nutrients and functions of foods in maintaining health
CO5	Analyze the proper use of food colors and food additives in safe food preparation.

## **UNIT I**

Properties of food- Food nutrients, solids, solutions and colloids, Solutions-

Physical properties of solutions, classification of foods based on viscosity characteristics. Solutes-chemical properties, Food dispersion: Colloids- Types of colloid and properties of colloids and rheology of food dispersions; Structure, formation and stability of gels, sols, emulsion and foams.

Starch - Sources, Structure and composition of starch; Properties and characteristics of food starches; Modified food starches-Structure and composition, Effect of heat on food starch properties, gluten formation in wheat flour, influencing factors[gluten], gelatinization, gelation and retrogradation, dextrinization and factors affecting gelatinization.

## **UNIT II**

Proteins-Structure and composition, Classification and properties of proteins; Effect of heat on physio-chemical properties of proteins; Role of proteins in food products; Texturized vegetable protein, protein concentrates.

Enzymes: Classification and its nature; Mechanism of action; Factors influencing enzyme activity; Role of enzymes in food products; Immobilized enzymes and its application in food industries.

## **UNIT III**

Fats and oil -Structure, composition and properties of fats and oil; storage of fat, characteristics [shortening, plasticity, flavor, retention of moisture, melting point, optical activity, color, specific gravity], Hydrogenation, winterization, flavor reversion, smoking point, Rancidity-Types, Mechanism and prevention; Role of fat/oil in food products; Fat substitutes.

Sugar and sugar products-Types of sugar, Types of granulated sugar, Physical and chemical properties, Sugar products -Types of honey, Jaggery, corn syrup, various forms of sugar used in cookery and Crystallization of sugar.

## **UNIT IV**

Milk components- water, carbohydrate, milk fat, milk protein, minerals and other components in milk, Physiochemical properties of milk, Effect of physical and chemical factors on milk components [Effect of heat, protein, factors affecting coagulation, casein coagulation, minerals, Non-enzymatic browning], [Effects of acid], Effects of enzymes-renin, fermented and non-fermented milk products

Egg-proteins in Egg, microscopic structure of egg, characteristics [color, size], Nutritional qualities, quality check, functional properties- foaming, factors affecting foam formation.

## **UNIT V**

Food additives- Definition, different food additives and Need for food additives. Flavour compounds in vegetables, fruits and spices; Effect of processing on food flavours; Role of colours and flavours in food products.

Sweeteners- Properties, Artificial and Natural sweeteners and role of sweeteners in food industry.

### TEXT BOOKS:

- Srilakshmi B. (2015). Food Science. New Age International (P) Ltd. Publishers.
- S.M. Reddy (2015). Basic Food science and technology. New Age International publishers. Avantina Sharma (2017). Text book of food science and Technology. CBS Publishers and distributes Ltd. 3<sup>rd</sup> Edition.
- Swaminathan A. (2018). Handbook of Food and Nutrition, Bangalore press.
- Serpil Sahin and Servet Gulum Sumnu. (2006). Physical properties of Foods. Springer publications

### REFERENCES:

- [Gerard L. Hasenhuettl](#), [Richard W. Hartel](#). (2019). Food Emulsifiers and Their Applications. Springer publications. 3<sup>rd</sup> edition.
- Vickie.A. Vaciavik. (2021). Essentials of Food science. Springer publications. 5<sup>th</sup> edition.
- Dr.M.Swaminathan.(2015). Advanced text book of Food and Nutrition. volume-2. Bapco publications.
- Eskein.(2012). Biochemistry of Food. Elsevier publications.
- Lyn O brien Nabors.(2001). Alternative Sweeteners. Taylor and Francis publications.
- Janet D. Ward and Larry Ward.(2006). Principles of Food Science. Stem Publishers. 4<sup>th</sup> Edition.

### E-LEARNING RESOURCES:

[www.fao.org](http://www.fao.org)  
[www.wfp.org](http://www.wfp.org)  
[www.foodrisk.org](http://www.foodrisk.org)  
<http://www.fsis.usda.gov/>  
<https://www.fda.gov/food>

### Mapping CO with PSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2
CO2	3	3	3	2	1	2
CO3	3	3	3	3	3	2
CO4	2	3	3	2	1	3
CO5	3	3	3	2	2	3
Average	2.8	3	2.8	2.2	2	2.4

### PEDAGOGY:

Lecture, Case study, journal reviewing, Assignments, Group discussion, Power point presentation

## 1.2 CORE: II MACRO NUTRIENTS

**CREDITS:5**

**SEMESTER:1**

**YEAR:1**

**HOURS PER WEEK 7**

### **OBJECTIVES:**

- To enable the students
- To highlight the physiological and metabolic role of nutrients and their relationship to human health and wellbeing.
- To understand the relationship between energy, carbohydrate, protein, lipid and water.
- To understand the health problems associated with nutrient deficiency or toxicity.

### **COURSE OUTCOMES**

After studying this paper, the students would know

<b>CO No.</b>	<b>CO STATEMENT</b>
CO1	The importance of food intake and energy metabolism in maintaining health and well-being.
CO2	Role of carbohydrates in health and diseases.
CO3	Role of protein in health and diseases, methods of assessment of protein quality and enhancement of protein quality in the diet.
CO4	Health implications of lipids in health and diseases, fat substitutes, plant foods to manage hypercholesterolemia.
CO5	Distribution and exchange of water in the body, water imbalance and electrolyte mechanism.

### **UNIT I:**

**ENERGY-** Energy content of foods, physiological fuel value, Estimation of total energy requirements (BMR, REE and physical cost of activities) TEE, Energy balance, Basal metabolic rate, total energy requirements, BMR& RMR, Factors affecting BMR, Thermic effect of food. Changes in body weight and body composition with the changing energy balance, Regulation of food intake- role of hunger and satiety centers. Energy balance and obesity.

### **UNIT II:**

**CARBOHYDRATES** – Classification, Therapeutic uses of carbohydrates, sugars in parenteral nutrition. Glycemic index of foods and its uses. Toxic effects of fructose, xylitol and galactose. Sugar alternatives, Role of dietary fiber in health and disease. Role of carbohydrates in health and disease

### **UNIT III:**

**PROTEIN** – Historical review of protein metabolism, Amino acid patterns in protein & of animals and vegetable origin, critical study of methods of assessment of protein quality. Physiological functions of proteins.

Essential Amino Acids, amino acid balance and imbalance, Role of protein in health and disease.  
Supplementation of individual amino acid.

#### **UNIT IV:**

**LIPIDS**—Concepts of visible and invisible fats, EFA, SFA, MUFA, PUFA, omega–6 to omega–3 ratios – Sources and physiological functions and their role in health and disease. Adipose tissue – Lipogenesis and Lipolysis, lipoproteins – types and health implication. Storage of body fat, Effects of deficiency. Fat substitutes, Hypocholesterolaemic foods – garlic, fiber and plant proteins.

#### **UNIT V:**

**WATER – Sources, Function, Requirement**, Distribution of water in the body and Factors influencing distribution of body fluid. Exchange of water in the body. Water imbalance – dehydration- water intoxication, water and electrolyte mechanism – ADH,

#### **TEXT BOOKS:**

- Satyanarayana, U., & Chakrapani, U. (2013). Biochemistry, Book and Allied Pvt. *Ltd.*, Kolkata.
- Wardlaw, G. M., Byrd-Bredbenner, C., Moe, G., Berning, J. R., & Kelley, D. S. (2013). *Wardlaw's perspectives in nutrition*. McGraw-Hill.
- Williams, S. R. (2004). Nutrition and diet therapy. *Nutrition and diet therapy*.
- Sizer, F., Whitney, E., & Webb, F. (2003). Nutrition Concepts and Controversy, Thomas Wadsworth, Australia. 9<sup>th</sup> edition.
- Shils, M. E., Olson, J. A., &Shike, M. (2000). Modern nutrition in health and disease. Modern Nutrition in Health and Disease. Vol I and II. Lea &Febiger Philadelphia, A Waverly Company. Eighth edition.
- Mahan, L.K., & Stump, S.E. (2002). Krause's Food Nutrition and Diet Therapy. W.B. Saunder's company, Philadelphia. 10<sup>th</sup> edition.

#### **REFERENCES:**

- Guthire, H.A., (2001). Introductory Nutrition. C.V. Mosby Company, St. Louis. Tenth edition.
- Bogert, J.G.V., Briggs, D.H., & Calloway, (2000). Nutrition and physical fitness. W.B. Saunders Co., Philadelphia, London, Toronto. 11<sup>th</sup> edition.
- Brown, J.E., (2002). Nutrition Now. Wadsworth Thomson Learning New York. 3<sup>rd</sup> edition.
- Toteja, G. S. (2004). *Micronutrient profile of Indian population*. Indian Council of Medical Research Publication, New Delhi.
- Swaminathan, M., (2002). Principles of Nutrition and Dietetics. BAPPCO, 88, Mysore Road. Bangalore – 560 018.
- Jain, J.L., Jain, S., & Jain, N., (2005). Fundamentals of Biochemistry. S. CHAND & COMPANY Ltd. Ram nagar, New Delhi-110 055. 6<sup>th</sup> revised edition.

#### **E- LEARNING RESOURCES:**

[www.nutrition.gov](http://www.nutrition.gov) – Service of National agricultural library, USDA

[www.nal.usdfa.gov/fnic](http://www.nal.usdfa.gov/fnic) - Food and nutrition information center

[www.fantaproject.org](http://www.fantaproject.org)- Fanta technical assistance for nutrition

<http://dietary-supplements.info.nih.gov> – Officer of dietary supplements, national institute of health.

### MAPPING (CO/PSO)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	2	2	3	3	3	3
CO5	2	2	2	3	3	2
Average	2.6	2.6	2.8	3	3	2.8

**PEDAGOGY:**Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions

### 1.3 CORE: III

#### ADVANCED FOOD SCIENCE PRACTICAL

**CREDIT: 4**

**SEMESTER :1**

**YEAR :1**

**HOURS PER WEEK :6**

#### **COURSE OBJECTIVES:**

- To enable the students
- Comprehend the knowledge gained on characteristics and properties of foods during cooking
- Apply the properties of food in various food processing and preparations Analyse the factors affecting cooking quality of foods
- Create appropriate food preparation and processing methods to ensure quality standards.

## **COURSE OUTCOME**

On successful completion of the course the students will be able to

<b>CO No.</b>	<b>CO Statement</b>
CO1	Gain knowledge on sensory analysis and cereal cookery Concept
CO2	Understand the properties of various food.
CO3	Analyze the cooking quality of foods and apply knowledge in food industries.
CO4	Identify and understand the Physical characteristics.
CO5	Revise appropriate food preparation and processing methods to ensure standards in food industry.

### **UNIT -1**

Sensory method –Analysis of taste sensitivity-Threshold test Duo –Trio test, Multiple sample difference

Starch

Microscopic structure and gelatinization.

Factors affecting gelatinization –sag test.

Gluten formation

### **UNIT -2**

PULSE

Factors affecting cooking quality

FRUIT

Enzymatic browning Pectin test

Firmness of gel

### **UNIT -3**

VEGETABLE

Various method of cooking fat soluble and water-soluble pigment.



## MILK

Detecting the presence of starch, soda, starch, urea in milk sample. pH of milk sample.

Effect of acid on milk Maillard reaction.

## UNIT -4

### SUGAR

Relative sweetness of sugar- sucrose, maltose, lactose, fructose, dextrose, glucose, artificial sweeteners Stages of sugar cookery

Effect of dextrose, jaggery, honey and cream of tartar on sucrose.

### FATS AND OIL

Smoking point – Groundnut oil, coconut oil, Gingelly oil, Olive oil, Vanaspati, Ghee, Refined Sunflower oil, Rice bran oil.

Cooking temperature and fat absorption- – Groundnut oil, coconut oil, Gingelly oil, Refined Sunflower oil, Rice bran oil.

## UNIT -5

### PHYSICAL PROPERTIES

- Thousand grain weight
- Thousand grain volume
- Hydration capacity
- Hydration index
- Swelling capacity
- Specific gravity
- Seed displacement test
- Viscosity - Line spread test, Viscometer.

Adulteration

## TEXT BOOKS:

- Srilakshmi B. (2015). Food Science, New Age International (P) Ltd. Publishers.
- Potter N. and Hotchkiss J.H. (1996). Food Science, Fifth ed., CBS Publishers and Distributors, New Delhi
- Avantinasharma (2017). Text book of food science and Technology. CBS Publisheres and distributes ltd. 3rd Edition.
- Reddy S M. (2015). Basic Food science and technology. New Age International publishers. 2<sup>ND</sup> edition.

## REFERENCES:

- Swaminathan A (1979) . Food Science And Experimental Foods, Ganesh And Company Madras. 3<sup>rd</sup> edition.
- Bennion, Marion and O. Hughes (2001). Introductory Foods. Edi: mac millian N. Y. 1<sup>st</sup> edition.

- Eskein . (2012). Biochemistry of Food. Elsevier publications
- Desrosier, N.W. and James N. (2007). Technology of food preservation.
- AVI Publishers.
- Manay, S. and Shadaksharamasamy, (2004) .Food: Facts and Principles, New Age International Publishers, New Delhi. 1<sup>st</sup> edition.

**E-LEARNING RESOURCES**

<http://www.fao.org/3/V5030E/V5030E00.htm>

<https://fmtmagazine.in/fruits-vegetables-processing-technologies/>

**ELECTIVE I  
ADVANCED HUMAN PHYSIOLOGY**

**CREDITS: 3**

**SEMESTER :I**

**YEAR :I**

**HOURS PER WEEK :5**

**Objectives:**

This course will enable students to:

- Advance their understanding of some of the relevant issues and topics of human physiology.
- Enable the students to understand the integrated function of the system
- Understand alterations of structure and function in various organs and systems in disease conditions.

**COURSE OUTCOME**

On successful completion of the course the student will be able to

CO No.	CO STATEMENT
CO 1	Develop insight of normal functioning of all the organ systems of the body and their interaction. Understand the current state of knowledge about the functional organization of Human cell and Histology.
CO 2	Understand the structural and functional organization of blood and Cardiac System
CO 3	Understand the structural and functional organization of Respiration, Immunity and Endocrine GIT and Urinary System
CO 4	Comprehend the structural and functional organization Digestive System and Reproductive System
CO 5	Understand the structural and functional organization of Skin, Nervous and Excretory system

## **UNIT I**

### **Cell**

- Structure and function.
- Transportation across cell membrane.
- Cell theory and cycle. Difference between meiotic and mitotic cell division.
- Stem cells- types and functions.

### **Tissue**

- Structure and function.

## **UNIT II**

### **Blood**

- Composition and functions
- Blood group – ABO system and Rh factor.
- Blood coagulation.

### **Heart**

- Structure and function of heart and blood vessels.
- Systemic and pulmonary circulation.
- Cardiac cycle and conduction system.
- Heart rate, cardiac output and blood pressure
- ECG–Working principles and mechanism

## **UNIT III**

### **Respiratory System**

- Structure and function.
- Gas laws pertaining to gas exchange (Meaning only)-Henry's Law of Partial Pressure, Boyle - Mariotte's Law of Volume and Pressure, Dalton's Law of Partial Pressure, Charles's Law of Ideal Gas Equation and Fick's Law of Diffusion.
- Mechanism of respiration.
- Circulation and exchange of respiratory gases. Internal and external respiration. Chloride shift.
- Definition of lung volumes and lung capacities
- Ventilation and Artificial Respiration.

### **Immunity**

- Definition and types of immunity-Innate and Acquire immunity.

### **Endocrine System**

- Hormones and its type.
- Syndromes resulting from hypo and hyperactivity of Pituitary, Thyroid, Adrenals and Pancreas.

## **UNIT IV**

### **Gastrointestinal System**

- Structure and function of GI tract and its accessory organs.
- Digestion and absorption of carbohydrates, proteins and fats.

### **Reproductive System**

- Roll of hormones in reproduction and lactation.
- Menstrual cycle and menopause.
- Invitro fertilization (IVF)
- Spermatogenesis.

## **UNIT V**

### **NERVOUS SYSTEM**

- Structure and functions of neuron. Afferent and efferent nerves.
- Conduction of nerve impulse- Synapses, Neurotransmitters, Summation and Action Potential.
- Sympathetic and Parasympathetic nervous System.
- Cerebrospinal fluid (CSF) – composition and function.
- Blood-brain barrier (BBB).
- Electroencephalogram (EEG)

### **EXCRETORY SYSTEMS**

#### **Renal system**

Organs in the urinary system.

Structure and functions of nephron.

Juxtaglomerular cell.

Mechanism of formation of urine.

Role of kidney to regulate blood pressure, Water, Electrolytes and Acid Base Balance.

#### **Skin**

Structure and function.

Regulation of temperature of the body.

### **TEXT BOOKS**

K. Sembulingam&PremaSembulingam (2019), Essentials of Medical Physiology. Jaypee publications. Eighth edition.

Waugh A, Ross and Wilson (2018). Anatomy and Physiology in Health and Illness. Elsevier publications. 13ed.

CC Chatterjee (2020). Human Physiology. CBS publishers. 13 ed.

Indu Khurana (2020). Medical Physiology for Undergraduate Students. Elsevier Publication. 2 Edition.GK

Pal (2019). Textbook of human physiology, Elsevier publications. 3edition.

## REFERENCES:

- Guyton, A.G. and Hall, J.B. (2005): Text Book of Medical Physiology. W.B.Sanders Company, Prism Books (Pvt.) Ltd., Bangalore. 9th Edition.
- Wilson, K.J.W and Waugh, A. (2003): Ross and Wilson Anatomy and Physiology in Health and Illness. Churchill Livingstone. 8th Edition.
- Jain, A.K.: Textbook of Physiology. Avichal Publishing Co., New Delhi. Vol.I and II.
- McArdle, W.D., Katch, F.I. and Katch V.L.(2001): Exercise Physiology. Energy, Nutrition and Human Performance. Williams and Wilkins, Baltimore. 4th Edition.
- Ganong, W.F. (1985): Review of Medical Physiology. Lange Medical Publication., 12th Edition.
- Moran Campbell E.J., Dickinson, C.J., Slater, J.D., Edwards. C.R.W. and Sikora, K. (1984): Clinical Physiology. ELBS, Blackwell Scientific Publications. , 5th Edition.
- McArdle, W.D., Katch, F.I. and Katch, V.L. (1996): Exercise Physiology. Energy, Nutrition and Human Performance, Williams and Wilkins, Baltimore. 4th Edition.
- Jain, A.K.: Textbook of Physiology. Avichal Publishing Co., New Delhi. Vol. I and II.
- Winword. Sear's Anatomy and Physiology for nurses. London, Edward Arnell.
- Chatterjee Chandi Charan: Text Book of Medical Physiology, London W.B.

## E LEARNING CONTENT

<https://youtu.be/MZDy0RvA52Y>-Osmosis

<https://youtu.be/TgeviVQnVBs>-Respiratory system

<https://youtu.be/44B0ms3XPKU>-nervous system

### Mapping: (CO/PSO)

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	3	3	2	3
CO2	3	1	3	3	2	3
CO3	3	1	3	3	2	3
CO4	3	1	3	3	2	3
CO5	3	1	3	3	2	3

## PEDAGOGY

Lecture, Power Point Presentation, Demonstration, Group Discussion, Assignment, Library visits, Seminars and Oral & Written Revision

## ELECTIVE II

### FOOD PROCESSING AND TECHNOLOGY

**CREDIT: 3**

**SEMESTER :1**

**YEAR :1**

**HOURS PER WEEK :5**

#### **COURSE OBJECTIVES:**

To enable the students:

1. Understand the science behind processing of foods and its impact on nutritive value of food stuffs.
2. Acquire in-depth knowledge on production of processed food products and the waste utilization techniques.
3. Understand the changes in physicochemical properties of foods due to processing condition.
4. Understand the various parameters related to post-harvest technology.

#### **COURSE OUTCOME:**

On successful completion of the course the students will be able to

<b>CO No.</b>	<b>CO Statement</b>
CO1	The concepts and principles of food processing.
CO2	The various processed food products from plant and animal sources.
CO3	The by-products utilization from food processing.
CO4	The systematic knowledge of basic and applied aspects in food processing and technology.
CO5	The various post-harvest technologies for different food products

## **UNIT-I**

Processing of foods: Primary, secondary and tertiary processing, historical perspective, traditional technologies used in food processing. Effects of processing on components, properties and nutritional value of foods.

Enzymes in Food Processing: Enzyme- Review of classification, enzyme inhibitors, enzymatic browning.

## **UNIT-II**

### **Cereal Processing and Technology:**

Rice: parboiling, milling and pearling; Processing and milling of wheat, maize, barley, oats and rye.

Millets: processing of millets;

Cereal Products: Flours and its quality; Processed products of rice, wheat and maize; By products utilization; breakfast cereals and extrusion; Effect of processing on nutritive value of cereals; changes in physiochemical properties of cereal starch and protein due to processing.

Milling process: Complete milling process, break rolls, reduction rolls, milled products and their nutritive value and applications

### **Pulse Processing and Technology:**

Dals, flours, protein concentrates, isolates and hydrolysates; Byproducts utilization; Effect of processing on nutritive value and physiochemical properties of pulses.

### **Nuts and Oil Seeds Processing and Technology:**

Nuts Processing methods, Oil seeds processing: Oil extraction methods and refining process; byproducts utilization; Effect of processing on nutritive value and physiochemical properties of vegetable oils

## **UNIT-III**

### **Vegetables Processing and Technology:**

Pigments: Classification, effects on processing of vegetables; Preliminary processing of vegetables;

Vegetable products: Fermented and nonfermented and its shelf life; Vegetable waste utilization; Effect of processing on nutritive value and physiochemical properties of vegetable

### **Fruits Processing and Technology:**

Concept of maturity, ripening and senescence; Methods of fruit processing technologies: traditional and new methods.

Fruit products: fermented and nonfermented; Effect of processing on nutritive value and physiochemical properties of fruits;

Browning reactions: types and mechanism; prevention methods; Fruit waste utilization.

### **Milk Processing and Technology:**

Milk types, composition, physiochemical properties; Milk processing- Separation, centrifugal process, natural creaming, pasteurization, sterilization, homogenization. Milk storage; Effects of processing on nutritive value and physiochemical properties of milk

## **UNIT-IV**

### **Egg Processing and Technology:**

Egg processing and storage; Effect of processing on nutritive value and physiochemical properties of eggs; changes in egg quality during storage and preservation methods.

### **Meat Processing and Technology:**

Meat processing and storage; Factors influencing meat quality; Ageing and tenderization of meat.

Poultry: Processing and storage of poultry meat; Preservation methods for poultry.

Fish: Processing and storage; Preservation methods for fish. Effect of processing on nutritive value and physiochemical properties of meat, poultry and fish.

## **UNIT-V**

### **Introduction of post-harvest technology**

Introduction to post-harvest technology of agricultural produce; Status of Production, Losses, Need, Scope and Importance.

Post-Harvest Loss- Definition, Factors contributing to Post-harvest Loss; and Technologies and Practices to reduce Post-harvest Losses.

## **TEXTBOOKS**

- Shakuntala Manay N ShadakCheraswamy M . (2004) Food Facts and Principles. New age publisher . 2<sup>nd</sup> edition.
- Roday S. (2011) .Food Science. Oxford publication . 1<sup>st</sup> edition.
- B Srilakshmi (2015)Food science. New Age Publishers. 6<sup>th</sup> edition. Fellows P.(2000). Food Processing Technology, 2nd Edition.
- Woodhead Publishing Limited and CRC Press LLC. 1<sup>st</sup> edition.
- Avantina Sharma. (2017).Text book of food science and Technology. CBS Publisheres and distributes ltd. 3<sup>rd</sup> edition.



## REFERENCES

Raocg . (2006 ).Essentials of food process engineering . PHI learning private ltd.

Janet D Ward and Larry Ward.(2006). Principles of Food Science .Stem Publishers. 4<sup>th</sup> edition.

Srivastava R P and Kumar S. (2006 ) Fruits and Vegetables Preservation- Principles and Practices. International Book Distributing Co. 3<sup>rd</sup> edition.

W B Crusess.(2004). Commercial Unit and Vegetable Products.

W.V. Special Indian Edition, PubAgrobios India . 2<sup>nd</sup> edition. Forsythe S J and Hayes P R

(1998). Food Hygiene,

Microbiology and HACCP. GaitersburgMaryland Aspen.

Eskein .(2012). Biochemistry of Food. Elsievier publications. 1<sup>st</sup> edition.

## ELEARNING RESOURCES:

<http://www.fao.org/3/V5030E/V5030E00.htm>[https://fmtmagazine.in/fruits-vegetables-processing-](https://fmtmagazine.in/fruits-vegetables-processing-technologies/)

[https://www.actioncontrelafaim.org/wp-content/uploads/2018/01/technical\\_paper\\_phl.pdf](https://www.actioncontrelafaim.org/wp-content/uploads/2018/01/technical_paper_phl.pdf)

<https://www.nutsforlife.com.au/resource/nuts-and-processing/><https://www.fssai.gov.in/>

## MAPPING (CO/PSO):

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	3	3	2	2	2
CO2	3	3	2	2	3	2
CO3	2	3	2	1	2	2
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	2.8	3	2.6	2.2	2.6	2.4

**PEDAGOGY:** Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions

**SEMESTER II**  
**2.1 CORE 1V**  
**ADVANCED DIETETICS**

**CREDIT: 5**

**SEMESTER:II**

**YEAR:1**

**HOURS PER WEEK :6**

**COURSE OBJECTIVES:**

- To acquire knowledge regarding the effect of various diseases on nutritional status and nutrient requirement
- To understand the modifications in nutrients and dietary requirements for therapeutic condition.
- To Learn recent concepts in the dietary management of different diseases.

**COURSE OUTCOME:**

On successful completion of the course the students will be able to

<b>CO No.</b>	<b>CO Statement</b>
<b>CO1</b>	Critique the nutritional screening technique
<b>CO2</b>	Comprehend the current concepts of therapeutic diets and critically ill
<b>CO3</b>	Implement the dietary principles on various disorders.
<b>CO4</b>	Acquire the knowledge of diet counseling skills.
<b>CO5</b>	Apply the dietary principles to manage the lifestyle disorders in the society

## UNIT I

Nutritional screening, Nutritional care process, Nutritional assessment, Nutritional diagnosis, Nutritional intervention, Monitoring and evaluation.

Basic concepts of diet therapy – Therapeutic adaptations of normal diet, Principles and classification of therapeutic diets. Routine Hospital diets – Regular, soft, fluid diet

Nutritional Management in critical care -Nutritional screening and assessment of nutritional status of critically ill and nutritional requirement.

Nutritional support systems: Enteral and parenteral nutrition - Types, composition and complications.

## UNIT II

Medical Nutrition therapy for Gastro Intestinal, Liver, Gall Bladder and Pancreatic disorders Upper Gastrointestinal Tract Diseases – Nutritional care and diet therapy in diseases of Oesophagus - Esophagitis, Gastro Esophageal Reflux Disease[GERD] and Hiatus hernia.

Disorders of stomach: Indigestion, Gastritis, Gastric and duodenal ulcers, and Dumping syndrome.

Lower Gastrointestinal Tract Diseases/Disorders-Nutritional management for intestinal dysfunction - Flatulence, Constipation, Hemorrhoids, Diarrhoea and Steatorrhea. Diseases of the large intestine-Diverticular disease, irritable bowel syndrome, inflammatory bowel disease. Diseases of Small Intestine-Celiac disease, Tropical sprue, Intestinal brush border enzyme deficiencies.

Diseases of the Liver, Gall Bladder and Pancreas – Hepatitis, Cirrhosis and Hepatic Coma, Cholelithiasis, Cholecystitis, Pancreatitis, and Zollinger Ellison syndrome and Biliary dyskinesia.

## UNIT III

Medical Nutrition Therapy for Pulmonary Disease- Chronic pulmonary diseases- Asthma, cystic fibrosis, chronic obstructive pulmonary disease and Pneumonia- Pathophysiology and dietary management. Effect of malnutrition on pulmonary system and effect of pulmonary disease on nutritional status.

Medical Nutrition Therapy for Rheumatic disease- Etiology, Pathophysiology of Inflammation of Rheumatic diseases, Rheumatoid Arthritis, Osteoarthritis and Sjogren's syndrome.

Nutritional Management of Physiological Stress- Classification, Complications, Metabolic changes in protein and electrolytes and Dietary management of Burns, Trauma and Stress.

## UNIT IV

Nutritional Management on Weight Imbalance -Prevalence and classification.

Underweight -Etiology and Dietary Management; Obesity-Etiology, Classification, Energy balance, Dietary modifications and Bariatric surgery- types and dietary modifications of pre and post bariatric surgery.

Nutritional Management in Diabetes Mellitus - Prevalence, Etiology, Risk factors,

complications, and dietary modifications of diabetes mellitus.

Nutritional Management in Febrile Condition – Acute and Chronic Fever – Symptoms, Diagnosis and Dietary modifications.

## UNITY

Nutritional Management of Cardio Vascular Diseases- Etiology, Risk factors, Clinical features and Dietary Modifications of Atherosclerosis and Hypertension.

Nutrition Management of Renal Disease -Etiology, Clinical and Metabolic manifestations, Diagnostic tests, Types-Glomerulonephritis, Nephrotic Syndrome, Renal Failure: Acute and chronic, ESRD, Nephrolithiasis and Dietary modifications.

Nutritional Management in Cancer- Pathogenesis and progression of Cancer, Types,Symptoms and Dietary Management.

## TEXT BOOKS:

- Mahan L.K., Sylvia Escott-Stump.(2000).Krause's Food Nutrition and Diet Therapy.W.B. Saunders Company London. 10<sup>th</sup> edition.
- B. Srilakshmi. (2007).Dietetics. K.K. Gupta For New age International Pvt. Ltd. New Delhi Publisher.
- Antia F.P. And Philip Abraham.(2001).Clinical Nutrition and Dietetics.Oxford Publishing Company.
- Passmore P. And M.A. East Wood.(Digitized in 2010).Human Nutrition And Dietetics.Churchill Living Stone.
- S.R.Mudambi.M.K.Rajagopal.(2009).Fundamentals, Food Nutrition and Diet therapy.New Age Publishers. 5<sup>th</sup> edition.
- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, And A.E., Carwick.(1990).Basic Nutrition and Diet therapy, Macmillan Publishing Company.

## REFERENCES:

- Garrow JS, James WPT, Ralph A.(2000). Human Nutrition and Dietetics.Churchill Livingstone, NY. 10<sup>th</sup> edition.
- Groff L James, Gropper S Sareen.(2000). Advanced Nutrition and Human Metabolism.West / Wadsworth, UK. 3<sup>rd</sup> edition.
- Sue Rodwell Williams. (1993).Nutrition, Diet Therapy.W.B. Saunders Company London. 7<sup>th</sup> edition.
- Whitney, E. N. and C. B.Cataldo.(1983). Understanding Normal and Clinical Nutrition. West Pub. S1. Paul.

## E-LEARNING RESOURCES:

- [www.nutrition.gov](http://www.nutrition.gov) - Service of National agricultural library, USDA.
- [www.nal.usda.gov/fnic](http://www.nal.usda.gov/fnic) -Food and Nutrition information centre.
- [www.healthyeating.org](http://www.healthyeating.org)
- [www.eatrightpro.org](http://www.eatrightpro.org).
- <https://www.globalhealthlearning.org>.

### Mapping of Co with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO5	PSO6
CO1	3	3	2	3	1	2
CO2	2	3	3	3	1	2
CO3	3	3	3	3	1	3
CO4	2	3	3	3	1	2
CO5	3	3	3	3	1	3
Average	2.6	3	2.8	3	1	2.4

**PEDAGOGY** Lecture, journal reviewing, Assignments, Power point presentations, video presentations.

### 2.2 CORE V

#### NUTRITIONAL BIOCHEMISTRY

**CREDIT:5**

**SEMESTER :II**

**YEAR :I**

**HOURS PER WEEK :6**

#### **COURSE OBJECTIVES**

- Understand the need for the study of biochemistry as the basis for nutritional sciences.
- Make students aware of metabolism of proximate principles and others.
- A basic understanding of the functions of biological systems in relation to Nutritional biochemistry.

## COURSE OUTCOME

On completion of the course the students will be able to...

CO No.	CO Statement
CO1	Understand the role of enzymes and co enzymes in biological oxidation.
CO2	Gain knowledge on metabolism and regulation of carbohydrate.
CO3	Understand the concept of metabolism and bioenergetics of lipids.
CO4	Discuss the classification, structure, organization and metabolic pathway of protein.
CO5	Comprehend the biological metabolism and functions of nucleic acid and understand recent concepts in biochemistry.

### UNIT I

Biological oxidation and enzymes

Biological oxidation, Electron transport chain and Oxidative Phosphorylation.

Enzymes – Definition, Types, mechanism of action, factors affecting enzyme activity, coenzyme, role of B vitamin as coenzyme.

Free radicals – definition, formation in biological systems. Antioxidants – definition, Role of antioxidants in prevention of degenerative disorders

### UNIT 2

Metabolism of Carbohydrates: Glycolysis, The Citric Acid Cycle, glycogenesis, glycogenolysis, gluconeogenesis, The Hexose Monophosphate Shunt and bioenergetics.

Hormonal regulations of blood glucose homeostasis

### UNIT 3

Protein and amino acid metabolism

Classification of amino acids, Oxidative Deamination, decarboxylation, transamination and transmethylation of amino acids, urea cycle, biosynthesis of non-essential amino acids, catabolism of essential amino acids. Protein biosynthesis.

## UNIT 4

### Metabolism of Lipids:

Classification of fatty acid, Biosynthesis of fatty acids, beta oxidation of fatty acids and ketone bodies. Essential fatty acids – types and functions. Metabolism of phospholipids, and cholesterol. Lipo proteins – classification and function.

## UNIT 5

Overview of intermediary metabolism of carbohydrates, protein and lipid.

Hormonal regulation of carbohydrate protein and fat metabolism

Structural components and functions of nucleic acid, Structure of DNA, DNA

Replication, RNA synthesis – types and functions and metabolism, translation.

Recombinant DNA technology, Metabolism of Xenobiotics, Nutrigenomics

## TEXT BOOKS

- Jain, J.L., Jain, S., & Jain, N., (2005). Fundamentals of Biochemistry. S. CHAND & COMPANY Ltd. Ram nagar, New Delhi-110 055. 6<sup>th</sup> revised edition.
- Bettelheim, F. A., Brown, W. H., Campbell, M. K., & Farrell, S. O. (2009). *General, Organic & Biochemistry*. Brooks/Cole Cengage Learning.
- Champe, P. C., Harvey, R. A., & Ferrier, D. R. (2005). *Biochemistry*. Lippincott Williams & Wilkins, 6<sup>th</sup> Edition, Wolters Kluwer, London.
- Talwar, G. P., & Srivastava, L. M. (2002). *Textbook of biochemistry and human biology*. PHI Learning Pvt. Ltd..
- Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2000): 25th Ed. Harpers Biochemistry. Macmillan worth publishers.

## REFERENCE BOOK

- Marshall, W. J., Lapsley, M., Day, A., & Ayling, R. (2014). *Clinical Biochemistry E-Book: Metabolic and Clinical Aspects*. Elsevier Health Sciences.
- Bender, D. A. (2003). *Nutritional biochemistry of the vitamins*. Cambridge university press.
- Albanese, A. (Ed.). (2012). *Newer methods of nutritional biochemistry V3: With applications and interpretations*. Elsevier.
- Champe, P. C., Harvey, R. A., & Ferrier, D. R. (2005). *Biochemistry*. Lippincott Williams & Wilkins.
- Lieberman, M., & Ricer, R. E. (2009). *Lippincott's Illustrated Q&A Review of Biochemistry*. Lippincott Williams & Wilkins.

**E-LEARNINGRESOURCES:**

<https://www.udemy.com/share/1027yA/><https://www.classcentral.com/course/swayam->

<https://www.classcentral.com/course/edx-biochemistry-biomolecules-methods-and-mechanisms-12585>

<https://www.classcentral.com/course/swayam-experimental-biochemistry-12909>

<https://youtu.be/y6YGZfcAegw>

**Mapping of CO with PSO:**

<b>CO/PS O</b>	<b>PS O 1</b>	<b>PS O 2</b>	<b>PS O 3</b>	<b>PSO 4</b>	<b>PS O 5</b>	<b>PS O 6</b>
<b>CO1</b>	3	3	2	1	1	3
<b>CO2</b>	3	3	2	1	1	3
<b>CO3</b>	3	3	2	1	1	3
<b>CO4</b>	3	3	2	1	1	3
<b>CO5</b>	3	3	3	1	1	3
<b>Average</b>	<b>3</b>	<b>3</b>	<b>2.2</b>	<b>1</b>	<b>1</b>	<b>3</b>

**PEDAGOGY (TEACHING METHODOLOGY):**

Group Discussion, Casestudy, seminar, journal reviewing, Assignments, Power point presentations.

**2.3 CORE VI  
ADVANCED DIETETICS PRACTICALS****CREDITS :4****SEMESTER:II****YEAR: 1****HOURS PER WEEK:6****COURSE OBJECTIVES:**

- To acquire Knowledge in planning diets for various disorders
- To gain knowledge in diet counselling and educating patients.
- To understand the therapeutic modifications of diet.



### **COURSE OUTCOME:**

On successful completion of the course the students will be able to

<b>CO No.</b>	<b>CO Statement</b>
CO1	Evaluate various therapeutic diets
CO2	Identify the requirements for disease conditions and critically ill patients.
CO3	Assess and plan the diets for various disease conditions.
CO4	Create Knowledge in nutrient calculations and dietary principles.
CO5	Design the personalized diets for different individuals in the society

- Routine Hospital Diet: Regular diet, Clear liquid, Soft diet, Full liquid diet. Planning and preparing Enteral and Parenteral Nutrition [8hrs].
- Assessing requirements and planning diet for obese and underweight individual[6hrs]
- Planning and preparing diet for Diabetes Mellitus[IDDM and NIDDM] [6hrs].
- Planning and preparing diet for Atherosclerosiswith Hypertension[6hrs]
- Assessing and planning diets for the following conditions[13hrs]
  - Celiac disease
  - Lactose Intolerance
  - GERD
  - Peptic Ulcer
  - Hepatitis
  - Cirrhosis
- Planning and preparing diet for Febrile Conditions [6hrs]
- Planning and preparing diet for RheumatoidArthritis[6hrs]
- Planning and preparation of diet for Glomerulonephritis and Nephrosis[6hrs]
- Planning and preparation of diet for Cancer[6hr]
- Planning and Preparing diet for pre and post Bariatric surgery patients[6hrs]
- Planning and Preparing diet for post Burn condition[6hrs].

## **TEXTBOOKS:**

- Stump SE.(2012).Nutrition and diagnosis related care. Lippincott Williams and Wilkins. Canada.7<sup>th</sup> edition.
- Width.M&Reinhardt.T. (2018).The Essential Pocket Guide for Clinical Nutrition.Wolters Kluwer Publishers. 2<sup>nd</sup> edition.
- Whitney EN and RolfesSR.(2002). Understanding Nutrition, 9th edition, West/Wordsworth.
- Guthrie H.(2002). Introductory Nutrition. CV Mosby Co.St. Louis.
- Elia M, Ljungqvist O, Stratton RJ, Lanham SA.(2013). Clinical Nutrition.
- The Nutrition Society Textbook.Wiley Blackwell Publishers.2<sup>nd</sup> edition.
- Mitch, W. and Ikizler, Alp.(2010). Handbook of Nutrition and the
- Kidney.Lippincott Williams and Wilkins, New Delhi.6<sup>th</sup> edition.
- Mahan LK, Stump SE and Raymond JL.(2012). Krause's Food and Nutrition Care Process.Elsevier Saunders.Missouri.13<sup>th</sup> edition.

## **REFERENCES:**

- Gopalan C., Ram Sastri B.V. And BalaSubramaniam S.C. (2006). Nutritive Value of Indian Foods. Hydrabad, National Institute of Nutrition. Indian Council of Medical Research.
- Clinical Dietetics Manual.(2018). Indian Dietetic Association. 2<sup>nd</sup> edition. Peggy Stanfield.
- Y.H.Hui.(2010). Nutrition and Diet therapy. Jones andBartlett publishers.
- William's. (2012).Basic Nutrition and Diet therapy.14<sup>th</sup> Edition.

## **E-LEARNING RESOURCES:**

- [www.nutrition.gov](http://www.nutrition.gov) - Service of National agricultural library, USDA.
- [www.nal.usda.gov/fnic](http://www.nal.usda.gov/fnic) -Food and Nutrition information centre.[www.healthyating.org](http://www.healthyating.org).
- [www.eatrightpro.org](http://www.eatrightpro.org).
- <https://www.globalhealthlearning.org>.

**ELECTIVE III  
RESEARCH METHODS IN NUTRITION**

**CREDIT: 3**

**SEMESTER:2**

**YEAR:1**

**HOURS PER WEEK: 4**

**OBJECTIVES:**

- To provide students understanding of the basic concepts, approaches and methods in conducting research thereby enabling them to appreciate and critique the nuances of designing a research study as well the ethical dimensions of conducting research.
- To explain the importance of research in food science and nutrition.
- To make students understand the types of tools applicable to research problem and develop skills in preparing outline of research work and construct common data collection tools.

**COURSE OUTCOME:**

On successful completion of the course the student will be able to

<b>CO No.</b>	<b>CO STATEMENT</b>
<b>CO 1</b>	Demonstrate knowledge of the scientific method, purpose and approaches to research and Become a qualified researcher.
<b>CO 2</b>	Identify and selection of the research sampling and scales of measurement
<b>CO 3</b>	Understand the types of tools applicable to the research problem and develop skills for preparing outline of research work andconstruct common data collection tools
<b>CO 4</b>	Assess the numerical data for providing statistical evidence to support the research results and interpretation of data with the use of tables and pictorial representations
<b>CO 5</b>	Present research data in a scientific manner and understand the key elements of a research report and variousapplications of computer in Nutrition research

## **Unit 1: Foundation of Nutrition Research**

Meaning, Objectives and Classification of Research Designs—Exploratory, Descriptive, Longitudinal and Cross sectional, Observation-Participant and Non-participant, Epidemiological Surveillance, Retrospective, IN VIVO, IN VITRO and Experimental Design— Pre-Experimental, Quasi Experimental, True Experimental and Statistical Experimental designs. Need of Research in Foods and Nutrition

Research Process-Selection and Formulation of Research Problem. Explanation, Control and Prediction. Hypothesis: Definition, Importance, Types and Errors - I & II.

## **Unit 2: Sampling and Sample Design**

Sampling Process and Characteristics of good Sampling. Classification of Sampling Techniques - Probability and Non-Probability Sampling. Preparation of Laboratory Food Samples. Sampling and Non- Sampling Errors. Measurements and Scaling -Fundamental and Comparative Scales – Meaning and types -Nominal Scale, Ordinal Scale, Interval Scale and Ratio Scale. Non comparative Scales– Meaning and types - Continuous Rating Scale, Itemized Rating Scale, Likert Scale, Semantic Differential Scale and Stapel Scale.

## **Unit 3: Data Collection and Preparation**

Data Collection – Tools –Primary Data - Interviews -structured and unstructured, Case studies, Questionnaire, Surveys – Pilot and Knowledge, Attitude and Practice, Laboratory Experiments. Secondary Data - Published Sources, Unpublished Sources, Reliability and Validity of Tools– Meaning, Data Preparation Process, Editing, Coding, Classification and Tabulation.

## **Unit 4: Statistical Methods**

Parametric and Non-Parametric tests –Difference and Applications, Data Analysis Process- Descriptive Analysis-Graphical and Diagrammatic Presentations, Central Tendency – Mean, Median & Mode. Dispersion - Standard Deviation, Statistical Inference – Tests of Hypothesis, t – test. ANOVA – One Way & Two Way. Chi-square test – Goodness of Fit & Test of Independence.

## **Unit 5: Reporting the Findings and Computer Applications**

Report Writing –Importance, Types, Mechanics, Guidelines and Precautions. End Notes- Bibliography, Appendices, Footnotes and Glossary of terms.

Computer applications in Nutrition Research - Importance and Uses. Applicable Statistical Analysis Software- Literature Searching-PubMed

Data Analysis- Micro Soft Excel, SPSS, Minitab, Plagiarism Checker – Turnitin, Scribbr

## TEXTBOOKS

- Kothari C R (2004). Research Methodology – Methods & Methodology. Delhi, New Age International Pvt Ltd. 2<sup>nd</sup> Ed
- Chawla, Deepak and Neena Sondhi (2018): Research Methodology - Concepts and Cases. Noida, Vikas Publishing House Pvt Ltd. 2<sup>nd</sup> Ed.
- Gupta, S P (2019). Statistical Methods. New Delhi. S Chand & Sons. 45th Ed.
- Copper, H.M. (2002). Integrating Research: A guide for literature reviews. California: Sage, 2nd Edition.
- Kerlinger, Foundation of Educational Research Ingle P.O. Scientific Report Writing. Nagpur, Sarla P. Ingle.

## REFERENCES

- Ranjit Kumar (2011). Research Methodology: a step-by-step guide for beginners, SAGE Publications. 3<sup>rd</sup> edition.
- Anderson, David R and et.al.(2013) : Statistics for Business and Economics. Delhi, Cengage Learning India Pvt Ltd. 11<sup>th</sup> Ed.
- Bandarkar, P.L. and Wilkinson T.S. (2000): Methodology and Techniques of Social Research. Himalaya Publishing House, Mumbai.
- Bell, Judith (2005): Doing your Research Project – A guide for first time researchers in education, health and social science. England, Open University Press. 4<sup>th</sup> Ed.
- Danial, Wayne W and Chad L Cross (2017): Biostatistics – Basic Concepts and Methodology for the Health Sciences – International Student Version. New Delhi, ArEmm International, 10<sup>th</sup> Ed.

### Mapping: (CO/PSO)

CO/PSO	PS O 1	PS O 2	PS O 3	PS O 4	PS O 5	PSO 6
CO1	1	3	2	2	3	2
CO2	1	1	1	0	2	1
CO3	3	3	3	3	3	2
CO4	1	3	3	0	3	1
CO5	3	2	3	0	0	1
Average	1.8	2.4	2.4	1	2.2	1.4

### PEDAGOGY

Lecture, Power Point Presentation, Demonstration, Group Discussion, Assignment, Seminars and Oral & Written Revision

## **ELECTIVE 4 FOOD PRESERVATION**

**CREDIT: 3**

**SEMESTER: 2**

**YEAR :1**

**HOURS PER WEEK: 4**

### **LEARNING OBJECTIVES**

#### **To enable students to**

- Learn the basic concepts and importance of Food Preservation
- Understand the different methods of Food Preservation
- Choose appropriate food handling and storage techniques

### **COURSE OUTCOME**

- Describe the basic concepts and principles of Food Preservation
- Identify the best methods of storage of different foods based on their shelf life. Recommend appropriate postharvest technology procedures that increase shelf life of food
- Analyze the use of low and high temperature to preserve food and identify the appropriate method to preserve different foods
- Discuss the use and effects of different preservatives on the quality of foods
- Appreciate the use of modern technology in food preservation and managing food wastage.

#### **Unit I Introduction to Food Preservation**

Concept, the importance of food preservation., Common terms used in food preservation. Different methods and Principles of preservation.

#### **Unit II Preservation by High Temperature**

Preservation of foods by high temperatures. Blanching, Pasteurization and Sterilization of foods. General process of canning of foods

#### **Unit III**

##### **Preservation by Low Temperature**

Use of Cold and Refrigerated Storage ,Use of Freezing temperatures: Slow and fast freezing of foods and Cryogenic freezing of foods, dehydrofreezing, Frozen storage and thawing of foods

#### **Unit IV Preservation by Drying**

Principles and application of drying and dehydration of foods Different types of drying and dryers.

## **Unit V Preservation using Chemicals and Irradiation**

Preservation using Chemical preservatives- Squashes, Ketchup and Marmalade

Preservation by Irradiation: Gamma rays, X-rays and Electron Beam

Preservation by high osmotic pressure:

High Concentration of Sugar-jams and Jellies

High Concentration of Salt- Pickling and Curing of meat.

### **REFERENCES BOOKS**

- Prakash Triveni (2010) : Food Preservation, Aadi Publication, Delhi.
- M. Shafiur Rahman (2007): Hand Book of Food Preservation, Marcel Dekker Inc, New York.
- McWillims and Paine ( 2009) : Modern Food Preservation, Surjeet Publications
- Karnal, Marcus and D.B. Lund (2003)
- “Physical Principles of Food Preservation”. Rutledge. Van Garde, S.J. and Woodburn. M(2001) “Food Preservation and Safety Principles and Practice”. Surbhi Publications
- Sivasankar, B (2002). “Food Processing & Preservation”, Prentice Hall of India
- Khetarpaul, Neelam (2005) “Food Processing and Preservation”, Daya Publications
- Norman N. Potter, Joseph H. Hotchkiss: Food science, 5th ed. New York : Chapman & Hall

### **E-LEARNING RESOURCES**

[https:// www.embibe .com/food -preservation/](https://www.embibe.com/food-preservation/)

<https://agripathshala.com/lessons/principles-of-food-preservation>

[www.onlinebiologynotes.com/food-preservation-from-microbial-spoilage-principles](http://www.onlinebiologynotes.com/food-preservation-from-microbial-spoilage-principles)

[https://www.researchgate.net/publication/347909697\\_FOOD\\_PRESERVATION](https://www.researchgate.net/publication/347909697_FOOD_PRESERVATION)

### Mapping of Co with PSO

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO5	PSO6
CO1	3	3	2	3	1	2
CO2	2	3	3	3	1	2
CO3	3	3	3	3	1	3
CO4	2	3	3	3	1	2
CO5	3	3	3	3	1	3
Average	2.6	3	2.8	3	1	2.4

**PEDAGOGY** Lecture, journal reviewing, Assignments, Power point presentations, video presentations.

### PERSPECTIVES OF HOME SCIENCE

**CREDITS:2**

**SEMESTER :II**

**YEAR :I**

**HOURS PER WEEK : 4**

#### **OBJECTIVES:**

- To enable students to have a sound knowledge in various branches of Home Science for strengthening the extension and research base.

#### **SPECIFIC OBJECTIVES OF LEARNING:**

On successful completion of these units, students are expected :

- To describe the importance of each branch of Home Science
- To understand the essence of each subject
- To prepare them for UGC NET, SLET and ASRB



## COURSE OUTCOME

On successful completion of the course the student will be able to-

CO No.	CO STATEMENT
CO 1	Understand the concept of Extension Education and its importance
CO 2	Comprehend the key aspects of human growth and development and realize the importance of mastering developmental tasks of each life span stage
CO 3	Understand the basic concepts of Textile and Clothing
CO 4	List personal goals and values, set living standards
CO 5	Understand the meaning of Guidance and Counselling and Career perspectives in Home Science

### UNIT – I Extension Education

- Meaning, Definition, objectives, characteristics, principles
- Extension teaching methods- types and methods
- Qualities of a good Extension Worker
- Communication, Innovation and Social change

### UNIT – II Human Development

- Growth, Development, Maturation and Learning
- Principles and Developmental stages & Task
- Parental Disciplinary Techniques – merits and demerits
- Early Childhood Education – Objectives. Types of Nursery Schools.
- Exceptional children – Deaf, Blindness, Physical Impairment, Mental Retarded and Giftedness . Rehabilitation.

### UNIT – III Textiles and Clothing

- Classification and General properties textile fibres.
- Processing and manufacture of Cotton, Silk, Wool and Rayon fibres.
- Yarn: Classification.
- Fabric construction - woven, non-woven and knitted fabric
- Clothing: selection for the family.

### UNIT – IV Family Resource Management

- Home Management – Meaning, objectives and process
- Resources - Classification and characteristics
- Time, Money and Energy management
- Decision making - Steps and Methods of resolving conflicts
- Work simplification - Importance of work simplification. Mundel's classes of Change
- Principles and Elements of Interior design, Various colours and colour schemes.

## UNIT – V-Guidance and Counselling

- Meaning, nature, types and scope of guidance and counselling
- Various steps and techniques of Guidance and counselling
- Need and importance of educational guidance.

### TEXTBOOKS:

- Jha, J.K. (2002). Encyclopaedia of Teaching of Home Science, Vol.I,II and III . New Delhi: Anmol Publications.
- Suriakanthi.A., (2002). Child Development - An Introduction Gandhigram: Kavitha Publications.
- Srilakshmi.B. (2015). Food Science. New Delhi. New Age International Pvt.Ltd.
- PremlataMullick (2016), 4<sup>TH</sup> edition, Kalyani Publishers.

### REFERENCES:

- Serene and Ahlawat Santos Shekhar (2013), Textbook of Home Scienc Extension Education.
- Tami James Moore and Sylvia M.Asay (2008), Family Resource Management, Sage Publications.
- Diane E. Papalia (2004), 9<sup>th</sup> edition, Human Development, McGraw Hill India.
- Rani K. Sudha and Srivastava Sushila, Textbook of Human Development: A lifespan development approach, S. Chand & Co Ltd.

### Mapping: (CO/PSO)

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	1	3	3	1	3
CO2	3	2	3	3	2	3
CO3	3	2	3	3	1	3
CO4	3	2	3	3	1	3
CO5	3	1	3	3	1	3
Average	3	1.6	3	3	1.2	3

### PEDAGOGY

Lecture, Power Point Presentation, Demonstration, Group Discussion, Assignment, Library Visits, Seminars and Oral & Written Revision

