M.SC.,
NUTRITION AND DIETETICS

SYLLABUS

FROM THE ACADEMIC YEAR

2023 - 2024

TAMILNADU STATE COUNCIL FOR HIGHER EDUCATION,
CHENNAI – 600 005

M.Sc. NUTRITION AND DIETETICS

INTRODUCTION:

Outcome-Based Education is incorporated into the curriculum based on the requirements of NAAC and UGC – Quality Mandate (2018). To fulfill these requirements, the Programme Educational Objectives (PEOs), Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) and Course Outcomes (COs) were framed for all programmes in alignment with the Vision, Mission and Educational Objectives of the University.

VISION AND MISSION OF THE UNIVERSITY:

VISION:

To provide quality education to reach the un-reached.

MISSION:

- To conduct research, teaching and outreach programmes to improve conditions of human living.
- To create an academic environment that glorify women and men of all races, caste, creed, cultures and all atmosphere that values intellectual curiosity, pursuit of knowledge , academic freedom and integrity.
- To offer a wide variety of campus educational and training programmes, including the use of information technology to individuals and groups.
- To develop partnership with industries and government so as to improve the quality of work place and to serve as catalyst for economic and cultural development.
- To provide quality / inclusive education especially for the rural and unreached segments of economically downtrodden students including women, socially oppressed and differently abled.

PREAMBLE:

The post graduate programme in this discipline has been designed to provide the students intensive and extensive theoretical and experiential learning. The programme allows flexibility in the choices based

credit systems. It is envisaged that the current of thrust areas, which students can select, based require trained professionals in areas such as Public Nutrition, Dietetics and Clinical Nutrition, Institutional Food Administration as well as Food Science and Quality Control.

TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION	
Programme	**M.Sc. NUTRITION AND DIETETICS**
Programme Code	
Duration	**2 years for PG**
Programme Outcomes (Pos)	**PO1: Problem Solving Skill** Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context. **PO2: Decision Making Skill** Foster analytical and critical thinking abilities for data-based decision-making. **PO3: Ethical Value** Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities. **PO4: Communication Skill** Ability to develop communication, managerial and interpersonal skills. **PO5: Individual and Team Leadership Skill** Capability to lead themselves and the team to achieve organizational goals. **PO6: Employability Skill** Inculcate contemporary business practices to enhance employability skills in the competitive environment. **PO7: Entrepreneurial Skill** Equip with skills and competencies to become an entrepreneur. **PO8: Contribution to Society** Succeed in career endeavors and contribute significantly to society. **PO 9 Multicultural competence** Possess knowledge of the values and beliefs of multiple cultures and a global perspective. **PO 10: Moral and ethical awareness/reasoning** Ability to embrace moral/ethical values in conducting one's life.
Programme Specific Outcomes (PSOs)	**PSO1 – Placement** To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions. **PSO 2 - Entrepreneur**

	To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations. **PSO3 – Research and Development** Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development. **PSO4 – Contribution to Business World** To produce employable, ethical and innovative professionals to sustain in the dynamic business world. **PSO 5 – Contribution to the Society** To contribute to the development of the society by collaborating with stakeholders for mutual benefit.

Template for P.G., Programmes

Semester–I	Credit	Hours	Semester-II	Credit	Hours	Semester-III	Credit	Hours	Semester–IV	Credit	Hours
1.1. Core-I	5	6	2.1. Core-IV	5	6	3.1. Core-VII	5	6	4.1. Core-XI	5	6
1.2 Core-II	5	6	2.2 Core-V	5	6	3.2 Core-VII	5	6	4.2 Core-XII	5	6
1.3 Core – III	4	6	2.3 Core – VI	4	6	3.3 Core – IX	5	6	4.3 Project with viva voce	7	10
1.4 Core Practical	2	4	2.4 Discipline Centric Elective – III	3	4	3.4 Core – X	4	6	4.4Elective - VI (Industry / Entrepreneurship) 20% Theory 80% Practical	3	4
1.5 Discipline Centric Elective -I	2	4	2.5 Generic Elective -IV:	3	4	3.5 Discipline Centric Elective - V	3	3	4.5 Skill Enhancement course / Professional Competency Skill	2	4
1.6 Generic Elective-II Practical	2	4	2.6 NME I	2	4	3.6 NME II	2	3	4.6 Extension Activity	1	
1.7 SKILL ENHANCEMENT COURSE 1	-	-				3.7 Internship/ Industrial Activity	2	-			
	20	**30**		**22**	**30**		**26**	**30**		**23**	**30**
Total Credit Points -91											

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

Part	List of Courses	Credits	No. of Hours
	Core – I	5	6
	Core – II	5	6
	Core – III	4	6
	Core – 1 Practical	2	4
	Elective – I	2	4
	Elective – II practical	2	4
		20	**30**

Semester-II

Part	List of Courses	Credits	No. of Hours
	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
		22	**30**

Second Year – Semester – III

Part	List of Courses	Credits	No. of Hours
	Core – VII	5	6
	Core – VIII	5	6
	Core – IX	5	6
	Core (Industry Module) – X	4	6
	Elective – V	3	3
	Skill Enhancement Course - II	2	3
	Internship / Industrial Activity [Credits]	2	-
		26	**30**

Semester-IV

Part	List of Courses	Credits	No. of Hours
	Core – XI	5	6
	Core – XII	5	6
	Project with VIVA VOCE	7	10
	Elective – VI (Industry Entrepreneurship)	3	4
	Skill Enhancement Course – III / Professional Competency Skill	2	4
	Extension Activity	1	-
		23	**30**

Total 91 Credits for PG Courses

M.Sc., NUTRITION & DIETETICS

SEMESTER - I

Course status	**Course Title**	Credits	Hours
Core-1	Advanced Food science	5	6
Core -2	Advanced Human Physiology	5	6
Core-3	Nutrition Through Lifecycle	4	6
Core I Practical	Advanced Food science practical	2	4
Elective - I	Food processing and technology/ Principles Of Menu Planning	2	4
Elective – II Practical	Food processing and technology practical	2	4
	Total	**20**	**30**

1.1 CORE -I-

ADVANCED FOOD SCIENCE

CREDIT: 4
SEMESTER :1
YEAR :1
HOURS PER WEEK :15

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

CO No.	CO Statement
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.
Sweetners- Properties, Artificial and Natural sweetners and role of sweetners 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.AvantinaSharma (2017).Text book of food science and Technology. CBS Publisheres and distributes ltd. 3rd Edition.
Swaminathan A.(2018) . Handbook of Food and Nutrition, Bangalore press.
Serpil Sahin and ServetGulumSumnu.(2006).Physical properties of Foods.
Springer publications

REFERENCES:

Gerard L. Hasenhuettl , Richard W. Hartel. (2019).Food Emulsifiers and Their Applications.Springer publications. 3rd edition.

Vickie.A. Vaciavik. (2021). Essentials of Food science. Springer publications. 5th edition.
Dr.M.Swaminathan.(2015). Advanced text book of Food and Nutrition. volume-2.Bapco publications.
Eskein.(2012). Biochemistry of Food. Elsievier publications.
Lyn O brienNabors.(2001).Alternative Sweetners. Taylor and Francis publications.
Janet D. Ward and Larry Ward.(2006). Principles of Food Science. Stem Publishers. 4th Edition.

ELEARNING RESOURCES:

www.fao.org www.wfp.org
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
ADVANCED HUMAN PHYSIOLOGY

CREDITS: 4
SEMESTER :I
YEAR :I
HOURS PER WEEK :15

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.
- Stem cells- types and functions.

Tissue

- Structure and Function.

UNIT II

Blood

- Composition& Functions
- Blood Group – ABO System &Rh factor.
- Blood Coagulation.

Heart

- Structure &Function of Heart and Blood Vessels.
- Systemic &Pulmonary circulation
- Cardiac cycle and Conduction.
- Heart rate and Cardiac output. ECG.
- Blood pressure & their regulations.

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.
- Definitions of Lung volumes and Lung capacities
- Ventilation and Artificial Respiration.

Immunity

- Definition and types 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 (I V) fertilization
- Spermatogenesis.

UNIT V

NERVOUS SYSTEM

- Structure and Function 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 Heathand 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, Nutritionand Human Performance. Williams and Wilkins, Baltimore. 4th Edition.
- Ganong, W.F. (1985): Review of Medical Physiology. lange Medical Publication. , 12th Edition.
- Moran Campell 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.1. 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 ChandiCharan : Text Book of Medical Physiology,London W.B.

E LEARNING CONTENT

https://youtu.be/MZDy0RvA52Y-Osmosis
https://youtu.be/TgcyiVQnVBs- Respiratory system
https://youtu.be/44B0ms3XPKU- nervous system

Mapping: (CO/PSO)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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

1.3 CORE: III
NUTRITION THROUGH LIFECYCLE

CODE:

Time/Hrs: 5Hours (Theory) **Year I**
Credits :3 **Semester :I**

LEARNING OBJECTIVES

To enable the students to

1. Understand the importance of nutrition through various life stages
2. Determinenutrientneedsforallagegroupsandcalculatethebasicnutritionalrequirements
3. Develop plan of action and implement nutritional care plan for every age group

COURSEOUTCOME

Onsuccessfulcompletionofthecoursethestudentwillbeableto

CO	COSTATEMENT	K LEVEL
CO1	Recallprenatalandneonatalgrowthanddevelopment.Understandthefoetalorigins ofadultdisease.Identifythecausesofintrauterinegrowthdefects.Interpretthegrowthchartandanalyzethegrowthanddevelopmentofinfants.Evaluatethenutritional needsofinfants.Developbalanceddietchartsandlowcostsupplementaryfoods	**K1,K2,K3, K4,K5,K6**
CO2	Recallthegrowthanddevelopmentduringchildhood.Identifythefoodandnutrient needs.Implementthedevelopmentofhealthygutmicrobiomeduringchildhood. Analyze thefactorsaffecting optimum growthanddevelopment.Evaluate the causesofnutritionaldisordersandmethodsoftreatment.Create innovativeandnutrientdense packedlunchmenus.Developdietchartsforchildrenwithspecialneeds.	**K1,K2,K3, K4,K5,K6**
CO3	Recallthedefinitionofadolescent.Understandthegrowthanddevelopmentof adolescent.Identify their foodandnutrientrequirements. Recognizethecauses fortheirfoodhabitsandirregularmealpattern.Analyzetheeatingdisordersandevaluate theprosandconsoffaddiets.Examinethecausesofproblemsduringadolescence. Constructinnovativebalancedmenus.	**K1,K2,K3, K4,K5,K6**
CO4	Recallthefoodandnutrientrequirementsandunderstandthephysiologicalchanges duringpregnancyandlactation.Identifythefactorsinfluencingfertilityandinterpret pregnancyoutcomes.Discussthediscomfortsandcomplicationsduringpregnancyandlactation.Examinetheroleofhormonesinlactationandevaluatethecompositionof breastmilk.ExplainCOVIDprotocolstobefollowedduringthis period.Create balanceddietsbasedonrecommended dietaryguidelines	**K1,K2,K3, K4,K5,K6**
CO5	Statethefoodandnutrientrequirementsduringadulthoodandoldage.Recognizethe needfordietarymodificationsduringthisperiod.Implementthedietaryguidelinesincreatingmenuplans.Analyzetheirconstraintsanddevelopstrategiestoovercome them.	**K1,K2,K3, K4,K5,K6**
K1 -Remember;**K2**-Understand;**K3**-Apply;**K4** -Analyze;**K5**-Evaluate;**K6**–Create		

THEORY

S.No	CONTENT	No ofhours

UnitI	**PrenatalandInfantnutrition** a. Foetal origins of adult disease, intrauterine growth retardation, low birthweight,cleftpalate,foetalalcoholsyndrome–causesandconsequences. b. Infancy – current feeding practices and nutritional concerns, guidelinesfor feeding normal and low birth weight infants. Growth and nutritionalassessment – Growth chart, LBW babies – characteristics andnutritionalcare. c. Nutritionalassessment, nutrientneeds,lactoseintolerance, infantformula–types,complementaryfoods-liquid,semi-solidandsolidfoodchoices,specialnutritionalconcerns ininfantfeeding.Feeding thepremature infant, allergies and infant obesity. Develop low costsupplementaryfoods.	**15**
UnitII	**Nutritionduringchildhood** a. Childhood – Growth and development, food and nutrient needs, dietaryadequacy. Factors influencing food choices, food acceptance, parentalinfluences.Developmentofhealthygutmicrobiome.Aetiology andtreatment of PEM, Vitamin A Deficiency, Anaemia. Planning meals forchildren with Attention-deficit/hyperactivity disorder (ADHD), autismanddyslexia.Immunizationscheduleforchildren. b. School age - Growth and development, food and nutrient needs, dietaryadequacy. Food choices, meal patterns, prevention of nutrition andhealthproblems. Causes and consequences of stunting, underweight, wasting,overweight,obesityanddentalcaries. c. Packedlunch–dietaryguidelinesandnutritionalrequirements.Planningpacked lunchforvariousincomegroups.	**15**
UnitIII	**Nutritionduringadolescence** a. Growthanddevelopment,foodandnutrientrequirements b. Food habits, irregular meal pattern, peer pressure, eating disorders. Prosandconsofpopularfad diets. Planningbalanced dietsforadolescents. c. Causes, consequences and treatment of adolescent pregnancy, PCOD,hormonal imbalance, premenstrual syndrome, anaemia, underweight,obesity.	**10**

UnitIV	**NutritioninPregnancyandLactation** a. Maternalnutrition– Factorsinfluencingfertility,foodandnutrientrequirements,Effectsofnutritionaldeficiencies duringpregnancy,Physiologicalchanges,weightgainduringpregnancy,typicalfoodpreferences,PICA b. Effects of smoking, drugs and alcohol on stages of foetal growth andpregnancy outcome. Complications and discomfort during pregnancy - Nausea,vomiting,constipation,heartburn,PIH,eclampsia,pre-eclampsiaandgestationaldiabetes.	**20**
	c. Lactation and breast milk – Physiology of lactation. Nutritive value andcomposition of breast milk - Colostrum. Food and nutrient requirementsfor nursing mother, advantages of breast feeding, importance of breastfeeding over formula feeds. Public health measures for pregnant andlactatingwomen.Complications duringlactation. d. COVID protocols for pregnant and lactating women. Planning balanceddietsforpregnantandlactatingwomen	
UnitV	**Nutritionin AdulthoodandOldAge** a. Food and nutrientrequirements during adulthood.Nutritional concernsinadulthoodrelatedtonutrientdeficiencies.Signsandsymptomsofmenopause.Effect of occupational hazards, stress related disorders andlifestylemodifications toovercomethem. b. Geriatric nutrition - Food and Nutritional requirements - Nutritional careof the elderly. Physiological changes affecting digestion and absorption.Foodselectionpatternsoftheelderly.Nutritionalproblemsofoldage. c. Planning balanced diets for adults and elderly based on special needsandrequirements.	**15**
		75

REFERENCESBOOKS

- Nix.S2016,Williams'BasicNutrition&DietTherapy,FifteenthEdition,Elsevier.
- Simon Langley-Evans, 2015 Nutrition, Health and Disease: A Lifespan Approach 2ndEdition,WileyBlackwell.
- JacalynJ.McComb,ReidNorman,etal.,TheActiveFemale:HealthIssuesThroughouttheLifespan2010,Human press.
- AletaL. Meyer and Thomas P. Gullotta., Physical Activity Across theLifespan:PreventionandTreatmentforHealthandWell-Being(IssuesinChildren'sandFamilies'Lives),2012, Springer.
- Antia, F.P., 1992, Clinical Dietetics and Nutrition Oxford University Press, NewDelhi.

- Corinne,R.H.,1996,Normalandtherapeuticnutrition,McmallianCo.,NewYork.
- Davidson, S.R. and Passmore J.F., 1989, Human Nutrition and Dietetics, ELBSLondon.
- Mahan,K.L.,andStump,S.E.,1996,KrausesFood,NutritionandDiettherapyM.B.SaundersCo., USA.
- Balasubramanianetal.,1998,Dietaryguidelinesfor Indians,ICMR,NewDelhi.
- Passmore, AH and Adams, A.A., 1990, Clinical assessment of nutritional status – Aworkingmanual,WillandWilsonPublishing,London.
- Bamji et al(1996), Textbook of Human Nutrition Oxford and IBH Publishing co. Pvt.Ltd.Delhi.
- Shils.E.M,Shike.M,Ross.A.C,Cabellero.BandCousins.R.J(2011)ModernNutrition in Health and Disease, Eleventh Edition, Lippincott Williams and Wilkins,Philadelphia.
- Mahan, K.L., and Stump, S.E., 1996, Krauses Food, Nutrition and Diet therapy M.B.SaundersCo., USA.

E-LEARNINGRESOURCES

- www.four-h.purdue.edu
- www.ingenta.connect.com
- nal.usda.gov/fnic/lifecycle
- www.fda.gov/search.html
- http://epgp.inflibnet.ac.in/Home/ViewSubject?catid=1827

MAPPINGOFCOWITHPSO

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	S	S	S	S	S
CO2	S	S	S	S	S	S
CO3	S	S	S	S	S	S
CO4	S	S	S	S	S	S
CO5	S	S	S	S	S	S

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions

1.4 Core I Practical

ADVANCED FOOD SCIENCE PRACTICAL

CREDIT: 3
SEMMESTER :1
YEAR :1
HOURS PER WEEK :10

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

CO No.	CO Statement
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

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

2. Starch
   Microscopic structure and gelatinization.
   Factors affecting gelatinization –sag test.

Gluten formation

UNIT -2

1. PULSE
   Factors affecting cooking quality
2. FRUIT
   Enzymatic browning Pectin test
   Firmness of gel

UNIT -3

1. VEGETABLE

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

2. 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

1. 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.

2. 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

1. PHYSICAL PROPERTIES
   a. Thousand grain weight
   b. Thousand grain volume
   c. Hydration capacity
   d. Hydration index
   e. Swelling capacity
   f. Specific gravity
   g. Seed displacement test
   h. Viscosity - Line spread test,

Viscometer. 2.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. 2ND edition.

REFERENCES:

Swaminathan A (1979) . Food Science And Experimental Foods, Ganesh And Company Madras. 3rd edition.

Bennion, Marion and O. Hughes (2001). Introductory Foods. Edi: mac millian N. Y. 1st edition.

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Desrosier, N.W. and James N. (2007). Technology of food preservation.

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E-LEARNING RESOURCES

http://www.fao.org/3/V5030E/V5030E00.htm
https://fmtmagazine.in/fruits-vegetables-processing-technologies/

www.fao.org
www.wfp.org

Learn Microbiology with Online Courses and Classes | edX

Mapping of CO with PSO:

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

PEDAGOGY

Experiments, Planning recipes , Group Discussion, Assignments, .

1.5 ELECTIVE GENERIC /DISCIPLINE CENTRIC II

FOOD PROCESSING AND TECHNOLOGY

CREDIT: 3
SEMESTER :1
YEAR :1
HOURS PER WEEK :10

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

CO No.	CO Statement
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 physicochemical 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 ShadakCheraswamyM . (2004) Food Facts and Principles. New age publisher . 2nd edition.

Roday S. (2011) .Food Science. Oxford publication . 1st edition.

B Srilakshmi (2015)Food science. New Age Publishers. 6th edition. Fellows P.(2000). Food Processing Technology, 2nd Edition.

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W.V. Special Indian Edition,PubAgrobios India . 2nd edition. Forsythe S J and Hayes P R (1998). Food Hygiene,

Microbiology and HACCP. GaitersburgMaryland Aspen.

Eskein .(2012). Biochemistry of Food. Elsievier publications. 1st edition.

ELEARNING RESOURCES:

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

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

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

1.5 ABILITY ENHANCEMENT COURSE -SOFT SKILL 1
PRINCIPLES OF MENU PLANNING

UNIT-I: RECOMMENDED ALLOWANCES

RDA for Indian basis for requirement, computation of allowance based on energy expenditure, components of energy expenditure. General concepts about growth and development through different stages of life.

UNIT-II

Preschool -, Food habits and nutrient intake of preschool children. Dietary allowances and supplementary foods.

School going age -, Nutritional status of school children, school lunch program, factors to be considered in planning a menu, food habits and nutritional requirement, packed lunch.

UNIT-III

Adolescence: Changes of growth characteristics of adolescents. Nutritional needs of the adolescents.

Adults: Nutrition for adults. Basis for requirement. Nutrition and work efficiency.

UNIT-IV: NUTRITION IN PREGNANCY

ICMR Nutrient allowances, Dietary guidelines. Common nutrition related problem of pregnancy and Lactation.

UNIT-V

Geriatric -Nutrition allowances - Dietary Guidelines -- psycho social and economical factors affecting eating behavior.

Infant -Rate of growth, weight as the indicator, Nutrition allowances for the infants. Breast feeding. Weaning foods suitable for infants. Premature infant and their feeding infant formulas.

REFERENCES

BOOKS

Nix .S 2016, Williams' Basic Nutrition & Diet Therapy, Fifteenth Edition, Elsevier.

Simon Langley-Evans, 2015 Nutrition, Health and Disease: A Lifespan Approach 2nd Edition, Wiley Blackwell.

Jacalyn J. McComb, Reid Norman, et al.,The Active Female: Health Issues Throughout

the Lifespan 2010, Human press.

Aleta L. Meyer and Thomas P. Gullotta., Physical Activity Across the Lifespan: Prevention and Treatment for Health and Well-Being (Issues in Children's and Families' Lives), 2012, Springer.

Antia, F.P., 1992, Clinical Dietetics and Nutrition Oxford University Press, New Delhi.

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Davidson, S.R. and Passmore J.F., 1989, Human Nutrition and Dietetics, ELBS London.

Mahan, K.L., and Stump, S.E., 1996, Krauses Food, Nutrition and Diet therapy M.B. Saunders Co., USA.

Balasubramanian et al., 1998, Dietary guidelines for Indians, ICMR, New Delhi.

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Shils.E.M, Shike .M, Ross. A.C, Cabellero.B and Cousins.R.J (2011) Modern Nutrition in Health and Disease, Eleventh Edition, Lippincott Williams and Wilkins, Philadelphia.

Mahan, K.L., and Stump, S.E., 1996, Krauses Food, Nutrition and Diet therapy M.B. Saunders Co., USA.

E- LEARNING RESOURCES

- www.four-h.purdue.edu
- www.ingenta.connect.com
- nal.usda.gov/fnic/lifecycle

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

1.6 ELECTIVE GENERIC /DISCIPLINE CENTRIC II PRACTICAL

FOOD PROCESSING AND TECHNOLOGY

1. Refrigeration and Freezing of fruits and vegetables.
2. Refrigeration and Freezing of meat and fish.
3. Sun and Oven drying of Fruits and Vegetables.
4. Preparation of Jam, Jelly, Syrup and Squash.
5. Preparation of pickles.
6. Visit to Canning and Bottling unit.
7. Visit to fish processing unit.
8. Visit to a food packaging unit.

COURSE OUTCOMES:

On completion of the course, students will be able to

CO 1. To develop the skill to analyze the quality like sugar such as jam, jelly etc.CO 2. To explain the fermentation process such as canning and bottling unit .

CO 3. To analyze technologies in food preservation.. CO 4. To discuss preservation of foods by salt and acid.

CO 5. To evaluate the novel technologies in food preservation.

Mapping

Food Processing and Preservation Practical											
CO	**PO**					**PSO**					
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**
1	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**
2	**3**	**3**	**3**	**1**	**2**	**3**	**3**	**2**	**3**	**3**	**2**
3	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**
4	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**
5	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**

Strongly Correlated (3); Moderately Correlated (2); Weakly Correlated (1); No Correlation (0)

1.7 SKILL ENHANCEMENT COURSE 1

Computer in Nutrition Research

Course objective

1. Understand the basics of computer and its applications
2. Gain knowledge to use computers
3. Develop skills to apply computer based technology in Food science and Nutrition

Course Out Comes

1. The student will gain knowledge on computer applications.

2. The knowledge on Operating system and MS Office will be enhanced

3. Acquire knowledge on computer networks.

4. To gain knowledge on computer networking system and apply in the field of food science, nutrition and research.

UNIT I

Introduction to Computers History of Development of Computers, Main Frame, Minis, Micros and Super Computer Systems, Binary numbers, Bits, Bytes, CPU, Input and Output Devices, Recent software's in field of food and Nutrition .

UNIT II

Operating Systems and MS Office Introduction to Operating Systems, Windows Applications MS Word, MS Excel. MS Access and MS PowerPoint

UNIT III

Nutrition software and websites, e-journals in Food Science and Nutrition, Use of SPSS.

UNIT IV

Application of Computers in Food Science and Nutrition -Power point presentation, nutrient and diet calculations, nutrition education and counselling,

REFERENCES

Balagurusamy. E (2008) Computing Fundamentals and C Programming, Tata McGraw Hill Education Private Limited, New Delhi.

Bansal.S.K (2004) Text Book of Information Technology , APH, Publishing Corporation.

Andrew S. Tanenbaum (2009) IV Edition, Computer Networks, Pearson Education And Dorling Kindersley Publishers, Delhi.

James F. Kurose and Keith W Ross (2008) III Edition, Computer Networking. A Top-Down Approach Featuring the Internet, Pearson Education and Dorling Kindersley

Publishers, Delhi.

Ralf Steinmetz and KlaraNahrstedt (2011) Multimedia- Computing, Communications and Applications, Pearson Education and Dorling Kindersley Publishers, Delhi

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

M.SC. NUTRITION AND DIETETICS

INTRODUCTION:

Outcome-Based Education is incorporated into the curriculum based on the requirements of NAAC and UGC – Quality Mandate (2018). To fulfill these requirements, the Programme Educational Objectives (PEOs), Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) and Course Outcomes (COs) were framed for all programmes in alignment with the Vision, Mission and Educational Objectives of the University.

VISION AND MISSION OF THE UNIVERSITY:

VISION:

To provide quality education to reach the un-reached.

MISSION:

- To conduct research, teaching and outreach programmes to improve conditions of human living.
- To create an academic environment that glorify women and men of all races, caste, creed, cultures and all atmosphere that values intellectual curiosity, pursuit of knowledge , academic freedom and integrity.
- To offer a wide variety of campus educational and training programmes, including the use of information technology to individuals and groups.
- To develop partnership with industries and government so as to improve the quality of work place and to serve as catalyst for economic and cultural development.
- To provide quality / inclusive education especially for the rural and unreached segments of economically downtrodden students including women, socially oppressed and differently abled.

PREAMBLE:

The post graduate programme in this discipline has been designed to provide the

students intensive and extensive theoretical and experiential learning. The programme allows flexibility in the choices based

credit systems. It is envisaged that the current of thrust areas, which students can select, based require trained professionals in areas such as Public Nutrition, Dietetics and Clinical Nutrition, Institutional Food Administration as well as Food Science and Quality Control.

TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION	
Programme	**M.Sc. NUTRITION AND DIETETICS**
Programme Code	
Duration	**2 years for PG**
Programme Outcomes (Pos)	**PO1: Problem Solving Skill** Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context. **PO2: Decision Making Skill** Foster analytical and critical thinking abilities for data-based decision-making. **PO3: Ethical Value** Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities. **PO4: Communication Skill** Ability to develop communication, managerial and interpersonal skills. **PO5: Individual and Team Leadership Skill** Capability to lead themselves and the team to achieve organizational goals. **PO6: Employability Skill** Inculcate contemporary business practices to enhance employability skills in the competitive environment. **PO7: Entrepreneurial Skill**

	Equip with skills and competencies to become an entrepreneur. **PO8: Contribution to Society** Succeed in career endeavors and contribute significantly to society. **PO 9 Multicultural competence** Possess knowledge of the values and beliefs of multiple cultures and a global perspective. **PO 10: Moral and ethical awareness/reasoning** Ability to embrace moral/ethical values in conducting one's life.
Programme Specific Outcomes (PSOs)	**PSO1 – Placement** To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions. **PSO 2 - Entrepreneur** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations. **PSO3 – Research and Development** Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development. **PSO4 – Contribution to Business World** To produce employable, ethical and innovative professionals to sustain in the dynamic business world. **PSO 5 – Contribution to the Society** To contribute to the development of the society by collaborating with stakeholders for mutual benefit.

SEMESTER – II

Course status	Course Title	Credits	Hours
Core 4	Research Methods in Nutrition	5	6
Core 5	Advanced Dietetics	5	6
Core 6	Advanced Dietetics- Practical	4	6
Elective 3	Nutritional Biochemistry	3	4
Elective 4	Perspectives of Home science	3	4
	Skill Enhancement Course [SEC] - NME - I	2	4
	Total	22	30

2.1 CORE: IV
RESEARCH METHODS IN NUTRITION

CREDIT :5
SEMESTER :2
YEAR :1
HOURS PER WEEK :15

OBJECTIVES:

- To provide students understandings about 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 researches.
- 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 of preparing out line of research work and construct common data collection tools.

COURSE OUTCOME:
On successful completion of the course the student will be able to

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

Unit 1: Foundation of Nutrition Research

1. 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** – Pre-Experimental, Quasi Experimental, True Experimental and Statistical Experimental designs.
2. Need of Research in Food Science and Nutrition
3. Research Process-
    - Selection and Formulation of Research Problem
    - Objectives of Research: Explanation, Control and Prediction
    - Hypothesis: Definition, Importance, Types and Errors - I & II
    - Deciding Variables

Unit 2: Sampling and Sample Design

Sampling Process and Characteristics of good Sampling

1. Classification of Sampling Techniques - Probability and Non Probability Sampling
2. Preparation of Laboratory Food Samples
3. Sampling and Non- Sampling Errors

Measurements and Scaling -

1. Fundamental and Comparative Scales – Meaning and types

- Nominal Scale
- Ordinal Scale
- Interval Scale
- Ratio Scale

2. Non comparative Scales– Meaning and types

1. Continuous Rating Scale
2. Itemized Rating Scale

- Likert Scale
- Semantic Differential Scale
- Stapel Scale

Unit 3: Data Collection and Preparation

1. Data Collection – Tools –0

Primary Data

1.Interviews -structured and unstructured
2. Case studies
3. Questionnaire
4. Surveys – Pilot & KAP
5. LaboratoryExperiments

Secondary Data

1. Published Sources
2. Unpublished Sources
3. **Reliability and Validity** of Tools– Meaning
4. **Data Preparation Process –**
    - Editing
    - Coding
    - Classification
    - Tabulation

Unit 4: Statistical Methods

1. **Parametric and Non-Parametric tests –** Difference and Applications
2. **Data Analysis Process-**

1. **Descriptive Analysis-**
    - Graphical and Diagrammatic Presentations
    - Central Tendency – Mean, Median & Mode
    - Dispersion -Standard Deviation
2. **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

1. **Report Writing –**

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

2. computer applications in nutrition research -importance and uses

3. 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. 2nd Ed
- Chawla,Deepak and NeenaSondhi (2018): Research Methodology
- Concepts and Cases. Noida, Vikas Publishing House Pvt Ltd. 2nd Ed.

- Gupta, S P (2019). Statistical Methods. New Delhi. S Chand & Sons. 45th Ed.
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- Bell, Judith (2005): Doing your Research Project – A guide for first time researchers in education, health and social science. England, Open University Press. 4th Ed.
- Danial, Wayne W and Chad L Cross (2017): Biostatistics – Basic Concepts and Methodology For the Health Sciences – International Student Version. New Delhi, ArEmmInternatonal, 10th Ed.

Mapping: (CO/PSO)

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO6
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

2.2 CORE - V
ADVANCED DIETETICS

CREDIT: 5

SEMESTER :II

YEAR:1

HOURS PER WEEK :15

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 dietary management of different diseases.

COURSE OUTCOME:

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

CO No.	CO Statement
CO1	Critique the Nutritional screening technique
CO2	Comprehend the current concepts of therapeutic diets and critically ill
CO3	Implement the dietary principles on various disorders.
CO4	Acquire the knowledge of diet counseling skills.
CO5	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 nutritional Status assessment of critically ill, Nutritional requirement according to the critical condition
- Nutritional support systems: Enteral and parenteral nutrition support- Types, composition and complications.

UNIT II

- **Medical Nutrition therapy for gastrointestinal and liver disorders** Upper Gastrointestinal tract Diseases – Nutritional care and diet therapy in Diseases of oesophagus - Oesophagitis, 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-Common Symptoms of Intestinal dysfunction - Flatulence, constipation, haemorhoids, diarrhoea, steatorrhoea, 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- hepatitis, hepatic coma, cirrhosis, cholecystits, cholelithiasis and pancreatitis, Zollinger Ellison syndrome and Biliary dyskinesia.

UNIT III

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

- Medical Nutrition therapy for Rheumatic disease- Etiology, Pathophysiology of Inflammation of Rheumatic diseases, Rheumatoid Arthritis, Osteoarthritis and sjogren syndrome.
- Nutritional management of physiological stress- Classification, Complications, Metabolic changes in protein and electrolytes and Dietary management of burns, dietary management of trauma and stress.

UNIT IV

- Nutritional Management on Weight imbalance -Regulation of food intake and pathogenesis of obesity and malnutrition and starvation; 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 bariatricsurgery.
- Nutritional Management in metabolic disorders- Prevalence, Etiology, risk factors, complications and dietary modifications of diabetes mellitus.

UNIT V

- Nutritional management of cardiovascular diseases-etiology, risk factors, clinical features and dietary modifications of Dyslipidemias, Atherosclerosis , Hypertension, Ischemic heart disease, Congestive cardiac failure.
- 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. 10th 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.
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- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, And A.E., Carwick.(1990).Basic Nutrition and Diet therapy, Macmillan Publishing Company.

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

E-LEARNING RESOURCES:

- www.nutrition.gov - Service of National agricultural library, USDA.
- www.nal.usda.gov/fnic -Food and Nutrition information centre.
- www.healthyeating.org.
- www.eatrightpro.org. https://www.globalhealthlearning.org.

Mapping of Co with PSO:

CO/PSO	PSO 1	PSO2	PSO3	PSO4	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.

2.3 CORE VI
ADVANCED DIETETICS PRACTICALS

CREDITS :4
SEMESTER :II
YEAR : 1
HOURS PER WEEK : 15

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

CO No.	CO Statement
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

1. Routine hospital diet : Regular diet, Clear liquid, Soft diet, Full liquid diet and Planning and preparing Enteral feed plan [8hrs].
2. Assessing requirements and planning diet for obese and underweight individual[6hrs]
3. Planning and preparing diet for Diabetes Mellitus [IDDM and NIDDM] [6hrs].
4. Planning and preparation of diet for Atherosclerosis with hypertension [6hrs]
5. Assessing and planning diets for the following conditions[13hrs]
    - Celiac disease
    - Lactose intolerance.
    - GERD

- Peptic ulcer
- Hepatitis
- Cirrhosis

6. Planning and preparing diet for Pneumonia [6hrs]
7. Planning and preparing diet for Rheumatic arthritis[6hrs]
8. Planning and preparation of diet for Glomerulonephritis[6hrs]
9. Planning and preparation of diet for cancer according to the condition.[6hr]
10. Planning and Preparing diet for pre and post Bariatric surgery patients.[6hrs]
11. Assessment and planning diet for post burn condition[6hrs].

TEXTBOOKS:

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

REFERENCES:

- Gopalan C., Ram Sastri B.V. And BalSubramaniam 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. 2nd edition. Peggy Stanfield.Y.H.Hui.(2010). Nutrition and Diet therapy. Jones and Bartlett publishers.
- William's. (2012).Basic Nutrition and Diet therapy.14th Edition.

E-LEARNING RESOURCES:

- www.nutrition.gov - Service of National agricultural library, USDA.
- www.nal.usda.gov/fnic -Food and Nutrition information centre.
- www.healthyeating.org.
- www.eatrightpro.org.
- https://www.globalhealthlearning.org.

Mapping: (CO/PSO)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO 5	PSO6
CO1	2	3	3	3	1	2
CO2	3	3	3	3	1	3
CO3	3	2	3	3	2	3
CO4	3	2	3	3	3	2
CO5	3	3	3	3	3	3
Average	**2.8**	**2.6**	**3**	**3**	**2**	**2.6**

PEDAGOGY

Group Discussion, Case study, Assignments, Planning menus in charts.

2.4 ELECTIVE (GENERIC/DISPILINE CENTRIC)- III

NUTRITIONAL BIOCHEMISTRY

CREDIT:3

SEMESTER :II

YEAR :I

HOURS PER WEEK :10

COURSE OBJECTIVES

1. Understand the need for the study of biochemistry as the basis for nutritional sciences.
2. Make students aware of metabolism of proximate principles and others.
3. 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 Cycleglycogenesis, 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. 6th 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, 6th 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-LEARNING RESOURCES:

- https://www.udemy.com/share/1027yA/

  https://www.classcentral.com/course/swayam-biochemistry-5229

- https://www.classcentral.com/course/edx-biochemistry-biomolecules-metho ds-and-mechanisms-12585

- https://www.classcentral.com/course/swayam-experimental-biochemistry-12 909

- https://youtu.be/y6YGZfcAegw

Mapping of CO with PSO:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO4	PSO 5	PSO 6
CO1	3	3	2	1	1	3
CO2	3	3	2	1	1	3
CO3	3	3	2	1	1	3
CO4	3	3	2	1	1	3
CO5	3	3	3	1	1	3
Average	**3**	**3**	**2.2**	**1**	**1**	**3**

PEDAGOGY (TEACHING METHODOLOGY):
Group Discussion, Case study, seminar, journal reviewing, Assignments, Power point presentations.

2.5 ELECTIVE (GENERIC/DISCIPLINE CENTRIC) - IV
PERSPECTIVES OF HOME SCIENCE

CREDITS:3
SEMESTER :II, YEAR :I
HOURS PER WEEK :10

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:

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

REFERENCES:

1. Serene and Ahlawat Santos Shekhar (2013), Textbook of Home Science Extension Education.
2. Tami James Moore and Sylvia M.Asay (2008), Family Resource Management, Sage Publications.
3. Diane E. Papalia (2004), 9th edition, Human Development, McGraw Hill India.
4. 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

2.6 SKILL ENHANCEMENT COURSE -SOFT SKILL –NME - 1

NUTRITION IN SPECIAL CONDITION

CREDIT-2

SEMESTER-II

YEAR -I

HOURS PER WEEK -2

Course objective

- To acquire knowledge on physiological changes during extreme climatric changes.
- To understand the diet pattern and food choice in special condition
- To develop the skill of planning menu for military ration.

COURSE OUTCOME

- Asses the physiological condition during special condition
- Design a space food and military ration
- Understand different techniques of maintain health in extreme condition
- Comprehend the dietary requirements of various climatic condition
- Plan a balanced diet for polar , hot and sea voyage condition

UNIT 1 Space Nutrition

- Physiological changes during space flight, types of space food, essential quality and criteria required for space food

UNIT 2 Nutrition in extreme condition

- Physiological changes , Nutritional requirement in cold polar and hot environment , food supplements .

UNIT 3 Sea voyage

- Stress in daily life aboard, Legal background for catering , cause of malnutrition in sea voyage, Limitation in food choice and diet pattern.

UNIT 4 Military Nutrition

- Dietary guidelines , Food choice, nutrient supplements and ration developed in militaty

REFERENCES

- Jacalyn J. McComb, Reid Norman, et al.,The Active Female: Health Issues Throughout the Lifespan 2010, Human press.
- Aleta L. Meyer and Thomas P. Gullotta., Physical Activity Across the Lifespan: Prevention and Treatment for Health and Well-Being (Issues in Children's and Families' Lives), 2012, Springer.
- Antia, F.P., 1992, Clinical Dietetics and Nutrition Oxford University Press, New Delhi.
- Corinne, R.H., 1996, Normal and therapeutic nutrition, Mcmallian Co., New York.

Mapping of Co with PSO:

CO/PSO	PSO 1	PSO2	PSO3	PSO4	PSO5	PSO6
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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.