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| M.sc.,  Food science & Nutrition & Dietetics |
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| **SYLLABUS** |
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| **FROM THE ACADEMIC YEAR**  **2023 - 2024** |
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| **TAMILNADU STATE COUNCIL FOR HIGHER EDUCATION, CHENNAI – 600 005** |
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**CONTENT:**

**OUTLINE OF THE CURRICULUM AND TEMPLATE FO RCOURSE SYLLABUS**

Introduction to the Programme

Highlights of the Programme

Programme Outcomes (PO) of PG Degree Programme

Programme Specific Outcomes (PSO) of PG Degree Programme

Teaching Methodologies

Template For Curriculum Design for PG Degree Programme

Credit Distribution for PG Programme

Consolidated Semester Wise and Component Wise Credit Distribution

Methods of Evaluation

# INTRODUCTION

Home Science is both multidisciplinary and interdisciplinary in its context encompassing fmajor 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 contentis comparabletoworldclass curriculum.
  + Thecourses are updated to include recent developments in the field of HomeScience-Food science Nutrition and Dietetics.
  + References are updated and web resources are cited.
  + Each course in the curriculum carries either a practical/activityor experiential learningcomponentto ensure skill development along with acquiring knowledge in the subject.
  + Potentialfor employabilityhas been enhanced through mandatoryinternships.
  + Digitalliteracyandcompetencyisensured usingICT enabledlearningenvironment.

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| --- | --- |
| **TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION** | |
| **Programme** | **M.Sc., Food Science 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 | 7 | 2.1. Core-IV | 5 | 6 | 3.1. Core-VII | 5 | 6 | 4.1. Core-XI | 5 | 6 |
| 1.2 Core-II | 5 | 7 | 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 Discipline Centric  Elective -I | 3 | 5 | 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 Generic Elective-II: | 3 | 5 | 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 |
|  |  |  | 2.6 NME I | 2 | 4 | 3.6 NME II | 2 | 3 | 4.6 Extension Activity | 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 | 7 |
| Core – II | 5 | 7 |
| Core – III | 4 | 6 |
| Elective – I | 3 | 5 |
| Elective – II | 3 | 5 |
|  |  | **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., Food science & Nutrition & Dietetics

**SEMESTER - I**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course status** | **Course Title** | Credits | Hours |
| Core-1 | Advanced Food science | 5 | 7 |
| Core -2 | Advanced Human Physiology | 5 | 7 |
| Core-3 | Macronutrients | 4 | 6 |
| Elective - I | Advanced Food science practicals | 3 | 5 |
| Elective - II | Food processing and technology | 3 | 5 |
|  | **Total** | **20** | **30** |

**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 Homescience | 3 | 4 |
|  | Skill Enhancement Course [SEC] - I  NME | 2 | 4 |
|  | Total | 22 | 30 |

**SEMESTER - III**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course status** | **Course Title** | Credits | Hours |
| Core 7 | Micronutrients | 5 | 6 |
| Core 8 | Performance Nutrition | 5 | 6 |
| Core 9 | Techniques in Food analysis | 5 | 6 |
| Core 10 | Food Product Development | 4 | 6 |
| Elective 5 | Food Microbiology | 3 | 3 |
|  | Food Microbiology practiclas |  |  |
|  | Skill Enhancement Course - II | 2 | 3 |
|  | Internship / Industrial Activity | 2 | - |
|  | **Total** | **26** | **30** |

**SEMESTER - IV**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course status** | **Course Title** | Credits | Hours |
| Core 11 | Public health nutrition | 5 | 6 |
| Core 12 | Advanced Food service Management | 5 | 6 |
|  | Project Work with Viva voce | 7 | 10 |
| Elective 6 | Advanced Food service Management | 3 | 4 |
|  | Skill Enhancement Course – III / Professional Competency Skill | 2 | 4 |
|  | Extension Activity | 1 | - |
|  | Total | **23** | **30** |

**Total Credits - 91**

**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](https://www.amazon.com/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Gerard%2BL.%2BHasenhuettl&text=Gerard%2BL.%2BHasenhuettl&sort=relevancerank&search-alias=books) , [Richard W. Hartel](https://www.amazon.com/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&field-author=Richard%2BW.%2BHartel&text=Richard%2BW.%2BHartel&sort=relevancerank&search-alias=books). (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](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](http://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/MZDy0RvA52Y-Osmosis)[**https://youtu.be/TgcyiVQnVBs-**](https://youtu.be/TgcyiVQnVBs-) **Respiratory system** [**https://youtu.be/44B0ms3XPKU-**](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

**1.3 CORE: III**

**MACRO NUTRIENTS**

**CREDITS:4**

**SEMESTER :1**

**YEAR :1**

**HOURS PER WEEK 15**

**OBJECTIVE:**

To enable the students

* To understand the relationship between lipid, carbohydrate, protein and mineral metabolism.
* To learn about the therapeutic uses of carbohydrates protein and fat in prevention of non-communicable disease.
* To get insights in the inborn errors of metabolism

**COURSE OUTCOMES:**

After studying this paper, the students would know

|  |  |
| --- | --- |
| **CO No.** | **CO STATEMENT** |
| CO1 | The essentials of nutrients in growth and development of humans |
| CO2 | The importance of major nutrients in maintaining human health and leading active lifestyle |
| CO3 | The enhancement of nutritional quality of the diet. |
| CO4 | Identify the various types & sources of food borne illness and methods of prevention. |
| CO5 | The role of nutrients in health and diseases. |

**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:**

1. Satyanarayana, U., & Chakrapani, U. (2013). Biochemistry, Book and Allied Pvt. *Ltd., Kolkata*.
2. Wardlaw, G. M., Byrd-Bredbenner, C., Moe, G., Berning, J. R., & Kelley, D. S. (2013). *Wardlaw's perspectives in nutrition*. McGraw-Hill.
3. Williams, S. R. (2004). Nutrition and diet therapy. *Nutrition and diet therapy.*
4. Sizer, F., Whitney, E., & Webb, F. (2003). Nutrition Concepts and Controversy, Thomas Wadsworth, Australia. 9th edition.
5. 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.
6. Mahan, L.K., & Stump, S.E. (2002). Krause’s Food Nutrition and Diet Therapy. W.B. Saunder’s company, Philadelphia. 10th 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. 11th edition.
* Brown, J.E., (2002). Nutrition Now. Wadsworth Thomson Learning New York. 3rd 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. 6th 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-](about:blank) Fanta technical assistance for nutrition

[http://dietary-supplements.info.nih.gov](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

**1.4 ELECTIVE (GENNERIC /DISCIPLINE CENTRIC -I**

**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

1. Starch

Microscopic structure and gelatinization.

Factors affecting gelatinization –sag test.

Gluten formation

**UNIT -2**

* 1. PULSE

Factors affecting cooking quality

* 1. FRUIT

Enzymatic browning Pectin test

Firmness of gel

**UNIT -3**

1. VEGETABLE

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

1. 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.

1. 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
     1. Thousand grain weight
     2. Thousand grain volume
     3. Hydration capacity
     4. Hydration index
     5. Swelling capacity
     6. Specific gravity
     7. Seed displacement test
     8. 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.

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

**E-LEARNING RESOURCES**

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

[www.fao.org](http://www.fao.org/) [www.wfp.org](http://www.wfp.org/)

[Learn Microbiology with Online Courses and Classes | edX](https://www.edx.org/learn/microbiology)

**Mapping of CO with PSO:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **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 GENNERIC /DISCIPLINE CENTRIC II**

**FOOD PROCESSING AND TECHNOLOGY**

**CREDIT: 3**

**SEMMESTER :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.

Woodhead Publishing Limited and CRC Press LLC. 1st edition.

Avantina Sharma. (2017).Text book of food science and Technology. CBS Publisheres and distributes ltd. 3rd 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. 4th edition.

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

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

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](https://www.actioncontrelafaim.org/wp-content/uploads/2018/01/technical%20_paper_phl.pdf)

[\_paper\_phl.pdf](https://www.actioncontrelafaim.org/wp-content/uploads/2018/01/technical%20_paper_phl.pdf)

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

**MAPPING (CO/PSO):**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PO** | **PSO**  **1** | **PSO2** | **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 ABILITY ENHANCEMENT COURSE -SOFT SKILL 1

PRINCPLES OF MENU PLANNING

CREDITS:2

SEMESTER 1

YEAR :1

HOURS PER WEEK :2

## 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.

Corinne, R.H., 1996, Normal and therapeutic nutrition, Mcmallian Co., New York.

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.

Passmore, AH and Adams, A.A., 1990, Clinical assessment of nutritional status – A working manual, Will and Wilson Publishing, 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.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](http://www.four-h.purdue.edu/)
  + [www.ingenta.connect.com](http://www.ingenta.connect.com/)
  + nal.usda.gov/fnic/lifecycle

**MAPPING (CO/PSO):**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PO** | **PSO**  **1** | **PSO2** | **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

**1.7 SKILL ENHANCEMENT COURSE 1**

**Computer in Nutrtion Research**

**CREDIT :2**

**SEMESTER :1**

**YEAR :1**

**HOURS PER WEEK : 2**

## 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** | **PSO2** | **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: IV**

**RESEARCH METHODS IN NUTRITION**

**CREDIT :4**

**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.

1. Need of Research in Food Science and Nutrition
2. 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**
3. Continuous Rating Scale
4. 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.

* + Copper, H.M. (2002). IntergratingResearch : 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. 3rd edition.
* Anderson, David R and et.al.(2013) : Statistics for Business and Economics. Delhi, Cengage Learning India Pvt Ltd. 11th 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. 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: 4**

**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 |

**UNITI**

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.

**UNITII**

**Medical Nutrition therapy for gastrointestinal and liver disorders** UpperGastrointestinal tract Diseases – Nutritional care and diet therapy in Diseases of oesophagus - Oesophagitis, Gastro esophageal refluxdisease[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.

**UNITIII**

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.

**UNITIV**

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.

**UNITV**

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.

Passmore P. And M.A. East Wood.(Digitised 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. 5th 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. 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.](http://www.nal.usda.gov/fnic-FoodandNutritioninformationcentre) [www.healthyeating.org](http://www.healthyeating.org/).

[www.eatrightpro.org](http://www.eatrightpro.org/).

https://[www.globalhealthlearning.org.](http://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]
   1. Celiac disease
   2. Lactose intolerance.
   3. GERD
   4. Peptic ulcer
   5. Hepatitis
   6. 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 Saunders.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.](http://www.nal.usda.gov/fnic-FoodandNutritioninformationcentre) [www.healthyeating.org](http://www.healthyeating.org/).

[www.eatrightpro.org](http://www.eatrightpro.org/).

https://[www.globalhealthlearning.org.](http://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/DISPILINECENTRIC)-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**

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

**REFERENCE BOOK**

1. Marshall, W. J., Lapsley, M., Day, A., &Ayling, R. (2014). Clinical Biochemistry E-Book: Metabolic and Clinical Aspects. Elsevier Health Sciences.
2. Bender, D. A. (2003). Nutritional biochemistry of the vitamins. Cambridge university press.
3. Albanese, A. (Ed.). (2012). Newer methods of nutritional biochemistry V3: With applications and interpretations. Elsevier.
4. Champe, P. C., Harvey, R. A., & Ferrier, D. R. (2005). Biochemistry. Lippincott Williams & Wilkins.
5. 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-biochemistry-5229>

[https://www.classcentral.com/course/edx-biochemistry-biomolecules-metho](https://www.classcentral.com/course/edx-biochemistry-biomolecules-methods-and-mechanisms-12585) [ds-and-mechanisms-12585](https://www.classcentral.com/course/edx-biochemistry-biomolecules-methods-and-mechanisms-12585)

[https://www.classcentral.com/course/swayam-experimental-biochemistry-12](https://www.classcentral.com/course/swayam-experimental-biochemistry-12909) [909](https://www.classcentral.com/course/swayam-experimental-biochemistry-12909)

<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**

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

**UNIT – II Human Development**

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

**UNIT – III Textiles and Clothing**

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

**UNIT – IV Family Resource Management**

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

**UNIT – V-Guidance and Counselling**

1. Meaning, nature, types and scope of guidance and counselling
2. Various steps and techniques of Guidance and counselling
3. 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 SEC 2**

**FOOD PRESERVATION**

**CREDIT:2**

**SEMESTER: 2**

**YEAR :1**

**HOURS PER WEEK:2**

**LEARNING OBJECTIVES**

**To enable students to**

1. Learn the basic concepts and importance of Food Preservation
2. Understand the different methods of Food Preservation
3. 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 Low Temperature

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

Unit III Preservation by High Temperature

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

Unit IV Preservation by Drying

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

**REFERENCES**

**BOOKS**

PrakashTriveni (2010) : Food Preservation, Aadi Publication, Delhi.

M. ShafiurRahman (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.VanGarde,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://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>

**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.

**2.7 ABILITY ENHANCEMENT COURSE -SOFT SKILL -2**

**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** |
| **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.

**SEMESTER III**

**3.1 CORE – VII**

**MICRONUTRIENTS**

**CREDITS: 4**

**SEMESTER :III**

**YEAR :II**

**HOURS PER WEEK :15**

## COURSE OBJECTIVES

1. To enables the students to learn the functions, deficiency symptoms, food sources and requirements of the different micro nutrients.
2. To Gain knowledge of nutrients requirement and management of micronutrients during various stages of life and disease
3. To gain insight about recent concept and findings in field of nutrition and application of the same to prevent disease

## COURSE OUTCOMES:

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

|  |  |
| --- | --- |
| **CO No.** | **CO Statement** |
| CO1 | Evaluate the specific role of functional foods and nutraceuticals in prevention of degenerative disease. |
| CO2 | Understand the importance of micronutrients in growth and development of humans. |
| CO3 | Analyse the importance of diet in maintaining human health to combat nutrient deficiency in the community |
| CO4 | Gain in-depth knowledge of the physiological and metabolic functions of vitamins and minerals and their implications |
| CO5 | Analyse the recent advances in the field of micronutrient and research for the welfare of the community |

## UNIT I: 15 hours

Distribution in the body; functions, effects of deficiency, food sources, requirement and recent research of macro minerals - Calcium, Phosporous, Magnesium, Potassium, Sodium and Chloride.

## UNIT – II 15 hours

Distribution in the body, functions, food sources, requirement deficiency, toxicity and recent research of micro minerals and trace minerals. Micro minerals - – iron, zinc, fluoride, copper, iodine and manganese. Trace Minerals -Selenium, cobalt, chromium, silicon, boron and nickel

Selenium and Vitamin E relationship, Chromium and glucose tolerance factor.

## UNIT III: 15 hours

Distribution in the body, functions, food sources, requirement deficiency, toxicity and recent research of Fat Soluble Vitamins A,D,E and K

## UNIT IV: 15 hours

Distribution in the body, functions, food sources, requirement deficiency, toxicity and recent research of Water soluble vitamins – Water soluble vitamins: vitamin C, thiamine, riboflavin, niacin, pantothenic acid, biotin, folic acid, vitamin B12, vitamin B 6, choline and inositol.

## UNIT V: 15 hours

**RECENT CONCEPTS IN NUTRITION:**

Immuno-nutrients and Antioxidants

Definition, classification and function of functional food and nutraceuticals. Antinutrients present in various food groups – Cereals , legumes and nuts and oilseeds

Food and drug interaction.

## TEXT BOOKS

* 1. Guthrie, H.A. (2001) – “Introductory Nutrition”, Tenth edition, C.V. Mosby Company, St. Louis.
  2. Bogert, J.G.V., Briggs,D.H, Calloway, (2000). “ Nutrition and physical fitness”, 11th edition W.B. Saunders Co., Philadelphia, London, Toronto.
  3. Wardlaw, G.M and Kessel, M, (2002) “ Perespective in Nutrition”, 5thedition, Mc Graw Hill, New York, New Delhi.
  4. Willium, S. R. (2000), “ Nutrition and Diet Therapy”, Mosby Co., St. Louis.
  5. Sizer, F.S and Whitney E. R. (2003), “ Nutrition , Concepts and Controversies” 9th edition, Thomas Wadsworth, Australia.

## REFERENCE BOOK

1. Brown, J.E. (2002), “Nutrition Now”, 3rd edition, Wadsworth Thomson Learning New York.
2. Maurice, E. Shils, James A. Obson, Moshe shike, (2000), “ Modern Nutrition in Health and Disease”, 8th Edition, Vol I and II, Lea &Febiger Philadelphia, A Waverly Company.
3. Mahan L.K. and Stamp, S.E (2000), “Krause’s Food Nutrition and Diet Therapy”, 11th edition, W.B. saunder’s Company, Philadelphia.
4. Toteja, G.S and Singh P (2004), “ Micronutrient Profile of Indian Population”, ICMR Publication, New Delhi.
5. D. M. Swaminathan (2002), “ Principles of Nutrition and Dietetics”, BAPPCO, 88, Mysore RoadBangalore – 560 018.

## E-LEARNINGRESOURCES:

<https://www.udemy.com/share/1027yA/>

[WHO | The e-learning platform Nutrition Knowledge Hub launch](https://www.who.int/nutrition/events/2018-launch-nutrition-knowledge-hub-14dec/en/) [WFP Nutrition's Learning Platform - UN World Food Programme](https://cdn.wfp.org/nutrition/nutx/) [Nutrition Online Courses | Coursera](https://www.coursera.org/browse/health/nutrition)

[E-Learning Programs (nestlenutrition-institute.org)](https://www.nestlenutrition-institute.org/education/e-learning)

[WFP Nutrition's Learning Platform | Humanitarian Library](https://www.humanitarianlibrary.org/resource/wfp-nutritions-learning-platform)

# Mapping: (CO/PSO)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO3** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 2 | 3 |
| **Average** | **3** | **3** | **3** | **3** | **2** | **3** |

## PEDAGOGY (TEACHING METHODOLOGY):

Group Discussion, Case study, seminar, journal reviewing, Assignments, Power point presentations.

**3.2CORE – VIII**

**PERFORMANCE NUTRITION**

**CREDITS: 4**

**SEMESTER :III**

**YEAR :II**

**HOURS PER WEEK :15**

**COURSE OBJECTIVES:**

To enable the students to

Learn about the role of nutrients in enhancing Sports Performance. Understand the fundamentals of planning diet for different sports.

Know about the different types of sports supplements and nutrition for special athletes.

## COURSE OUTCOME:

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

|  |  |
| --- | --- |
| **CO No.** | **CO Statement** |
| CO1 | Analyze and assess the body composition of athlete. |
| CO2 | Comprehend the role of Macro and micronutrients towards  athletic performance |
| CO3 | Emphasize the role of nutrition in competitive performance and for special needs. |
| CO4 | Retrieving the various sports supplements and Ergogenic aids for the athletes. |
| CO5 | Apply personalized nutrition guidance in the area of sports nutrition. |

## UNITI 15hrs

Nutritional assessment for athletes-assessment of body composition, techniques of measuring body composition, surface anthropometry, Biochemical, clinical and dietary

assessment, Body composition and sports performance.

Energy requirements for optimal athletic performance- Energy production, Energy metabolism in Athletes, Fatigue and exercise, energy requirements of athletes, factors affecting energy requirements of athletes.

## UNITII 15hrs

Carbohydrates in sports performance- Carbohydrate types, Glycaemic index and Glycaemic load, carbohydrate utilization during exercise, carbohydrate loading, fuelling before during and after exercise, carbohydrate requirements for athletes.

Protein and fat requirement for sports performance -protein and exercise, requirements of protein and fat for athletes, factors affecting protein requirements, protein needs and vegetarian athletes.

## UNITIII 15hrs

Micronutrients in sports- vitamins and mineral requirements in athletes, sports anaemia, antioxidants and exercise induced free radicals.

Hydration for athletes- Fluid balance and thermoregulation, fluid and electrolyte requirements for athletes, Effects of dehydration, factors affecting fluid intake, gastric emptying and fluid delivery to working muscles, Fluid intake before, during and after exercise.

## UNITIV 15hrs

Nutrition for competition performance-Nutrient timing, pre-competition nutritional guidelines, nutrition during exercise and nutrition after exercise, nutrition plan for specific sports events.

Ergogenic aids- Categories of Ergogenic aids and Ergolytics.

Sports foods-sports drinks, sports gels, Sports energy bars and sports gels.

## UNITV 15hrs

Nutrition for athletes with special dietary needs- Nutrition for special population like children, young and older athlete, Female athlete triad, weight loss and weight gain in athletes, vegetarian athlete, diabetic athlete, athletes with disabilities, factors affecting nutritional needs for travel athlete, GI stress and athletes.

## TEXT BOOK:

Deakin, Burke.(2006). Clinical Sports Nutrition.McGraw-Hill Australia.3rd edition. Bean, Anit. (2010).The complete guide to Sports Nutrition.A&C.Black. London.6th edition.

Bourns, Fred.(2002).Essentials of Sports Nutrition. John and Wiley. 2nd edition. B.Srilakshmi, Suganthi.v, C.Kalaivani Ashok.(2017). Exercise physiology fitness and sports Nutrition, New age publishers. 1st edition.

Benardot, Dan. (2000).Advanced Sports Nutrition. Human Kinetics.

## REFERENCES:

Burke, Louise. (2007).Practical Sports Nutrition.Human Kinetics.

Gleeson, Jeukendrup.(2004).Sports Nutrition: An Introduction to Energy Production and Performance.Human Kinetics.

Suzanne Girard Eberle.(2000).Endurance Sports Nutrition.Human Kinetics. Natalie DigateMuth.(2015).Sports Nutrition for health professionals.QuincyMcdonald.

D. Enette Larson-Meyer.(1963).Vegetarian sports nutrition.Human kinetics.

## E-LEARNING RESOURCES:

[http://ijpnpa.biomedcentral.com](http://ijpnpa.biomedcentral.com/) [www.acsm.org](http://www.acsm.org/) [www.ausport.govt.au](http://www.ausport.govt.au/) [www.sportsci.org](http://www.sportsci.org/) [www.gssiweb.com](http://www.gssiweb.com/)

## Mapping of Co with PSO:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 2 | 3 | 3 | 3 | 1 | 2 |
| **CO2** | 2 | 2 | 2 | 3 | 1 | 2 |
| **CO3** | 2 | 3 | 3 | 3 | 1 | 1 |
| **CO4** | 3 | 3 | 3 | 3 | 1 | 1 |
| **CO5** | 2 | 2 | 3 | 3 | 2 | 3 |
| **Average** | **2.2** | **2.6** | **2.8** | **3** | **1.2** | **1.8** |

**PEDAGOGY**

Lecture, Case study, journal reviewing, Assignments, Group discussion, Power point presentations.

**3.3 CORE – IX**

**TECHNIQUES IN FOOD ANALYSIS**

**CREDITS:4**

**SEMESTER:III**

**YEAR:II**

**HOURS PER WEEK:15**

## OBJECTIVES:

To enable students to:

* + Learn the techniques of estimating the quantity of different nutrients present in food.
  + To enable the students to get practical experience in the laboratory and develop the skills to undertake research work

## COURSE OUTCOME:

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

|  |  |
| --- | --- |
| **CO No.** | **CO STATEMENT** |
| CO 1 | Understand safety rules for the laboratory and demonstrate various instruments used for food analysis. |
| CO 2 | Acquire skills to prepare and standardise various solutions to  conduct experiments for food analysis. |
| CO 3 | Acquire skills in ashing of foods and prepare ash solution to  analyse mineral contents in food. |
| CO 4 | Demonstrate quantitative analysis of various nutrients in foods i.e. crude fibre, moisture, Vit -C, calcium, phosphorus, iron, etc. |
| CO 5 | Demonstrate experiments to check estimation of protein, fat  content and Pigment Analysis |

## Unit – 1 (15 HRS)

1. **Introduction to Laboratory Practices**

## Instrumental Techniques –

* + Autoclave
  + Hot Air Oven
  + pH Meter
  + Electronic Weighing Balance
  + Centrifuges
  + Hot Plate
  + Spectrophotometer
  + Water Bath
  + Muffle Furnace
  + Viscometer
  + IR Moisture Analyzer
  + Colorimeter

## Unit – 2 (8 HRS)

**Preparation and Standardisation of Solution**

## Unit – 3 (12 HRS)

**Ashing of Food (**Thermogravimetric Method**) and Preparation of Ash Solution Unit – 4 (25 HRS)**

**Food Analysis Experiments –** Estimation of –

* + Moisture Content – Thermogravimetric Analysis -Air Oven Method and Infrared Radiation(IR) Moisture Analyzer Method
  + Crude Fibre–Gravimetric Method
  + Iodine Number of oils – Wij’s Method
  + Acid Number of oils - Titrimetric Method
  + Peroxide Value of oils - Titrimetric Method
  + Ascorbic Acid – 2, 6- Dichloroindophenol Titrimetric Method
  + Calcium -Precipitation Titrimetric Method
  + Iron – Wong’s Method
  + Phosphorus–Colorimetric Method

## Unit – 5 (15 HRS)

**Demonstration Experiments**

* + Estimation of protein content in food by Kjeldahl method
  + Estimation of fat content in food by Soxhlet method
  + Pigment Analysis by Paper Chromatography Techniques

## TEXT BOOKS AND REFERENCES:

* S. Suzanne Nielsen (2017). Food Analysis Laboratory Manual. Springer International Publishing. Third Edition.
* S. Suzanne Nielsen (2017). Food Analysis. Springer International Publishing. Fifth Edition.
* Otles, S. (2005). “Methods of Analysis of Food Components and Additives” CRC Press, USA.
* Ranganna, S. (2001). “Handbook of Analysis and Quality Control for Fruit and Vegetable Products”. Tata-McGraw- Hill, India. 2nd edition.
* Sadasivam, S and Manickam, A (1997). “Biochemical Methods”. New Age International Publishers, New Delhi. 2nd Edition.
* Jayaram, I, (1996), “Laboratory Manual in Biochemistry”, New Age International Publishers, New Delhi. Fifth ed.
* Raghuramulu, N, Nair K.M &Kalayanasundaram, S.A, (1983), “Manual of Laboratory Techniques”, National Institute of Nutrition, ICMR.

## Mapping: (CO/PSO)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO** | **PSO** | **PSO** | **PSO** | **PSO** | **PSO** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **1** | **2** | **3** | **4** | **5** | **6** |
| **CO1** | 3 | 2 | 3 | 0 | 3 | 2 |
| **CO2** | 2 | 3 | 3 | 0 | 3 | 1 |
| **CO3** | 2 | 3 | 3 | 0 | 3 | 1 |
| **CO4** | 3 | 3 | 3 | 1 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 1 | 3 | 3 |
| **Average** | **2.6** | **2.8** | **3** | **2** | **3** | **2** |

## PEDAGOGY

Demonstration, Experiments, Activities as assignment, Group Discussion, Observation and Interpretation

**3.4 ELECTIVE – V**

**FOOD MICROBIOLOGY**

**CREDITS:3**

**SEMESTER:III**

**YEAR:II**

**HOURS PER WEEK:15**

**COURSE OBJECTIVES**

To understand the practical skill in handling microscope and preparation of culture media

To Gain knowledge of principles of various techniques of isolation and determination of microorganisms in foods

To acquire practical skill in production of fermented foods.

## COURSE OUTCOMES:

**O**n completion of the course the students will be able to…

|  |  |
| --- | --- |
| **CO No.** | **CO Statement** |
| **CO1** | CO1 - Gain knowledge in handling of microscope and develop basic skill in cultivation of bacteria with different culture media |

|  |  |
| --- | --- |
| **CO2** | CO2 - Comprehend insight on various techniques of staining and hanging drop method to understand the morphology of microorganism. |
| **CO3** | CO3 - Evaluate and isolate microorganism form different sources like air, water and food. |
| **CO4** | CO4 - Describe and determine the viable count of microorganism from food samples. |
| **CO5** | CO5 - Understand and apply the concept of food fermentation and isolation of organism from fermented food |

## Unit – I 15 hours

**General microbiology and**

* 1. Cleaning and sterilization of glass wares.
  2. Handling of hot air oven and autoclave.
  3. Uses and study of microscopes.

## Unit 2 15 hours

**Preparation of culture media and their sterilization.**

Cultivation of bacteria

1. Pour plate method.
2. Spread plate method.
3. Streak plate method

## Unit 3 15 hours

**Study of Morphology of microorganism**

1. Staining of bacteria
2. Simple staining.
3. Gram staining.
4. Microscopic test for bacterial motility by hanging drop method.

## Unit – 4 15 hours

**Isolation of micro organisms from different sources**

1. Air (Petri plate exposure method)
2. Microbial testing of water
3. Determination of microbiological quality of milk

## Unit 5 15 hours

**Determination of viable count of microorganisms**

1. Introduction to colony counter
2. Total plate count
3. Yeast and mold count

## ACTIVITY

**Production and Microbiological examination of fermented food (Any two)**

1. Fermented fruits and vegetables
2. Fermented dairy product
3. Wine production
4. Pickle fermentation
5. Fermented cereal and legume-based product.
6. Production of edible mushroom

## TEXT BOOKS

* 1. Frazier W.C and WesthoffD.C.(2013), Food Microbiology, Tata McGraw Hill Publishing Co., Ltd. New Delhi.
  2. Annak.Joshua, (2001). Microbiology, Popular Book Depot.Chennai-15.
  3. Ray, B. (2001) Fundamental Food Microbiology, 2nd Ed, CRC press, Boca ratonF. 4.JoshiVK&Pandey(2004).Biotechnology:food,fermentation,microbiology,bioch emistryand technology,vol I &II,Educational publishers and distributors,New Delhi.

5. Crueger W and Crueger A (2003) Biotechnology: A textbook of Industrial Microbiology 2nd Edition,Panima Publishing Corpoartion,New Delhi.

## REFERENCE BOOK

1. Guttierrez-Lopez GF and Barbosa-Canovas GV (Eds) (2003) Food Science and Food Biotechmolgy CRC press,USA.
2. Halford NG (2003) ‘Genetically Modified Crops’ Imperial College Press, UK Modern Food Micro-Biology by James M. Jay, (2000), 6th edition, An Aspen Publication,Maryland, USA.
3. Food Microbiology: Fundamentals and frontiers by M.P. Doyle, L.R. Beuchat

and Thoma J. Montville, (2001), 2nd edition, ASM press, USA.

1. MichealPelczar MJ, Chan ECS, Krieg N. (2001) Microbiology. 5th ed. Tata McGraw-Hill Publishing Co. Ltd.
2. Prescott LM, Harley JP, Klein DA.(2008) Microbiology. 6th ed. WMC Brown

## E-LEARNINGRESOURCES:

[Top Microbiology Courses - Learn Microbiology Online | Coursera](https://www.coursera.org/courses?query=microbiology&page=1) [Learn Microbiology with Online Courses and Classes | edX](https://www.edx.org/learn/microbiology)

[72 Online studies in Microbiology - DistanceLearningPortal.com](https://www.distancelearningportal.com/disciplines/224/microbiology.html) [Microbiology Free Online Courses and MOOCs | MOOC List (mooc-list.com)](https://www.mooc-list.com/tags/microbiology)

[Virtual Microbiology Classroom: 8-week micro course from Science Prof Online](https://www.scienceprofonline.com/virtual-micro-main.html)

# Mapping: (CO/PSO)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 3 | 3 | 2 | 1 | 3 | 2 |
| **CO2** | 3 | 3 | 2 | 1 | 3 | 2 |
| **CO3** | 3 | 3 | 2 | 1 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 1 | 3 | 2 |
| **CO5** | 3 | 3 | 2 | 1 | 3 | 2 |
| **Average** | **3** | **3** | **2** | **1** | **3** | **2** |

## KEY:

**PEDAGOGY (TEACHING METHODOLOGY):**

Group Discussion, Case study, seminar, journal reviewing, Assignments, Power Point Presentations.

**3.5 CORE – INDUSTRY MODULE**

**FOOD PRODUCT DEVELOPMENT**

**CREDITS:3**

**SEMESTER:III**

**YEAR:II**

**HOURS PER WEEK:15**

## COURSE OBJECTIVES:

To enable students to:

Understand the various aspects of food product development Develop products that meets consumer requirements and demands

Formulate products that are nutritionally and commercially viable

## COURSE OUTCOME:

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

|  |  |
| --- | --- |
| **CO No.** | **CO Statement** |
| CO1 | Apply a product development process to generate ideas, design, develop and evaluate new products and their markets. |
| CO2 | Demonstrate skill in the application of standard methods for  the measurement and evaluation of sensory differences |
| CO3 | Evaluate and analyze the different food packaging material |
| CO4 | Review the appropriate labelling to adhere to standards |
| CO5 | Gain knowledge on pricing and marketing of food product |

## UNIT I: INTRODUCTION TO NEW FOOD PRODUCT DEVELOPMENT (15 HRS)

Definition, significance of product development, food needs and consumer preferences, market survey and designing a questionnaire to find consumer needs for a product.

Steps involved in product development, formulation of nutritious food products and standardization, Factors that influence new product development success,

Intellectual Property Rights and patenting of foods.

## UNIT II: SENSORY EVALUATION OF THE PRODUCT (15 HRS)

Assessing the sensory characteristics of food - colour, texture, harma, odor and taste. Sensory evaluation of foods – Laboratory set up, equipment, panel selection and training, judging quality.

Subjective evaluation techniques – Difference tests: paired comparison test, duo-trio test, triangle test. Rating tests – Ranking single sample, two samples and multiple samples.

Objective tests to assess the sensory properties of foods.

## UNIT III: ESSENTIALS OF FOOD PACKAGING (15 HRS)

Importance, definition, principles design requirement and basic FSSAI laws governing food packaging.

Selection criteria and types of packaging material – metal, glass, paper, plastic, edible

,wooden . Packages with special features – Boil-in-bag package, plastic-shrink package, cryovac film, microwave oven packaging , aseptic packaging and distribution packaging.

## UNIT IV: PRODUCT LABELLING AND REGULATIONS (15 HRS)

Definition, purpose, importance, Function ,Nutritional information and laws governing product labelling.

Types of labelling – smart labels, barcode labels, radioactive labels, antimicrobial labels, security labels and other specialized food labels.

Standards and regulations for nutrition harming and Nutrition claims in food labels.

## Unit V: QUALITY CONTROL, PRICING AND MARKETING (15 HRS)

Analyzing the product stability, evaluation of shelf life, determining the changes in sensory attributes due to environmental conditions.

Pricing a product , Methods of pricing-cost plus pricing, Demand pricing, Competitive pricing ,mark up pricing, Principles of pricing, determining the selling price and profit margin, price bundling, promotional pricing and quantity discounts.

Advertising and marketing strategies- Basic techniques, Food advertising regulations

,Marketing mix “four P’s”

## ACTIVITY

Conduct a market survey and develop a new food product based on the needs of your target audience. Conduct sensory analysis tests for the formulated product. Identify a suitable packaging material and design a label for your product. Determine the selling price and devise any two marketing strategies to promote your product.

## TEXTBOOKS:

Reddy S M. (2003) .Basic food science and technology . New age publisher , 1st edition.

Subbulakshmi G and Udipi A Shobha . (2017) .Food processing and preservation .new age publisher . 1st edition.

Manay S And Shadaksharamasamy . (2009) .Food: Facts and Principles. New Age International (P) Publishers New Delhi. 1stedition .

AvantinaSharma . (2017) Text book of food science and Technology.CBSOUPublisheres and distributes ltd. 3rdedition .

## REFERENCES:

Lyon D H and Francombe M A and Hasdell T A Lawson . (2002) .Guidelines for Sensory Analysis in Food Products Development and Quality Control . Chepman and Hall London. 1st edition.

Fuller G W. (1994). New Food Product Development from Concept to Market Place. RC Press New York. 2ndedition .

Man C M D andJomes A A. (1994) . Shelf Life Evaluation of Foods. Blackie Academic and Professional London. 2nd edition.

Frewer L And Van TrijpH .(2007). Understanding consumers of food products. Florida USACRC Press.1st edition.

## E RESOURCES

<https://www.fssai.gov.in/>

<https://nzifst.org.nz/resources/foodproductdevelopment> <https://nzifst.org.nz/resources/foodproductdevelopment/Chapter-3-1-2.htm> <https://www.fssai.gov.in/>

<https://theintactone.com/2019/07/23/im-u3-topic-3-packaging-and-labelling/>

## Mapping: (CO/PSO)

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

**PEDAGOGY**

Lecture, journal reviewing, Project work, Group discussion, Power point presentations, Field visit.

**3.6 ABILITY ENHANCEMENT COURSE SOFTSKILL-3**

**DIET AND NUTRITION COUNSELING**

**CREDITS:2**

**SEMESTER:III**

**YEAR:II**

**HOURS PER WEEK:15**

## Course objectives

* + To list out the steps in diet counselling process.
  + To Understand and apply the counselling skills in establishing rapport with patients.
  + To Analyze the nutritional needs of the patients after assessing the nutritional status.
  + To Evaluate the improvement of the patient after counselling.
  + To Create awareness among the patients to use the computer and mobile applications.

## Course Outline

**UNIT-1 Introduction to Dietitian and IDA**

* Dietician – Definition and Educational qualification
* Types of Dietician – Clinical, academic, research, specific, food service, public/ Community, industrial, consultant, sports, business etc.
* Qualities, Role and responsibilities of Dietician
* IDA – Objectives, membership; Registered Dietician – eligibility for R.D. exam

## UNIT-2 Diet Counseling/ Nutrition Care Process (NCP)

* Diet Counseling/ Nutrition Care Process (NCP) – Definition, importance, purposes and ethical principles
* Steps in Diet counseling Process; Documentation – SOAP
* Counseling Skills for a Dietitian; Tools of Dietitian; Guidelines for effective Counseling

## UNIT-3 Counseling Approaches

* Counselling Approaches – Meaning, Developing a counselling approach
* Different Counselling Approaches – Psychoanalytical, behavioural, humanistic, Patient centered GALIDRAA approaches etc.

## UNIT-4 Nutrition Education

* Nutrition Education – Meaning and importance,
* Teaching Methods and aids used for Nutrition Education in the Community Teaching Methods – Lecture, Group discussion, Role Play, Storytelling, Demonstrations, Nutrition Exhibition, Marathon race etc.
* Teaching Aids – Posters, pictures, models, charts, flash cards etc.
* Teaching Materials for patients – Models, pamphlets, leaflets, booklets etc.

## UNIT-5 Use of Modern Technology in Diet Counseling

* Use of Computers in Diet Counselling and Nutrition Education
* Use of Computer Applications and Mobile Applications in Diet Counselling and Nutrition Education; Computer and mobile applications available for Diet Counselling
* Pre requisites for setting up a Diet Counseling Center

References

* 1. Srilakshmi, B. “Dietetics”, 8th edition, 2018, New Age International Publishes, New Delhi
  2. IDA, Clinical Dietetics Manual, 2018, 2nd edition Elite Publishing House New Delhi
  3. Corinne H. Robinson, Marilyn R. Lawler, “Normal & Therapeutic Nutrition” 17th edition 1986
  4. Shubangini A Joshi, “Nutrition & Dietetics” 5th edition, 2022, McGraw hill Education India Pvt. Ltd.
  5. Judy Gable “Counselling Skills for Dietitians” 2nd edition, 2007, Black Well Publishing Ltd, Oxford, UK.
  6. “Clinical and Therapeutic Nutrition M.Sc.” published by directorate of Distance Education, Swami Vivekanand Subharti University, Meerut, U.P.
  7. Linda Snetselaar “Nutrition Counselling Skills for the Nutrition Care Process” 4th edition, 2021, Jane and Bartlett Publishers, London.

**Course Outcome**

|  |  |  |  |
| --- | --- | --- | --- |
| CONo | | Costatement | |
| CO1 | | Define Dietician and recall the qualities, role and responsibilities of a dietician | |
| CO2 | | Describes or explains the steps in diet and nutrition counseling | |
| CO3 | | Uses the skills in assessment of nutritional status of normal and diseased people | |
| CO4 | | Relate practical skills in dietary counseling of various health and disease conditions | |
| C05 | | Develop teaching aids and uses computer applications and smart phones in diet counseling | |

# Mapping of CO with PSO

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| CO1 | 2 | 1 | 3 | 1 | 3 | 1 |
| CO2 | 3 | 3 | 3 | 2 | 2 | 2 |
| CO3 | 3 | 2 | 3 | 3 | 1 | 2 |
| CO4 | 3 | 3 | 3 | 2 | 2 | 1 |
| C05 | 3 | 2 | 3 | 3 | 3 | 2 |
| AVERAGE | 2.8 | 2.2 | 3 | 2.2 | 2.2 | 1.6 |

KEY:**S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2**W**EAKLYCORELATED-1**N**OCORELATION-0

**3.7 SKILL ENHANCEMENT COURSE SEC -3**

**SCIENTIFICWRITINGANDPRESENTATIONSKILLS**

**CREDITS:2**

**SEMESTER:III**

**YEAR:II**

**HOURS PER WEEK:15**

**COURSEOBJECTIVES**

* + Togainknowledgeinscientificwritingandpresentationskill.
  + Tounderstandtheprinciplesfororalpresentations.
  + Togainindepthknowledgeonresearchpaperpublication

# COURSEOUTLINE

**UNITI:** Scientificwriting-abstract,fullpaper,clinicalupdate,manuscripts.Process of copyeditingjournals

**UNITII:** Presentationskills–Thematic,poster,oral,principlestobefollowedfor presentation

**UNIT III:** Computerapplicationforresearch

UseofInternetinResearch–Websites,searchEngines,E-journal and E-Library – INFLIBNET, SHODHGANGAPlagiarism–Citationandacknowledgement–reproducibilityandaccountability,Softwaresavailableinthemarketforplagiarism

# RECOMMENDEDTEXTBOOKS

1. BestJWandKahnJV,*ResearchinEducation*,7thEdition,PrenticeHallofIndiaPvt.Ltd.,New Delhi,2000.
2. CampbellWG,*FormandstyleinThesiswriting*,HoughtonMifflinCompany,Boston.

# REFERENCEBOOKS

1. KoulL,MethodologyofEducationalResearch,3rdedition,VikasPublishingHousePvt.Ltd,New Delhi
2. JohnW.BestandJamesV.Kahn,ResearchinEducation,7thEed,PrenticeHallofIndiaPvt. Ltd, NewDelhi, 2000.
3. Elhance.D.NVeenaandElhanceandAgarwal.B.M,FundamentalsofStatistics,48thed, Kitab mahal, Allahabad, 2005.
4. SadhuAN,AmarjitSingh,ResearchmethodologyinSocialSciences.HimalayaPublishingHouse, gurgoan, Mumbai, 1992.

JOURNALS

1. .Journal of academic writing.

**Course Outcome**

|  |  |
| --- | --- |
| CONo | Costatement |
| CO1 | Developaframeworkforscientificwriting. |
| CO2 | Describe,CompareandInterpretvariousmeansforposter,oralpresentationand copyediting. |
| CO3 | Evaluatetheuseofwebsites,searchengine,E-journalsandE-library for research |
| CO4 | Proposetheauthenticityoftheresearcharticleusingplagiarismchecking software. |

# Mapping of CO with PSO

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| CO1 | 3 | 3 | 3 | 1 | 3 | 1 |
| CO2 | 3 | 3 | 3 | 3 | 1 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 1 | 1 |
| CO4 | 3 | 3 | 3 | 3 | 1 | 1 |
| AVERAGE | 3 | 3 | 3 | 2.5 | 1.5 | 1.25 |

KEY:**S**TRONGLY CORELATED-3 **M**ODERATELY CORELATED-2**W**EAKLYCORELATED-1**N**OCORE

**SEMESTER -IV**

**4.1 CORE –X**

**PUBLIC HEALTH NUTRITION**

**CREDITS:4**

**SEMESTER:IV**

**YEAR:II**

**HOURS PER WEEK:15**

## COURSE OBJECTIVES:

* To understand the concept of Public Nutrition.
* To enable students to develop a holistic knowledge base on the importance of understanding the nutrition problems and their prevention.
* To understand the nutritional problems during emergencies / disasters as well as the strategies to tackle them.
* To develop skills in preparation of communication aids and planning nutrition education programme for the community

## COURSE OUTCOME:

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

|  |  |
| --- | --- |
| **CO No.** | **CO STATEMENT** |
| **CO1** | Understand the role of nutrition in national development |
| **CO2** | Acquire skill in assessment of nutritional status of  community. |
| **CO3** | Gain depth knowledge on Strategies for Improving nutrition status and health status of the community. |
| **CO4** | Evaluate the role organization in combating malnutrition. |
| **CO5** | Understand and apply Nutrition education for the community welfare. |

## UNIT I

**CONCEPT OF PUBLIC NUTRITION (15 HRS)**

* Nutrition and Health in National Development
* Relationship between health and nutrition, National Health Care Delivery System, Determinants of Health Status, Indicators of Health.
* Nutritional deficiency disorders in India -Prevalence, Etiology, Symptoms, Current status and Recent updates- PEM, VADD, IDD, Anemia.
* Nutrition and infection
* Role of public nutritionists in the health care delivery system.

## UNIT IASSESSMENT OF NUTRITIONAL STATUS (15 HRS)

* + **Direct methods: Direct** methods of Nutritional assessment, Nutritional anthropometry, biochemical, clinical and dietary assessment and Growth charts

- plotting of growth charts, growth monitoring and promotion (GMP).

* + **Indirect methods:** Demography, population dynamics and vital health statistics and their health implications. Food balance sheets, recent nutritional assessment methods- MUST, SGA, SOAP. Indicators ofhealth and nutrition. Causes of Malnutrition- Vicious cycle of malnutrition
  + Basic concepts of Nutritional Surveillance- Millennium Development Goals (MDG)

## UNIT III

**STRATEGIES FOR IMPROVING NUTRITION STATUS AND HEALTH STATUS OF THE COMMUNITY (15 HRS)**

**Immunization**: Awareness, types of vaccines, Importance and schedule of Immunization.

## Measures to overcome malnutrition in India

**Food Security** -Concepts, Meaning and significance, Food security act. Food fortification and Food enrichment, Genetic improvement of foods, National nutrition policy and action plan

**Nutrition intervention programmes** - Mid day Meal Programme, Balwadi Feeding Programme. Public Distribution System (PDS), Antyodaya Anna Yojana (AAY), Annapurna Scheme, Food for Work Programme, Special Nutrition Programme,

**Nutrition Intervention Schemes and programmes operating in India-** Control programmes - Vitamin A, Anemia, Goiter, Malnutrition.

Environmental sanitation and health

## UNIT IV

**ORGANIZATIONS TO COMBAT MALNUTRITIONANDNUTRITION DURING EMERGENCIES AND SPECIAL CONDITIONS(15 HRS)**

* **International organizations** concerned with food and nutrition FAO, WHO, UNICEF, CARE, AFPRO, CWS, CRS, World Bank.
* **National organization** – NIN, CFTRI, ICMR, ICAR, CFTRI, CHEB, NIPCCD, DFRL, NGOs.
* **Nutritional deficiency diseases in emergencies**- Major and micro nutrient. Control of communicable diseases in emergencies- Factors responsible for spread of communicable disease, mode of transmission and prevention of chicken pox, malaria, swine flu, tuberculosis, COVID-19 and AIDS.

## Nutritional requirement for space mission, sea voyage and army.

**UNIT V**

## NUTRITION EDUCATION AND EXTENSION OF BETTER NUTRITION

**(15 HRS)**

* **Nutrition education for the community** –Objectives, Definition and Importance of nutrition education to the community, Principles of planning, executing and evaluating nutrition education programmes.
* **Development and Use of AV aids in Public Nutrition Education**. -Charts, flip chart, posters, flannel board, models, OHP.

## ACTIVITY

1. Planning and evaluation of nutrition education programmes in community. Preparation of communication aids for different groups.
2. Development of low-cost recipes for infants, pre-schoolers, elementary school children, adolescents, pregnant and lactating mothers.
3. Field visits to ongoing national nutrition programmes.

## TEXTBOOKS

1. Park, K. (2013). Text Book of Preventive and Social medicine. M/s.BanarsidasBhanot Publishers, Jabalpur. 22nd Edition.
2. Suryatapa Das (2020). Textbook of Community Nutrition. Academic Publishers, Kolkata. 4th Edition
3. Srilakshmi, B (2017). Nutrition Science. New Age International Publishers. Multi Colour 6th Edition.
4. Connolly, M.A. (2005). Communicable Disease Control in Emergencies: WHO, WHO Library Cataloguing-in-Publication Data.
5. WHO (2002). The management of Nutrition in Major Emergencies. Published by AITBS Publishers, New Delhi.

## REFERENCES

1. MuthuVK (2014). A Short Book of Public Health, Jaypee Brothers Medical Publishers. 2nd edition
2. Dr. Srridhar Rao B (2018). Principles of Community Medicine, AITBS Publishers India. 6th edition.
3. Scott M. Smith, Sara R. Zwart and Martina Heer (2014). Human Adaptation to Space Flight: The role of nutrition. NASA Publication.

Owen, A.Y. and Frackle, R.T., (2002). Nutrition in the Community. The Art of Delivering Services. Times Mirror/Mosby. 2nd Edition.

1. Carolyn D. Berdanier Johanna T. Dwyer David Heber (2014). Handbook of Nutrition and Food, CRC Press, New York. Third Edition.

## LEARNING RESOURSES:

<https://apps.who.int/iris> <http://egyankosh.ac.in/bitstream/123456789/33312/1/Unit-18.pdf> [https://www.seafarerswelfare.org/assets/documents/ship/SHIP-HealthyFood\_A5\_](https://www.seafarerswelfare.org/assets/documents/ship/SHIP-HealthyFood_A5_20151209_LR.pdf) [20151209\_LR.pdf](https://www.seafarerswelfare.org/assets/documents/ship/SHIP-HealthyFood_A5_20151209_LR.pdf)

## Mapping(CO/PSO):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PS**  **O** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 3 | 3 | 2 | 3 | 3 | 3 |
| **CO2** | 3 | 2 | 3 | 3 | 3 | 3 |
| **CO3** | 2 | 3 | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | 3 |
| **Average** | **2.8** | **2.8** | **2.8** | **3** | **2.8** | **3** |

**PEDAGOGY:** Lecture, Case study, Assignments, Group discussion, Power point presentations.

**4.2 CORE –XI**

**ADVANCED FOOD SERVICE MANAGEMENT**

**CREDITS:4**

**SEMESTER:IV**

**YEAR:II**

**HOURS PER WEEK:15**

**COURSE OBJECTIVES:**

The course will enable the students:

1. To gain knowledge and develop skills in menu planning, purchasing and storage policies, and quality control in a food service establishment.

2. To acquire knowledge about safety hygiene and sanitation issues of a food service establishment.

3. To make students familiar with standard operating procedures, potential hazards in food production food safety regulations.

## COURSE OUTCOME:

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

|  |  |
| --- | --- |
| **CO No.** | **CO Statement** |
| **CO1** | Overview the food service management and techniques of menu planning |
| **CO2** | Acquire skill in purchase storage and food production |
| **CO3** | Understand the food management in food service establishment. |
| **CO4** | Compile the work safety and laws governing |
| **CO5** | Develop skill in starting own food service establishment |

## UNIT 1

**HISTORY, DEVELOPMENT OF FOOD SERVICE SYSTEM, MENU PLANNING (15 hrs)**

* History and development, recent trends, types of food service establishments, commercial establishments, non-commercial establishments, understanding management, approaches to food service management
* Menu planning – importance, definition, need use and function Knowledge and skills required for planning menu

Types of menu and its applications

Steps in menu planning and its evaluation, construction of menu,characteristics of a good menu, displaying a menu and evaluation of menu.

## UNIT 2

**PURCHASE AND STORAGE, QUALITY AND FOOD PRODUCTION**

## (15 hrs)

* Mode of purchasing, centralized purchasing, group purchasing, methods of purchasing, identifying needs and amounts to buy, minimum stock level, maximum stock level, receiving and inspecting deliveries
* storage space, dry storage, low temperature storage, store room management
* Production control, use of standardized recipes, developing a program for recipe standardization, safeguard in food production, quality control in food preparation and cooking.

## UNIT 3

**FOOD MANAGEMENT: DELIVERY AND SERVICE STYLES (15 hrs)**

* + Methods of delivery service system- centralized delivery system, decentralized delivery system, conventional food service system, commissary food service system - ready prepared food service system, assembly service system
  + Different types of service in food service establishments- table and counter service, self-service, tray service, types of service in a restaurant, silver service, plate service cafeteria service, and buffet service. specialized forms of service, hospital tray service, airline tray service, rail service, home delivery, catering and banquet, floor/room service, lounge service

## UNIT 4

**PERSONNEL MANAGEMENT, WORK PLACE SAFETY. (15 hrs)**

* + Definition of leadership, components approaches, qualities, leadership styles recruitment, selection and induction ,Employee facilities and benefits , laws governing employees, work productivity improvement measures , Training and development.
  + hygiene and sanitary practices, types of accidents , precautions to prevent accidents , Garbage and refuse sanitation- inside and outside storage , Pest control- pests, signs of infestation and Integrated Pest Management (IPM) Laws governing food service establishment.

## UNIT 5

**SETTING UP AND PLANNING FOOD SERVICE UNIT (15 hrs)**

Layout and design – Phases of planning layout-developing a prospectus, Determining work centers equipment , Factors influencing layout design, Architectural features, evaluation of plan , Energy and time management .

Planning- steps and types of planning, Preparing a planning guide , Registration of unit , Application for a licence , Rules regarding grading of hotels and restaurants, Loan facilities for start up .

## TEXTBOOKS

Bessie B and West Le Wood (1986) Food Service in Institutions (6th Ed.) Macmillan Publishing Co.

Mohini Sethi, (2008) Institutional Food Management, New age publications, New Delhi

[June Payne-Palacio](https://www.goodreads.com/author/show/265335.June_Payne_Palacio), [Monica Theis](https://www.goodreads.com/author/show/80770.Monica_Theis), (2011) Foodservice Management: Principles and Practices, Prentice Hall

Sudhir Andrews (1997), ëFood and Beverage Service- Training Manualí, 23rd Reprint, Tata McGraw Hill Publishing Co.

Food service management (2017) V Suganthi and C Premakumari.

## REFERENCES

Mohinder Chand, Managing Hospitality Operations, 2009, 1st Edition, Anmol Publications Pvt. Ltd. New Delhi.

Goel S.L, Health Care System and Hospital Administration, 2009, Vol.7, Deep and Deep Publications Pvt. Ltd.

KalkarS.A, Hospital Information Systems, 2010, Published by AsokeK.Ghosh, PHI Learning Pvt. Ltd. Shring Y, P.

Effective Food Service Management, Anmol publications Pvt Ltd,New Delhi, 2001. 3.

Stephen, B, , Williams, S, R, “Bill Jardine, and Richard, J, N, Introduction to Catering,

Ingredients for Success, Delmar- Thomson learning, 2001.

Yadav, C, P. Management of Hotel and Catering Industry, Anmol publications Pvt

## E LEARNING RESOURCES

<https://seafoodacademy.org/pdfs/haccp-training-folder-contents-v2.pdf> <https://psu.pb.unizin.org/hmd329/chapter/ch4/>

[https://www.plantautomation-technology.com/articles/types-of-food-processin](https://www.plantautomation-technology.com/articles/types-of-food-processing-equipment) [g-equipment](https://www.plantautomation-technology.com/articles/types-of-food-processing-equipment)

<https://dmi.gov.in/GradesStandard.aspx> [https://www.fssai.gov.in/cms/food-safety-and-standards-regulations.php](http://www.fssai.gov.in/cms/food-safety-and-standards-regulations.php)

## Mapping: (CO/PSO)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO 1** | **PSO 2** | **PSO 3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 3 | 3 | 2 | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO3** | 3 | 3 | 2 | 3 | 3 | 3 |
| **CO4** | 2 | 3 | 3 | 3 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | 3 |
| **Average** | **2.8** | **3** | **2.6** | **3** | **2.8** | **3** |

**PEDAGOGY:**Lecture, Case study, Assignments, Group discussion, Power point presentations, Field visit

**4.3 CORE –XII**

**ENTREPRENEURIAL DEVELOPMENT**

**CREDITS:4**

**SEMESTER:IV**

**YEAR:II**

**HOURS PER WEEK:15**

**COURSE OBJECTIVES**

**Toenablethestudentsto**

1. Understandbasicconceptsinentrepreneurship.
2. AcquireknowledgeaboutthevariousEntrepreneurialdevelopmentagencies.
3. Adoptkeystepsintheelaborationofbusinessideas.
4. UnderstandmajorstepsinvolvedinsettingupaSmall-ScaleUnit.
5. HighlighttheLegislationprocessandLaborLawsApplication.

**COURSEOUTCOMES**

**Onsuccessfulcompletionofthecoursethestudentswillbeableto**

|  |  |
| --- | --- |
| **CO** | **COSTATEMENT** |
| **CO1** | Discerndistinctentrepreneurialtraits. |
| **CO2** | Explain business idea generation techniques, Evaluate parameters to assessopportunities and constraints for new business ideas and device a businessplan.Discuss ownershipsand SHG |
| **CO3** | Explainfinancial,workingcapitalandmarketingmanagement |
| **CO4** | Identify and include Major steps involved in setting up a Small-ScaleUnitElaborateExportMarketing procedures& formalitiesandlearnaboutPatents&IPRs |
| **CO5** | AnalyzeLegislationprocessandexplaintheLaborLawsApplication |

**THEORY**

**Unit I**

**Entrepreneurship–Basicconcepts**

Entrepreneurship–Definition,Importance,Challengesanditsrelevanceincareergrowth StartupsIndia–IncubationCentre-Digitalentrepreneurship&Socialentrepreneurship, Entrepreneur-MeaningandCharacteristics.

Unit II

**BusinessIdeaandSelf-HelpGroups**

Business Idea Generation Techniques–Identification of BusinessOpportunities

Ownership-partnership,soleproprietorship,franchise,cottageindustries,self-employment

SHG–Meaning, ImportanceandGovernmentAssistance

**Unit III**

**FinancialandMarketingManagement**

FinancialManagement-BooksofAccounts,FinancialStatements,WorkingCapitalManagement–Factorsand sources,Break-EvenAnalysisMarketing Management- Marketing Mix- Product, Promotion, Place &Price.

Unit IV

**SettingupaSmall-ScaleUnit**

Majorstepsinvolved insettingupaSmall-ScaleUnitFinancialsupportfromFinancialInstitutes-National level -NBMSME, KVIC, DC-MSME, NSIC, NSTEDB, EDI, NI-MSME,NIESBUD,IIE,NABARD

Statelevel-DIC,SFC,SIDC,SIADB,SIDBI, Export Marketing- procedures & formalitiesInventoryManagement&TQM BasicconceptsPatents& IPRs

Unit V

**LegislationFormalities**

Legislation-Licensing,Registration,MunicipalLaws,BusinessEthicsLaborLawsApplication, ConsumerComplaintsandRedressalTax–GSTanditsimplication.

**REFERENCES**

**BOOKS**

* Saravanavel,(2005), EntrepreneurialDevelopment,Ess Pee Key PublishingHouse,Chennai
* VasantDesai,(2004),ProjectManagement,HimalayaPublishingHouse.
* Holt(2009),Entrepreneurship, Newventurecreation.
* S.SainiandS.K.,Dhameja,(2011),EntrepreneurshipandSmallBusinessRawartNewDelhi.
* C.Jain,(2012),HandbookforNewEntrepreneurs,OxfordUniversityPress.

**E-LEARNINGRESOURCES**

* <http://www.ddegjust.ac.in/studymaterial/mba/cp-401.pdf>
* <https://ecestudy.files.wordpress.com/2015/02/theories-of-entrepreneurship.pdf>
* <http://www.bimkadapa.in/materials/ED-5-UNITS-PDF.pdf>
* [https://www.theseus.fi/bitstream/handle/10024/115894/Laamanen\_Pirita.pdf?sequence](https://www.theseus.fi/bitstream/handle/10024/115894/Laamanen_Pirita.pdf?sequence=1&isAllowed=y)

[=1&isAllowed=y](https://www.theseus.fi/bitstream/handle/10024/115894/Laamanen_Pirita.pdf?sequence=1&isAllowed=y)

* <https://bbamantra.com/preparation-of-a-business-plan/>
* <https://courses.lumenlearning.com/boundless-business/chapter/introduction-toentrepreneurship>2.[http://www.rroij.com/open-access/women-entrepreneurs--problems-ofwomenentrepreneurs-.php](http://www.rroij.com/open-access/women-entrepreneurs--problems-ofwomen%20entrepreneurs-.php)?aid=48589–[3.http://www.mbae](http://www.mbaexamnotes.com/business_idea.html)xa[mnotes.com/business\_idea.html](http://www.mbaexamnotes.com/business_idea.html)
* <https://www.businessstudynotes.com/finance/project-management/types-feasibility>.

**MAPPINGOFCOWITHPSO**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | M | W | M | W | M | S |
| **CO2** | M | S | S | S | S | S |
| **CO3** | M | M | M | M | S | S |
| **CO4** | M | M | S | M | S | S |
| **CO5** | M | S | S | S | S | S |

**4.4 ELECTIVE –VI**

**FOOD MICROBIOLOGY PRACTICALS**

**CREDITS:3**

**SEMESTER:IV**

**YEAR:II**

**HOURS PER WEEK:15**

**COURSE OBJECTIVES**

To understand the practical skill in handling microscope and preparation of culture media

To Gain knowledge of principles of various techniques of isolation and determination of microorganisms in foods

To acquire practical skill in production of fermented foods.

## COURSE OUTCOMES:

**O**n completion of the course the students will be able to…

|  |  |
| --- | --- |
| **CO No.** | **CO Statement** |
| **CO1** | CO1 - Gain knowledge in handling of microscope and develop basic skill in cultivation of bacteria with different culture media |

|  |  |
| --- | --- |
| **CO2** | CO2 - Comprehend insight on various techniques of staining and hanging drop method to understand the morphology of microorganism. |
| **CO3** | CO3 - Evaluate and isolate microorganism form different sources like air, water and food. |
| **CO4** | CO4 - Describe and determine the viable count of microorganism from food samples. |
| **CO5** | CO5 - Understand and apply the concept of food fermentation and isolation of organism from fermented food |

## Unit – I 15 hours

**General microbiology and**

* 1. Cleaning and sterilization of glass wares.
  2. Handling of hot air oven and autoclave.
  3. Uses and study of microscopes.

## Unit 2 15 hours

**Preparation of culture media and their sterilization.**

Cultivation of bacteria

1. Pour plate method.
2. Spread plate method.
3. Streak plate method

## Unit 3 15 hours

**Study of Morphology of microorganism**

1. Staining of bacteria
2. Simple staining.
3. Gram staining.
4. Microscopic test for bacterial motility by hanging drop method.

## Unit – 4 15 hours

**Isolation of micro organisms from different sources**

1. Air (Petri plate exposure method)
2. Microbial testing of water
3. Determination of microbiological quality of milk

## Unit 5 15 hours

**Determination of viable count of microorganisms**

1. Introduction to colony counter
2. Total plate count
3. Yeast and mold count

## ACTIVITY

**Production and Microbiological examination of fermented food (Any two)**

1. Fermented fruits and vegetables
2. Fermented dairy product
3. Wine production
4. Pickle fermentation
5. Fermented cereal and legume-based product.
6. Production of edible mushroom

## TEXT BOOKS

* 1. Frazier W.C and WesthoffD.C.(2013), Food Microbiology, Tata McGraw Hill Publishing Co., Ltd. New Delhi.
  2. Annak.Joshua, (2001). Microbiology, Popular Book Depot.Chennai-15.
  3. Ray, B. (2001) Fundamental Food Microbiology, 2nd Ed, CRC press, Boca ratonF. 4.JoshiVK&Pandey(2004).Biotechnology:food,fermentation,microbiology,bioch emistryand technology,vol I &II,Educational publishers and distributors,New Delhi.

5. Crueger W and Crueger A (2003) Biotechnology: A textbook of Industrial Microbiology 2nd Edition,Panima Publishing Corpoartion,New Delhi.

## REFERENCE BOOK

1. Guttierrez-Lopez GF and Barbosa-Canovas GV (Eds) (2003) Food Science and Food Biotechmolgy CRC press,USA.
2. Halford NG (2003) ‘Genetically Modified Crops’ Imperial College Press, UK Modern Food Micro-Biology by James M. Jay, (2000), 6th edition, An Aspen Publication,Maryland, USA.

Food Microbiology: Fundamentals and frontiers by M.P. Doyle, L.R. Beuchat and Thoma J. Montville, (2001), 2nd edition, ASM press, USA.

1. MichealPelczar MJ, Chan ECS, Krieg N. (2001) Microbiology. 5th ed. Tata McGraw-Hill Publishing Co. Ltd.
2. Prescott LM, Harley JP, Klein DA.(2008) Microbiology. 6th ed. WMC Brown

## E-LEARNINGRESOURCES:

[Top Microbiology Courses - Learn Microbiology Online | Coursera](https://www.coursera.org/courses?query=microbiology&page=1) [Learn Microbiology with Online Courses and Classes | edX](https://www.edx.org/learn/microbiology)

[72 Online studies in Microbiology - DistanceLearningPortal.com](https://www.distancelearningportal.com/disciplines/224/microbiology.html) [Microbiology Free Online Courses and MOOCs | MOOC List (mooc-list.com)](https://www.mooc-list.com/tags/microbiology)

[Virtual Microbiology Classroom: 8-week micro course from Science Prof Online](https://www.scienceprofonline.com/virtual-micro-main.html)

# Mapping: (CO/PSO)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 3 | 3 | 2 | 1 | 3 | 2 |
| **CO2** | 3 | 3 | 2 | 1 | 3 | 2 |
| **CO3** | 3 | 3 | 2 | 1 | 3 | 2 |
| **CO4** | 3 | 3 | 2 | 1 | 3 | 2 |
| **CO5** | 3 | 3 | 2 | 1 | 3 | 2 |
| **Average** | **3** | **3** | **2** | **1** | **3** | **2** |

## KEY:

**PEDAGOGY (TEACHING METHODOLOGY):**

1. Group Discussion, Case study, seminar, journal reviewing, Assignments, Power point presentation.

**4.7.SEC-4**

**RECENT CONCEPTS IN NUTRITIONAL ASSESSMENT**

**CREDITS:2**

**SEMESTER:IV**

**YEAR:II**

**HOURS PER WEEK:15**

Learning Objectives

This course aims to

1. Impart the knowledge about various nutritional assessment techniques
2. Understand the concept of nutritional status and its relationship to health

Unit 1

Anthropometric measurement of children- height, weight, MUAC, BMI, Growth chart- plotting of growth charts, growth monitoring and promotion. Comparison with norms and interpretation of the nutritional assessment data and its significance. Weight for age, height for age, weight for height, Z scores, standard deviations, percentiles

Unit 2

Anthropometric Measurement of adults- height, weight, BMI, waist circumference, waist: hip ratio, waist: height ratio, skinfold callipers, Broka’s index, ponderal index. Clinical assessment and signs of nutrient deficiencies specially PEM (Kwashiorkor, marasmus), vitamin A deficiencies, Anaemia, Rickets, B-Complex deficiencies.

Unit 3

Biochemical assessment – types, merits and demerits. Estimation of food and nutrient intake: Household food consumption data, adult consumption unit, 24 hours dietary recall 24 hours record, Weighment method, food diaries, food frequency data, use of each of the above, information available through each individual, collection of data, estimation of intakes.

REFERENCE BOOKS

Nutrition Science: B Srilakshmi

Jelliffe, D. B.: Assessment of the Nutritional Status of the Community; World Health Organisation.

Sain, D. R. Lockwood, R., Scrimshaw, N. S.: Methods the Evaluation of the Impact of Food and Nutrition Programmes, United Nations University.

Ritchie, J.A.S. : Learning Bettor Nutrition FAO, Rome.

Gopalon. C. : Nutrition Foundation of India, Special Publication service.

Beghin, 1. Cap. M: Dujardan. B. : A Guide to Nutrition Status Assessment. W.H.O. Geneva.

Gopaldas, t. Seshadri, S. : Nutrition Monitoring a Assessment: Oxford University Press.

Mason, J. B., Habicht, J. P.; Tabatabai. H. Valverde. U.: Nutritional Surveillance, W.H.O.

Journals

Indian journal of Nutrition and Dietetics

American Journal of public health

Journal of community Nutrition and Health

# E-LEARNING RESOURCES

**Course Outcome**

|  |  |  |
| --- | --- | --- |
| CO No | CO statement | Knowledge level |
| CO1 | To learn various methods of assessment of nutritional status. | K1, k2 |
| CO2 | Describe, Compare and Interpret the different levels of malnutrition in the community. | K2, K4, K5 |
| CO3 | Understand the concept of nutritional status and its relationship to health | K5 |

# Mapping of CO with PSO

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CO/PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| CO1 | 3 | 3 | 3 | 1 | 3 | 1 |
| CO2 | 3 | 3 | 3 | 3 | 1 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 1 | 1 |
| AVERAGE | 3 | 3 | 3 | 2.5 | 1.5 | 1.25 |

KEY:**S**TRONGLY CORELATED-3 **M**ODERATEL CORELATED-2**W**EAKLY CORELATED-1 **N**O CORELATION-0