

# **FATIMA COLLEGE (AUTONOMOUS)**



**Re-Accredited with “A++” Grade by NAAC (Cycle - IV)**  
**Maryland, Madurai- 625 018, Tamil Nadu, India**

**NAME OF THE DEPARTMENT: RESEARCH CENTRE OF  
HOME SCIENCE**

**NAME OF THE PROGRAMME : HUMAN NUTRITION &  
NUTRACEUTICALS**

**PROGRAMME CODE : PSNN**

**ACADEMIC YEAR : 2023-2024**

### **VISION OF THE DEPARTMENT**

To empower the potential home makers and home scientists with life management skills to face the multidimensional challenges and contribute towards the progress of home and nation.

### **MISSION OF THE DEPARTMENT**

- To empower today's women with entrepreneurial skills to face the challenges of life effectively.
- To make them self-reliant.
- To explore ways and means to strengthen the industry-institution tie-up in order to prepare the students to meet the industrial expectations through internship in hospitals and industries.
- To kindle the scientific approach of the students towards research.

**PROGRAMME EDUCATIONAL OBJECTIVES (PEO)**

|              |   |
|--------------|---|
| <b>PEO 1</b> | Our graduates will be academic, digital and information literates; creative, inquisitive, innovative and committed researchers who would be desirous for the “more” in all aspects  |
| <b>PEO 2</b> | They will be efficient individual and team performers who would deliver excellent professional service exhibiting progress, flexibility, transparency, accountability and in taking up initiatives in their professional work |
| <b>PEO 3</b> | The graduates will be effective managers of all sorts of real – life and professional circumstances, making ethical decisions, pursuing excellence within the time framework and demonstrating at leadership skills           |
| <b>PEO 4</b> | They will engage locally and globally evincing social and environmental stewardship demonstrating civic responsibilities and employing right skills at the right moment.  |

**GRADUATE ATTRIBUTES (GA)**

Fatima College empowers her women graduates holistically. A Fatimite achieves all-round empowerment by acquiring Social, Professional and Ethical competencies. A graduate would sustain and nurture the following attributes:

| <b>I. SOCIAL COMPETENCE</b> |   |
|-----------------------------|---|
| <b>GA 1</b>                 | Deep disciplinary expertise with a wide range of academic and digital literacy  |
| <b>GA 2</b>                 | Hone creativity, passion for innovation and aspire excellence   |
| <b>GA 3</b>                 | Enthusiasm towards emancipation and empowerment of humanity   |
| <b>GA 4</b>                 | Potentials of being independent   |
| <b>GA 5</b>                 | Intellectual competence and inquisitiveness with problem solving abilities befitting the field of research  |
| <b>GA 6</b>                 | Effectiveness in different forms of communications to be employed in personal and professional environments through varied platforms  |
| <b>GA 7</b>                 | Communicative competence with civic, professional and cyber dignity and decorum   |
| <b>GA 8</b>                 | Integrity respecting the diversity and pluralism in societies, cultures and religions   |
| <b>GA 9</b>                 | All – inclusive skill sets to interpret, analyse and solve social and environmental issues in diverse environments  |
| <b>GA 10</b>                | Self awareness that would enable them to recognise their uniqueness through continuous self-assessment in order to face and make changes building on their strengths and improving their weaknesses |
| <b>GA 11</b>                | Finesse to co-operate exhibiting team-spirit while working in groups to achieve goals   |
| <b>GA 12</b>                | Dexterity in self-management to control their selves in attaining the kind of life that they dream for  |

|                                |   |
|--------------------------------|---|
| <b>GA 13</b>                   | Resilience to rise up instantly from their intimidating setbacks  |
| <b>GA 14</b>                   | Virtuosity to use their personal and intellectual autonomy in being life-long learners  |
| <b>GA 15</b>                   | Digital learning and research attributes  |
| <b>GA 16</b>                   | Cyber security competence reflecting compassion, care and concern towards the marginalised  |
| <b>GA 17</b>                   | Rectitude to use digital technology reflecting civic and social responsibilities in local, national and global scenario             |
| <b>PROFESSIONAL COMPETENCE</b> |   |
| <b>GA 18</b>                   | Optimism, flexibility and diligence that would make them professionally competent   |
| <b>GA 19</b>                   | Prowess to be successful entrepreneurs and become employees of trans-national societies   |
| <b>GA 20</b>                   | Excellence in Local and Global Job Markets  |
| <b>GA 21</b>                   | Effectiveness in Time Management  |
| <b>GA 22</b>                   | Efficiency in taking up Initiatives   |
| <b>GA 23</b>                   | Eagerness to deliver excellent service  |
| <b>GA 24</b>                   | Managerial Skills to Identify, Commend and tap Potentials   |
| <b>II. ETHICAL COMPETENCE</b>  |   |
| <b>GA 25</b>                   | Integrity and be disciplined in bringing stability leading a systematic life promoting good human behaviour to build better society |
| <b>GA 26</b>                   | Honesty in words and deeds  |

|              |   |
|--------------|---|
| <b>GA 27</b> | Transparency revealing one's own character as well as self-esteem to lead a genuine and authentic life                  |
| <b>GA 28</b> | Social and Environmental Stewardship  |
| <b>GA 29</b> | Readiness to make ethical decisions consistently from the galore of conflicting choices paying heed to their conscience |
| <b>GA 30</b> | Right life skills at the right moment   |

### **PROGRAMME OUTCOMES (PO)**

On completion of M. Sc Programme, the graduates would be able to

|             |   |
|-------------|---|
| <b>PO 1</b> | Apply acquired scientific knowledge to solve major complex issues in the society/industry.          |
| <b>PO 2</b> | Attain research skills to solve complex cultural, societal and environmental issues.                |
| <b>PO 3</b> | Employ latest and updated tools and technologies to solve complex issues.                           |
| <b>PO 4</b> | Demonstrate Professional Ethics that foster Community, Nation and Environment Building Initiatives. |

**PROGRAMME SPECIFIC OUTCOMES (PSO)**

On completion of M.Sc. Human Nutrition and Nutraceuticals programme, the graduates would be able to

|               |   |
|---------------|---|
| <b>PSO 1</b>  | Attain enhanced scientific knowledge about the physiology of the human body.  |
| <b>PSO 2</b>  | Gain advanced scientific knowledge in foods, functional foods, nutrition and nutraceuticals   |
| <b>PSO 3</b>  | Obtain professional competence in planning diet for normal & therapeutic conditions and diet counseling.                                |
| <b>PSO 4</b>  | Acquire advanced knowledge and understanding on the preventive and therapeutic role of functional foods.                                |
| <b>PSO 5</b>  | Develop understanding on the perspectives of research and formulate research designs.   |
| <b>PSO 6</b>  | Integrate the basic principles of community nutrition processes to address the major health related concerns of the population.         |
| <b>PSO 7</b>  | Imbibe scientific knowledge on the principles, instrumentation techniques and applications of different hi-tech analytical instruments. |
| <b>PSO 8</b>  | Acquire skills in analyzing food components and blood constituents  |
| <b>PSO 9</b>  | Demonstrate the knowledge of the scientific basis available to develop innovative value added food products                             |
| <b>PSO 10</b> | Achieve professional competence in implementing nutrition care during critical illness and disasters.                                   |
| <b>PSO 11</b> | Acquire knowledge and understanding the concepts of microbiology in the diverse areas such as food, environment and health.             |
| <b>PSO 12</b> | Attain enhanced knowledge and understanding of the bio molecules and its vital processes in human body.                                 |
| <b>PSO 13</b> | Advanced scientific knowledge and skill in the maintenance and monitoring of food safety and quality assurance.                         |
| <b>PSO 14</b> | Demonstrate the knowledge and skill gained in the management of food service institutions.  |
| <b>PSO 15</b> | Acquire in-depth knowledge on production of processed food products.  |



**FATIMA COLLEGE (AUTONOMOUS), MADURAI-18**  
**RESEARCH CENTRE OF HOME SCIENCE**  
**M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS**  
*For those who joined in June 2023 onwards*

**PROGRAMME CODE: PSNN**

**Semester-I**

|        | <b>Courses</b>   | <b>Credit</b> | <b>Hours per Week(L/T/P)</b> |
|--------|--|---------------|------------------------------|
| Part A | <b>Core Courses:</b>   | 5             | 6                            |
|        | 23PG1N1- Macronutrients  |               |                              |
|        | 23PG1N2- Advanced Dietetics  | 5             | 6                            |
|        | 23PG1N3- Advanced Dietetics Practical  | 4             | 6                            |
|        | <b>Elective Courses (Generic / Discipline Specific):</b>   |               |                              |
|        | 23PG1NE1 – Functional Foods and Nutraceuticals/<br>23PG1NE2 – Nutrition in Critical Care & Disasters | 3             | 5                            |
|        | 23PG1NE3 - Advanced Human Physiology/<br>23PG1NE4 - Food Biotechnology                               | 3             | 5                            |
|        | 23PG1NAE - Nutrition & Dietetics   | 1             | 2                            |
|        |  | <b>21</b>     | <b>30</b>                    |
|        |  |               |                              |

**Semester-II**

## CBCS Curriculum for M.Sc Human Nutrition &amp; Nutraceuticals

|        | <b>Courses</b>   | <b>Credit</b> | <b>Hours per Week(L/T/P)</b> |
|--------|--|---------------|------------------------------|
| Part A | 23PG2N4 - Advanced Food Science  | 5             | 6                            |
|        | 23PG2N5 - Analytical Instrumentation   | 5             | 6                            |
|        | 23PG2N6 - Techniques in Food Analysis Practical                                    | 4             | 6                            |
|        | <b>Elective Course(Generic / Discipline Specific):</b>                             |               |                              |
|        | 23PG2NE5 - Food Safety & Quality Control /<br>23PG2NE6 - Performance Nutrition     | 3             | 4                            |
|        | 23PG2NE7 - Food Microbiology /<br>23PG2NE8 - Nutritional Assessment & Surveillance | 3             | 4                            |
|        |  |               |                              |
| Part B | <b>Skill Enhancement Course: 23PG2NSE1 - Food Preservation</b>                     |               |                              |
|        |  | 2             | 4                            |
|        |  | <b>22</b>     | <b>30</b>                    |

## CBCS Curriculum for M.Sc Human Nutrition &amp; Nutraceuticals

| S. No | SEM. | COURSE CODE | COURSE TITLE  | HR S       | CRE DITS  | CIA Mks | ESE Mks | TOT. MKs |
|-------|------|-------------|---|------------|-----------|---------|---------|----------|
| 1.    | III  | 19PG3N11    | Functional Foods & Nutraceuticals in Preventive Dietetics | 6          | 5         | 40      | 60      | 100      |
| 2.    |      | 19PG3N12    | Community Nutrition                                       | 6          | 5         | 40      | 60      | 100      |
| 3.    |      | 19PG3N13    | Analytical Instrumentation                                | 6          | 5         | 40      | 60      | 100      |
| 4.    |      | 19PG3N14    | Community Nutrition Lab                                   | 4          | 2         | 40      | 60      | 100      |
| 5.    |      | 19PG3N15    | Techniques for Experimental Nutrition Lab                 | 4          | 2         | 40      | 60      | 100      |
| 6.    | IV   | 19PG4N16    | Food Microbiology   | 6          | 5         | 40      | 60      | 100      |
| 7.    |      | 19PG4N17    | Nutritional Biochemistry                                  | 6          | 5         | 40      | 60      | 100      |
| 8.    |      | 19PG4N18    | Advanced Food Science and Processing Techniques           | 6          | 5         | 40      | 60      | 100      |
| 9.    |      | 19PG4N19    | Food Microbiology Lab                                     | 4          | 2         | 40      | 60      | 100      |
| 10.   |      | 19PG4N20    | Nutrient Analysis Lab                                     | 4          | 2         | 40      | 60      | 100      |
|       |      |             | <b>TOTAL</b>  | <b>106</b> | <b>70</b> |         |         |          |

**MAJOR ELECTIVE / EXTRA DEPARTMENTAL COURSE /  
INTERNSHIP/ PROJECT - 20 CREDITS**

| S. No | SEM. | COURSE CODE           | COURSE TITLE  | HRS | CREDITS | CIA Mks | ESE Mks | TOT. Mks |
|-------|------|-----------------------|---|-----|---------|---------|---------|----------|
| 1.    | III  | 19PG3NE1/<br>19PG3NE2 | Food Product Development and Sensory Evaluation/ Institutional Management | 4   | 4       | 40      | 60      | 100      |
| 2.    |      | 19PG3SIN1             | Summer Internship   | -   | 3       | 40      | 60      | 100      |
| 3.    | IV   | 19PG4NE3/<br>19PG4NE4 | Food Safety and Quality Control/ Nutrition in Critical Care and Disasters | 4   | 4       | 40      | 60      | 100      |
| 4.    |      | 19PG4N21              | Project*& Viva Voce   | -   | 3       | 40      | 60      | 100      |
| TOTAL |      |                       |   | 14  | 20      |         |         |          |

**OFF-CLASS PROGRAMMES****ADD-ON COURSES**

| <b>COURSE CODE</b> | <b>COURSES</b>  | <b>HRS.</b>      | <b>CRE DIT S</b> | <b>SEMEST ER IN WHICH THE COURSE IS OFFERE D</b> | <b>CIA MK S</b> | <b>ES E MK S</b> | <b>TOTA L MAR KS</b> |
|--------------------|---|------------------|------------------|--|-----------------|------------------|----------------------|
| 19PAD2SS           | <b>SOFT SKILLS</b>  | 40               | 3                | I  | 40              | 60               | 100                  |
| 19PAD2CA           | <b>COMPUTER APPLICATIONS</b><br><br>SPSS  | 40               | 4                | II   | 40              | 60               | 100                  |
| 19PAD4CV           | <b>COMPREHENSIVE VIVA</b> (Question bank to be prepared for all the papers by the respective course teachers) | -                | 2                | IV   | -               | -                | 100                  |
| 19PAD4RC           | <b>READING CULTURE</b>  | 15/<br>Seme ster | 1                | I-IV   | -               | -                | -                    |

## EXTRA CREDIT COURSES

| Course Code | Courses   | Hr s. | Credit s                            | Semest er in which the course is offered | CIA Mk s | ESE Mk s | Total Mark s |
|-------------|---|-------|-------------------------------------|--|----------|----------|--------------|
|             | <b>SELF LEARNING COURSE for ADVANCED LEARNERS</b>   |       |                                     |  |          |          |              |
| 21PG1ZSL    | Intellectual Property Rights  | -     | 2                                   | I  | 40       | 60       | 100          |
| 21MSW2SL    | Geriatric Science   | -     | 2                                   | II                                       | 40       | 60       | 100          |
| 21PG3SLN    | Nutrigenomics   | -     | 2                                   | III                                      | 40       | 60       | 100          |
| 21PS4SLN    | Sports Nutrition  | -     | 2                                   | IV                                       | 40       | 60       | 100          |
|             | <b>MOOC COURSES</b><br>(Department Specific Courses) * Students can opt other than the listed course from UGC-SWAYAM portal as well as from NPTEL | -     | Respec tive Credits allotted by UGC | -  | -        | -        | 100          |

**100% EMPLOYABILITY****I M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS****SEMESTER –I***For those who joined in 2023 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE    | CATEGORY   | HRS/WEEK | CREDITS |
|----------------|-------------|-----------------|------------|----------|---------|
| PSNN           | 23PG1N1     | Macro Nutrients | Major Core | 6        | 4       |

**COURSE DESCRIPTION**

The course provides the knowledge on classification, functions, metabolism and deficiency of macro and micronutrients and its interrelationship.

**COURSE OBJECTIVES**

- Gain in depth knowledge in the study of major and minor nutrients.
- Understand the recent trends in the study of nutrients
- Develop competence for undertaking nutritional investigations.

**UNITS****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,

### BOOK REFERENCES:

1. Brown,M.L.(1990). *Present knowledge in Nutrition*, VI Edition, International Life Science Institute, Nutrition Foundation, Washington.
2. Gruff, J.L., Gropper, S.S, & Hunt, S.M (1995).*Advanced Nutrition and Human metabolism*, West Publishing Company, Minneapolis.
3. Helen, A. Guthrie. (1989). *Introductory Nutrition*, VII edition, Mosby College Publishing Col, Toronto.

4. Mahtab S. Bamji, Palhad Rao R, & Vinodhini Reddy, (1998). *Text book of Human Nutrition*, Oxford and IBH publishing co., Pvt.Ltd., New Delhi.
5. Sith K.L & Dekker M. (1990) . *Trace Minerals in Foods*, Inc., New York.

### **JOURNAL REFERENCES:**

1. British journal of nutrition, Cambridge University Press, London.
2. Nutrition news, Nutrition Institute of Nutrition, Hyderabad.
3. Nutrition reviews, the Nutrient Foundation, Inc., New York.
4. Nutrition and food science- incorporating home economics and technology, Pvt. Ltd., England.
5. The journal of nutrition, Cambridge University Press, London.
6. World review of Nutrition and Dietetics- all volumes.

### **Open Educational Resources:**

- 1) [https://en.wikibooks.org/wiki/Fundamentals\\_of\\_Human\\_Nutrition](https://en.wikibooks.org/wiki/Fundamentals_of_Human_Nutrition)
- 2) <http://pressbooks.oer.hawaii.edu/humannutrition/>
- 3) <https://www.youtube.com/watch?v=sorIaN6vRBI>
- 4) <http://pressbooks.oer.hawaii.edu/humannutrition2/>
- 5) <https://oer.galileo.usg.edu/cgi/viewcontent.cgi?article=1006&context=health-textbooks>

### **COURSE CONTENTS & LECTURE SCHEDULE:**

| Module No.                   | Topic   | No. of Lectures | Teaching Pedagogy                  | Teaching Aids                |
|------------------------------|---|-----------------|------------------------------------|------------------------------|
| <b>UNIT -1 ENERGY</b>        |   |                 |                                    |                              |
| 1.1                          | Energy content of foods, physiological fuel value   | 4               | Chalk & Talk, Lecture, Seminar     | Black Board,PPT,Videos       |
| 1.2                          | Estimation of total energy requirements (BMR, REE and physical cost of activities) TEE    | 2               | Chalk & Talk, Lecture, Seminar     | Black/white Board,PPT,Videos |
| 1.3                          | Energy balance, Basal metabolic rate, total energy requirements, BMR& RMR                 | 4               | Chalk & Talk, Lecture, Seminar     | PPT & White board            |
| 1.4                          | Factors affecting BMR, Thermic effect of food   | 3               | Lecture, Discussion                | PPT & White board,Videos     |
| 1.5                          | Changes in body weight and body composition with the changing energy balance              | 2               | Lecture                            | Black/white Board            |
| 1.6                          | Regulation of food intake- role of hunger and satiety centers. Energy balance and obesity | 3               | Lecture, Group Discussion, Seminar | PPT & White board,Videos     |
| <b>UNIT -2 CARBOHYDRATES</b> |   |                 |                                    |                              |

|                            |   |   |                                   |                             |
|----------------------------|---|---|-----------------------------------|-----------------------------|
| 2.1                        | Classification ,<br>Therapeutic uses<br>of carbohydrates,<br>sugars in<br>parenteral<br>nutrition | 3 | Lecture, Group<br>Discussion      | PPT & White board           |
| 2.2                        | Glycemic index of<br>foods and its uses   | 3 | Chalk & Talk,<br>Lecture, Demo    | Black/white<br>Board, PPT   |
| 2.3                        | Toxic effects of<br>fructose, xylitol<br>and galactose  | 3 | Chalk & Talk,<br>Lecture, seminar | Black/white<br>Board, PPT   |
| 2.4                        | Sugar alternatives  | 3 | Lecture                           | Black/White board           |
| 2.5                        | Role of dietary<br>fiber in health<br>and disease   | 3 | Chalk & Talk,<br>Lecture, seminar | Black/white Board,<br>PPT   |
| 2.6                        | Role of<br>carbohydrates in<br>health and<br>disease  | 3 | Chalk & Talk,<br>Lecture, seminar | Black/white Board,<br>PPT   |
| <b>UNIT-3      PROTEIN</b> |   |   |                                   |                             |
| 3.1                        | Historical review<br>of protein<br>metabolism   | 3 | Lecture, Group<br>Discussion      | PPT & White board           |
| 3.2                        | Amino acid<br>patterns in<br>protein & of<br>animals and<br>vegetable origin                      | 3 | Chalk & Talk,<br>Lecture, seminar | Black/white Board,<br>PPT   |
| 3.3                        | Critical study of<br>methods of<br>assessment of<br>protein quality                               | 3 | Chalk & Talk,<br>Lecture, Seminar | Black Board, PPT,<br>Videos |

|                        |   |   |                                |                        |
|------------------------|---|---|--------------------------------|------------------------|
| 3.4                    | Physiological functions of proteins   | 3 | Chalk & Talk, Lecture, Seminar | Black Board,PPT,Videos |
| 3.5                    | Essential Amino Acids, amino acid balance and imbalance   | 3 | Chalk & Talk, Lecture, Seminar | Black Board,PPT,Videos |
| 3.6                    | Role of protein in health and disease. Supplementation of individual amino acid                       | 3 | Chalk & Talk, Lecture, Seminar | Black Board,PPT,Videos |
| <b>UNIT – 4 LIPIDS</b> |   |   |                                |                        |
| ..                     |   |   |                                |                        |
| 4.1                    | Concepts of visible and invisible fats, EFA, SFA, MUFA, PUFA  | 3 | Lecture, Seminar               | Black Board,PPT        |
| 4.2                    | Omega-6 to omega-3 ratios. – sources and physiological functions and their role in health and disease | 3 | Lecture, Seminar               | Black Board,PPT        |
| 4.3                    | Adipose tissue – Lipogenesis and Lipolysis  | 3 | Chalk & Talk, Lecture, Seminar | Black Board,PPT,Video  |
| 4.4                    | Lipoproteins – types and health implication   | 3 | Chalk & Talk, Lecture, Seminar | Black Board,PPT,Video  |

|                       |  |           |                                |                       |
|-----------------------|--|-----------|--------------------------------|-----------------------|
| 4.5                   | Storage of body fat, Effects of deficiency                                     | 3         | Chalk & Talk, Lecture, Seminar | Black Board,PPT,Video |
| 4.6                   | Fat substitutes, Hypocholesterolaemic foods – garlic, fiber and plant proteins | 3         | Chalk & Talk, Lecture, Seminar | Black Board,PPT,Vides |
| <b>UNIT – 5 WATER</b> |  |           |                                |                       |
| 5.1                   | Sources, Function, Requirement   | 3         | Chalk & Talk, Lecture, Seminar | Black Board,PPT       |
| 5.2                   | Distribution of water in the body  | 3         | Chalk & Talk, Lecture, Seminar | Black Board,PPT       |
| 5.3                   | Factors influencing distribution of body fluid                                 | 3         | Chalk & Talk, Lecture, Seminar | Black Board,PPT       |
| 5.4                   | Exchange of water in the body  | 3         | Chalk & Talk, Lecture, Seminar | Black Board,PPT       |
| 5.5                   | Water imbalance – dehydration- water intoxication                              | 3         | Chalk & Talk, Lecture, Seminar | Black Board,PPT       |
| 5.6                   | Water and electrolyte mechanism – ADH  | 3         | Chalk & Talk, Lecture, Seminar | Black Board,PPT       |
| CIA                   |  |           |                                |                       |
| Scholastic            |  | <b>23</b> |                                |                       |
| Non Scholastic        |  | <b>2</b>  |                                |                       |

|  |           |
|--|-----------|
|  | <b>25</b> |
|--|-----------|

## EVALUATION PATTERN

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 15         |    | 3  | 5  | 2                | 25    | 75  | 100   |

### PG CIA Components

|           |   |              | Nos |   |        |
|-----------|---|--------------|-----|---|--------|
| <b>C1</b> | - | Test (CIA 1) | 1** | - | 15 Mks |
| <b>C2</b> | - | Test (CIA 2) | 1** | - | 15 Mks |
| <b>C3</b> | - | Assignment   | 1   | - | 3 Mks  |
| <b>C4</b> | - | Seminar      | 2 * | - | 5 Mks  |
| <b>C5</b> | - | Attendance   |     | - | 2 Mks  |

**\*\* Average of C1 and C2 will be taken.**

**\*The best out of two will be taken into account**

**COURSE OUTCOMES**

In the successful completion of the course, students will be able to:

| <b>NO.</b>  | <b>COURSE OUTCOMES</b>   | <b>KNOWLEDGE LEVEL<br/>(ACCORDING TO REVISED BLOOM'S TAXONOMY)</b> | <b>PSOs ADDRESSED</b>        |
|-------------|--|--|------------------------------|
| <b>CO 1</b> | Explain the functions,digestion, absorption, deficiency,sources & requirements of Macronutrients and water | K2   | PSO1, PSO2,PSO3,PSO8 & PSO12 |
| <b>CO 2</b> | Elaborate the energy value of foods by using different Calorimetric methods                                | K2   | PSO1, PSO2,PSO3,PSO8 &PSO12  |
| <b>CO 3</b> | Identify the functions, digestion, absorption, deficiency,sources & requirements of Minerals               | K3   | PSO1,PSO2, PSO3,PSO8 & PSO12 |
| <b>CO 4</b> | Analyze the functions, digestion, absorption, deficiency,sources & requirements of Vitamins                | K4   | PSO1,PSO2, PSO3,PSO8 & PSO12 |
| <b>CO 5</b> | Explain the knowledge on nutrient-nutrient and nutrient- drug interrelationship                            | K5   | PSO1,PSO2, PSO3,PSO8 & PSO12 |

**Mapping of COs with PSOs**

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO2      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO3      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO4      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO5      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |

**Mapping of COs with POs**

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 2   | 2   | 1   | 1   |
| CO2     | 2   | 2   | 1   | 1   |
| CO3     | 2   | 2   | 1   | 1   |
| CO4     | 2   | 2   | 1   | 1   |
| CO5     | 2   | 2   | 1   | 1   |

**Note: Strongly Correlated – 3****“ Moderately Correlated – 2 “ Weakly****Correlated -1****COURSE DESIGNER:****1. Ms.D.MOUNA****Forwarded By**

**(Dr.S.Santhi)**

**100% EMPLOYABILITY****I M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS****SEMESTER –I***For those who joined in 2023 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE       | CATEGORY   | HRS/WEEK | CREDITS |
|----------------|-------------|--------------------|------------|----------|---------|
| PSNN           | 23PG1N2     | Advanced Dietetics | Major Core | 6        | 5       |

**COURSE DESCRIPTION**

The course provides a comprehensive knowledge required for the prevention and treatment of various diseases.

**COURSE OBJECTIVES**

- To identify and describe various disease conditions.
- To gain knowledge on appropriate nutritional management.
- To develop the attitude and capacity for taking up dietetics as a profession.

**UNITS****UNIT –I NUTRITIONAL SCREENING & THERAPEUTIC NUTRITION (18Hrs)**

Nutritional screening, Nutritional care process, Nutritional Assessment, Nutritional diagnosis , Nutritional Intervention , Monitoring and evaluation.

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

Nutritional Management in critical care -Nutritional screening and nutritional Status assessment of critically ill, Nutritional requirement according to the critical condition

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

**UNIT –II MEDICAL NUTRITIONAL THERAPY FOR GASTROINTESTINAL****DISEASES****(18Hrs)**

Upper Gastrointestinal tract Diseases – Nutritional care and diet therapy in Diseases of oesophagus - Oesophagitis, Gastro esophageal reflux disease [GERD] and Hiatus hernia. Disorders of stomach: Indigestion, Gastritis, Gastric and duodenal ulcers, and dumping syndrome

Lower gastrointestinal tract Diseases/Disorders-Common Symptoms of Intestinal dysfunction - Flatulence, constipation, haemorrhoids, 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, cholecystitis, cholelithiasis and pancreatitis, Zollinger Ellison syndrome and Biliary dyskinesia.

**UNIT –III MEDICAL NUTRITIONAL THERAPY FOR PULMONARY,****RHEUMATIC DISEASES &PHYSIOLOGICAL STRESS(18Hrs)**

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

Medical Nutrition therapy for Rheumatic disease- Etiology, Pathophysiology of Inflammation of Rheumatic diseases, Rheumatoid Arthritis, Osteoarthritis and sjogren syndrome.

Nutritional management of physiological stress- Classification, Complications, Metabolic changes in protein and electrolytes and Dietary management of burns, dietary management of trauma and stress.

**UNIT –IV MEDICAL NUTRITIONAL THERAPY FOR WEIGHT IMBALANCE**

**& METABOLIC DISORDERS****(18Hrs)**

Nutritional Management on Weight imbalance -Regulation of food intake and pathogenesis of obesity and malnutrition and starvation; Weight Imbalance: prevalence and classification.

Underweight -Etiology and Dietary management; Obesity-Etiology, classification, Energy balance, dietary modifications and Bariatric surgery- types and dietary modifications of pre and post bariatricsurgery.

Nutritional Management in metabolic disorders- Prevalence, Etiology, risk factors, complications and dietary modifications of diabetes mellitus.

**UNIT –V MEDICAL NUTRITIONAL THERAPY FOR CARDIOVASCULAR,****RENAL DISEASES & CANCER****(18Hrs)**

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.

**BOOK REFERENCES:**

1. Cornnie H. Robinson and Emena S. Weighly, (1989). *Basic Nutrition and Diet Therapy*, 3rd .Ed, Macmillan Publishing Company, New York.
2. Davidson, S.S. Passmore, P. Brack, J.F. (1993). *Human Nutrition and Dietetics*, 9<sup>th</sup> Ed, F&S, Lingstone Ltd., Edinburgh and London,

3. Garrow.J.S, W.P.T. James, 9<sup>th</sup> Ed 1993, *Human Nutrition and Dietetics*, Churchill Livingstone.
4. Kathleen Mahan.L , 13<sup>th</sup> Ed, (2011), Sylvia Escott-Stump, Janice L Raymond *Krause's Food & Nutrition Therapy*, Elsevier Publications,.
5. Robinson CH (1994), *Normal and Therapeutic Nutrition*, 18<sup>th</sup> Ed, Macmillan Publishers Company, NewYork.
6. Srilakshmi.B, *Dietetics*, 1995, New Age International Private Ltd., New Delhi.
7. Sue Rodwell Williams, 2001, *Basic Nutrition and Diet therapy*, Mosby publications.

### **JOURNAL REFERENCES:**

1. Food and Nutrition Bulletin, United Nations University Press, Japan.
2. Journal of American Dietetic Association, American Dietetic Association, Mount Marris, Illinois, 61054, USA.
3. Nutrition Abstracts and Reviews, CBB International, UK
4. Nutrition
5. Reviews, Nutrition Foundation, Washington, DC.
6. The American Journal of Clinical Nutrition, Waverfy Press, USA.
7. The Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.
8. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Deemed University, Coimbatore.

### **OPEN EDUCATIONAL RESOURCES:**

- 1.<https://pressbooks.oer.hawaii.edu/humannutrition2/chapter/2-the-endocrine-system/>
- 2.<https://clinical-nutrition.imedpub.com/>
- 3.<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4597475/>
- 4.<https://nephcure.org/livingwithkidneydisease/diet-and-nutrition/renal-diet/>
- 5.<https://sa1s3.patientpop.com/assets/docs/36223.pdf>

- 6.<https://www.cancer.org/treatment/survivorship-during-and-after-treatment/staying-active/nutrition-and-physical-activity-during-and-after-cancer-treatment.html>
- 7.<https://www.thewellproject.org/hiv-information/nutrition-and-hiv>

**COURSE CONTENTS & LECTURE SCHEDULE:**

| Module No.  | Topic   | No. of Lectures | Teaching Pedagogy             | Teaching Aids                        |
|---|---|-----------------|-------------------------------|--------------------------------------|
| <b>UNIT -1 NUTRITIONAL SCREENING &amp; THERAPEUTIC NUTRITION</b>        |   |                 |                               |                                      |
| 1.1   | Nutritional screening<br>Nutritional care process<br>Nutritional Assessment<br>Nutritional diagnosis<br>Nutritional Intervention<br>Monitoring and evaluation.                                    | 4               | Lecture                       | PPT                                  |
| 1.2   | Basic concepts of diet therapy –<br>Therapeutic adaptations of<br>Normal diet, Principles and<br>classification of therapeutic<br>diets. Routine Hospital diets –<br>Regular, soft, fluid diet    | 4               | Chalk & Talk<br>Demonstration | Black<br>Board<br>Charts &<br>Models |
| 1.3   | Nutritional Management in<br>critical care -Nutritional<br>screening and nutritional<br>Status assessment of critically<br>ill, Nutritional requirement<br>according to the critical<br>condition | 4               | Discussion                    | Case<br>Study<br>Report              |
| 1.5   | Nutritional support systems:<br>Enteral and parenteral<br>nutrition support- Types,<br>composition and complications.   | 3               | Lecture                       | PPT                                  |
| <b>UNIT-2 MEDICAL NUTRITIONAL THERAPY FOR GASTROINTESTINAL DISEASES</b> |   |                 |                               |                                      |
| 2.1   | Upper Gastrointestinal tract<br>Diseases – Nutritional care and<br>diet therapy in Diseases of<br>oesophagus - Oesophagitis,<br>Gastro esophageal reflux disease<br>[GERD] and Hiatus hernia.     | 6               | Lecture                       | PPT,<br>Videos                       |

|   |  |   |              |             |
|---|--|---|--------------|-------------|
| 2.2   | Disorders of stomach:<br>Indigestion, Gastritis, Gastric and duodenal ulcers, and dumping syndrome   | 4 | Chalk & Talk | Black Board |
| 2.3   | Lower gastrointestinal tract Diseases/Disorders-Common Symptoms of Intestinal dysfunction - Flatulence, constipation, haemorrhoids, diarrhoea, steatorrhoea, Diseases of the large intestine-Diverticular disease, Irritable bowel syndrome, inflammatory bowel disease. | 4 | Lecture      | PPT         |
| 2.4   | Diseases of Small intestine-Celiac disease, tropical sprue, intestinal brush border enzyme deficiencies, diseases of the Liver-hepatitis, hepatic coma, cirrhosis,cholecystitis, cholelithiasis and pancreatitis, Zollinger Ellison syndrome and Biliary dyskinesia.     | 4 | Chalk & Talk | Black Board |
| <b>UNIT-3 MEDICAL NUTRITIONAL THERAPY FOR PULMONARY, RHEUMATIC DISEASES &amp;PHYSIOLOGICAL STRESS</b> |  |   |              |             |
| 3.1   | Medical Nutrition therapy for Pulmonary disease-Effect of Malnutrition on pulmonary system, effect of pulmonary disease on nutritional status, chronic pulmonary diseases-   | 5 | Lecture      | PPT         |
| 3.2   | Asthma, cystic fibrosis, chronic obstructive pulmonary disease and Pneumonia-Pathophysiology and dietary management.   | 5 | Chalk & Talk | Black Board |

|  |   |   |               |             |
|--|---|---|---------------|-------------|
| 3.3  | Medical Nutrition therapy for Rheumatic disease- Etiology, Pathophysiology of Inflammation of Rheumatic diseases, Rheumatoid Arthritis, Osteoarthritis and sjogren syndrome.                        | 3 | Demonstration | Model       |
| 3.4  | Nutritional management of physiological stress- Classification, Complications, Metabolic changes in protein and electrolytes, Dietary management of burns, dietary management of trauma and stress. | 5 | Lecture       | PPT         |
| <b>UNIT-4 MEDICAL NUTRITIONAL THERAPY FOR WEIGHT IMBALANCE &amp; METABOLIC DISORDERS</b> |   |   |               |             |
| 4.1  | Nutritional Management on Weight imbalance -Regulation of food intake and pathogenesis of obesity and malnutrition and starvation; Weight Imbalance: prevalence and classification.                 | 5 | Lecture       | PPT, Videos |
| 4.2  | Underweight -Etiology and Dietary management.   | 4 | Lecture       | PPT, Videos |
| 4.3  | Obesity-Etiology, classification, Energy balance, dietary modifications   | 5 | Chalk & Talk  | Black Board |
| 4.4  | Bariatric surgery- types and dietary modifications of pre and post bariatricsurgery.  | 2 | Lecture       | PPT         |

|  |   |   |              |                   |
|--|---|---|--------------|-------------------|
| 4.5  | Nutritional Management in metabolic disorders-Prevalence, Etiology, risk factors, complications and dietary modifications of diabetes mellitus.   | 2 | Chalk & Talk | Black Board       |
| <b>UNIT -5 MEDICAL NUTRITIONAL THERAPY FOR CARDIOVASCULAR, RENAL DISEASES &amp; CANCER</b> |   |   |              |                   |
| 5.1  | Nutritional management of cardiovascular diseases-etiology, risk factors, clinical features and dietary modifications of Dyslipidemias, Atherosclerosis , Hypertension, Ischemic heart disease, Congestive cardiac failure. | 5 | Chalk & Talk | Black Board       |
| 5.2  | Nutrition Management of Renal Disease -Etiology, Clinical and metabolic manifestations, Diagnostic tests  | 3 | Chalk & Talk | Black Board       |
| 5.3  | Types-Glomerulonephritis, Nephrotic syndrome , Renal Failure:   | 4 | Lecture      | PPT, Videos       |
| 5.4  | Acute and chronic, ESRD, Nephrolithiasis and Dietary modifications.   | 3 | Lecture      | PPT & White board |

|     |   |   |              |             |
|-----|---|---|--------------|-------------|
| 5.5 | Nutritional management in cancer- Pathogenesis and progression of cancer, types, Symptoms and Dietary management. | 3 | Chalk & Talk | Black Board |
|-----|---|---|--------------|-------------|

| CIA            |           |
|----------------|-----------|
| Scholastic     | <b>23</b> |
| Non Scholastic | <b>2</b>  |
|                | <b>25</b> |

## EVALUATION PATTERN

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 15         |    | 3  | 5  | 2                | 25    | 75  | 100   |

### UG CIA Components

|           |   |              |  | Nos |     |       |  |
|-----------|---|--------------|--|-----|-----|-------|--|
| <b>C1</b> | - | Test (CIA 1) |  | 1** | -   | 15Mks |  |
| <b>C2</b> | - | Test (CIA 2) |  | 1** | -   | 15Mks |  |
| <b>C3</b> | - | Assignment   |  | 1   | -   | 3Mks  |  |
| <b>C4</b> | - | Quiz         |  |     | 2 * | 5 Mks |  |
| <b>C5</b> | - | Attendance   |  |     |     | 2Mks  |  |

**\*\* Average of C1 and C2 will be taken.**

**\*The best out of two will be taken into account**

## COURSE OUTCOMES

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

| NO.  | COURSE OUTCOMES   | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|------|---|--|----------------|
| CO 1 | Discuss the Nutritional screening care process, assessment intervention, monitoring and evaluation. | K2   | PSO3           |
| CO 2 | Describe the medical nutritional management of gastrointestinal diseases.                           | K2   | PSO3           |
| CO 3 | Plan diets for the management of pulmonary, rheumatic and physiological stress.                     | K3   | PSO3           |
| CO 4 | Categorize the foods used in the treatment of weight imbalance and metabolic disorders.             | K4   | PSO3           |
| CO 5 | Explain the treatment strategies for cardiovascular, renal diseases & cancer.                       | K5   | PSO3           |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 1     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO2      | 1     | 1     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO3      | 1     | 1     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO4      | 1     | 1     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO5      | 1     | 1     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 2   | 1   | 1   | 1   |
| CO2     | 1   | 1   | 1   | 1   |
| CO3     | 2   | 1   | 1   | 1   |
| CO4     | 3   | 1   | 1   | 1   |
| CO5     | 3   | 1   | 1   | 1   |

**Note:** Strongly Correlated – 3      “ Moderately Correlated – 2      “ Weakly Correlated -1

### COURSE DESIGNER:

1. Mrs.P.MadaleneVirjini
2. Dr.K.Karthiga

**Forwarded By**



(Dr.S. Santhi)

**100% EMPLOYABILITY**

**I M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS**  
**SEMESTER –I**

*For those who joined in 2023 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE                 | CATEGORY | HRS/ WEEK | CREDITS |
|----------------|-------------|------------------------------|----------|-----------|---------|
| PSNN           | 23PG1N3     | Advanced Dietetics Practical | Lab      | 6         | 4       |

**COURSE DESCRIPTION**

The practical course offers hands-on experience in the planning, preparation and calculation of nutrients for the menu planned for various stages of normal life cycle, deficiency disorders, hospital diets, sports and space nutrition.

**COURSE OBJECTIVES**

- To develop skills in planning and preparing diets for weight imbalance
- To get expertise in planning and preparing diets for various diseases
- To plan diets for cancer, bariatric surgery and burns

**UNITS**

**UNIT I PLANNING & PREPARING DIET FOR WEIGHT BALANCE**

Assessing requirements and planning diet for obese and underweight individual.

**[18Hrs]**

## **UNIT II PLANNING & PREPARING DIET FOR METABOLIC & CARDIOVASCULAR DISEASES**

Planning and preparing diet for Diabetes Mellitus[IDDM and NIDDM] and Atherosclerosis with Hypertension.

**[18Hrs]**

## **UNIT III PLANNING & PREPARING DIET GASTROINTESTINAL DISORDERS**

**[18Hrs]**

Assessing and planning diets for the following conditions

Celiac disease, Peptic Ulcer, Lactose intolerance, Hepatitis, Cirrhosis

## **UNIT IV PLANNING & PREPARING DIET FOR PULMONARY, RENAL & RHEUMATICS**

**[18Hrs]**

Planning and preparing diet for Pneumonia, Rheumatic arthritis and Glomerulonephritis

## **UNIT V PLANNING & PREPARING DIET FOR CANCER, BARIATRIC & BURNS**

**[18Hrs]**

Planning and preparing diet for cancer, pre and post Bariatric surgery patients and post burn condition.

## **REFERENCES**

1. Cornnie H. Robinson & Emena S. Weighly.(1989).*Basic Nutrition and Diet Therapy*, (6<sup>th</sup> ed), Macmillan Publishing Company, New York.
2. Kathleen Mahan. L. Sylvia Escott-Stump, Janice L Raymond & Krause (2011).*Food & Nutrition Therapy*, (13<sup>th</sup> ed), Elsevier Publications.
2. Robinson CH.(1994) . *Normal & Therapeutic Nutrition* XVIII Edition, Macmillan Publishers Company, New York.

3. Srilakshmi.B (1995). *Dietetics*, New Age International Private Ltd., New Delhi.
4. Sue Rodwell Williams. (2001). *Basic Nutrition and Diet therapy*, Mosby publications

| <b>Module No.</b>   | <b>Topic</b>   | <b>No. of Lectures</b> | <b>Teaching Pedagogy</b> | <b>Teaching Aids</b>  |
|---|--|------------------------|--------------------------|-----------------------|
| <b>UNIT -1 PLANNING&amp; PREPARING DIET FOR WEIGHT BALANCE</b>                          |  |                        |                          |                       |
| 1.1   | Assessing requirements and planning diet for underweight individual. | 9                      | Demonstration            | Cook wares & Utensils |
| 1.2   | Assessing requirements and planning diet for obese.                  | 9                      | Demonstration            | Cook wares & Utensils |
| <b>UNIT -2 PLANNING&amp; PREPARING DIET FOR METABOLIC &amp; CARDIOVASCULAR DISEASES</b> |  |                        |                          |                       |
| 2.1   | Planning and preparing diet for Diabetes Mellitus[IDDM and NIDDM].   | 6                      | Demonstration            | Cook wares & Utensils |
| 2.2   | Planning and preparing diet for Atherosclerosis.                     | 6                      | Demonstration            | Cook wares & Utensils |
| 2.3   | Planning and preparing diet for Hypertension.                        | 6                      | Demonstration            | Cook wares & Utensils |
| <b>UNIT -3 PLANNING&amp; PREPARING DIET GASTROINTESTINAL DISORDERS</b>                  |  |                        |                          |                       |
| 3.1   | Assessing and planning diets for Celiac disease, Peptic Ulcer        | 6                      | Demonstration            | Cook wares & Utensils |
| 3.2   | Assessing and planning diets for Lactose intolerance,                | 6                      | Demonstration            | Cook wares & Utensils |

|   |  |   |               |                       |
|---|--|---|---------------|-----------------------|
| 3.3   | Assessing and planning diets for Hepatitis, Cirrhosis                | 6 | Demonstration | Cook wares & Utensils |
| <b>UNIT -5 PLANNING&amp; PREPARING DIET FOR PULMONARY, RENAL &amp; RHEUMATICS</b> |  |   |               |                       |
| 4.1   | Planning and preparing diet for Pneumonia                            | 6 | Demonstration | Cook wares & Utensils |
| 4.2   | Planning and preparing diet Rheumatic arthritis                      | 6 | Demonstration | Cook wares & Utensils |
| 4.3   | Planning and preparing diet Glomerulonephritis                       | 6 | Demonstration | Cook wares & Utensils |
| <b>UNIT -5 PLANNING&amp; PREPARING DIET FOR CANCER, BARIATRIC &amp; BURNS</b>     |  |   |               |                       |
| 5.1   | Planning and preparing diet for cancer.                              | 6 | Demonstration | Cook wares & Utensils |
| 5.2   | Planning and preparing diet pre and post Bariatric surgery patients. | 6 | Demonstration | Cook wares & Utensils |
| 5.3   | Planning and preparing diet for post burn condition.                 | 6 | Demonstration | Cook wares & Utensils |

**EVALUATION PATTERN**

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC |     | MARKS |       |
|------------|----|----|----|------------------|-----|-------|-------|
| C1         | C2 | C3 | C4 | C5               | CIA | ESE   | Total |
| 15         |    | 3  | 5  | 2                | 25  | 75    | 100   |

| UG CIA Components |   |              |     |   |       |
|-------------------|---|--------------|-----|---|-------|
|                   |   |              | Nos |   |       |
| <b>C1</b>         | - | Test (CIA 1) | 1** | - | 15Mks |
| <b>C2</b>         | - | Test (CIA 2) | 1** | - | 15Mks |
| <b>C3</b>         | - | Assignment   | 1   | - | 3Mks  |
| <b>C4</b>         | - | Quiz         | 2 * | - | 5 Mks |
| <b>C5</b>         | - | Attendance   |     | - | 2Mks  |

**\*\* Average of C1 and C2 will be taken.**

**\*The best out of two will be taken into account**

## COURSE OUTCOMES

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

| NO.  | COURSE OUTCOMES   | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|------|---|--|----------------|
| CO 1 | Discuss and plan diet for weight imbalance.   | K2   | PSO2 & PSO3    |
| CO 2 | Plan and prepare diet for Diabetes Mellitus [IDDM and NIDDM] and Atherosclerosis with Hypertension                            | K2   | PSO2 & PSO3    |
| CO 3 | Assess and plan diets for<br>Analyse the diet for Celiac disease, Peptic Ulcer, Lactose intolerance, Hepatitis and Cirrhosis. | K3   | PSO2 & PSO3    |
| CO 4 | Pneumonia, Rheumatic arthritis and Glomerulonephritis   | K4   | PSO2 & PSO3    |
| CO 5 | Recommend diet for cancer, pre and post Bariatric surgery patients and post burn condition.                                   | K5   | PSO2 & PSO3    |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 3     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO2      | 1     | 3     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO3      | 1     | 3     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO4      | 1     | 3     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO5      | 1     | 3     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |

**Mapping of COs with POs**

| CO/<br>PSO | PO1 | PO2 | PO3 | PO4 |
|------------|-----|-----|-----|-----|
| 1          | 2   | 1   | 1   | 1   |
| 2          | 1   | 1   | 1   | 1   |
| 3          | 1   | 1   | 1   | 1   |
| 4          | 1   | 1   | 1   | 1   |
| 5          | 2   | 1   | 1   | 1   |

**Note:**    " Strongly Correlated – 3        " Moderately Correlated – 2        Weakly Correlated -1

**COURSE DESIGNER:**

1. Dr.K.Karthiga

2. Mrs.D.Mouna

**Forwarded By**



(Dr.S. Santhi)

**100% SKILL DEVELOPMENT**

**I M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS**  
**SEMESTER –I**

*For those who joined in 2023 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE                        | CATEGORY | HRS/ WEEK | CREDITS |
|----------------|-------------|-------------------------------------|----------|-----------|---------|
| PSNN           | 23PG1NE1    | Functional Foods and Nutraceuticals | Elective | 5         | 3       |

**COURSE DESCRIPTION**

The course contents are an eye opener to students on the terminologies, importance, therapeutic applications of nutraceuticals from sources through plant, animal and microbes.

**COURSE OBJECTIVES**

- To enable students to understand the relation between Functional Foods, Nutraceuticals to Food and Drugs
- To introduce them to various functional food groups and products
- To enable students understand the regulatory aspects of Functional Foods and nutraceuticals

**UNITS****UNIT- I INTRODUCTION TO FUNCTIONAL FOODS & NUTRACEUTICALS**

**(18 HRS.)**

Functional foods and Nutraceuticals – Definition and history.

Teleology – definition, primary and secondary metabolites.

Organisational Models for Nutraceuticals - a) Food Sources b) Mechanism of Action c) Chemical Nature

Consumer Marketing - Factors for marketing functional foods and nutraceuticals.

**UNIT –II FUNCTIONAL COMPONENTS FROM PLANT SOURCES (18 HRS.)**

- (i) Nutrient Molecules: a) Phospholipids b) Vitamin K c) Carbohydrate Derivatives- Dietary fiber - Types and sources, Physical and Physiological properties d) Minerals – Zinc, Selenium.
- (ii) Non Nutrient Molecules: a) Phenolic compounds – Phytoestrogens (Isoflavones, Lignans) Flavonoids – Quercetin, kempferol, Flavones – limonene, Flavols – Catechin, Phenolic acid – Ellagic acid, Caffeic acid b) Phytosterols and phytostenols c) Saponins d) Tannins  
e) Carotenoids - Lycopene, Beta-carotene, Lutein and zeaxanthin

### **UNIT-III FUNCTIONAL COMPONENTS FROM ANIMAL SOURCES (18 HRS.)**

- (i) Major and minor components in cow's Milk and Human Milk  
Proteins – lactalbumin, lactoglobulin, lactoferrin, immunoglobulins,  
Derived peptides – casein phospho peptides, glycomacro peptides,  
Lactose. Fat. Mineral – zinc, selenium, Calcium
- (ii) Dietary lipids - Conjugated Linolenic Acid, linoleic acid, oleic acid, GLA
- (iii) Omega 3 and Omega 6 Fatty Acids

### **UNIT -IV MICROBES AS FUNCTIONAL FOODS (18 HRS.)**

General Functions of Intestinal Microflora

Prebiotics - Definition, role of prebiotic as functional ingredient, examples.

Probiotics - Definition, role of prebiotic as functional ingredient, examples.

Symbiotics - Definition, functions, examples.

### **UNIT -V HERBS AND FLOWERS AS FUNCTIONAL FOODS (18 HRS.)**

#### **Action of Herbs and Efficacy on:**

- a) Nervous System-Ginseng, St.John's wort, Ginkgo biloba, *Bacopa Monnieri*&*Centalla asiatica*
- b) Heart and Circulatory System-Hawthorn plant
- c) Immune System -Echinacea
- d) Digestive System-Ginger valerian root fennel
- e) Respiratory System-Licorice root, kava kava
- f) Urinary System-Cranberry, Saw palmetto
- g) Musculoskeletal System-Fever few

#### **Flowers**

Medicinal values, nutritional importance, culinary uses, effect of cooking of

Edible flowers – Drumstick, Neem, Agathi, Plantain

Ornamental edible flowers – Hibiscus, lotus, rose

**BOOK REFERENCES:**

1. Chatwick. R. (2003), Functional Foods Springer.
2. David H Watson (2001), Performance Functional Foods, Culinary and Hospitality Industry Publications.
3. Israel Goldberg (2001), Functional Foods Designer Foods Pharma Food, Nutraceuticals, Culinary and Hospitality Industry Publications.
4. Mary K Schmidl and Theodore P. Labuza, (2000), Essentials of Functional Foods, Culinary and Hospitality Industry Publications Services.
5. Mazza G. (1998), Functional Foods Biochemical Processing Aspects, Culinary and Hospitality Industry Publications.
6. Robert E C Wildman (2001), Handbook of Nutraceuticals and Functional Foods, Culinary and Hospitality Industry Publications.

**JOURNAL REFERENCES:**

1. Journal of Functional Foods
2. Nutraceuticals World Magazine - Exclusives, Markets, Health, Jobs, Events
3. The American Journal of Clinical Nutrition, Waverly Press, USA.
4. The Indian Journal of Medical Research, The Indian Council of Medical Research, New Delhi.

**Open Educational Resources:**

1. <https://search.proquest.com/openview/18c319d200432644bfd72f1cb4a1f812/1?pq-origsite=gscholar&cbl=1976406>
2. <https://www.healthline.com/nutrition/functional-foods#bottom-line>
3. <https://www.spinacafarms.com/blog/nutraceuticals-vs-supplements-and-functional-foods-whats-the-difference-anyways#:~:text=Functional%20foods%20look%20like%20food%20and%20are%20modified%20for%20greater,whole%20foods%20to%20augment%20health.>
4. <http://egyankosh.ac.in/bitstream/123456789/38355/1/Unit-9.pdf>
5. [https://chiro.org/nutrition/FULL/Functional\\_Foods.shtml](https://chiro.org/nutrition/FULL/Functional_Foods.shtml)
6. [https://fac.ksu.edu.sa/sites/default/files/lecture\\_1\\_457\\_0.pdf](https://fac.ksu.edu.sa/sites/default/files/lecture_1_457_0.pdf)
7. [https://www.researchgate.net/publication/328415909\\_Traditional\\_Foods\\_Functional\\_Foods\\_and\\_Nutraceuticals](https://www.researchgate.net/publication/328415909_Traditional_Foods_Functional_Foods_and_Nutraceuticals)

**COURSE CONTENTS & LECTURE SCHEDULE:**

| <b>Module No.</b>  | <b>Topic</b>   | <b>No. of Lectures</b> | <b>Teaching Pedagogy</b> | <b>Teaching Aids</b> |
|--|--|------------------------|--------------------------|----------------------|
| <b>UNIT -1 INTRODUCTION TO FUNCTIONAL FOODS AND NUTRACEUTICALS</b> |  |                        |                          |                      |
| 1.1  | Functional foods and Nutraceuticals – Definition and history.  | 4                      | Chalk & Talk             | PPT & White board    |
| 1.2  | Teleology – definition, primary and secondary metabolites.   | 5                      | Chalk & Talk             | PPT & White board    |
| 1.3  | Organisational Models for Nutraceuticals - a) Food Sources<br>b) Mechanism of Action: c) Chemical Nature | 5                      | Lecture                  | PPT & White board    |
| 1.4  | Consumer Marketing - Factors for marketing functional foods and nutraceuticals.                          | 4                      | Lecture                  | Black Board          |
| <b>UNIT -2 FUNCTIONAL COMPONENTS FROM PLANT SOURCES</b>            |  |                        |                          |                      |
| 2.1  | Nutrient Molecules: a) Phospholipids b) Vitamin K  | 3                      | Lecture                  | PPT & White board    |
| 2.2  | c) Carbohydrate Derivatives- Dietary fiber - Types and sources, Physical and Physiological properties    | 3                      | Discussion               | Black Board          |

|     |  |   |            |                      |
|-----|--|---|------------|----------------------|
| 2.3 | Non Nutrient Molecules: a)<br>Phenolic compounds –<br>Phytoestrogens (Isoflavones,<br>Lignans) Flavonoids – Quercetin,<br>kempferol, | 3 | Lecture    | PPT &<br>White board |
| 2.4 | Flavones – limonene, Flavols –<br>Catechin, Phenolic acid – Ellagic<br>acid, Caffeic acid  | 3 | Lecture    | LCD                  |
| 2.5 | b) Phytosterols and phytostenols<br>c) Saponins d) Tannins   | 3 | Lecture    | PPT &<br>White board |
| 2.6 | e) Carotenoids - Lycopene, Beta-<br>carotene, Lutein and zeaxanthin  | 3 | Discussion | Black Board          |

### UNIT -3 FUNCTIONAL COMPONENTS FROM ANIMAL SOURCES

|     |  |   |                 |             |
|-----|--|---|-----------------|-------------|
| 3.1 | Major and minor components in<br>cow's Milk and Human Milk   | 3 | Discussion      | Black Board |
| 3.2 | Proteins – lactalbumin,<br>lactoglobulin, lactoferrin,<br>immunoglobulins,<br>Derived peptides – casein<br>phospho peptides, glycomacro<br>peptides, | 4 | Lecture         | Black Board |
| 3.3 | Lactose. Fat. Mineral – zinc,<br>selenium, Calcium   | 3 | Chalk &<br>Talk | Black Board |
| 3.4 | Dietary lipids - Conjugated<br>Linolenic Acid, linoleic acid, oleic<br>acid, GLA   | 4 | Discussion      | Black Board |
| 3.5 | Omega 3 and Omega 6 Fatty<br>Acids   | 4 | Lecture         | Black Board |

### UNIT -4 MICROBES AS FUNCTIONAL FOODS

|  |   |   |              |                   |
|--|---|---|--------------|-------------------|
| 4.1  | General Functions of Intestinal Microflora  | 4 | Chalk & Talk | Black Board       |
| 4.2  | Prebiotics - Definition, role of prebiotic as functional ingredient, examples.                              | 5 | Lecture      | PPT & White board |
| 4.3  | Probiotics - Definition, role of prebiotic as functional ingredient, examples.                              | 5 | Lecture      | PPT & White board |
| 4.4  | Symbiotics - Definition, functions, examples.   | 4 | Lecture      | PPT & White board |
| <b>UNIT -5 HERBS AND FLOWERS AS FUNCTIONAL FOODS</b> |   |   |              |                   |
| 5.1  | a) Nervous System-Ginseng, St.John's wort, Ginkgo biloba, <i>Bacopa Monnieri</i> & <i>Centalla asiatica</i> | 3 | Chalk & Talk | Black Board       |
| 5.2  | b) Heart and Circulatory System-Hawthorn plant<br>c) Immune System -Echinacea                               | 3 | Lecture      | PPT & White board |
| 5.3  | d) Digestive System-Ginger<br>valerian root fennel<br>e) Respiratory System-Licorice root, kava kava        | 3 | Lecture      | LCD               |
| 5.4  | f) Urinary System-Cranberry, Saw palmetto<br>g) Musculoskeletal System-Fever few                            | 3 | Lecture      | PPT & White board |

|     |   |   |              |             |
|-----|---|---|--------------|-------------|
| 5.5 | Medicinal values, nutritional importance, culinary uses, effect of cooking of<br>Edible flowers – Drumstick, Neem, Agathi, Plantain | 3 | Discussion   | Black Board |
| 5.6 | Medicinal values, nutritional importance, culinary uses, effect of cooking of<br>Ornamental edible flowers – Hibiscus, lotus, rose  | 3 | Chalk & Talk | Black Board |

| CIA            |           |
|----------------|-----------|
| Scholastic     | <b>23</b> |
| Non Scholastic | <b>2</b>  |
|                | <b>25</b> |

## EVALUATION PATTERN

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 15         |    | 3  | 5  | 2                | 25    | 75  | 100   |

| PG CIA Components |   |              |     |   |        |
|-------------------|---|--------------|-----|---|--------|
|                   |   |              | Nos |   |        |
| <b>C1</b>         | - | Test (CIA 1) | 1** | - | 15 Mks |
| <b>C2</b>         | - | Test (CIA 2) | 1** | - | 15 Mks |
| <b>C3</b>         | - | Assignment   | 1   | - | 3 Mks  |
| <b>C4</b>         | - | Seminar      | 2 * | - | 5 Mks  |
| <b>C5</b>         | - | Attendance   |     | - | 2 Mks  |

**\*\* Average of C1 and C2 will be taken.**

**\*The best out of two will be taken into account**

## COURSE OUTCOMES

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

| NO.         | COURSE OUTCOMES   | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|-------------|---|--|----------------|
| <b>CO 1</b> | Discuss and understand the concepts of functional foods.                            | K2   | PSO2 & PSO4    |
| <b>CO 2</b> | Classify the bioactive components of functional foods.                              | K2   | PSO2 & PSO4    |
| <b>CO 3</b> | Identify the role of prebiotics, probiotics & synbiotics as functional ingredients. | K3   | PSO2 & PSO4    |
| <b>CO 4</b> | Discover the efficacy of herbs and flowers as functional foods                      | K4   | PSO2 & PSO4    |
| <b>CO 5</b> | Explain the role of Nutraceuticals in treating diseases                             | K5   | PSO2 & PSO4    |

**Mapping of COs with PSOs**

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 3     | 2     | 3     | 1     | 1     | 1     | 1     | 3     | 1      | 1      | 1      | 1      | 1      | 2      |
| CO2      | 1     | 3     | 2     | 3     | 1     | 1     | 1     | 1     | 2     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO3      | 1     | 3     | 2     | 3     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO4      | 1     | 3     | 1     | 3     | 1     | 1     | 1     | 1     | 2     | 1      | 1      | 1      | 1      | 1      | 2      |
| CO5      | 1     | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 2     | 1      | 1      | 1      | 1      | 1      | 2      |

**Mapping of COs with POs**

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 1   | 1   | 1   | 2   |
| CO2     | 1   | 2   | 2   | 1   |
| CO3     | 1   | 1   | 1   | 1   |
| CO4     | 1   | 1   | 1   | 1   |
| CO5     | 2   | 1   | 2   | 1   |

**Note:**    " Strongly Correlated – 3        " Moderately Correlated – 2        Weakly Correlated -1

**COURSE DESIGNER:**

**Mrs. D.Mouna**

**Forwarded By**



(Dr.S.Santhi)

**100% SKILL DEVELOPMENT****I M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS SEMESTER –IV***For those who joined in 2023 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE                             | CATEGORY | HRS/WEEK | CREDITS |
|----------------|-------------|--|----------|----------|---------|
| PSNN           | 23PG1NE2    | NUTRITION IN CRITICAL CARE AND DISASTERS | Elective | 5        | 3       |

**COURSE DESCRIPTION**

The course offers comprehensive knowledge on the assessment and management of nutritional support systems for critically ill.

**COURSE OBJECTIVES**

- To understand the physiology, metabolism and special nutritional requirements of the critically ill.
- To be familiar with special nutritional support techniques and feeding formulations to meet their nutritional requirements.

**UNITS**

**UNIT –I NUTRITIONAL SCREENING AND ASSESSMENT FOR THE CRITICALLY ILL (12 HRS.)**

Nutritional screening and nutritional status assessment of the critically ill. Nutritional support system and other life saving measures for the critically ill.

### **UNIT –II IMMUNO ENHANCERS AND SPECIAL DIETS IN CRITICAL CARE**

**(12 HRS.)**

Role of immuno enhancers, conditionally essential nutrients, immuno suppressants and special diets in critical care.

### **UNIT –III SPECIAL NUTRITIONAL THERAPY IN CRITICAL ILLNESSES –BURNS, CV AND KIDNEY**

**(12 HRS.)**

Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like stress, trauma, sepsis, burns, CV complications and surgery, dialysis, transplant, multiple organ failure.

### **UNIT –IV SPECIAL NUTRITIONAL THERAPY IN CRITICAL ILLNESSES –GI AND LIVER**

**(12 HRS.)**

Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like GI tract surgery, hepatic transplants.

### **UNIT –V REFEEDING SYNDROME AND ETHICAL ISSUES IN TERMINALLY ILL**

**(12 HRS.)**

Complications of nutritional support system including refeeding syndrome  
Diet related ethical issues in the terminally ill.

### **REFERENCES:**

1. Escott – Stump.S. (2000), *Krause's food Nutrition and Diet Therapy*, 10<sup>th</sup> Ed.W.S.Saunders Ltd.
2. Shields, R. (1992), *Bailliere's Clinical Gastroenterology*, Baillere Tindall London.
3. Shikora, S.A. and Blackburn. G.L. (1999). *Nutritional Support – Theory and Therapeutics*, Chapman and Hall, ITP (International Thompson Publishing).

### **JOURNAL REFERENCES:**

1. Indian Journal of Critical Care Medicine.
2. Journal of Parenteral and Enteral Nutrition
3. Journal of American Dietetic Association, American Dietetic Association, Mount Marris, Illinois, 61054, USA.
4. The American Journal of Clinical Nutrition, Waverfy Press, USA.
5. The Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi

**OPEN EDUCATIONAL RESOURCES:**

1. <https://scholar.google.co.in/scholar?q=oer+nutritional+support+for+>
2. <https://www.sciencedirect.com/science/article/abs/pii/S0899900704001649>
3. <https://www.sciencedirect.com/science/article/abs/pii/S0012369215321097>
4. <https://www.nejm.org/>
5. <https://aspenjournals.onlinelibrary.wiley.com/doi/abs/10.1177/0148607103027005355>

**COURSE CONTENTS & LECTURE SCHEDULE:**

| <b>Module No.</b>  | <b>Topic</b>  | <b>No. of Lectures</b> | <b>Teaching Pedagogy</b>      | <b>Teaching Aids</b>  |
|--|---|------------------------|-------------------------------|-----------------------|
| <b>UNIT -1 NUTRITIONAL SCREENING AND ASSESSMENT FOR THE CRITICALLY ILL</b>             |   |                        |                               |                       |
| 1.1  | Nutritional screening and nutritional status assessment of the critically ill.  | 6                      | Lecture                       | PPT                   |
| 1.2  | Nutritional support system and other life saving measures for the critically ill.   | 6                      | Chalk & Talk<br>Demonstration | Black Board<br>Models |
| <b>UNIT -2 IMMUNO ENHANCERS AND SPECIAL DIETS IN CRITICAL CARE</b>                     |   |                        |                               |                       |
| 2.1  | Role of immuno enhancers, conditionally essential nutrients in critical care.   | 6                      | Lecture                       | PPT                   |
| 2.2  | Role of immuno suppressants and special diets in critical care.   | 6                      | Lecture                       | PPT                   |
| <b>UNIT -3 SPECIAL NUTRITIONAL THERAPY IN CRITICAL ILLNESSES –BURNS, CV AND KIDNEY</b> |   |                        |                               |                       |
| 3.1  | Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like stress, trauma, sepsis, burns. | 4                      | Lecture                       | PPT                   |
| 3.2  | Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like CV complications and surgery.  | 4                      | Chalk & Talk                  | Black Board           |

|  |  |   |               |             |
|--|--|---|---------------|-------------|
| 3.3  | Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like dialysis, transplant, multiple organ failure. | 4 | Demonstration | Model       |
| <b>UNIT -4 SPECIAL NUTRITIONAL THERAPY IN CRITICAL ILLNESSES –GI AND LIVER</b> |  |   |               |             |
| 4.1  | Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like GI tract surgery.                             | 6 | Lecture       | PPT         |
| 4.2  | Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like hepatic transplants.                          | 6 | Lecture       | PPT         |
| <b>UNIT -5 REFEEDING SYNDROME AND ETHICAL ISSUES IN TERMINALLY ILL</b>         |  |   |               |             |
| 5.1  | Complications of nutritional support system including refeeding syndrome.  | 6 | Lecture       | PPT         |
| 5.2  | Diet related ethical issues in the terminally ill.   | 6 | Chalk & Talk  | Black Board |

|                   | C1      | C2      | C3      | C4             | C5      | Total<br>Scholastic<br>Marks | Non<br>Scholastic<br>Marks<br>C6 | CIA Total |
|-------------------|---------|---------|---------|----------------|---------|------------------------------|----------------------------------|-----------|
| Levels            | T1      | T2      | Seminar | Assignme<br>nt | OBT/PPT |                              |                                  |           |
|                   | 10 Mks. | 10 Mks. | 5 Mks.  | 5 Mks          | 5 Mks   | 35 Mks.                      | 5 Mks.                           | 40Mks.    |
| K2                | 4       | 4       | -       | -              | -       | 8                            | -                                | 8         |
| K3                | 2       | 2       | -       | 5              | -       | 9                            | -                                | 9         |
| K4                | 2       | 2       | -       | -              | 5       | 9                            | -                                | 9         |
| K5                | 2       | 2       | 5       | -              | -       | 9                            | -                                | 9         |
| Non<br>Scholastic | -       | -       | -       | -              | -       |                              | 5                                | 5         |
| Total             | 10      | 10      | 5       | 5              | 5       | 35                           | 5                                | 40        |

## CIA

Scholastic **35**Non Scholastic **5****40**

- All the course outcomes are to be assessed in the various CIA components.
- The levels of CIA Assessment based on Revised Bloom's Taxonomy for PG are :

**K2**-Understand, **K3**-Apply, **K4**-Analyse, **K5**-Evaluate

## EVALUATION PATTERN

| SCHOLASTIC |    |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5 | C6               | CIA   | ESE | Total |
| 10         | 10 | 5  | 5  | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test-1

**C2** – Internal Test-2

**C3** - Seminar

**C4** – Assignment

**C5** - OBT/PPT

**C6** – Non - Scholastic

## COURSE OUTCOMES

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

| <b>NO.</b>  | <b>COURSE OUTCOMES</b>   | <b>KNOWLEDGE<br/>LEVEL<br/>(ACCORDING<br/>TO REVISED<br/>BLOOM'S<br/>TAXONOMY)</b> | <b>PSOs<br/>ADDRESSED</b> |
|-------------|--|--|---------------------------|
| <b>CO 1</b> | Explain nutritional screening, assessment and support system for critically ill                | K2   | PSO10                     |
| <b>CO 2</b> | Discuss the role of immuno-enhancers and special diets in critical care                        | K2   | PSO10                     |
| <b>CO 3</b> | Plan special nutrition therapy in critical illness - stress, burns, cardiovascular and kidney  | K3   | PSO10                     |
| <b>CO 4</b> | Examine the special nutrition therapy in gastrointestinal tract surgery and hepatic transplant | K4   | PSO10                     |
| <b>CO 5</b> | Determine the refeeding syndrome and ethical issues in terminally ill                          | K5   | PSO10                     |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 3      | 1      | 1      | 1      | 1      | 1      |
| CO2      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 3      | 1      | 1      | 1      | 1      | 1      |
| CO3      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 3      | 1      | 1      | 1      | 1      | 1      |
| CO4      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 3      | 1      | 1      | 1      | 1      | 1      |
| CO5      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 3      | 1      | 1      | 1      | 1      | 1      |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 2   | 1   | 1   | 1   |
| CO2     | 2   | 1   | 1   | 1   |
| CO3     | 1   | 1   | 2   | 1   |
| CO4     | 1   | 1   | 2   | 1   |
| CO5     | 1   | 1   | 1   | 3   |

**Note: Strongly Correlated – 3      “ Moderately Correlated – 2      “ Weakly Correlated -1**

**COURSE DESIGNER:**  
**Dr.Vasantha Esther Rani**

**Forwarded By**



(Dr.S.Santhi)

**100% SKILL DEVELOPMENT**

**I M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS**  
**SEMESTER –I**

*For those who joined in 2023 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE              | CATEGORY   | HRS/WEEK | CREDITS |
|----------------|-------------|---------------------------|------------|----------|---------|
| PSNN           | 23PG1NE3    | Advanced Human Physiology | Major Core | 5        | 3       |

**COURSE DESCRIPTION**

The course provides a detailed insight on the anatomy and functions of the various systems of the human body.

**COURSE OBJECTIVES**

- Organs of the bod
- y and their functions
- Different systems of the body, their functions with special reference to the control and feedback mechanisms
- Physiological changes at different stages of life.

**UNITS**

**UNIT –I** **(18 HRS.)**

**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 CIRCULATORY SYSTEM (18 HRS.)****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 (18 HRS.)****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**

**(18 HRS.)**

### **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**

**(18 HRS.)**

### **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.

## **BOOK REFERENCES:**

1. Best and Taylor, The Living Body, Chapman and Hall ltd., London.
2. Chatterji (1999). *Human Physiology*, Roy Publications
3. Gitanjali Chatterjee (1999) *Handbook of Food and Nutrition*, Rajat Publications.
4. Guyton, A.C& Hall J.B (1996): *Textbook of Medical Physiology*, 9<sup>th</sup> edition W.B Sanders Company, Prism Books (Pvt) Ltd, Bangalore.
5. Kamala Krishnaswami (2000) *Nutrition Research-Current Scenerio and future trends*, Oxford and IBH Publishing Co.Pvt.ltd.,
6. LraineM.Summerfield (2000). *Nutrition ,exercise and behaviour an integrated approach to Weight management* ,Thomson learning,
7. Mahtab S. Bamji, Pralhad& Rao VinodhiniReddy.(1996) *Textbook of Human Nutrition*, Oxford, IBH publishing Co. pvt ltd.,
8. Margaret McWilliams (1994). *Experimental Food laboratory Manual*, Surjeet Publications,
9. Mickael J.Gibney, Ian A. Macdonald& Helen M. Roche (2004), *Nutrition and metabolism* Blackwell Publications,.
10. Mike Epsy (2001) *Nutrition Eating for good health*, Surbhi Publications, Jaipur,.

11. Sembulingam&PremaSembulingam (2006), *Essentials of Medical Physiology*,  
Yaypee Brothers, Medical Publishers (p) Ltd, New Delhi.
12. Vijay Kamshik (2000). *Food science and nutrition*, Mangal Deep Publications. Jaipur

### **JOURNAL REFERENCES:**

1. Journal of Applied Physiology
2. Journal of General Physiology
3. BMC Physiology
4. Physiological Reviews
5. International Journal of Basic & Applied Physiology

### **Open Educational Resources**

1. <https://journals.physiology.org/doi/full/10.1152/japplphysiol.00711.2011>
2. <https://www.springer.com/journal/421>
3. <https://opentextbooks.concordia.ca/oerbydiscipline/chapter/kinesiology-2/>
4. <https://publons.com/journal/39067/european-journal-of-applied-physiology-and-occupat/>
5. <https://openstax.org/details/books/anatomy-and-physiology>

### **E LEARNING CONTENT**

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

[Osmosishttps://youtu.be/TgcyiVQnVBs](https://youtu.be/TgcyiVQnVBs)-Respiratory system

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

### **COURSE CONTENTS & LECTURE SCHEDULE:**

| <b>Module No.</b>                           | <b>Topic</b>                                | <b>No. of Lectures</b> | <b>Teaching Pedagogy</b> | <b>Teaching Aids</b>                |
|---|---|------------------------|--------------------------|-------------------------------------|
| <b>UNIT -1 CELL AND TISSUES</b>             |   |                        |                          |                                     |
| 1.1   | Cell - Structure and Function               | 3                      | Chalk & Talk             | Black Board                         |
| 1.2   | Structure and function of cell              | 3                      | Chalk & Talk             | Black Board                         |
| 1.3   | Cell theory and Cycle.                      | 3                      | Lecture                  | PPT & Videos                        |
| 1.4   | Difference between Meiotic and Mitotic cell | 3                      | Lecture                  | Black Board                         |
| 1.5   | Stem cells- types and functions             | 3                      | Demonstration            | Blood coagulation and grouping kits |
| 1.6   | Structure and function of tissues           | 3                      | Lecture                  | PPT                                 |
| <b>UNIT -2 BLOOD AND CIRCULATORY SYSTEM</b> |   |                        |                          |                                     |
| 2.1   | Composition of blood                        | 2                      | Lecture                  | Model                               |
| 2.2   | Functions of blood                          | 2                      | Chalk & Talk             | Black Board                         |
| 2.3   | Blood Group – ABO System                    | 2                      | Lecture                  | PPT                                 |
| 2.5   | Rh factor                                   | 2                      | Lecture                  | Smart Board                         |
| 2.6   | Blood Coagulation                           | 2                      | Lecture                  | Videos                              |
|   | Structure & Function of Heart               | 2                      | Lecture                  | Model                               |
|   | Blood Vessels                               | 2                      | Lecture                  | PPT                                 |

|  |  |   |              |             |
|--|--|---|--------------|-------------|
|  | Systemic & Pulmonary circulation   | 1 | Chalk & Talk | Black Board |
|  | Cardiac cycle and Conduction   | 1 | Lecture      | Smart class |
|  | Heart rate and Cardiac output. ECG   | 2 | Discussion   | Black Board |
|  | Blood pressure & their regulations   | 1 | Lecture      | PPT         |
| <b>UNIT -3      RESPIRATORY AND ENDOCRINE SYSTEM</b> |  |   |              |             |
| 3.1  | Structure and function of respiratory system   | 2 | Lecture      | Smart class |
| 3.2  | Gas Laws pertaining to Gas Exchange  | 2 | Chalk & Talk | Black Board |
| 3.3  | Henry's Law of Partial Pressure  | 1 | Lecture      | PPT         |
| 3.4  | Boyle - Mariotte's Law of Volume and Pressure  | 1 | Lecture      | PPT         |
| 3.5  | Dalton's Law of Partial Pressure   | 3 | Lecture      | Smart class |
| 3.6  | Charles's Law of Ideal Gas Equation  | 2 | Lecture      | Smart class |
| 3.7  | Fick's Law of Diffusion  | 2 | Lecture      | PPT         |
| 3.8  | Mechanism of respiration   | 2 | Lecture      | PPT         |
| 3.9  | Circulation and Exchange of respiratory gases. Internal and External Respiration. Chloride shift | 2 | Lecture      | PPT         |

|   |   |   |              |             |
|---|---|---|--------------|-------------|
| 3.10  | Definitions of Lung volumes and Lung capacities, Ventilation and Artificial Respiration, Immunity, Endocrine system | 1 | Lecture      | PPT         |
| <b>UNIT -4 GASTROINTESTINAL AND REPRODUCTIVE SYSTEM</b> |   |   |              |             |
| 4.1   | Structure and function of GI tract  | 2 | Lecture      | PPT         |
| 4.2   | Structure and function accessory organ  | 2 | Lecture      | PPT         |
| 4.3   | Digestion and absorption of Carbohydrates   | 2 | Lecture      | PPT         |
| 4.4   | Digestion and absorption of protein   | 2 | Lecture      | PPT         |
| 4.5   | Digestion and absorption of fat   | 2 | Lecture      | PPT         |
| 4.6   | Role of hormones in reproduction and Lactation  | 2 | Lecture      | PPT         |
| 4.7   | Menstrual Cycle and Menopause   | 2 | Lecture      | PPT         |
| 4.8   | In vitro (I V) fertilization  | 2 | Lecture      | PPT         |
| 4.9   | Spermatogenesis   | 2 | Lecture      | PPT         |
| <b>UNIT -5 NERVOUS SYSTEM AND EXCRETORY SYSTEM</b>      |   |   |              |             |
| 5.1   | Structure and Function of Neuron  | 2 | Chalk & Talk | Black Board |
| 5.2   | Afferent and Efferent Nerves  | 3 | Lecture      | PPT         |

|      |  |   |              |             |
|------|--|---|--------------|-------------|
| 5.3  | Conduction of Nerve Impulse  | 2 | Chalk & Talk | Black Board |
| 5.4  | Sympathetic and Parasympathetic nervous System                                       | 2 | Lecture      | Smart class |
| 5.5  | Cerebrospinal fluid (CSF) – composition and function                                 | 1 | Discussion   | Videos      |
| 5.6  | Blood-brain barrier (BBB)  | 1 | Lecture      | PPT         |
| 5.7  | Electroencephalogram   | 1 | Chalk & Talk | Black Board |
| 5.8  | Organs in the Urinary System   | 2 | Lecture      | Smart class |
| 5.9  | Structure and functions of Nephron   | 1 | Chalk & Talk | Black Board |
| 5.10 | Juxtaglomerular Cell, Mechanism of formation of urine                                | 1 | Discussion   | Black Board |
| 5.11 | Role of kidney to regulate Blood pressure, Water, Electrolytes and Acid Base Balance | 1 | Discussion   | Black Board |
| 5.12 | Structure and function of skin. Regulation of temperature                            | 1 | Discussion   | Black Board |

| CIA            |           |
|----------------|-----------|
| Scholastic     | <b>23</b> |
| Non Scholastic | <b>2</b>  |
|                | <b>25</b> |

**EVALUATION PATTERN**

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 15         |    | 3  | 5  | 2                | 25    | 75  | 100   |

| PG CIA Components |   |              |     |   |        |
|-------------------|---|--------------|-----|---|--------|
|                   |   |              | Nos |   |        |
| <b>C1</b>         | - | Test (CIA 1) | 1** | - | 15 Mks |
| <b>C2</b>         | - | Test (CIA 2) | 1** | - | 15 Mks |
| <b>C3</b>         | - | Assignment   | 1   | - | 3 Mks  |
| <b>C4</b>         | - | Seminar      | 2 * | - | 5 Mks  |
| <b>C5</b>         | - | Attendance   |     | - | 2 Mks  |

**\*\* Average of C1 and C2 will be taken.**

**\*The best out of two will be taken into account**

**COURSE OUTCOMES**

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

| NO.  | COURSE OUTCOMES   | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|------|---|--|----------------|
| CO 1 | Describe the functions of blood and endocrine system                    | K2   | PSO1           |
| CO 2 | Illustrate the anatomy and functions of circulatory system              | K2   | PSO1           |
| CO 3 | Identify the role of digestive and excretory systems                    | K3   | PSO1           |
| CO 4 | Analyse the mechanism of musculoskeletal and respiratory systems        | K4   | PSO1           |
| CO 5 | Explain the structure and functions of nervous and reproductive systems | K5   | PSO1           |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO2      | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO3      | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO4      | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO5      | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |

**Mapping of COs with POs**

| CO/<br>PSO | PO1 | PO2 | PO3 | PO4 |
|------------|-----|-----|-----|-----|
| 1          | 2   | 1   | 1   | 1   |
| 2          | 1   | 1   | 1   | 1   |
| 3          | 1   | 1   | 1   | 1   |
| 4          | 1   | 1   | 1   | 1   |
| 5          | 2   | 1   | 1   | 1   |

**Note: Strongly Correlated – 3      “ Moderately Correlated – 2      “ Weakly Correlated -1**

**COURSE DESIGNER:**

**Dr.C.Helen**

**Forwarded**

**By**



(Dr.S.Santhi)

**100% SKILL DEVELOPMENT**

**I M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS**

**SEMESTER –I**

*For those who joined in 2023 onwards*

| PROGRAMME<br>CODE | COURSE<br>CODE | COURSE TITLE          | CATEGOR<br>Y | HRS/WEEK | CREDITS |
|-------------------|----------------|-----------------------|--------------|----------|---------|
| PSNN              | 23PG1NE4       | Food<br>Biotechnology | Elective     | 5        | 3       |

**COURSE DESCRIPTION**

The course offers knowledge on the scope, importance and the basic aspects of biotechnology relating to foods

### **COURSE OBJECTIVES**

- To enlighten the students on role of enzymes in food industries.
- To create awareness on biotechnological aspects of food additives
- To gain knowledge in plant and animal biotechnology

### **UNITS**

#### **UNIT –I ENZYMES**

**( 15HRS.)**

Definition, Properties of enzymes, Microorganisms producing enzymes, Methods of enzyme production, Self study : Enzymes produced -  $\alpha$ -amylases, lipases, proteases, Use of enzymes in food industry – Proteases, glucose oxidase, catalase, lactase.

#### **UNIT –II ENZYMES IN FRUIT JUICES AND BREWING**

**(15 HRS.)**

##### **INDUSTRY**

Enzymes used in the production of fruit juices, beer and distilled alcoholic drinks, processing steps of wine and beer.

#### **UNIT –III FOOD ADDITIVES**

**( 15HRS.)**

Organic acids – Production of citric acid, acetic acid, lactic acid

Sweeteners - Production of HFCS and glucose syrup

Microbial colour, Microbial flavours

Modification of starch and Oilseeds

#### **UNIT –IV FOOD AND PLANT, ANIMAL BIOTECHNOLOGY**

**( 15HRS.)**

Application of Plant and Animal Biotechnology in the Food industry.

Regulations and Oversight of Biotechnology

Fruits and Vegetables, Milled Corn Product and Milled Soy Products,

Golden rice, Vegetable oil.

Fish, Meat, Milk and Milk products

#### **UNIT –V GENETICALLY MODIFIED FOODS**

**( 15HRS.)**

Basic concepts of DNA structure, definition of Genetically modified foods, types and techniques of Genetically modified foods, health and safety concerns of Genetically modified foods for human consumption

Advantages and disadvantages of Genetically modified foods

Ethical issues of Genetically modified foods

## REFERENCES:

1. Dubey, R.C.( 1996) *A textbook of Biotechnology*, S. Chand and company ltd., New Delhi
2. Gupta, K. (1995). *Elements of Biotechnology*, Rastogi Publications, Meerut.
3. Sriram Sridhar. (2005) *Enzyme Biotechnology*, Dominant Publishers and Distributors, New Delhi
4. Rita Singh. (2004) *Food Biotechnology*, Global Vision Publishing House, Delhi.
5. Trevor Palmer. (2004). *Enzymes: Biochemistry, Biotechnology and Clinical chemistry*; Affiliated East West press pvt ltd., New Delhi.

## OPEN EDUCATIONAL REFERNCES:

1. <http://www.businessdictionary.com/definition/food-biotechnology.html>
2. <http://www.mrothery.co.uk/genetech/genetechnotes.htm>
3. <http://www.wpi.edu/Pubs/E-project/Available/E-project-031405-135846/unrestricted/IQP.pdf>
4. <http://oer.funai.edu.ng/wp-content/uploads/2017/10/BTG-307-Food-Biotechnology-I-Definition-and-Scope-of-Food-Biotechnology-By-Dr.-Friday-Nwalo.ppt>
5. <https://www.ncbi.nlm.nih.gov/books/NBK235032/>
6. <https://actascientific.com/ASAG/pdf/ASAG-03-0438.pdf>
7. [https://www.researchgate.net/publication/312875936\\_Applications\\_of\\_Food\\_Biot\\_echnology](https://www.researchgate.net/publication/312875936_Applications_of_Food_Biot_echnology)

## COURSE CONTENTS & LECTURE SCHEDULE:

### COURSE CONTENTS & LECTURE SCHEDULE:

| Module No.  | Topic   | No. of Lectures | Teaching Pedagogy | Teaching Aids     |
|---|---|-----------------|-------------------|-------------------|
| <b>UNIT -1 ENZYMES</b>                                      |   |                 |                   |                   |
| 1.1   | Enzymes – Definition, Properties of enzymes                                     | 2               | Chalk & Talk      | Black Board       |
| 1.2   | Microorganisms producing enzymes  | 2               | Chalk & Talk      | LCD               |
| 1.3   | Methods of enzyme production  | 4               | Lecture           | PPT & White board |
| 1.4   | Enzymes produced - $\alpha$ -amylases, lipases, proteases, ..                   | 3               | Lecture           | Smart Board       |
| 1.5   | Use of enzymes in food industry – Proteases, glucose oxidase, catalase, lactase | 4               | Lecture           | Black Board       |
| <b>UNIT -2 ENZYMES IN FRUIT JUICES AND BREWING INDUSTRY</b> |   |                 |                   |                   |
| 2.1   | Enzymes used in the production of fruit juices                                  | 3               | Lecture           | Black Board       |
| 2.2   | Enzymes used in the production of beer and distilled alcoholic drinks           | 4               | Chalk & Talk      | LCD               |
| 2.3   | processing steps of wine  | 4               | Lecture           | PPT & White board |
| 2.4   | processing steps of beer.   | 4               | Lecture           | Smart Board       |
| <b>UNIT -3 FOOD ADDITIVES</b>                               |   |                 |                   |                   |
| 3.1   | Organic acids – Production of citric acid, acetic acid, lactic acid             | 4               | Lecture           | Black Board       |

|     |   |   |              |                   |
|-----|---|---|--------------|-------------------|
| 3.2 | Sweeteners - Production of HFCS and glucose syrup | 4 | Lecture      | PPT & White board |
| 3.3 | Microbial colour                                  | 2 | Lecture      | Smart Board       |
| 3.4 | Microbial flavours                                | 3 | Chalk & Talk | LCD               |
| 3.5 | Modification of starch and Oilseeds               | 2 | Lecture      | PPT & White board |

#### **UNIT -4 FOOD AND PLANT BIOTECHNOLOGY**

|     |   |   |              |                   |
|-----|---|---|--------------|-------------------|
| 4.1 | Application of Plant Biotechnology in Food industry | 2 | Lecture      | PPT & White board |
| 4.2 | Fruits and Vegetables                               | 3 | Chalk & Talk | LCD               |
| 4.3 | Milled Corn Products                                | 3 | Chalk & Talk | LCD               |
| 4.4 | Milled Soy Products                                 | 2 | Lecture      | Black Board       |
| 4.5 | Golden rice   | 3 | Lecture      | PPT & White board |
| 4.6 | Vegetable oil                                       | 2 | Lecture      | PPT & White board |

#### **UNIT -5 FOOD AND ANIMAL BIOTECHNOLOGY**

|     |  |   |              |                   |
|-----|--|---|--------------|-------------------|
| 5.1 | Application of Animal Biotechnology in Food industry       | 2 | Lecture      | PPT & White board |
| 5.2 | fish, meat   | 3 | Lecture      | PPT & White board |
| 5.3 | milk and milk products                                     | 4 | Chalk & Talk | LCD               |
| 5.4 | Advantages and disadvantages of genetically modified foods | 2 | Chalk & Talk | LCD               |

|     |  |   |         |             |
|-----|--|---|---------|-------------|
| 5,5 | Ethical issues of genetically modified foods | 4 | Lecture | Black Board |
|-----|--|---|---------|-------------|

|                | C1                     | C2               | C3          | C4           | Total Scholastic Marks | Non Scholastic Marks C5 | CIA Total | % of Assessment |
|----------------|------------------------|------------------|-------------|--------------|------------------------|-------------------------|-----------|-----------------|
| Levels         | Session - wise Average | Better of W1, W2 | M1+M2       | MID-SEM TEST |                        |                         |           |                 |
|                | 5 Mks.                 | 5 Mks            | 5+5=10 Mks. | 15 Mks       | 35 Mks.                | 5 Mks.                  | 40Mks.    |                 |
| K1             | 5                      | -                | -           | 2 ½          | 7.5                    | -                       | 7.5       | 18.75 %         |
| K2             | -                      | 5                | 4           | 2 ½          | 11.5                   | -                       | 11.5      | 28.75 %         |
| K3             | -                      | -                | 3           | 5            | 8                      | -                       | 8         | 20 %            |
| K4             | -                      | -                | 3           | 5            | 8                      | -                       | 8         | 20 %            |
| Non Scholastic | -                      | -                | -           | -            |                        | 5                       | 5         | 12.5 %          |
| Total          | 5                      | 5                | 10          | 15           | 35                     | 5                       | 40        | 100 %           |

| CIA            |    |
|----------------|----|
| Scholastic     | 35 |
| Non Scholastic | 5  |
|                | 40 |

✓ All the course outcomes are to be assessed in the various CIA components.

✓ The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :

**K1-** Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

✓ **The I UG course teachers are requested to start conducting S1, W1, M1, in due intervals of time.**

## EVALUATION PATTERN

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 5          | 10 | 15 | 5  | 5                | 40    | 60  | 100   |

**C1** – Average of Two Session Wise Tests

**C2** – Average of Two Monthly Tests

**C3** - Mid Sem Test

**C4** – Best of Two Weekly Tests

**C5** – Non - Scholastic

## COURSE OUTCOMES

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

| NO.  | COURSE OUTCOMES   | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|------|---|--|----------------|
| CO 1 | Describe the techniques in enzymes production and its application             | K1   | PSO3& PSO5     |
| CO 2 | Infer the process distilled alcoholic beverages                               | K4   | PSO3& PSO5     |
| CO 3 | Classify the types of food additives of microorganism origin                  | K2   | PSO5           |
| CO 4 | Compute the concept of transgenic plants and its application in food industry | K3   | PSO5           |
| CO 5 | Interpret genetically modified foods and its application in food industry     | K5   | PSO5           |

### Mapping of COs with PSOs

| CO/<br>SO | PSO1  | PSO2  | PSO3  | PSO4  | PSO5  | PSO6  | PSO7  | PSO8  | PSO9  | PSO10 | PSO11 | PSO12 |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| CO1       |       |       | 3     |       | 3     |       |       |       |       |       |       |       |
| CO2       |       |       | 3     |       | 3     |       |       |       |       |       |       |       |
| CO3       |       |       | 3     |       | 3     |       |       |       |       |       |       |       |
| CO4       |       |       | 3     |       | 3     |       |       |       |       |       |       |       |
| CO5       |       |       | 3     |       | 3     |       |       |       |       |       |       |       |
| CO/<br>SO | PSO13 | PSO14 | PSO15 | PSO16 | PSO17 | PSO18 | PSO19 | PSO20 | PSO21 | PSO22 | PSO23 |       |
| CO1       |       |       |       |       |       |       |       |       | 1     |       |       |       |
| CO2       |       |       |       |       |       |       |       |       | 1     |       |       |       |
| CO3       |       |       |       |       |       |       |       |       | 1     |       |       |       |
| CO4       |       |       |       |       |       |       |       |       | 1     |       |       |       |
| CO5       |       |       |       |       |       |       |       |       | 1     |       |       |       |

### Mapping of COs with POs

| PO/<br>SO | PO1      | PO2      | PO3      | PO4 | PO5 |
|-----------|----------|----------|----------|-----|-----|
| PO1       | 3        | 3        | 3        | 1   | 3   |
| PO2       | 3        | 3        | 3        | 1   | 3   |
| PO3       | 3        | 3        | 3        | 1   | 3   |
| PO4       | 3        | 3        | 3        | 1   | 3   |
| PO5       | <b>3</b> | <b>3</b> | <b>3</b> | 1   | 3   |

**Note:** ♦ Strongly Correlated – **3**      ♦ Moderately Correlated – **2**      ♦  
Weakly Correlated -**1**

**COURSE DESIGNER:**  
**1Mrs..J. JosephineJesintha**

**Forwarded By**



(Dr.S.Santhi)

**100% EMPLOYABILITY**

**I M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS**  
**SEMESTER –II**

*For those who joined in 2023 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE          | CATEGORY | HRS/WEEK | CREDITS |
|----------------|-------------|-----------------------|----------|----------|---------|
| PSNN           | 23PG1NAE    | Nutrition & Dietetics | EDC      | 2        | 1       |

**COURSE DESCRIPTION**

This course offers scientific understanding of the role of nutrition in health diseases.

**COURSE OBJECTIVES**

- To understand the basics of nutrition.
- To learn the menu planning methods for family members.
- To learn the clinical aspects of disease conditions and diet therapy.

**UNITS**

**UNIT –I INTRODUCTION TO NUTRITION (12 Hrs)**

Nutrition – definition, nutritional status, nutrients and their function, relationship of food and health – Characteristics of good nutrition – balanced diet – BMI, IBW, Dietary guidelines-basic food groups, food pyramid

**UNIT –II MACRO NUTRIENTS (12 Hrs)**

Classification, functions, sources, deficiency of carbohydrates, protein, lipids.

**UNIT –III MICRO NUTRIENTS (12 Hrs)**

Functions, sources, deficiency disorders of Vitamins – Fat soluble vitamins A, D, E, K;  
Water Soluble vitamins – B1, B2, Niacin, B6, B12, Folic acid.

Minerals – Ca, P, Zn, Fe, I, Fl.

**UNIT –IV NUTRITION FOR DEVELOPMENTAL MILESTONES (12 Hrs)**

Menu planning, Principles of planning meals,

Nutritional importance of pregnancy, changes incurred and complications

Nutritional importance of lactation

Nutrition during infancy – growth and development, advantages of breast feeding and bottle feeding, formulation criteria for bottle milk. Supplementary foods.

Nutritional importance for adolescence.

**UNIT –V PRINCIPLE OF DIET THERAPY (12 Hrs)**

Definition of Diet therapy, Foods to be included and avoided – obesity and underweight, diabetes mellitus, typhoid, peptic ulcer, anaemia, CVD.

**BOOK REFERENCES:**

1. Srilakshmi B (2012) *Dietetics*, New Age International Publishers,
2. Antia F.P. (1989) *Nutrition Dietetics*, Oxford University Press
3. Swaminathan M (1988) *Advanced textbook on Food and Nutrition*, Vol I and Vol II, The Bangalore Printing and Publishing Co., Ltd.

**JOURNAL REFERENCES:**

1. The Indian Journal of Nutrition & Dietetics.
2. Clinical Journal of Nutrition & Dietetics

**OPEN EDUCATIONAL RESOURCES:**

1. <https://open.umn.edu/opentextbooks/textbooks/622>
2. <https://pressbooks.oer.hawaii.edu/humannutrition/>
3. [https://en.wikibooks.org/wiki/Fundamentals\\_of\\_Human\\_Nutrition](https://en.wikibooks.org/wiki/Fundamentals_of_Human_Nutrition)
4. <https://www.youtube.com/watch?v=sorIaN6vRBI>
5. <https://oer.galileo.usg.edu/cgi/viewcontent.cgi?article=1006&context=health-textbooks>

**COURSE CONTENTS & LECTURE SCHEDULE:**

| <b>Module No.</b>                        | <b>Topic</b>   | <b>No. of Lectures</b> | <b>Teaching Pedagogy</b> | <b>Teaching Aids</b> |
|--|--|------------------------|--------------------------|----------------------|
| <b>UNIT -1 INTRODUCTION TO NUTRITION</b> |  |                        |                          |                      |
| 1.1                                      | Nutrition – definition, nutritional status, nutrients and their function, relationship of food and health.       | 6                      | Lecture                  | PPT                  |
| 1.2                                      | Characteristics of good nutrition – balanced diet – BMI, IBW, Dietary guidelines-basic food groups, food pyramid | 6                      | Chalk & Talk             | Black Board          |
| <b>UNIT -2 MACRO NUTRIENTS</b>           |  |                        |                          |                      |
| 2.1                                      | Classification, functions, sources, deficiency of carbohydrates.   | 4                      | Lecture                  | PPT                  |
| 2.2                                      | Classification, functions, sources, deficiency of protein.   | 4                      | Chalk & Talk             | Black Board          |
| 2.3                                      | Classification, functions, sources, deficiency of lipids.  | 4                      | Lecture                  | PPT                  |
| <b>UNIT -3 MICRO NUTRIENTS</b>           |  |                        |                          |                      |
| 3.1                                      | Functions, sources, deficiency disorders of Vitamins – Fat soluble vitamins A, D,.                               | 3                      | Lecture                  | PPT                  |

|   |   |   |              |             |
|---|---|---|--------------|-------------|
| 3.2   | Functions, sources, deficiency disorders of E, K; Water Soluble vitamins – B1, B2.  | 2 | Chalk & Talk | Black Board |
| 3.3   | Functions, sources, deficiency disorders of Water Soluble vitamins –Niacin, B6, B12, Folic acid.  | 3 | Chalk & Talk | Black Board |
| 3.4   | Functions, sources, deficiency disorders of Minerals – Ca, P. Zn  | 2 | Lecture      | PPT         |
| 3.5   | Functions, sources, deficiency disorders of Minerals – Fe, I, Fl.   | 2 | Chalk & Talk | Black Board |
| <b>UNIT -4 NUTRITION FOR DEVELOPMENTAL MILESTONES</b> |   |   |              |             |
| 4.1   | Menu planning, Principles of planning meals,<br><br>Nutritional importance of pregnancy, changes incurred and complications<br><br>Nutritional importance of lactation. | 4 | Lecture      | PPT         |
| 4.2   | Nutrition during infancy – growth and development, advantages of breast feeding and bottle feeding, formulation criteria for bottle milk. supplementary foods.          | 4 | Lecture      | PPT         |

|  |   |   |              |                   |
|--|---|---|--------------|-------------------|
| 4.3                                      | Nutritional importance for adolescence.   | 4 | Chalk & Talk | Black Board       |
| <b>UNIT -5 PRINCIPLE OF DIET THERAPY</b> |   |   |              |                   |
| 5.1                                      | Definition of Diet therapy, Foods to be included and avoided – obesity and underweight, diabetes mellitus, typhoid. | 4 | Chalk & Talk | Black Board       |
| 5.2                                      | Definition of Diet therapy, Foods to be included and avoided- diabetes mellitus, typhoid.                           | 4 | Chalk & Talk | Black Board       |
| 5.3                                      | Definition of Diet therapy, Foods to be included and avoided- peptic ulcer, anaemia, CVD.                           | 4 | Lecture      | PPT & White board |

|                |           |
|----------------|-----------|
| CIA            |           |
| Scholastic     | <b>23</b> |
| Non Scholastic | <b>2</b>  |
|                | <b>25</b> |

## EVALUATION PATTERN

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 15         |    | 3  | 5  | 2                | 25    | 75  | 100   |

| UG CIA Components |   |              |     |   |       |
|-------------------|---|--------------|-----|---|-------|
|                   |   |              | Nos |   |       |
| <b>C1</b>         | - | Test (CIA 1) | 1** | - | 15Mks |
| <b>C2</b>         | - | Test (CIA 2) | 1** | - | 15Mks |
| <b>C3</b>         | - | Assignment   | 1   | - | 3Mks  |
| <b>C4</b>         | - | Quiz         | 2 * | - | 5 Mks |
| <b>C5</b>         | - | Attendance   |     | - | 2Mks  |

**\*\* Average of C1 and C2 will be taken.**

**\*The best out of two will be taken into account**

## COURSE OUTCOMES

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

| <b>NO.</b>  | <b>COURSE OUTCOMES</b>   | <b>KNOWLEDGE<br/>LEVEL<br/>(ACCORDING<br/>TO REVISED<br/>BLOOM'S<br/>TAXONOMY)</b> | <b>PSOs<br/>ADDRESSED</b> |
|-------------|--|--|---------------------------|
| <b>CO 1</b> | Describe different nutrition terms and concepts of food and nutrition.     | K2   | PSO2                      |
| <b>CO 2</b> | Explain the role of macro and micronutrients in human nutrition.           | K2   | PSO2                      |
| <b>CO 3</b> | Estimate the functions and deficiency effects of micronutrients.           | K3   | PSO2                      |
| <b>CO 4</b> | Determine the importance of nutrition in the different stages of lifespan. | K3   | PSO3                      |
| <b>CO 5</b> | Analyze the principles of diet therapy in the management of diseases.      | K4   | PSO3                      |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO2      | 1     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO3      | 1     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO4      | 1     | 2     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO5      | 1     | 1     | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 3   | 1   | 1   | 1   |
| CO2     | 2   | 1   | 1   | 1   |
| CO3     | 2   | 2   | 2   | 1   |
| CO4     | 2   | 1   | 1   | 1   |
| CO5     | 2   | 1   | 1   | 1   |

### COURSE DESIGNER:

1. Mrs. P.MagdaleneVirjini
2. Mrs. D. Mouna

Forwarded By



(Dr.S.Santhi)

**100% EMPLOYABILITY**

**I M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS**  
**SEMESTER –I**

*For those who joined in 2023 onwards*

| PROGRAMME<br>CODE | COURSE<br>CODE | COURSE<br>TITLE          | CATEGORY   | HRS/WEEK | CREDITS |
|-------------------|----------------|--------------------------|------------|----------|---------|
| PSNN              | 23PG2N4        | Advanced<br>Food Science | Major Core | 6        | 5       |

**COURSE DESCRIPTION**

The course provides a detailed insight on food science.

## **COURSE OBJECTIVES**

- 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

## **UNITS**

### **UNIT –I**

**(18 HRS.)**

**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**

**(18 HRS.)**

**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**

**(18 HRS.)**

**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**

**(18 HRS.)**

**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**

**(18 HRS.)**

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

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

#### **TEXT BOOKS:**

Srilakshmi B. (2015). Food Science.New Age International (P) Ltd.Publishers.

S.M. Reddy (2015). Basic Food science and technology. New Age International

publishers.AvantinaSharma (2017).Text book of food science and Technology. CBS Publisheres and distributes ltd. 3<sup>rd</sup> Edition.

Swaminathan A.(2018) . Handbook of Food and Nutrition, Bangalore press.

Serpil Sahin and ServetGulumSumnu.(2006).Physical properties of Foods.

Springer publications

## REFERENCES:

[Gerard L. Hasenhuettl](#) , [Richard W. Hartel](#). (2019). Food Emulsifiers and Their Applications. Springer publications. 3<sup>rd</sup> edition.

Vickie.A. Vaciavik. (2021). Essentials of Food science. Springer publications. 5<sup>th</sup> edition.

Dr.M.Swaminathan.(2015). Advanced text book of Food and Nutrition. volume-2.Bapco publications.

Eskein.(2012). Biochemistry of Food. Elsevier publications.

Lyn O brien Nabors.(2001). Alternative Sweeteners. Taylor and Francis publications.

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

## JOURNAL REFERENCES:

1. Journal of Applied Physiology
2. Journal of General Physiology
3. BMC Physiology
4. Physiological Reviews
5. International Journal of Basic & Applied Physiology

## Open Educational Resources

6. <https://journals.physiology.org/doi/full/10.1152/japplphysiol.00711.2011>
7. <https://www.springer.com/journal/421>
8. <https://opentextbooks.concordia.ca/oerbydiscipline/chapter/kinesiology-2/>
9. <https://publons.com/journal/39067/european-journal-of-applied-physiology-and-occupat/>
10. <https://openstax.org/details/books/anatomy-and-physiology>

## 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>

## COURSE CONTENTS & LECTURE SCHEDULE:

| Module No.     | Topic  | No. of Lectures | Teaching Pedagogy | Teaching Aids                       |
|----------------|--|-----------------|-------------------|-------------------------------------|
| <b>UNIT -1</b> |  |                 |                   |                                     |
| 1.1            | Properties of food- Food nutrients, solids, solutions and colloids, Solutions- Physical properties of solutions, classification of foods based on viscosity characteristics.                               | 3               | Chalk & Talk      | Black Board                         |
| 1.2            | 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 | 3               | Chalk & Talk      | Black Board                         |
| 1.3            | Starch - Sources, Structure and composition of starch; Properties and characteristics of food starches   | 3               | Lecture           | PPT & Videos                        |
| 1.4            | Modified food starches- Structure and composition  | 3               | Lecture           | Black Board                         |
| 1.5            | Effect of heat on food starch properties, gluten formation in wheat flour  | 3               | Demonstration     | Blood coagulation and grouping kits |

|                |  |   |              |             |
|----------------|--|---|--------------|-------------|
| 1.6            | Gelatinization, gelation and retrogradation, dextrinization and factors affecting gelatinization | 3 | Lecture      | PPT         |
| <b>UNIT -2</b> |  |   |              |             |
| 2.1            | Proteins-Structure and composition   | 2 | Lecture      | Model       |
| 2.2            | Classification and properties of proteins  | 2 | Chalk & Talk | Black Board |
| 2.3            | Effect of heat on physio-chemical properties of proteins   | 2 | Lecture      | PPT         |
| 2.5            | Role of proteins in food products; Texturized vegetable protein, protein concentrates            | 3 | Lecture      | Smart Board |
| 2.6            | Enzymes: Classification and its nature; Mechanism of action                                      | 3 | Lecture      | Videos      |
| 2.7            | Factors influencing enzyme activity; Role of enzymes in food products                            | 2 | Lecture      | Model       |
| 2.8            | Immobilized enzymes and its application in food industries                                       | 2 | Lecture      | PPT         |
| <b>UNIT -3</b> |  |   |              |             |
| 3.1            | Fats and oil -Structure, composition and properties of fats and oil                              | 2 | Lecture      | Smart class |

|                |  |   |              |             |
|----------------|--|---|--------------|-------------|
| 3.2            | Storage of fat, characteristics [shortening, plasticity, flavor, retention of moisture, melting point, optical activity, color, specific gravity], | 2 | Chalk & Talk | Black Board |
| 3.3            | Hydrogenation, winterization, flavor reversion, smoking point  | 1 | Lecture      | PPT         |
| 3.4            | Rancidity-Types, Mechanism and prevention; Role of fat/oil in food products; Fat substitutes   | 1 | Lecture      | PPT         |
| 3.5            | Sugar and sugar products-Types of sugar  | 3 | Lecture      | Smart class |
| 3.6            | Types of granulated sugar  | 2 | Lecture      | Smart class |
| 3.7            | Physical and chemical properties   | 2 | Lecture      | PPT         |
| 3.8            | Sugar products -Types of honey, Jaggery, corn syrup  | 2 | Lecture      | PPT         |
| 3.9            | Various forms of sugar used in cookery and   | 2 | Lecture      | PPT         |
| 3.10           | Crystallization of sugar   | 1 | Lecture      | PPT         |
| <b>UNIT -4</b> |  |   |              |             |
| 4.1            | Milk components- water, carbohydrate, milk fat, milk protein, minerals and other components in milk  | 2 | Lecture      | PPT         |

|                |   |   |              |             |
|----------------|---|---|--------------|-------------|
| 4.2            | Physiochemical properties of milk, Effect of physical and chemical factors on milk components | 2 | Lecture      | PPT         |
| 4.3            | Factors affecting coagulation, casein coagulation, minerals                                   | 2 | Lecture      | PPT         |
| 4.4            | Effects of enzymes-renin, fermented and non-fermented milk products                           | 3 | Lecture      | PPT         |
| 4.5            | Egg-proteins in Egg, microscopic structure of egg, characteristics                            | 3 | Lecture      | PPT         |
| 4.6            | Nutritional qualities, quality check, functional properties                                   | 3 | Lecture      | PPT         |
| 4.7            | - foaming, factors affecting foam formation   | 3 | Lecture      | PPT         |
| <b>UNIT -5</b> |   |   |              |             |
| 5.1            | Foodadditives- Definition   | 2 | Chalk & Talk | Black Board |
| 5.2            | Different food additives  | 3 | Lecture      | PPT         |
| 5.3            | Need for food additives   | 2 | Chalk & Talk | Black Board |
| 5.4            | Flavour compounds in vegetables, fruits and spices  | 3 | Lecture      | Smart class |
| 5.5            | Effect of processing on food flavours   | 2 | Discussion   | Videos      |

|     |   |   |              |             |
|-----|---|---|--------------|-------------|
| 5.6 | Role of colours and flavours in food products.          | 2 | Lecture      | PPT         |
| 5.7 | Sweetners- Properties, Artificial and Natural sweetners | 2 | Chalk & Talk | Black Board |
| 5.8 | Role of sweetners in food industry                      | 2 | Lecture      | Smart class |

| CIA            |           |
|----------------|-----------|
| Scholastic     | <b>23</b> |
| Non Scholastic | <b>2</b>  |
|                | <b>25</b> |

## EVALUATION PATTERN

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 15         |    | 3  | 5  | 2                | 25    | 75  | 100   |

| <b>PG CIA Components</b> |   |              |            |   |        |
|--------------------------|---|--------------|------------|---|--------|
|                          |   |              | <b>Nos</b> |   |        |
| <b>C1</b>                | - | Test (CIA 1) | 1**        | - | 15 Mks |
| <b>C2</b>                | - | Test (CIA 2) | 1**        | - | 15 Mks |
| <b>C3</b>                | - | Assignment   | 1          | - | 3 Mks  |
| <b>C4</b>                | - | Seminar      | 2 *        | - | 5 Mks  |
| <b>C5</b>                | - | Attendance   |            | - | 2 Mks  |

**\*\* Average of C1 and C2 will be taken.**

**\*The best out of two will be taken into account**

## **COURSE OUTCOMES**

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

| <b>NO.</b>  | <b>COURSE OUTCOMES</b>   | <b>KNOWLEDGE LEVEL<br/>(ACCORDING TO REVISED BLOOM'S TAXONOMY)</b> | <b>PSOs ADDRESSED</b> |
|-------------|--|--|-----------------------|
| <b>CO 1</b> | Describe the relationship between the chemical structure and the properties of the main components in food | K2   | PSO1                  |
| <b>CO 2</b> | Illustrate the Composition and characteristics of various food commodities.                                | K2   | PSO1                  |
| <b>CO 3</b> | Identify the role cooking quality of foods and apply food science knowledge in food industries             | K3   | PSO1                  |
| <b>CO 4</b> | Analyse the nutrients and functions of foods in maintaining health   | K4   | PSO1                  |
| <b>CO 5</b> | Explain the proper use of food colors and food additives in safe food preparation.                         | K5   | PSO1                  |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO2      | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO3      | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO4      | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO5      | 3     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| 1       | 2   | 1   | 1   | 1   |
| 2       | 1   | 1   | 1   | 1   |
| 3       | 1   | 1   | 1   | 1   |
| 4       | 1   | 1   | 1   | 1   |
| 5       | 2   | 1   | 1   | 1   |

**Note: Strongly Correlated – 3      “ Moderately Correlated – 2      “ Weakly Correlated -1**

**COURSE DESIGNER:**  
**Dr.C.Helen**

**Forwarded By**



(Dr.S.Santhi)

**100% SKILL DEVELOPMENT**

**I M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS  
SEMESTER –II**

*For those who joined in 2023 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE               | CATEGORY   | HRS/WEEK | CREDITS |
|----------------|-------------|----------------------------|------------|----------|---------|
| PSNN           | 23PG2N5     | Analytical Instrumentation | Major Core | 6        | 5       |

**COURSE DESCRIPTION**

The course offers the understanding of the principles, instrumentation and analytical techniques of food

**COURSE OBJECTIVES**

- To understand the principle and instrumentation of hi-tech analytical techniques.
- To gain knowledge on applications of different analytical instruments.

**UNITS**

**UNIT –I CHROMATOGRAPHY****(18HRS.)**

Meaning – Types of Chromatography – principles, components and applications of

- i. Paper Chromatography – Ascending and descending – One and two dimensional
- ii. Thin Layer Chromatography
- iii. Gas Chromatography
- iv. Ion exchange
- v. Gel filtration
- vi. High Performance Liquid Chromatography

**UNIT –II ELECTROPHORESIS****(18 HRS.)**

Meaning –Types –Paper, Starch, Gel, Agar-gel, Poly Acrylamide gel, Moving boundary Electrophoresis, Immuno electrophoresis – Principle – components – Applications.

**UNIT –III COLORIMETRY, FLUORIMETRY AND****CENTRIFUGATION****(18 HRS.)**

Photoelectric Colorimeters, Fluorimeters –Principle -Applications.

**CENTRIFUGATION:**

Types of Centrifuge – Ordinary and Ultracentrifuge - Principle and applications.

**MICROBIOLOGICAL ASSAYS**

Types of Assays -Principle - Requirements for the conduct of Microbiological assays – Applications.

**UNIT –IV SPECTROSCOPY****(18 HRS.)****SPECTROSCOPY:**

Spectrophotometry – Spectrophotometers – Atomic Absorption Spectrophotometry & ICP.

Spectrophotometers –Principle – Applications.

**NMR and NIR:**

Nuclear Magnetic Resonance- Application and principle

Near Infra Red -Principle and Application

**UNIT –V ISOTOPES****( 18 HRS.)**

Types – Stable and Radioactive, Units of radio-activity – Uses in biological investigations - Geiger Muller Counter and Scintillation Counter –Effects of ionizing radiation-hazards and prevention - Applications.

**pH and Buffer:**

pH meter –measurement of pH, Buffer – Definition – Types – Buffer system with special reference to living body

**BOOK REFERENCES:**

1. Ewing. W.W. (1970). *Instrumental Methods of Chemical Analysis*. McGraw Hill Book Company, New Delhi.
2. Mahinder Singh,(2003). *Analytical Chemistry – Instrumental Techniques*. Dominant Publishers and Distributors, New Delhi.
3. Nikelal, (1973). *Experimental methods in Biophysical Chemistry*. John Wiley Publishers.
4. Yadav M.S (2001). *Instrumental Methods of Chemical Analysis*. Campus Books Internationals, New Delhi.

**Open Educational Resources:**

- 1.<https://microbenotes.com/types-of-chromatography/>
- 2.<https://www.slideshare.net/BlueRose9/electrophoresis-78994484>
- 3.<https://study.com/academy/lesson/spectrophotometer-definition-uses-parts.html>
- 4.<https://www.thermofisher.com/in/en/home/industrial/spectroscopy-elemental-isotope-analysis/spectroscopy-elemental-isotope-analysis-learning-center/molecular-spectroscopy-information/nmr-information/nmr-applications-process-control.html>
- 5.<https://dlc.dcccd.edu/biology1-2/ph-and-buffers>

**COURSE CONTENTS & LECTURE SCHEDULE:**

| <b>Module No.</b>              | <b>Topic</b>  | <b>No. of Lectures</b> | <b>Teaching Pedagogy</b> | <b>Teaching Aids</b> |
|--------------------------------|---|------------------------|--------------------------|----------------------|
| <b>UNIT -1 CHROMOTOGRAPHY</b>  |   |                        |                          |                      |
| 1.1                            | Meaning, – principles, components and applications                        | 2                      | Chalk & Talk             | Black Board          |
| 1.2                            | Paper Chromatography – Ascending and descending – One and two dimensional | 5                      | Chalk & Talk             | LCD                  |
| 1.3                            | Thin Layer Chromatography   | 3                      | Seminar                  | PPT & White board    |
| 1.4                            | Gas Chromatography  | 2                      | Seminar                  | Smart Board          |
| 1.5                            | Ion exchange Chromatography   | 2                      | Seminar                  | Black Board          |
| 1.6                            | Gel filtration Chromatography   | 2                      | Chalk & Talk             | LCD                  |
| 1.7                            | High Performance Liquid Chromatography                                    | 2                      | Chalk & Talk             | LCD                  |
| <b>UNIT -2 ELECTROPHORESIS</b> |   |                        |                          |                      |
| 2.1                            | Meaning –Types of Electrophoresis   | 2                      | Lecture                  | Black Board          |
| 2.2                            | Pape Electrophoresis  | 2                      | Chalk & Talk             | LCD                  |
| 2.3                            | Starch Electrophoresis  | 2                      | Seminar                  | PPT & White board    |
| 2.4                            | Gel, Agar-gel Electrophoresis   | 4                      | Seminar                  | Smart Board          |
| 2.5                            | Poly Acrylamide gel   | 3                      | Seminar                  | Black Board          |
| 2.6                            | Moving boundary Electrophoresis   | 2                      | Chalk & Talk             | LCD                  |

|   |  |   |              |             |
|---|--|---|--------------|-------------|
| 2.7   | Immuno electrophoresis   | 3 | Chalk & Talk | LCD         |
| <b>UNIT 3 COLORIMETRY, FLUORIMETRY AND CENTRIFUGATION</b> |  |   |              |             |
| 3.1   | Photoelectric Colorimeters, Principle -Applications.                   | 3 | Lecture      | Black Board |
| 3.2   | Fluorimeters –Principle - Applications.                                | 3 | Seminar      | Smart Board |
| 3.3   | Types of Centrifuge – Ordinary Centrifuge -Principle and applications. | 3 | Seminar      | Black Board |
| 3.4   | Types of Centrifuge – Ultra Centrifuge -Principle and applications.    | 3 | Chalk & Talk | LCD         |
| 3.5   | Types of Assays -Principle   | 3 | Chalk & Talk | LCD         |
| 3.6   | Requirements for the conduct of Microbiological assays                 | 2 | Seminar      | LCD         |
| 3.7   | Applications of Microbiological assays                                 | 1 | Chalk &Talk  | LCD         |
| <b>UNIT 4 SPECTROSCOPY</b>                                |  |   |              |             |
| 4.1   | Spectrophotometry – Principle – Applications.                          | 4 | Seminar      | LCD         |
| 4.2   | Atomic Absorption Spectrophotometers - Principle – Applications.       | 5 | Chalk & Talk | LCD         |
| 4.3   | Nuclear Magnetic Resonance- Application and principle                  | 5 | Seminar      | LCD         |
| 4.4   | Near Infra Red -Principle and Application                              | 4 | Seminar      | Smart Board |
| <b>UNIT 5 ISOTOPES</b>                                    |  |   |              |             |
| 5.1   | Types – Stable and Radioactive Isotopes                                | 2 | Seminar      | LCD         |

|     |  |   |              |             |
|-----|--|---|--------------|-------------|
| 5.2 | Units of radio-activity  | 1 | Chalk & Talk | LCD         |
| 5.3 | Uses in biological investigations                                    | 2 | Seminar      | Smart Board |
| 5.4 | Geiger Muller Counter and Scintillation Counter                      | 3 | Seminar      | LCD         |
| 5.5 | Effects of ionizing radiation-hazards and prevention - Applications. | 3 | Seminar      | Black Board |
| 5.6 | pH meter –measurement of pH  | 3 | Seminar      | LCD         |
| 5.7 | Buffer – Definition – Types  | 1 | Lecture      | Black Board |
| 5.8 | Buffer system with special reference to living body.                 | 2 | Seminar      | Smart Board |

| CIA            |           |
|----------------|-----------|
| Scholastic     | <b>23</b> |
| Non Scholastic | <b>2</b>  |
|                | <b>25</b> |

## EVALUATION PATTERN

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 15         |    | 3  | 5  | 2                | 25    | 75  | 100   |

| UG CIA Components |   |              |     |   |       |
|-------------------|---|--------------|-----|---|-------|
|                   |   |              | Nos |   |       |
| <b>C1</b>         | - | Test (CIA 1) | 1** | - | 15Mks |
| <b>C2</b>         | - | Test (CIA 2) | 1** | - | 15Mks |
| <b>C3</b>         | - | Assignment   | 1   | - | 3Mks  |
| <b>C4</b>         | - | Seminar      | 2 * | - | 5 Mks |
| <b>C5</b>         | - | Attendance   |     | - | 2Mks  |

**\*\* Average of C1 and C2 will be taken.**

**\*The best out of two will be taken into account**

## COURSE OUTCOMES

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

| <b>NO.</b>  | <b>COURSE OUTCOMES</b>  | <b>KNOWLEDGE LEVEL<br/>(ACCORDING TO REVISED BLOOM'S TAXONOMY)</b> | <b>PSOs ADDRESSED</b> |
|-------------|---|--|-----------------------|
| <b>CO 1</b> | Explain the principle and instrumentation of chromatography   | K2   | PSO7                  |
| <b>CO 2</b> | Summarize the working procedure of electrophoresis  | K2   | PSO7                  |
| <b>CO 3</b> | Apply the principle, procedure and application of Photoelectric Colorimeters, Fluorimeters and Microbiological assays | K3   | PSO7                  |
| <b>CO 4</b> | Analyze the types of Spectrophotometry its principle, procedure and application                                       | K4   | PSO7                  |
| <b>CO 5</b> | Explain the different types of pH isotopes, buffers and its application   | K5   | PSO7                  |

### Mapping of COs with PSOs

| PS O | SO1 | SO2 | SO3 | SO4 | SO5 | SO6 | SO7 | SO8 | SO9 | SO10 | SO11 | PSO12 | PSO13 | PSO14 | PSO15 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-------|-------|-------|-------|
| PO1  | 1   | 1   | 1   | 1   | 1   | 1   | 3   | 2   | 1   | 1    | 1    | 1     | 1     | 1     | 1     |
| PO2  | 1   | 1   | 1   | 1   | 1   | 1   | 3   | 2   | 1   | 1    | 1    | 1     | 1     | 1     | 1     |
| PO3  | 1   | 1   | 1   | 1   | 1   | 1   | 3   | 2   | 1   | 1    | 1    | 1     | 1     | 1     | 1     |
| PO4  | 1   | 1   | 1   | 1   | 1   | 1   | 3   | 2   | 1   | 1    | 1    | 1     | 1     | 1     | 1     |
| PO5  | 1   | 1   | 1   | 1   | 1   | 1   | 3   | 2   | 1   | 1    | 1    | 1     | 1     | 1     | 1     |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 2   | 1   | 3   | 3   |
| CO2     | 2   | 1   | 3   | 3   |
| CO3     | 3   | 2   | 3   | 3   |
| CO4     | 3   | 1   | 1   | 1   |
| CO5     | 2   | 1   | 1   | 1   |

**Note:** Strongly Correlated – 3 Moderately Correlated – 2  
Correlated -1

**Weakly**

#### COURSE DESIGNERS:

1. Dr.K.Karthiga
2. Mrs. J.JosephineJesintha

**Forwarded By**



(Dr.S.Santhi)

**100% SKILL DEVELOPMENT****I M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS****SEMESTER –II***For those who joined in 2023 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE                          | CATEGORY   | HRS/ WEEK | CREDITS |
|----------------|-------------|---------------------------------------|------------|-----------|---------|
| PSNN           | 23PG2N6     | Techniques in Food Analysis Practical | Major Core | 6         | 4       |

**COURSE DESCRIPTION**

The practical course provides hands –on training in the use of hi-tech precision equipments to identify and analyze the various nutrients present in the food.

**COURSE OBJECTIVES**

- 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

**UNITS****UNIT –I INTRODUCTION TO LABORATORY PRACTICES (18HRS.)**

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 –II PREPARATION AND STANDARDISATION OF SOLUTION (18HRS.)**

## **UNIT –III ASHING OF FOOD (Thermogravimetric Method) and PREPARATION OF ASH SOLUTION(18HRS.)**

## **UNIT –IV FOOD ANALYSIS EXPERIMENTS (18HRS.)**

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 –V DEMONSTRATION EXPERIMENTS(18HRS.)**

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

## **REFERENCES:**

1. Berwal. J.S.,GrewalR.B.,Kapoor C.M &.Garg M.R (2004).*Practical Methods in Food Analysis*. Agrotech Publishing Academy, Udaipur.
2. Horwitz W.,(2000).*Official Methods of Analysis of AOAC International*.AOAC International publishers,Rockville,Mary Land.
3. Jayaraman J. (1996), *Laboratory Manual in Biochemistry*. New Age International Ltd. New Delhi.
4. Ranganna S. (1986), *Hand Book of Analysis and Quality Control for fruits and Vegetable Products*. Tata Mc Graw –Hill Publishing Company Limited, New Delhi.
5. Sadasivam S. & Manickam A. (1991), *Biochemical Methods*. New Age International Pvt.Ltd.,New Delhi.

6. Swaminathan.G&George.M (2002). *Laboratory Chemical Methods in Food Analysis*. Margham Publications, Chennai.
7. Yeshajahu Pomeranz & Clifton E. Meloan,( 2004), *Food Analysis –Theory and Practice*. CBS Publishers and Distributors, New Delhi.

**COURSE CONTENTS & LECTURE SCHEDULE:**

| <b>Module No.</b>   | <b>Topic</b>   | <b>No. of Lectures</b> | <b>Teaching Pedagogy</b>       | <b>Teaching Aids</b>     |
|---|--|------------------------|--------------------------------|--------------------------|
| <b>UNIT -1 INTRODUCTION TO LABORATORY PRACTICES (18HRS.)</b>                                      |  |                        |                                |                          |
| 1.1   | Autoclave<br>Hot Air Oven<br>PH Meter<br>Electronic Weighing Balance<br>Centrifuge<br>Hot Plate<br>Spectrophotometer | 9                      | Chalk & Talk,<br>Demonstration | Glasswares,<br>Equipment |
| 1.2   | Water bath<br>Muffle Furnace<br>Viscometer<br>IR Moisture Analyzer<br>Colorimeter                                    | 9                      | Chalk & Talk,<br>Demonstration | Glasswares,<br>Equipment |
| <b>UNIT -2 PREPARATION AND STANDARDISATION OF SOLUTION (18HRS.)</b>                               |  |                        |                                |                          |
| 2.1   | <b>Preparation and Standardisation of Solution</b>   | 18                     | Chalk & Talk,<br>Demonstration | Glasswares,<br>Equipment |
| <b>UNIT -3 ASHING OF FOOD (Thermogravimetric Method) and PREPARATION OF ASH SOLUTION (18HRS.)</b> |  |                        |                                |                          |
| 3.1   | <b>Ashing of Food and Preparation of Ash Solution</b>  | 18                     | Chalk & Talk,<br>Demonstration | Glasswares               |
| <b>UNIT -4 FOOD ANALYSIS EXPERIMENTS (18HRS.)</b>   |  |                        |                                |                          |

|   |   |    |                                |                          |
|---|---|----|--------------------------------|--------------------------|
| 4.1   | Moisture Content –<br>Thermogravimetric Analysis –<br>Air Oven Method and<br>Infrared Radiation (IR)<br>Moisture Analyzer Method<br>Crude Fibre – Gravimetric<br>Method<br>Iodine Number-Wiji's Method<br>Acid Number of oils | 9  | Chalk & Talk,<br>Demonstration | Glasswares               |
| 4.2   | Peroxide Value of Oils<br>Ascorbic Acid<br>Calcium<br>Iron<br>Phosphorous   | 9  |                                |                          |
| <b>UNIT -5 DEMONSTRATION EXPERIMENTS (18HRS.)</b> |   |    |                                |                          |
| 5.1   | Estimation of Protein<br>Estimation of fat<br>Pigment analysis  | 18 | Chalk & Talk,<br>Demonstration | Glasswares,<br>Equipment |

### EVALUATION PATTERN

| SCHOLASTIC |    |    |    | NON -<br>SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|---------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5                  | CIA   | ESE | Total |
| 10         | 10 | 10 | 5  | 5                   | 40    | 60  | 100   |

**C1** – Internal Test - 1

**C2** – Internal Test - 2

**C3** – Model Practical Exam**C4** – Record**C5** – Non - Scholastic**COURSE OUTCOMES**

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

| NO.         | COURSE OUTCOMES   | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|-------------|---|--|----------------|
| <b>CO 1</b> | Explain the principle and instrumentation of chromatography   | K2   | PSO7           |
| <b>CO 2</b> | Summarize the working procedure of electrophoresis  | K2   | PSO7           |
| <b>CO 3</b> | Apply the principle, procedure and application of Photoelectric Colorimeters, Fluorimeters and Microbiological assays | K3   | PSO7           |
| <b>CO 4</b> | Analyze the types of Spectrophotometry its principle, procedure and application                                       | K4   | PSO7           |
| <b>CO 5</b> | Explain the different types of pH isotopes, buffers and its application   | K5   | PSO7           |

**Mapping of COs with PSOs**

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 1     | 1     | 1     | 1     | 1     | 3     | 3     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO2      | 1     | 3     | 2     | 1     | 1     | 2     | 1     | 3     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO3      | 1     | 3     | 2     | 1     | 1     | 2     | 1     | 3     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO4      | 1     | 3     | 2     | 1     | 1     | 2     | 1     | 3     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO5      | 1     | 3     | 2     | 1     | 1     | 2     | 1     | 3     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 3   | 3   | 2   | 1   |
| CO2     | 3   | 3   | 2   | 1   |
| CO3     | 3   | 3   | 2   | 2   |
| CO4     | 3   | 3   | 1   | 2   |
| CO5     | 3   | 3   | 2   | 1   |

**Note: Strongly Correlated – 3      “ Moderately Correlated – 2      “ Weakly Correlated -1**

### COURSE DESIGNER:

1. Dr.K.KARTHIGA
2. Mrs. J.JOSEPHINE JESINTHA

**Forwarded By**



(Dr.S. Santhi)

**100% SKILL DEVELOPMENT****I M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS SEMESTER –II***For those who joined in 2023 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE                    | CATEGORY         | HRS/WEEK | CREDITS |
|----------------|-------------|---------------------------------|------------------|----------|---------|
| PSNN           | 23PG2NE5    | FOOD SAFETY AND QUALITY CONTROL | Major Elective 3 | 3        | 4       |

**COURSE DESCRIPTION**

The course provides an outline on the standards, tools and techniques to ensure safety and integrity of foods in food preparation and processing.

**COURSE OBJECTIVES**

- To develop approaches to identify food safety hazards in food processing.
- To apply preventive measures and control methods to minimize microbiological hazards and maintain quality of foods.
- To identify the wide variety of parameters affecting food quality.
- To develop quality control strategies.

**UNITS****UNIT –I BASIC CONCEPTS OF FOOD SAFETY AND FOOD LAWS (12 Hrs.)**

Food and its safety concerns, Importance of safe food, Factors affecting food safety, Threats to safety of food supply, Principles of food quality.

Food Quality management- Definition, Tenets of TQM, Benefits of TQM.

Food Laws: PFA, Essential Commodity Act, Standards of Weights and measures Act, Export Act.

Voluntary Laws: BIS, AGMARK, Consumer Protection Act, FSSAI

International Laws: Codex Alimentarius. Code India, ISO, FAO, WHO.

**UNIT –II NATURAL TOXINS IN FOOD****(12 Hrs.)**

Toxicants in animal foods – Shellfish

Toxicants in plant foods - Favism, Gossypol, Toxic amino acids, Toxic alkaloids, Cyanogens, Lima beans, Mushroom poisoning.

Antinutritional factors – Protease inhibitors, Trypsin inhibitors, Haemagglutinins, Phytates, Tannins, Oxalates, Goitrogens

**Environmental Toxins** - Mercury; Polybrominated biphenyl (PBB); Polychlorinated biphenyl (PCB); Lead; Cadmium; Pesticide residues; Contaminants from plastics

### **. UNIT – III FOOD ADDITIVES**

**(12 Hrs.)**

Definition, Importance of use in foods, Classification, Types - Preservatives, antioxidants, artificial colours, Flavour enhancers, bleaching agents, nutrient additives, Thickening and stabilizing agents, anticaking, antifoaming, sequestrants sweetening agents, GRAS - Generally Recommended As Safe (GRAS).

### **UNIT – IV QUALITY ASSURANCE IN FOOD**

**(12 Hrs.)**

HACCP – Definition, principles, Guidelines for application of HACCP principles.

ISO 22000, Halal

### **UNIT – V FOOD PACKAGING**

**(12 Hrs.)**

Definition, Functions of Packaging, Classification of Packaging materials, Packaging methods, Moisture Sorption Properties of foods and selection of packaging materials,

Interaction between packaging and foods.

Nutrition labeling and nutrition claims.

### **REFERENCES:**

1. Judith E. Brown, (2002), 3<sup>rd</sup> Ed, Nutrition Now, Wadsworth, London.
2. Pomeranz Y and Meloan CE (1996), *Food Analysis : Theory and Practice*, CBS Publishers and Distributors, New Delhi.
3. Shirley J. Van Grade, Margy Woodburn. (1999), “*Food Preservation and Safety Principles & Practice*”; Surabhi Publications.
4. Subbulakshmi.G; Shobha.A.Udipi, (2001), “*Food Processing and Preservation*”, New Age International Publishers.

### **JOURNAL REFERENCES:**

1. Journal of Food Quality Hazards Control
2. Journal of Food Safety
3. International Journal of Food Safety and Public Health

### **OPEN EDUCATION RESOURCES:**

1. [https://old.fssai.gov.in/Portals/0/Training\\_Manual/Presentation%20on%20concepts%20of%20Food%20Safety%20and%20Quality%20Management%20Systems](https://old.fssai.gov.in/Portals/0/Training_Manual/Presentation%20on%20concepts%20of%20Food%20Safety%20and%20Quality%20Management%20Systems)
2. <https://www.ag.ndsu.edu/foodlaw/overview/introhaccp>
3. <https://www.sesotec.com/apac/en/resources/blog/what-is-food-safety>
4. <https://ncert.nic.in/textbook/pdf/lehe106.pdf>
5. <https://www.who.int/news-room/fact-sheets/detail/natural-toxins-in-food#:~:text=Cassava%2C%20sorghum%2C%20stone%20fruits%2C,important%20foods%20containing%20cyanogenic%20glycosides>.
6. [https://www.cfs.gov.hk/english/multimedia/multimedia\\_pub/multimedia\\_pub\\_fsf\\_11\\_02.html](https://www.cfs.gov.hk/english/multimedia/multimedia_pub/multimedia_pub_fsf_11_02.html)
7. <https://www.who.int/news-room/fact-sheets/detail/food-additives>
8. <https://foodinsight.org/food-additives-and-ingredients-resources-you-can-use/>
9. <https://fssai.gov.in/upload/uploadfiles/files/Chapter1.pdf>
10. <https://fssai.gov.in/upload/uploadfiles/files/FSSAI-regulations.pdf>

### **COURSE CONTENTS & LECTURE SCHEDULE:**

| <b>Module No.</b>  | <b>Topic</b>  | <b>No. of Lectures</b> | <b>Teaching Pedagogy</b> | <b>Teaching Aids</b> |
|--|---|------------------------|--------------------------|----------------------|
| <b>UNIT -1 BASIC CONCEPTS OF FOOD SAFETY AND FOOD LAWS</b> |   |                        |                          |                      |
| 1.1  | Food and its safety concerns, Importance of safe food, Factors affecting food safety, Threats to safety of food supply, Principles of food quality. | 3                      | Chalk & Talk             | Black Board          |
| 1.2  | Food Laws: PFA, Essential Commodity Act, Standards of Weights and measures Act, Export Act.   | 3                      | Lecture                  | PPT                  |
| 1.3  | Voluntary Laws: BIS, AGMARK, Consumer Protection Act, FSSA.   | 3                      | Lecture                  | PPT                  |
| 1.4  | International Laws: Codex Alimentarius. Code India, ISO, FAO, WHO.  | 3                      | Lecture                  | PPT                  |
| <b>UNIT -2 NATURAL TOXINS IN FOOD</b>                      |   |                        |                          |                      |
| 2.1  | Toxicants in animal foods – Shellfish.  | 3                      | Lecture                  | PPT                  |

|                               |   |   |              |              |
|-------------------------------|---|---|--------------|--------------|
| 2.2                           | Toxicants in plant foods - Favism, Gossypol, Toxic amino acids, Toxic alkaloids, Cyanogens, Lima beans, Mushroom poisoning.                                   | 3 | Lecture      | PPT, Video   |
| 2.3                           | Antinutritional factors - Protease inhibitors, Trypsin inhibitors, Haemagglutinins, Phytates, Tannins, Oxalates, Goitrogens.                                  | 3 | Lecture      | PPT          |
| 2.4                           | Environmental Toxins - Mercury; Polybrominated biphenyl (PBB); Polychlorinated biphenyl (PCB); Lead; Cadmium; Pesticide residues; Contaminants from plastics. | 3 | Lecture      | PPT          |
| <b>UNIT -3 FOOD ADDITIVES</b> |   |   |              |              |
| 3.1                           | Definition, Importance of use in foods, Classification.   | 3 | Chalk & Talk | Black Board  |
| 3.2                           | Types - Preservatives, antioxidants, artificial colours, Flavour enhancers, bleaching agents, nutrient additives.   | 3 | Lecture      | PPT, Samples |
| 3.3                           | Thickening and stabilizing agents, anticaking, antifoaming, sequestrants sweetening agents.   | 3 | Lecture      | PPT, Samples |
| 3.4                           | GRAS - Generally Recommended As Safe (GRAS).  | 3 | Chalk & Talk | Black Board  |

**UNIT -4 QUALITY ASSURANCE IN FOOD**

|     |   |   |         |     |
|-----|---|---|---------|-----|
| 4.1 | HACCP – Definition, principles, Guidelines for application of HACCP principles.<br>ISO 22000, Halal | 6 | Lecture | PPT |
| 4.2 | ISO 22000, Halal  | 6 | Lecture | PPT |

**UNIT -5 FOOD PACKAGING**

|     |  |   |              |             |
|-----|--|---|--------------|-------------|
| 5.1 | Definition, Functions of Packaging, Classification of Packaging materials,                     | 6 | Lecture      | PPT         |
| 5.2 | Packaging methods, Moisture Sorption Properties of foods and selection of packaging materials, | 6 | Chalk & Talk | Black Board |

|                   | C1      | C2      | C3      | C4             | C5      | Total<br>Scholastic<br>Marks | Non<br>Scholastic<br>Marks<br>C6 | CIA Total |
|-------------------|---------|---------|---------|----------------|---------|------------------------------|----------------------------------|-----------|
| Levels            | T1      | T2      | Seminar | Assignme<br>nt | OBT/PPT |                              |                                  |           |
|                   | 10 Mks. | 10 Mks. | 5 Mks.  | 5 Mks          | 5 Mks   | 35 Mks.                      | 5 Mks.                           | 40Mks.    |
| K2                | 4       | 4       | -       | -              | -       | 8                            | -                                | 8         |
| K3                | 2       | 2       | -       | 5              | -       | 9                            | -                                | 9         |
| K4                | 2       | 2       | -       | -              | 5       | 9                            | -                                | 9         |
| K5                | 2       | 2       | 5       | -              | -       | 9                            | -                                | 9         |
| Non<br>Scholastic | -       | -       | -       | -              | -       |                              | 5                                | 5         |
| Total             | 10      | 10      | 5       | 5              | 5       | 35                           | 5                                | 40        |

## CIA

Scholastic **35**Non Scholastic **5****40**

- All the course outcomes are to be assessed in the various CIA components.
- The levels of CIA Assessment based on Revised Bloom's Taxonomy for PG are :

**K2**-Understand, **K3**-Apply, **K4**-Analyse, **K5**-Evaluate

**EVALUATION PATTERN**

| SCHOLASTIC |    |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5 | C6               | CIA   | ESE | Total |
| 10         | 10 | 5  | 5  | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test-1**C2** – Internal Test-2**C3** - Seminar**C4** – Assignment**C5** - OBT/PPT**C6** – Non - Scholastic**COURSE OUTCOMES**

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

| NO.  | COURSE OUTCOMES   | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|------|---|--|----------------|
| CO 1 | Outline the concept of food safety and food laws.                               | K2   | PSO13          |
| CO 2 | Explain the toxicants in animal and plant foods.                                | K2   | PSO13          |
| CO 3 | Identify food additives   | K3   | PSO13          |
| CO 4 | Examine the various quality assurance systems in food industries.               | K4   | PSO13          |
| CO 5 | Determine the functions, methods and properties of packaging and its materials. | K5   | PSO13          |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 3      | 1      | 1      |
| CO2      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 3      | 1      | 1      |
| CO3      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 3      | 1      | 1      |
| CO4      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 3      | 1      | 1      |
| CO5      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 3      | 1      | 1      |

### Mapping of COs with POs

| CO/<br>PSO | PO1 | PO2 | PO3 | PO4 |
|------------|-----|-----|-----|-----|
| CO1        | 2   | 1   | 1   | 1   |
| CO2        | 2   | 1   | 1   | 1   |
| CO3        | 1   | 2   | 1   | 1   |
| CO4        | 1   | 2   | 1   | 1   |
| CO5        | 2   | 1   | 1   | 1   |
| CO6        | 1   | 1   | 2   | 1   |

**Note: Strongly Correlated – 3      “ Moderately Correlated – 2      “ Weakly Correlated -1**

**COURSE DESIGNER:**

**1. Mrs.P.Magdalene Virjini**

**Forwarded By**



(Dr.S. Santhi)

**100% EMPLOYABILITY****I M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS****SEMESTER –II***For those who joined in 2023 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE          | CATEGORY | HRS/WEEK | CREDITS |
|----------------|-------------|-----------------------|----------|----------|---------|
| PSNN           | 23PG2NE6    | Performance Nutrition | Elective | 4        | 3       |

**COURSE DESCRIPTION**

The course explains the medical nutrition therapy for sports personnel, common diseases, and special conditions like sports related disease conditions.

**COURSE OBJECTIVES**

- To identify and describe the nutritional needs of normal & sports personnel.
- To identify and describe various sports related disease conditions.
- To gain knowledge on appropriate medical nutritional therapy for sports injury, sports anaemia, dehydration, gut disorders & allergies.
- To develop the attitude and capacity for taking up sport nutrition counselling as a profession.

**Units****Unit-I Introduction to Health & Exercise:**

Concept of health, Wellness, Well being . Specific fitness and health status. Physical Activities & Fitness: Concept to Fitness, Exercise -Definition, components of fitness, energy system – aerobic & anaerobic, nutritional demands of sports and dietary recommendations – objectives, nutritional requirements, dietary guidelines-

**Unit-II Holistic approach to the management of fitness and health:**

Energy input and output. Diet and Exercise Effect of specific nutrients on work performance and physical fitness. Nutrition, exercise, Physical fitness and health – inter-relationship.

**Unit III Nutrition in Sports:**

Sports specific requirement, Diet manipulation - Pre-game and post game meals. Assessment of different nutrigenic aids and commercial supplements. Diets for persons with high energy requirements, stress, fracture and injury.

#### **Unit IV Medical nutrition therapy (MNT):**

MNT for athletes with Nutrition related disorders; Diabetes and Cardiovascular disease: Physiological effect of exercise; Physical activity. Effects of long-term physical activity; Acute effects of exercise; Dietary guidelines and Nutrient timing; type of carbohydrate and timing; Pre and post event carbohydrate loading and fluids; Osteoporosis: Causes and consequences; Physiological effects of exercise; Sports Anaemia: Causes and consequences; .Physiological effects of exercise

#### **Unit V Sports Nutritional Therapy for Gut disorders:**

Athletes with gastrointestinal disorders: food allergies and food intolerance; GI disturbance; Excessive flatulence; Abdominal distention; Intermittent diarrhoea; Constipation; Food related adverse reactions (FRAR). Fluid intake- Water and electrolyte balance, losses and their replenishments during exercise and sports events, dehydration and its effects.

#### **References:**

1. "Fitness and Wellness" : Warner W. K Hoeger and Sharvon A. Hoegor.
2. "Fitness & Wellness concepts": Charles B. Corbina & Ruth Lindsey.
3. "Lifetime Fitness & Wellness - A personal choice": Melvin H. Williams
4. Oxford Textbook of Public Health, Helen Liepman. · Sunderlal, Aadarsh, Pankaj, 2007.
5. Textbook of Community Medicine, CBS Publishers & Distributors. · Kirch, Wilhelm, 2008.
6. Encyclopedia of Public Health, Volume 1 & 2, Kluwer Academic Publishers.
7. Mary -Jane Schneider and Henrey Schneider, 2006 (2nd edition), Introduction to Public Health, Jones and Bartlett Publishers.
8. Kathleen Mahan. L. Sylvia Escott-Stump, Janice L Raymond & Krause (2011) .*Food & Nutrition Therapy*, (13<sup>th</sup> ed), Elsevier Publications.
9. Robinson CH.(1994) . *Normal & Therapeutic Nutrition* XVIII Edition, Macmillan Publishers Company, New York.
10. Srilakshmi.B (1995). *Dietetics*, New Age International Private Ltd., New Delhi.
11. Sue Rodwell Williams. (2001). *Basic Nutrition and Diet therapy*, Mosby publications.

#### **JOURNAL REFERENCES:**

1. Food and Nutrition Bulletin United Nations University Press, Japan.
2. Journal of American Dietetic Association, The American Dietetic Association, Mount Marris, Illinois, 61054, USA.
3. Nutrition Abstracts and Reviews, CBB International, UK.

4. Nutrition Reviews, Nutrition Foundation, Washington, DC..
5. The Indian Journal of Medical Research, The Indian Council of Medical Research, New Delhi.

**WEB REFERENCES:**

1. [www.faseb.org/asns](http://www.faseb.org/asns)
2. [www.nutritionfoundation.org](http://www.nutritionfoundation.org)
3. [www.lifelines.com/ntnlknk.html](http://www.lifelines.com/ntnlknk.html)
4. [www.diabetes.org](http://www.diabetes.org)
5. [www.americanheart.org](http://www.americanheart.org)
6. [www.cancer.org](http://www.cancer.org)
7. [www.pugmarks.cons/aims](http://www.pugmarks.cons/aims)
8. [www.eatright.org/](http://www.eatright.org/)
9. [www.sea&airtravelnutrition.org](http://www.sea&airtravelnutrition.org)

**EVALUATION PATTERN**

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 5          | 10 | 15 | 5  | 5                | 40    | 60  | 100   |

**COURSE OUTCOMES**

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

| NO.  | COURSE OUTCOMES   | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|------|---|--|----------------|
| CO 1 | Concept of health and wellness<br>Physical activity and fitness                       | K2   | PSO 1          |
| CO 2 | Analyze Energy input and output.<br>Physical fitness and health – inter-relationship. | K2, K3   | PSO 1          |
| CO 3 | Summarize the concepts of Nutrition in sports   | K2, K4   | PSO 1 & PSO 2  |
| CO 4 | Build knowledge on Medical Nutrition Therapy  | K2   | PSO 3 & PSO 4  |
| CO 5 | Identify the sports nutrition therapy for gut disorders                               | K3& K5   | PSO 2          |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 3     |       | 3     | 3     |       |       |       |       |       |        |        |        |        |        |        |
| CO2      | 2     |       | 3     | 3     |       | 2     |       |       |       |        |        |        |        |        |        |
| CO3      | 3     | 2     | 2     | 2     |       | 2     |       |       |       |        |        |        |        |        |        |
| CO4      | 2     |       | 3     | 3     |       | 2     |       |       |       |        |        |        |        |        |        |
| CO5      | 2     | 2     | 3     | 3     |       | 2     |       |       |       |        |        |        |        |        |        |

**Mapping of COs with POs**

| CO/<br>PSO | PO1 | PO2 | PO3 | PO4 | PO5 |
|------------|-----|-----|-----|-----|-----|
| CO1        | 3   | 3   | 3   |     | 2   |
| CO2        | 3   | 2   | 2   |     |     |
| CO3        | 3   | 3   |     |     |     |
| CO4        | 3   | 3   |     |     | 2   |
| CO5        | 3   | 2   |     |     |     |

**Note:** Strongly Correlated – 3      " Moderately Correlated – 2  
                     " Weakly Correlated -1

**COURSE DESIGNERS:**

**Ms.P. Magdalene Virjini**

**Forwarded By**



(Dr.S.Santhi)

**100% SKILL DEVELOPMENT****I M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS****SEMESTER –II***For those who joined in 2023 onwards*

| <b>PROGRAMME CODE</b> | <b>COURSE CODE</b> | <b>COURSE TITLE</b>      | <b>CATEGORY</b>   | <b>HRS/ WEEK</b> | <b>CREDITS</b> |
|-----------------------|--------------------|--------------------------|-------------------|------------------|----------------|
| <b>PSNN</b>           | <b>23PG2NE7</b>    | <b>Food Microbiology</b> | <b>Major Core</b> | <b>4</b>         | <b>3</b>       |

**COURSE DESCRIPTION**

The course outlines the role of micro-organism in food spoilage, preservation and processing.

**COURSE OBJECTIVES**

- To gain knowledge of role of micro-organisms in humans and environment
- To understand the importance of micro-organisms in food spoilage and to learn advanced, techniques used in food preservation.
- To understand the latest procedures adopted in various food operations to prevent food-borne disorders and legal aspects involved in these areas.

**UNITS****UNIT –I FOOD AND MICROORGANISMS****(18 HRS.)**

Food Microbiology – Definition, Basic concept, History of Food Microbiology

Food as substrate for microorganisms – Hydrogen ion concentration, Water activity, Oxidation-Reduction potential, Nutrient content.

Microorganisms important in Food – Industrial importance of Mold, Yeast and Bacteria.

**UNIT –II FOOD BORNE INFECTIONS****(18 HRS.)**

Classification of Food borne diseases

Food infection – Definition, Classification, Types – Salmonellosis, *Clostridium perfringes* Gastroenteritis, *Bacillus cereus* Gastroenteritis, E.coli infection, Shigellosis

**UNIT-III FOOD BORNE INTOXICATION****(18 HRS.)**

Food Intoxication – Bacterial food intoxication – Botulism, Staphylococcal gastroenteritis, Mycotoxins – Definition, Types – Ochratoxin, Aflatoxin, Patulin.

Identification and Enumeration of Microbes in food – Preparation and Distribution of Culture Media, Inoculation of Culture media, Examination of Organisms, Plating techniques.

**UNIT-IV CONTAMINATION, SPOILAGE AND PRESERVATION OF FOODS****(18 HRS.)**

Contamination, Spoilage and Preservation - Cereals, Vegetables, Fruits, Meat, Fish, Egg, Poultry, Milk and its products, Canned foods.

General Principles of Food Preservation; Methods of Food Preservation- Asepsis, Removal of microorganisms, Maintenance of anaerobic conditions, Use of high temperature, Use of low temperature, Use of chemicals, Drying, Use of Radiation, Non thermal methods – Ohmic heating, High Pressure Processing, Cold Plasma Processing, Pulsed electric field.

**UNIT -V WATER MICROBIOLOGY (18 HRS.)**

Microbial analysis of water- Sanitary tests for coliforms, MPN of coliforms

Water borne diseases – Definition – common microorganism involved in water borne diseases.

Typhoid - Causes- incubation period – clinical symptoms – mode of transmission – prevention and control.

Diarrhoea- Causes- incubation period – clinical symptoms – mode of transmission- prevention and control.

Cholera – Causes- incubation period – clinical symptoms – mode of transmission- prevention and control.

**REFERENCES:**

1. Adams M.R.and M.O.Moss (2005), *Food Microbiology*, New Age International (P) Ltd., Publishers, New Delhi.
2. FrazierW.C, (2000), *Food Microbiology*, New Age International (P) Ltd., Publishers, New Delhi.
3. George J.Banwart (2004), *Basic Food Microbiology*, S.K.Jain for CBS Publishers and Distributors, New Delhi.
4. James.M.Jay, (1996), *Modern Food Microbiology*, S.K.Jain for CBS Publishers and Distributors ,4596/1A,11 Darya Ganj,New Delhi- 110 002,.
5. Pelczar.J, Jr.E.C.S.Chan, Noel R.Kieg, (1993), 5<sup>th</sup> edition *Microbiology*, Tata McGraw Hill Publishing Co., New Delhi,.
6. Rao A.S., (1998), *Introduction to Microbiology*, Asoke K, Ghosh, Pentice-Hall of India Pvt., New Delhi-110 001,
7. Sharma.P.D, (1996), *Microbiology*, Rakesh Kumar Rastogi for rastogi Publications “Gangotri” Shivaji road, Meerut.

**JOURNAL REFERENCES:**

1. International Journal of Food Microbiology.
2. Frontiers in Microbiology.

3. Annals of Microbiology.
4. Indian Journal of Microbiology.
5. Applied Microbiology and Biotechnology.

**OPEN EDUCATION RESOURCES**

1. <https://mediahub.unl.edu/media/9239#:~:text=This%20lecture%20provides%20an%20overview,affect%20bacterial%20growth%20and%20survival.>
2. [https://www.researchgate.net/publication/285514362\\_Basic\\_Food\\_Microbiology](https://www.researchgate.net/publication/285514362_Basic_Food_Microbiology)
3. <https://www.frontiersin.org/articles/10.3389/fmicb.2020.00237/full>
4. <https://courses.lumenlearning.com/boundless-microbiology/chapter/food-preservation/#:~:text=Preservation%20usually%20involves%20preventing%20the,or%20otherwise%20reduce%20food%20spoilage.>
5. <https://food.unl.edu/food-poisoning-foodborne-illness>

**COURSE CONTENTS & LECTURE SCHEDULE:**

| <b>Module No.</b>                       | <b>Topic</b>   | <b>No. of Lectures</b> | <b>Teaching Pedagogy</b> | <b>Teaching Aids</b> |
|---|--|------------------------|--------------------------|----------------------|
| <b>UNIT -1 FOOD AND MICROORGANISMS</b>  |  |                        |                          |                      |
| 1.1                                     | Food Microbiology – Definition, Basic concept  | 2                      | Chalk & Talk             | Black Board          |
| 1.2                                     | History of Food Microbiology   | 4                      | Lecture                  | PPT                  |
| 1.3                                     | Food as substrate for microorganisms – Hydrogen ion concentration, Water activity, Oxidation-Reduction potential, Nutrient content | 4                      | Lecture                  | PPT                  |
| 1.4                                     | Industrial importance of Mold, Yeast   | 5                      | Lecture                  | Videos               |
| 1.5                                     | Industrial importance of bacteria  | 3                      | Chalk & Talk             | Black Board          |
| <b>UNIT -2 FOOD BORNE INFECTIONS</b>    |  |                        |                          |                      |
| 2.1                                     | Classification of Food borne diseases<br>Food infection – Definition, types  | 4                      | Chalk & Talk             | Black Board          |
| 2.2                                     | Salmonellosis, Clostridium Perfringes  | 5                      | Chalk & Talk             | Black Board          |
| 2.3                                     | Gastroenteritis, Bacillus cereus gastroenteritis   | 5                      | Lecture                  | PPT                  |
| 2.4                                     | E.coli infection, Shigellosis  | 4                      | Lecture                  | PPT                  |
| <b>UNIT -3 FOOD BORNE INTOXICATIONS</b> |  |                        |                          |                      |

|  |  |   |                           |                   |
|--|--|---|---------------------------|-------------------|
| 3.1  | Food Intoxication – Bacterial food intoxication – Botulism, Staphylococcal gastroenteritis,                                      | 4 | Lecture                   | PPT               |
| 3.2  | Mycotoxins – Definition, Types – Ochratoxin, Aflatoxin, Patulin.   | 4 | Lecture                   | PPT               |
| 3.3  | Identification and Enumeration of Microbes in food – Preparation and Distribution of Culture Media, Inoculation of Culture media | 5 | Lecture cum demonstration | Hands on training |
| 3.4  | Examination of Organisms, Plating techniques.  | 5 | Lecture cum demonstration | Hands on training |
| <b>UNIT -4 CONTAMINATION, SPOILAGE AND PRESERVATION OF FOODS</b> |  |   |                           |                   |
| 4.1  | Contamination, Spoilage and Preservation - Cereals, Vegetables, Fruits   | 3 | Lecture                   | PPT               |
| 4.2  | Contamination, Spoilage & Preservation - Meat, Fish  | 2 | Lecture                   | PPT               |
| 4.3  | Contamination, Spoilage & Preservation - Egg, Poultry  | 3 | Lecture                   | PPT               |
| 4.4  | Contamination, Spoilage & Preservation - Milk and its products, Canned foods   | 2 | Lecture                   | Smart Board       |

|                                   |   |   |              |             |
|-----------------------------------|---|---|--------------|-------------|
| 4.5                               | General Principles of Food Preservation;<br>Methods of Food Preservation- Asepsis, Removal of microorganisms, Maintenance of anaerobic conditions | 2 | Lecture      | Videos      |
| 4.6                               | Use of high temperature, Use of low temperature, Use of chemicals, Drying, Use of Radiation   | 3 | Lecture      | Videos      |
| 4.7                               | Non thermal methods – Ohmic heating, High Pressure Processing, Cold Plasma Processing, Pulsed electric field                                      | 3 | Chalk & Talk | Black Board |
| <b>UNIT -5 WATER MICROBIOLOGY</b> |   |   |              |             |
| 5.1                               | Microbial analysis of water- Sanitary tests for coliforms, MPN of coliforms   | 4 | Chalk & Talk | Black Board |
| 5.2                               | Water borne diseases – Definition – common microorganism involved in water borne diseases   | 3 | Lecture      | PPT         |
| 5.3                               | Typhoid - Causes- incubation period – clinical symptoms – mode of transmission – prevention and control   | 4 | Chalk & Talk | Black Board |

|     |  |   |            |        |
|-----|--|---|------------|--------|
| 5.4 | Diarrhoea- Causes-incubation period – clinical symptoms – mode of transmission- prevention and control | 4 | Discussion | Videos |
| 5.5 | Cholera – Causes-incubation period – clinical symptoms – mode of transmission- prevention and control  | 3 | Lecture    | PPT    |

| Levels         | C1      | C2      | C3      | C4         | C5      | Total Scholastic Marks | Non Scholastic Marks C6 | CIA Total | % of Assessment |
|----------------|---------|---------|---------|------------|---------|------------------------|-------------------------|-----------|-----------------|
|                | T1      | T2      | Seminar | Assignment | OBT/PPT |                        |                         |           |                 |
|                | 10 Mks. | 10 Mks. | 5 Mks.  | 5 Mks      | 5 Mks   | 35 Mks.                | 5 Mks.                  | 40Mks.    |                 |
| K2             | 4       | 4       | -       | -          | -       | 8                      | -                       | 8         | 20 %            |
| K3             | 2       | 2       | -       | 5          | -       | 9                      | -                       | 9         | 22.5 %          |
| K4             | 2       | 2       | -       | -          | 5       | 9                      | -                       | 9         | 22.5 %          |
| K5             | 2       | 2       | 5       | -          | -       | 9                      | -                       | 9         | 22.5 %          |
| Non Scholastic | -       | -       | -       | -          | -       |                        | 5                       | 5         | 12.5 %          |
| Total          | 10      | 10      | 5       | 5          | 5       | 35                     | 5                       | 40        | 100 %           |

## CIA

|                |           |
|----------------|-----------|
| Scholastic     | <b>35</b> |
| Non Scholastic | <b>5</b>  |
| Total          | <b>40</b> |

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I PG are :**

**K2-Understand, K3-Apply, K4-Analyse, K5- Evaluate**

### EVALUATION PATTERN

| SCHOLASTIC |    |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5 | C6               | CIA   | ESE | Total |
| 10         | 10 | 5  | 5  | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test-1

**C2** – Internal Test-2

**C3** - Seminar

**C4** – Assignment

**C5** - OBT/PPT

**C6** – Non - Scholastic

### COURSE OUTCOMES

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

| NO.         | COURSE OUTCOMES  | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|-------------|--|--|----------------|
| <b>CO 1</b> | Discuss the basic concepts of food microbiology                    | K2   | PSO11          |
| <b>CO 2</b> | Describe food borne infections                                     | K2   | PSO11          |
| <b>CO 3</b> | Identify food borne intoxications                                  | K3   | PSO11          |
| <b>CO 4</b> | Analyze the contamination, spoilage and food preservation of foods | K4   | PSO11          |
| <b>CO 5</b> | Assess the water quality and explain water borne diseases          | K5   | PSO11          |

### Mapping of COs with PSOs

| CO / PSO   | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| <b>CO1</b> | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 1      |
| <b>CO2</b> | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 2      |
| <b>CO3</b> | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 1      |
| <b>CO4</b> | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 2      |
| <b>CO5</b> | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 1      |

### Mapping of COs with POs

| CO/<br>PSO | PO1 | PO2 | PO3 | PO4 |
|------------|-----|-----|-----|-----|
| C01        | 3   | 2   | 2   | 1   |
| C02        | 3   | 2   | 2   | 2   |
| C03        | 1   | 1   | 1   | 1   |
| C04        | 3   | 2   | 1   | 3   |
| C05        | 2   | 2   | 2   | 3   |

**Note: Strongly Correlated – 3      “ Moderately Correlated – 2      “ Weakly Correlated -1**

**COURSE DESIGNER:**

**1. Mrs. C.Helen**

**Forwarded By**



(Dr.S. Santhi)

**100% SKILL DEVELOPMENT**

**I M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS  
SEMESTER –II**

*For those who joined in 2023 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE                            | CATEGORY | HRS/WEEK | CREDITS |
|----------------|-------------|---|----------|----------|---------|
| PSNN           | 23PG2NE8    | Nutritional Assessment and Surveillance | Elective | 4        | 3       |

## COURSE DESCRIPTION

The course provides an overview of nutritional surveillance and assessment methods, emphasizing the importance of accurate data collection and analysis in public health nutrition

## COURSE OBJECTIVES

1. Understand the principles of nutritional surveillance and assessment.
2. Learn methods for collecting and analyzing nutritional data.
3. Apply nutritional assessment techniques to real-world scenarios.
4. Interpret and communicate nutritional surveillance data effectively.

## UNITS

### Unit 1: Introduction to Nutritional Surveillance and Assessment:

Definition and importance of nutritional surveillance and assessment, Historical development of nutritional surveillance and assessment, Key concepts and terminology.

### Unit 2: Methods of Nutritional Surveillance:

Types of nutritional surveillance systems, Data collection methods (e.g., dietary surveys, anthropometric measurements), Data analysis and interpretation techniques.

### **Unit 3: Nutritional Assessment Techniques:**

Dietary assessment methods (e.g., 24-hour recall, food frequency questionnaire), Anthropometric assessment techniques (e.g., height, weight, body mass index), Biochemical assessment methods (e.g., blood tests, urine analysis).

### **Unit 4: Application of Nutritional Surveillance and Assessment:**

Case studies of nutritional surveillance and assessment in different settings (e.g., community, hospital, school), Designing and implementing nutritional surveillance systems, Challenges and limitations of nutritional surveillance and assessment.

### **Unit 5: Communication and Reporting of Nutritional Surveillance Data:**

Effective communication of nutritional surveillance data to different audiences (e.g., policymakers, healthcare professionals, community leaders), Reporting and presenting nutritional surveillance data, Using nutritional surveillance data for policy and program development.

**BOOK REFERENCES:**

1. Gibson, R. S. (2005). Principles of Nutritional Assessment. Oxford University Press.
2. Coates, J., & Fiedler, J. L. (2018). The Role of Food and Nutrition in the Prevention of Chronic Diseases. Academic Press.
3. Mahan, L. K., & Escott-Stump, S. (2019). Krause's Food and the Nutrition Care Process. Elsevier.
4. Semba, R. D., & Bloem, M. W. (2018). Nutrition and Health in Developing Countries. Springer.
5. Webb, P., & Rogers, B. L. (2003). Addressing Malnutrition Multisectorally: What Have We Learned? International Food Policy Research Institute.

**Open Educational Resources:**

1. <https://www.sciencedirect.com/topics/medicine-and-dentistry/nutrition-surveillance>
2. <https://pmc.ncbi.nlm.nih.gov/articles/PMC4797352/>
3. <https://www.revistanutricion.org/articles/interpreting-nutrition-through-assessment-techniques-105957.html>
4. <https://egyankosh.ac.in/bitstream/123456789/33460/1/Unit-9.pdf>

**COURSE CONTENTS & LECTURE SCHEDULE:**

| Module No.   | Topic   | No. of Lectures | Teaching Pedagogy              | Teaching Aids                |
|--|---|-----------------|--------------------------------|------------------------------|
| <b>UNIT -1 Introduction to Nutritional Surveillance and Assessment</b> |   |                 |                                |                              |
| 1.1  | Definition of nutritional surveillance and assessment             | 4               | Chalk & Talk, Lecture, Seminar | Black Board,PPT,Videos       |
| 1.2  | importance of nutritional surveillance and assessment             | 2               | Chalk & Talk, Lecture, Seminar | Black/white Board,PPT,Videos |
| 1.3  | Historical development of nutritional surveillance and assessment | 3               | Lecture, Discussion            | PPT & White board,Videos     |
| 1.4  | Key concepts and terminology.                                     | 2               | Lecture                        | Black/white Board            |
| <b>UNIT -2 Methods of Nutritional Surveillance</b>                     |   |                 |                                |                              |
| 2.1  | Types of nutritional surveillance systems,                        | 3               | Lecture, Group Discussion      | PPT & White board            |
| 2.2  | , Data collection methods (e.g., dietary surveys                  | 3               | Chalk & Talk, Lecture, Demo    | Black/white Board, PPT       |
| 2.3  | Data analysis   | 3               | Chalk & Talk, Lecture, seminar | Black/white Board, PPT       |
| 2.4  | interpretation techniques.  | 3               | Lecture                        | Black/White board            |

|  |  |   |                                |                          |
|--|--|---|--------------------------------|--------------------------|
| 2.5  | anthropometric measurements  | 3 | Chalk & Talk, Lecture, seminar | Black/white Board, PPT   |
| <b>UNIT-3 Nutritional Assessment Techniques</b>                              |  |   |                                |                          |
| 3.1  | Dietary assessment methods (e.g., 24-hour recall, food frequency questionnaire), | 3 | Lecture, Group Discussion      | PPT & White board        |
| 3.2  | Dietary assessment methods (e.g., food frequency questionnaire),                 | 3 | Chalk & Talk, Lecture, seminar | Black/white Board, PPT   |
| 3.3  | Anthropometric assessment techniques (e.g., height, weight, body mass index),    | 3 | Chalk & Talk, Lecture, Seminar | Black Board, PPT, Videos |
| 3.4  | Biochemical assessment methods (e.g., blood tests                                | 3 | Chalk & Talk, Lecture, Seminar | Black Board,PPT,Videos   |
| 3.5  | , Biochemical assessment methods (e.g., blood tests urine analysis).             | 3 | Chalk & Talk, Lecture, Seminar | Black Board,PPT,Videos   |
| <b>UNIT – 4 Application of Nutritional Surveillance and Assessment</b><br>.. |  |   |                                |                          |

|  |  |   |                                |                       |
|--|--|---|--------------------------------|-----------------------|
| 4.1  | Case studies of nutritional surveillance and assessment in different settings (e.g., community,      | 3 | Lecture, Seminar               | Black Board,PPT       |
| 4.2  | Case studies of nutritional surveillance and assessment in different settings hospital, school       | 3 | Lecture, Seminar               | Black Board,PPT       |
| 4.3  | Designing and implementing nutritional surveillance systems,   | 3 | Chalk & Talk, Lecture, Seminar | Black Board,PPT,Video |
| 4.4  | Challenges and limitations of nutritional surveillance and assessment                                | 3 | Chalk & Talk, Lecture, Seminar | Black Board,PPT,Video |
| <b>UNIT – 5</b><br><b>Communication and Reporting of Nutritional Surveillance Data</b> |  |   |                                |                       |
| 5.1  | Effective communication of nutritional surveillance data to different audiences (e.g., policymakers, | 3 | Chalk & Talk, Lecture, Seminar | Black Board,PPT       |

|                |  |           |                                |                 |
|----------------|--|-----------|--------------------------------|-----------------|
| 5.2            | Effective communication of nutritional surveillance data to different audiences (healthcare professionals, community leaders), | 3         | Chalk & Talk, Lecture, Seminar | Black Board,PPT |
| 5.3            | Reporting and presenting nutritional surveillance data,  | 3         | Chalk & Talk, Lecture, Seminar | Black Board,PPT |
| 5.4            | Using nutritional surveillance data for policy and program development   | 3         | Chalk & Talk, Lecture, Seminar | Black Board,PPT |
| CIA            |  |           |                                |                 |
| Scholastic     |  | <b>23</b> |                                |                 |
| Non Scholastic |  | <b>2</b>  |                                |                 |
|                |  | <b>25</b> |                                |                 |

**EVALUATION PATTERN**

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 15         |    | 3  | 5  | 2                | 25    | 75  | 100   |

| <b>PG CIA Components</b> |   |              |            |   |        |
|--------------------------|---|--------------|------------|---|--------|
|                          |   |              | <b>Nos</b> |   |        |
| <b>C1</b>                | - | Test (CIA 1) | 1**        | - | 15 Mks |
| <b>C2</b>                | - | Test (CIA 2) | 1**        | - | 15 Mks |
| <b>C3</b>                | - | Assignment   | 1          | - | 3 Mks  |
| <b>C4</b>                | - | Seminar      | 2 *        | - | 5 Mks  |
| <b>C5</b>                | - | Attendance   |            | - | 2 Mks  |

**\*\* Average of C1 and C2 will be taken.**

**\*The best out of two will be taken into account**

### **COURSE OUTCOMES**

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

| <b>NO.</b>  | <b>COURSE OUTCOMES</b>  | <b>KNOWLEDGE LEVEL<br/>(ACCORDING TO REVISED BLOOM'S TAXONOMY)</b> | <b>PSOs ADDRESSED</b>          |
|-------------|---|--|--------------------------------|
| <b>CO 1</b> | Analyze and assess the importance of nutritional surveillance and assessment, | K2   | PSO1, PSO2, PSO3, PSO8 & PSO12 |
| <b>CO 2</b> | Comprehend the types of nutritional surveillance systems,                     | K2   | PSO1, PSO2, PSO3, PSO8 & PSO12 |
| <b>CO 3</b> | Emphasize the role of nutritional assessment techniques                       | K3   | PSO1, PSO2, PSO3, PSO8 & PSO12 |
| <b>CO 4</b> | Retrieving the application of nutritional surveillance and assessment.        | K4   | PSO1, PSO2, PSO3, PSO8 & PSO12 |
| <b>CO 5</b> | Apply the effective communication of nutritional surveillance data            | K5   | PSO1, PSO2, PSO3, PSO8 & PSO12 |

**Mapping of COs with PSOs**

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO2      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO3      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO4      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO5      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |

**Mapping of COs with POs**

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 2   | 2   | 1   | 1   |
| CO2     | 2   | 2   | 1   | 1   |
| CO3     | 2   | 2   | 1   | 1   |
| CO4     | 2   | 2   | 1   | 1   |
| CO5     | 2   | 2   | 1   | 1   |

**Note: Strongly Correlated – 3****“ Moderately Correlated – 2 ”****Weakly Correlated -1****COURSE DESIGNER:****Ms.J.Josephine Jesintha****Forwarded By**



(Dr.S.Santhi)

**100% EMPLOYABILITY****I M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS****SEMESTER –II***For those who joined in 2023 onwards*

| <b>PROGRAMME CODE</b> | <b>COURSE CODE</b> | <b>COURSE TITLE</b>      | <b>CATEGORY</b>                     | <b>HRS/ WEEK</b> | <b>CREDITS</b> |
|-----------------------|--------------------|--------------------------|-------------------------------------|------------------|----------------|
| <b>PSNN</b>           | <b>23PG2NSE1</b>   | <b>FOOD PRESERVATION</b> | <b>Skill Enhancement Course EDC</b> | <b>4</b>         | <b>2</b>       |

**COURSE DESCRIPTION**

The course outlines the importance of food preservation, different methods of food preservation.

**COURSE OBJECTIVES**

- 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.

## UNITS

### **UNIT –I INTRODUCTION TO FOOD PRESERVATION (12 HRS.)**

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

### **UNIT –II PRESERVATION BY LOW TEMPERATURE (12 HRS.)**

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 (12 HRS.)**

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

### **UNIT-IV PRESERVATION BY DRYING (12 HRS.)**

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

### **UNIT-V PRESERVATION BY CHEMICALS (12 HRS.)**

Introduction, Classification and use of preservatives

## TEXTBOOK:

1. Dearosier. N.N(1975). *The Technology of Food Preservation*.

## REFERENCE BOOKS:

1. Lai G. Sideleappa G.B. (1987), *Preservation of Fruits and Vegetables* ICAR, New Delhi.
2. Parvinder S. Bali (2009). *Food Production Operations*, Oxford University Press, New Delhi.
3. Srilakshmi. B, (2008), *Food science*, New age international publishers.
4. Sudesh Jood&Neelani (2002) *Food Preservation*.
5. Thangam E. Philip, (1981). *Modern Cookery*, Vol I, Orient Longman, Mumbai.

## COURSE CONTENTS & LECTURE SCHEDULE:

| Module No.  | Topic  | No. of Lectures | Teaching Pedagogy | Teaching Aids     |
|---|--|-----------------|-------------------|-------------------|
| <b>UNIT 1 – INTRODUCTION TO FOOD PRESERVATION</b> |  |                 |                   |                   |
| 1.1   | Concept, the importance of food preservation.,                                       | 4               | Chalk & Talk      | Black Board       |
| 1.2   | Common terms used in food preservation.  | 4               | Chalk & Talk      | LCD               |
| 1.3   | Different methods and Principles of preservation.                                    | 4               | Lecture           | PPT & White board |
| <b>UNIT -2 PRESERVATION BY LOW TEMPERATURE</b>    |  |                 |                   |                   |
| 2.1   | Use of Cold and Refrigerated Storage   | 1               | Lecture           | LCD               |
| 2.2   | Use of Freezing temperatures: Slow and fast freezing of Use of Freezing temperatures | 4               | Chalk & Talk      | LCD               |
| 2.3   | Slow and fast freezing   | 3               | Lecture           | PPT & White board |
| 2.4   | Use of Cold  | 2               | Discussion        | PPT               |
| 2.5   | Refrigerated Storage   | 2               | Lecture           | Black board       |
| <b>UNIT -3 PRESERVATION BY HIGH TEMPERATURE</b>   |  |                 |                   |                   |
| 3.1   | Preservation of foods by high temperatures   | 3               | Lecture           | Black board       |
| 3.2   | Blanching  | 3               | Lecture           | LCD               |
| 3.3   | Pasteurization   | 3               | Chalk & Talk      | LCD               |
| 3.4   | Sterilization  | 3               | Lecture           | PPT & White board |

|  |                                      |   |              |                   |
|--|--------------------------------------|---|--------------|-------------------|
| 3.5                                      | General process of caning of foods   | 3 | Lecture      | PPT & White board |
| <b>UNIT -4 PRESERVATION BY DRYING</b>    |                                      |   |              |                   |
| 4.1                                      | Principles and application of drying | 3 | Lecture      | LCD               |
| 4.2                                      | Dehydration of foods                 | 3 | Chalk & Talk | LCD               |
| 4.3                                      | Different types of drying            | 3 | Lecture      | PPT & White board |
| 4.4                                      | Dryers                               | 3 | Lecture      | PPT & White board |
| <b>UNIT -5 PRESERVATION BY CHEMICALS</b> |                                      |   |              |                   |
| 5.1                                      | Introduction                         | 4 | Lecture      | LCD               |
| 5.2                                      | Classification                       | 4 | Chalk & Talk | LCD               |
| 5.3                                      | Use of preservatives                 | 4 | Lecture      | PPT & White board |

CBCS Curriculum for M.Sc Human Nutrition & Nutraceuticals

|                | C1      | C2      | C3      | C4         | C5      | Total Scholastic Marks | Non Scholastic Marks C6 | CIA Total |
|----------------|---------|---------|---------|------------|---------|------------------------|-------------------------|-----------|
| Levels         | T1      | T2      | Seminar | Assignment | OBT/PPT |                        |                         |           |
|                | 10 Mks. | 10 Mks. | 5 Mks.  | 5 Mks      | 5 Mks   | 35 Mks.                | 5 Mks.                  | 40Mks.    |
| K2             | 4       | 4       | -       | -          | -       | 8                      | -                       | 8         |
| K3             | 2       | 2       | -       | 5          | -       | 9                      | -                       | 9         |
| K4             | 2       | 2       | -       | -          | 5       | 9                      | -                       | 9         |
| K5             | 2       | 2       | 5       | -          | -       | 9                      | -                       | 9         |
| Non Scholastic | -       | -       | -       | -          | -       |                        | 5                       | 5         |
| Total          | 10      | 10      | 5       | 5          | 5       | 35                     | 5                       | 40        |

| CIA            |           |
|----------------|-----------|
| Scholastic     | <b>35</b> |
| Non Scholastic | <b>5</b>  |
|                | <b>40</b> |

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's**

**K2-Understand, K3-Apply, K4-Analyze, K5- Evaluate**

## EVALUATION PATTERN

| SCHOLASTIC |    |    |    |    | NON - SCHOLASTIC | MARKS |     |
|------------|----|----|----|----|------------------|-------|-----|
| C1         | C2 | C3 | C4 | C5 | C6               | CIA   | ESE |
| 10         | 10 | 5  | 5  | 5  | 5                | 40    | 60  |

**C1** – Internal Test-1

**C2** – Internal Test-2

**C3** - Seminar

**C4** – Assignment

**C5** - OBT/PPT

**C6** – Non - Scholastic

### **COURSE OUTCOMES**

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

| <b>NO.</b>  | <b>COURSE OUTCOMES</b>   | <b>KNOWLEDGE LEVEL<br/>(ACCORDING TO REVISED BLOOM'S TAXONOMY)</b> | <b>PSOs ADDRESSED</b>          |
|-------------|--|--|--------------------------------|
| <b>CO 1</b> | Describe the basic concepts and principles of Food Preservation  | K2   | PSO1, PSO2, PSO3, PSO8 & PSO12 |
| <b>CO 2</b> | Identify the best methods of storage of different foods based on their shelf life.<br><br>Recommend appropriate postharvest technology procedures that increase shelf life of food | K2   | PSO1, PSO2, PSO3, PSO8 & PSO12 |
| <b>CO 3</b> | Analyze the use of low and high temperature to preserve food and identify the appropriate method to preserve different foods   | K3   | PSO1, PSO2, PSO3, PSO8 & PSO12 |
| <b>CO 4</b> | Discuss the use and effects of different preservatives on the quality of foods   | K4   | PSO1, PSO2, PSO3, PSO8 & PSO12 |
| <b>CO 5</b> | Appreciate the use of modern technology in food preservation and managing food wastage.  | K5   | PSO1, PSO2, PSO3, PSO8 & PSO12 |

**Mapping of COs with PSOs**

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO2      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO3      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO4      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO5      | 3     | 3     | 3     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |

**Mapping of COs with POs**

| CO/ PSO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1     | 2   | 2   | 1   | 1   | 1   |
| CO2     | 2   | 2   | 1   | 1   | 1   |
| CO3     | 2   | 2   | 1   | 1   | 1   |
| CO4     | 2   | 2   | 1   | 1   | 1   |
| CO5     | 2   | 2   | 1   | 1   | 1   |

**Note: Strongly Correlated – 3****“ Moderately Correlated – 2****” Weakly Correlated -1****COURSE DESIGNER:**

1. Dr. C.HELEN

Forwarded By



(Dr.S.Santhi)

**100% SKILL DEVELOPMENT****II M.Sc., HUMAN NUTRITION & NUTRACEUTICALS****SEMESTER –III***For those who joined in 2019 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE  | CATEGORY   | HRS/WEEK | CREDITS |
|----------------|-------------|---|------------|----------|---------|
| PSNN           | 19PG3N11    | Functional Foods & Nutraceuticals in Preventive Dietetics | Major Core | 6        | 5       |

**COURSE DESCRIPTION:**

The course elicits the role of various bioactive components in the prevention and treatment of therapeutic conditions.

**COURSE OBJECTIVES**

The students will be able to

- Identify the role of functional foods and nutraceuticals in oral, gut and renal health.
- Describe the importance of functional foods in weight management and CVD
- Categorize the functional foods for bone health and diabetes.
- Summarize the effect of functional foods and Nutraceuticals in cancer
- Choose the functional foods for the management of nervous and respiratory disorders.

|               |   |                 |
|---------------|---|-----------------|
| <b>UNIT-I</b> | <b>FFN IN ORAL / GUT &amp; RENAL HEALTH</b> | <b>[18 HRS]</b> |
|---------------|---|-----------------|

### **FFN in Oral health**

Dietary strategies for oral health

Functional Foods for promoting oral health – xylitol

Relationship between dental caries and dietary carbohydrates

### **FFN in Gut health**

Colonic functional foods –Prebiotic, Probiotic and Symbiotic

Host microbe interaction

Improving the effectiveness of probiotics and prebiotics in optimizing gut health.

Dietary fiber and gut health

### **FFN in Renal health**

Role of functional foods in prevention and treatment of renal disorders – urinary infection, glomerulonephritis, nephrosis, acute renal failure.

|                |   |                 |
|----------------|---|-----------------|
| <b>UNIT-II</b> | <b>FFN FOR OBESITY, CARDIOVASCULAR DISEASES &amp; DIABETES MELLITUS</b> | <b>[18 HRS]</b> |
|----------------|---|-----------------|

### **FFN in Obesity**

Role of hormones in obesity.

Role of functional foods in the management of obesity.

### **FFN in CVD**

Role of Functional foods in the management of CVD

### **FFN in Diabetes Mellitus**

Role of Functional Foods and nutraceuticals in blood sugar support

|                 |   |                 |
|-----------------|---|-----------------|
| <b>UNIT-III</b> | <b>FFN FOR BONE AND REPRODUCTIVE HEALTH</b> | <b>[18 HRS]</b> |
|-----------------|---|-----------------|

### **FFN in Bone Health**

Bone growth and factors affecting bone mass

Role of functional foods in bone health - Osteoporosis.

### **FFN in Reproductive Health**

Role of FFN in reproductive health

Female infertility-types, role of FFN in managing infertility

Functional foods for menopausal health

|                |                                 |                 |
|----------------|---------------------------------|-----------------|
| <b>UNIT-IV</b> | <b>FFN IN CANCER &amp; AIDS</b> | <b>[18 HRS]</b> |
|----------------|---------------------------------|-----------------|

**FFN in Cancer**

Types of Cancer

Risk factors – Endogenous and exogenous risk factors

Role of functional foods in the prevention of cancer – Symbiotics, Glucosinolates, Phytoestrogens, Dietary fiber and vitamins, Antioxidants.

**FFN in AIDS**

Role of functional foods in the prevention and treatment of AIDS

|               |  |                 |
|---------------|--|-----------------|
| <b>UNIT-V</b> | <b>FFN IN NERVOUS &amp; RESPIRATORY SYSTEM</b> | <b>[18 HRS]</b> |
|---------------|--|-----------------|

Brain mechanisms involved in mood

Role of functional foods in Mood and memory

Alzheimers and Parkinsons diseases – Definition, causes, symptoms, role of functional foods

Role of functional foods in the prevention and treatment of respiratory disorders.

**REFERENCES:**

1. Chatwick R et al. (2003), *Functional Foods*, Springer, Culinary and Hospitality Industry Publications Services.
2. David H Watson, (2001), *Performance Functional Foods*, Culinary and Hospitality Industry Publications.
3. Hari Niwas Mishra et.al., *Functional Foods*, New India Publishing Agency, New Delhi.
4. Israel Goldberg, (2001), *Functional Foods Designer Foods*, Pharma Food, Nutraceuticals Culinary and Hospitality Industry Publications.
5. Mary K. Schimdl and Theodore P Labuza, (2000), *Essential of Functional Foods*, Culinary and Hospitality Industry Publications Services.
6. Mazza G. (1998), *Functional Foods Biochemical Processing Aspects*, Culinary and Hospitality Industry Publications
7. Robert E C, (2001), Wildman *Handbook of Nutraceuticals and functional Foods*, Culinary and Hospitality Industry Publications.

**JOURNAL REFERENCES:**

1. Journal of Functional Foods
2. Nutraceuticals World Magazine - Exclusives, Markts, Health, Jobs, Events

3. The American Journal of Clinical Nutrition, Waverly Press, USA.
4. The Indian Journal of Medical Research, The Indian Council of Medical Research, New Delhi.

**OPEN EDUCATIONAL RESOURCES:**

1. <http://medcraveonline.com/JNHFE/JNHFE-07-00247.pdf>
2. [http://ssu.ac.ir/cms/fileadmin/user\\_upload/Daneshkadaha/dbehdasht/behdasht\\_imani/book/Functional\\_Foods.pdf](http://ssu.ac.ir/cms/fileadmin/user_upload/Daneshkadaha/dbehdasht/behdasht_imani/book/Functional_Foods.pdf)
3. [https://www.researchgate.net/publication/283076818\\_Food\\_is\\_Medicine - An introduction to Nutraceuticals](https://www.researchgate.net/publication/283076818_Food_is_Medicine_-_An_introduction_to_Nutraceuticals)
4. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3257668/>
5. <https://ijpsr.com/bft-article/therapeutic-and-preventive-role-of-functional-foods-in-process-of-neurodegeneration/?view=fulltext>
6. <http://www.ijrpc.com/files/17-382.pdf>

**COURSE CONTENTS & LECTURE SCHEDULE:**

| <b>Module No.</b>  | <b>Topic</b>   | <b>No. of Lectures</b> | <b>Teaching Pedagogy</b> | <b>Teaching Aids</b> |
|--|--|------------------------|--------------------------|----------------------|
| <b>UNIT 1 FFN IN ORAL / GUT &amp; RENAL HEALTH [18 HRS]</b>                    |  |                        |                          |                      |
| 1.1  | FFN in oral health   | 1                      | Chalk & Talk             | Black Board          |
| 1.2  | Dietary strategies for oral health   | 2                      | Chalk & Talk             | LCD                  |
| 1.3  | Functional Foods for promoting oral health – xylitol.  | 2                      | Lecture                  | PPT & White board    |
| 1.4  | Relationship between dental caries and dietary carbohydrates   | 1                      | Lecture                  | Smart Board          |
| 1.5  | FFN in gut health  | 1                      | Lecture                  | Black Board          |
| 1.6  | Colonic functional foods – Prebiotic, Probiotic and Symbiotic  | 2                      | Discussion               | Google classroom     |
| 1.7  | Host microbe interaction   | 2                      | Specimen                 | Green Board          |
| 1.8  | Improving the effectiveness of probiotics and prebiotics in optimizing gut health.   | 2                      | Discussion               | Black Board          |
| 1.9  | Dietary fiber and gut health   | 1                      | Lecture                  | LCD                  |
| 1.10   | FFN in renal health  | 1                      | Lecture                  | Smart Board          |
| 1.11   | Role of functional foods in prevention and treatment of renal disorders – urinary infection, glomerulonephritis, nephrosis, acute renal failure. | 3                      | Lecture                  | PPT                  |
| <b>UNIT 2 FFN FOR OBESITY, CARDIOVASCULAR DISEASES &amp; DIABETES MELLITUS</b> |  |                        |                          | <b>[18 HRS]</b>      |

|   |  |   |              |                       |
|---|--|---|--------------|-----------------------|
| 2.1   | FFN in Obesity   | 1 | Lecture      | Green Board<br>PPT    |
| 2.2   | Role of hormones in obesity.                                       | 2 | Chalk & Talk | Green Board           |
| 2.3   | Role of functional foods in the management of obesity.             | 3 | Lecture      | PPT                   |
| 2.4   | FFN in CVD   | 3 | Chalk & Talk | Video                 |
| 2.5   | Role of Functional foods in the management of CVD                  | 3 | Lecture      | PPT                   |
| 2.6   | FFN in Diabetes Mellitus   | 3 | Lecture      | PPT                   |
| 2.7   | Role of Functional Foods and nutraceuticals in blood sugar support | 3 | Lecture      | PPT                   |
| <b>UNIT 3 FFN FOR BONE AND REPRODUCTIVE HEALTH [18 HRS]</b> |  |   |              |                       |
| 3.1   | FFN in Bone Health   | 2 | Lecture      | Green Board<br>Charts |
| 3.2   | Bone growth and factors affecting bone mass                        | 2 | Chalk & Talk | Green Board           |
| 3.3   | Role of functional foods in bone health - Osteoporosis.            | 3 | Lecture      | Black Board           |
| 3.4   | FFN in Reproductive Health   | 2 | Lecture      | LCD                   |
| 3.5   | Role of FFN in reproductive health                                 | 3 | Lecture      | Smart Board           |
| 3.6   | Female infertility-types, role of FFN in managing infertility      | 3 | Lecture      | PPT                   |

|   |  |   |              |             |
|---|--|---|--------------|-------------|
| 3.7   | Functional foods for menopausal health   | 3 | Lecture      | Black Board |
| <b>UNIT 4 FFN IN CANCER &amp; AIDS [18HRS]</b>                |  |   |              |             |
| 4.1   | Types of Cancer  | 1 | Lecture      | Green Board |
| 4.2   | Risk factors – Endogenous and exogenous risk factors   | 2 | Chalk & Talk | Black Board |
| 4.3   | Role of functional foods in the prevention of cancer – Symbiotics, Glucosinolates,                       | 3 | Lecture      | LCD         |
| 4.4   | Role of functional foods in the prevention of cancer – Phytoestrogens, Dietary fiber                     | 3 | Lecture      | LCD         |
| 4.5   | Role of functional foods in the prevention of cancer –Vitamins, Antioxidants.                            | 3 | Lecture      | Black Board |
| 4.6   | Role of functional foods in the prevention of AIDS   | 3 | Lecture      | PPT         |
| 4.7   | Role of functional foods in the treatment of AIDS  | 3 | Lecture      | PPT         |
| <b>UNIT 5 FFN IN NERVOUS &amp; RESPIRATORY SYSTEM [18HRS]</b> |  |   |              |             |
| 5.1   | Brain mechanisms involved in mood  | 2 | Lecture      | PPT         |
| 5.2   | Role of functional foods in Mood and memory  | 4 | Lecture      | PPT         |
| 5.3   | Alzheimers- Definition, causes, symptoms,role of functional foods in treating Alzheimers                 | 4 | Lecture      | PPT         |
| 5.4   | Parkinsons disease-Definition, causes, symptoms,role of functional foods in treating Parkinsons diseases | 4 | Lecture      | PPT         |

CBCS Curriculum for M.Sc Human Nutrition & Nutraceuticals

|     |  |   |         |     |
|-----|--|---|---------|-----|
| 5.5 | Role of functional foods in the prevention and treatment of respiratory disorders. | 4 | Lecture | PPT |
|-----|--|---|---------|-----|

|                | C1      | C2      | C3      | C4         | C5      | Total Scholastic Marks | Non Scholastic Marks C6 | CIA Total |
|----------------|---------|---------|---------|------------|---------|------------------------|-------------------------|-----------|
| Levels         | T1      | T2      | Seminar | Assignment | OBT/PPT |                        |                         |           |
|                | 10 Mks. | 10 Mks. | 5 Mks.  | 5 Mks      | 5 Mks   | 35 Mks.                | 5 Mks.                  | 40Mks.    |
| K2             | 4       | 4       | -       | -          | -       | 8                      | -                       | 8         |
| K3             | 2       | 2       | -       | 5          | -       | 9                      | -                       | 9         |
| K4             | 2       | 2       | -       | -          | 5       | 9                      | -                       | 9         |
| K5             | 2       | 2       | 5       | -          | -       | 9                      | -                       | 9         |
| Non Scholastic | -       | -       | -       | -          | -       |                        | 5                       | 5         |
| Total          | 10      | 10      | 5       | 5          | 5       | 35                     | 5                       | 40        |

| CIA                   |           |
|-----------------------|-----------|
| <b>Scholastic</b>     | <b>35</b> |
| <b>Non Scholastic</b> | <b>5</b>  |
|                       | <b>40</b> |

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for PG are :**

**K2-Understand, K3-Apply, K4-Analyse, K5-Evaluate**

### EVALUATION PATTERN

| SCHOLASTIC |    |    |    |    | NON - SCHOLASTIC | MARKS |     |
|------------|----|----|----|----|------------------|-------|-----|
| C1         | C2 | C3 | C4 | C5 | C6               | CIA   | ESE |
| 10         | 10 | 5  | 5  | 5  | 5                | 40    | 60  |

**C1** – Internal Test-1

**C2** – Internal Test-2

**C3** - Seminar

**C4** – Assignment

**C5** - OBT/PPT

**C6** – Non – Scholastic

## COURSE OUTCOMES

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

| NO.         | COURSE OUTCOMES  | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|-------------|--|--|----------------|
| <b>CO 1</b> | Explain the role of functional foods and nutraceuticals in oral, gut and renal health. | K2   | PSO2 & PSO4    |
| <b>CO 2</b> | Describe the importance of functional foods in weight management and CVD               | K2   | PSO2 & PSO4    |
| <b>CO 3</b> | Identify the functional foods for bone health and diabetes                             | K3   | PSO2 & PSO4    |
| <b>CO 4</b> | Analyze the effect of functional foods and Nutraceuticals in cancer                    | K4   | PSO2 & PSO4    |
| <b>CO 5</b> | Choose the functional foods for the management of nervous and respiratory disorders    | K5   | PSO2 & PSO4    |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 3     | 2     | 3     | 1     | 2     | 1     | 1     | 2     | 1      | 1      | 1      | 1      | 1      | 2      |
| CO2      | 1     | 3     | 2     | 3     | 1     | 2     | 1     | 1     | 2     | 1      | 1      | 1      | 1      | 1      | 2      |
| CO3      | 1     | 3     | 2     | 3     | 1     | 2     | 1     | 1     | 2     | 1      | 1      | 1      | 1      | 1      | 2      |
| CO4      | 1     | 3     | 2     | 3     | 1     | 2     | 1     | 1     | 2     | 1      | 1      | 1      | 1      | 1      | 2      |
| CO5      | 1     | 3     | 2     | 3     | 1     | 2     | 1     | 1     | 2     | 1      | 1      | 1      | 1      | 1      | 2      |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 3   | 3   | 2   | 1   |
| CO2     | 3   | 3   | 2   | 1   |
| CO3     | 3   | 3   | 2   | 1   |
| CO4     | 3   | 3   | 2   | 1   |
| CO5     | 3   | 3   | 2   | 1   |

**Note: Strongly Correlated – 3**

**“ Moderately Correlated – 2**

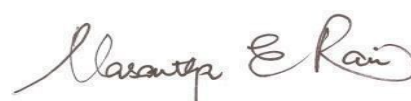
**Weakly Correlated -1**

### COURSE DESIGNER:

**1. Dr. Vasantha Esther Rani**

**2. Ms. D.Mouna**

**Forwarded By**



(Dr.Vasantha Esther Rani)

**100% SKILL DEVELOPMENT**

**II M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS  
SEMESTER –III**

*For those who joined in 2019 onwards*

| PROGRAMME<br>CODE | COURSE<br>CODE | COURSE<br>TITLE        | CATEGORY   | HRS/<br>WEEK | CREDITS |
|-------------------|----------------|------------------------|------------|--------------|---------|
| PSNN              | 19PG3N12       | Community<br>Nutrition | Major Core | 6            | 5       |

**COURSE DESCRIPTION**

The course imparts the knowledge on various national nutritional problems and its implications, nutrition awareness among various sections of the population.

**COURSE OBJECTIVES**

- To understand national nutritional problems and their implications.

- To become familiar with the national and international contributions towards improvement of nutrition in India.
- To impart skills in the planning and execution of nutrition awareness programmes among various sections of the population.

## UNITS

### **UNIT –I NUTRITION AND NATIONAL DEVELOPMENT, NATIONAL NUTRITIONAL PROBLEMS (18 HRS.)**

Relation of nutrition to national development in terms of socio-economic, industrial and agricultural development.

National nutritional problems – prevalence, causes, consequences and prevention of PEM, vitamin A deficiency, anaemia, iodine deficiency, and fluorosis

### **UNIT –II MALNUTRITION, STRATEGIES TO OVERCOME MALNUTRITION (18 HRS.)**

Malnutrition - Definition, etiology and consequences

Strategies to overcome malnutrition: Food based strategies – Dietary diversification, Horticulture intervention, Food fortification, Nutrition & Health education, Nutrition based strategies – Supplementation, Concepts of Selecting / implementing and intervention strategy.

### **UNIT-III NUTRITION INTERVENTION PROGRAMMES - NATIONAL, INTERNATIONAL (18 HRS.)**

Genesis, objectives and operation of nutrition intervention programmes in India – School lunch programme, CMNMP, ICDS organized by government for vulnerable sections of the population.

National organizations – ICMR, CSWB, SSWB, NIN, NNMB, CFTRI, DFRL, NIPCCD.

International organization : FAO, WHO, UNICEF, KGNMT, CARE.

### **UNIT-IV NATIONAL NUTRITION POLICY, NUTRITIONAL SURVEILLANCE (18 HRS.)**

National Nutrition policy – aim, nutrition policy instruments and its implementation; Health indicators.

Nutrition Surveillance System- definition, objectives, uses, infrastructure, Health indicators for successful nutrition surveillance programme.

### **UNIT –V NUTRITION EDUCATION, ASSESSMENT OF NUTRITIONAL STATUS OF COMMUNITY (18 HRS.)**

Nutrition Education - Definition, importance, Process of nutrition education and communication – components of communication process, phases of nutrition education – conceptualization, formulation, implementation and

evaluation, Methods of Nutrition education – face to face, mass media, traditional media, and criteria for selecting methods.

Assessment of nutritional status – Direct and indirect methods of assessment.

## REFERENCES:

1. Davidson, S.S. Passmore, P. Brack, J.F. (1993) *.Human Nutrition and Dietetics, 9<sup>th</sup> Edition*, F&S, Lingstone Ltd., Edinburgh and London.
2. Gupta J.P. & Indra Murali (1989) *National Review of Immunisation Programme in India*, National Institute of Health and Family Welfare, New Delhi.
3. Jose M. Conon (1988). *Food Toxicology – Part A Principles and Concepts*, Marceldebber, Inc., New York.
4. King F.S. & Burgess, A. (1992).*Nutrition for Developing Countries, 2<sup>nd</sup> edition*, Oxford, Oxford University Press, London.
5. Rajammal P. Devadas (1980) *Nutrition and Nutritional Development*, Saradalaya Press, Coimbatore, Tamil Nadu.
6. Sach Dev. H.P.S. & Choudhury, P. (1994).*Nutrition in Children – Developing Country Concerns*, Cambridge Press, New Delhi.
7. Shanthi Ghosh, (1992) *.The Feeding and care of Infants and Young Children*, Voluntary Health Association of India, New Delhi.
8. Shanthi Ghossh (1997) *Nutrition and Child Care, A Practical Guide*, Jay Pee Brothers, Medical Publishers (P) Ltd., New Delhi.
9. UNICEF (1990). *Children and Women in India*, Situation Analysis, New Delhi.

## JOURNAL REFERENCES:

1. Journal of Community Health.
2. Journals of Nutrition Education and Behavior.
3. Asia Pacific Journal of Public Health.
4. Indian Journal of Nutrition and Dietetics
5. Journal of Nutrition and Health Sciences

## WEB REFERENCES:

1. [www.nutrition society.org](http://www.nutrition society.org)
2. [www.who.int](http://www.who.int)
3. [www.nin.res.in](http://www.nin.res.in)
4. [www.publichealth.org](http://www.publichealth.org)
5. [www.fda.gov](http://www.fda.gov)

**COURSE CONTENTS & LECTURE SCHEDULE:**

| Module No.   | Topic   | No. of Lectures | Teaching Pedagogy | Teaching Aids |
|--|---|-----------------|-------------------|---------------|
| <b>UNIT -1 NUTRITION AND NATIONAL DEVELOPMENT, NATIONAL NUTRITIONAL PROBLEMS</b> |   |                 |                   |               |
| 1.1  | Relation of nutrition to national development in terms of socio-economic, industrial and agricultural development | 2               | Chalk & Talk      | Black Board   |
| 1.2  | Prevalence, causes, consequences and prevention of PEM  | 4               | Lecture           | PPT           |
| 1.3  | Prevalence, causes, consequences and prevention of vitamin A deficiency   | 4               | Lecture           | PPT           |
| 1.4  | Prevalence, causes, consequences and prevention of anaemia  | 4               | Lecture           | Videos        |
| 1.5  | Prevalence, causes, consequences and prevention of iodine deficiency  | 2               | Chalk & Talk      | Black Board   |
| 1.6  | Prevalence, causes, consequences and prevention of iodine deficiency of fluorosis                                 | 2               | Lecture           | PPT           |
| <b>UNIT -2 MALNUTRITION, STRATEGIES TO OVERCOME MALNUTRITION</b>                 |   |                 |                   |               |
| 2.1  | Malnutrition- - Definition, etiology and consequences   | 3               | Chalk & Talk      | Black Board   |
| 2.2  | Food based strategies to overcome malnutrition  | 2               | Chalk & Talk      | Black Board   |

|  |  |   |                         |             |
|--|--|---|-------------------------|-------------|
| 2.3  | Dietary diversification, Horticulture intervention             | 3 | Lecture                 | PPT         |
| 2.4  | Food fortification, Nutrition & Health education               | 4 | Lecture                 | Smart Board |
| 2.5  | Nutrition based strategies – Supplementation                   | 3 | Lecture                 | Videos      |
| 2.6  | Concepts of Selecting / implementing and intervention strategy | 3 | Case study Discussion   | Videos      |
| <b>UNIT -3 NUTRITION INTERVENTION PROGRAMMES - NATIONAL, INTERNATIONAL</b> |  |   |                         |             |
| 3.1  | Genesis, objectives and operation School lunch programme       | 2 | Chalk & Talk            | Black Board |
| 3.2  | Genesis, objectives and operation CMNMP                        | 2 | Chalk & Talk            | Black Board |
| 3.3  | Genesis, objectives and operation ICDS                         | 3 | Case study Chalk & Talk | Black Board |
| 3.4  | ICMR, NIN, CSWB, SSWB  | 3 | Lecture                 | Smart class |
| 3.5  | NNMB, CFTRI, DFRL, NIPCCD                                      | 2 | Discussion              | Black Board |
| 3.6  | FAO, WHO   | 2 | Lecture                 | PPT         |
| 3.7  | UNICEF, KGNMT, CARE  | 4 | Lecture                 | PPT         |
| <b>UNIT -4 NATIONAL NUTRITION POLICY, NUTRITIONAL SURVEILLANCE</b>         |  |   |                         |             |
| 4.1  | National Nutrition policy                                      | 4 | Chalk & Talk            | Black Board |
| 4.2  | Nutrition policy instruments and its implementation            | 5 | Chalk & Talk            | Black Board |

|   |  |   |              |             |
|---|--|---|--------------|-------------|
| 4.3   | Nutrition Surveillance System- definition, objectives, uses, infrastructure                                      | 5 | Lecture      | PPT         |
| 4.4   | Health indicators for successful nutrition surveillance programme  | 4 | Discussion   | Black Board |
| <b>UNIT -5 NUTRITION EDUCATION, ASSESSMENT OF NUTRITIONAL STATUS OF COMMUNITY</b> |  |   |              |             |
| 5.1   | Nutrition Education - Definition, importance   | 2 | Chalk & Talk | Black Board |
| 5.2   | Process and components of nutrition education and communication  | 4 | Lecture      | PPT         |
| 5.3   | Phases of nutrition education – conceptualization, formulation, implementation and evaluation                    | 4 | Chalk & Talk | Black Board |
| 5.4   | Methods of Nutrition education – face to face, mass media, traditional media, and criteria for selecting methods | 4 | Discussion   | Videos      |
| 5.5   | Assessment of nutritional status- Direct methods   | 2 | Lecture      | PPT         |
| 5.6   | Assessment of nutritional status- Indirect methods   | 2 | Lecture      | PPT         |

CBCS Curriculum for M.Sc Human Nutrition & Nutraceuticals

|                   | C1      | C2      | C3      | C4             | C5      | Total<br>Scholastic<br>Marks | Non<br>Scholastic<br>Marks<br>C6 | CIA Total |
|-------------------|---------|---------|---------|----------------|---------|------------------------------|----------------------------------|-----------|
| Levels            | T1      | T2      | Seminar | Assignme<br>nt | OBT/PPT |                              |                                  |           |
|                   | 10 Mks. | 10 Mks. | 5 Mks.  | 5 Mks          | 5 Mks   | 35 Mks.                      | 5 Mks.                           | 40Mks.    |
| K2                | 4       | 4       | -       | -              | -       | 8                            | -                                | 8         |
| K3                | 2       | 2       | -       | 5              | -       | 9                            | -                                | 9         |
| K4                | 2       | 2       | -       | -              | 5       | 9                            | -                                | 9         |
| K5                | 2       | 2       | 5       | -              | -       | 9                            | -                                | 9         |
| Non<br>Scholastic | -       | -       | -       | -              | -       |                              | 5                                | 5         |
| Total             | 10      | 10      | 5       | 5              | 5       | 35                           | 5                                | 40        |

CIA

Scholastic                      **35**

Non Scholastic              **5**

**40**

- **All the course outcomes are to be assessed in the various CIA components.**
- **The levels of CIA Assessment based on Revised Bloom's Taxonomy for PG are :**

**K2-Understand,    K3-Apply,    K4-Analyse, K5-Evaluate**

## EVALUATION PATTERN

| SCHOLASTIC |    |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5 | C6               | CIA   | ESE | Total |
| 10         | 10 | 5  | 5  | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test-1

**C2** – Internal Test-2

**C3** - Seminar

**C4** – Assignment

**C5** - OBT/PPT

**C6** – Non – Scholastic

## COURSE OUTCOMES

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

| NO.  | COURSE OUTCOMES   | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|------|---|--|----------------|
| CO 1 | Associate Nutrition and National development                            | K2   | PSO6           |
| CO 2 | Describe the strategies to overcome malnutrition                        | K2   | PSO6           |
| CO 3 | Identify the Nutrition intervention programs and organization           | K3   | PSO6           |
| CO 4 | Analyze the National nutrition policy and Nutrition surveillance system | K4   | PSO6           |
| CO 5 | Explain Nutrition assessment and Nutrition education                    | K5   | PSO6           |

## Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 1     | 2     | 1     | 1     | 3     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO2      | 1     | 1     | 2     | 1     | 1     | 3     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO3      | 1     | 1     | 2     | 1     | 1     | 3     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO4      | 1     | 1     | 2     | 1     | 1     | 3     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO5      | 1     | 1     | 2     | 1     | 1     | 3     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO6      | 1     | 1     | 2     | 1     | 1     | 3     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 3   | 3   | 2   | 1   |
| CO2     | 3   | 3   | 2   | 1   |
| CO3     | 3   | 3   | 2   | 2   |
| CO4     | 3   | 3   | 1   | 2   |
| CO5     | 3   | 3   | 3   | 1   |
| CO6     | 3   | 3   | 3   | 2   |

**Note: Strongly Correlated – 3**

**“ Moderately Correlated – 2**

**“ Weakly Correlated -1**

**COURSE DESIGNER:**

**1. Mrs. C.Helen**

**Forwarded By**



(Dr.Vasantha Esther Rani)

**100% SKILL DEVELOPMENT**

**II M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS**  
**SEMESTER –III**

*For those who joined in 2019 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE               | CATEGORY   | HRS/ WEEK | CREDITS |
|----------------|-------------|----------------------------|------------|-----------|---------|
| PSNN           | 19PG3N13    | Analytical Instrumentation | Major Core | 6         | 5       |

**COURSE DESCRIPTION**

The course offers the understanding of the principles, instrumentation and analytical techniques of food

**COURSE OBJECTIVES**

- To understand the principle and instrumentation of hi-tech analytical techniques.
- To gain knowledge on applications of different analytical instruments.

**UNITS**

**UNIT –I CHROMATOGRAPHY (18HRS.)**

Meaning – Types of Chromatography – principles, components and applications of

- vii. Paper Chromatography – Ascending and descending – One and two dimensional
- viii. Thin Layer Chromatography
- ix. Gas Chromatography
- x. Ion exchange
- xi. Gel filtration
- xii. High Performance Liquid Chromatography

## **UNIT –II ELECTROPHORESIS (18 HRS.)**

Meaning –Types –Paper, Starch, Gel, Agar-gel, Poly Acrylamide gel, Moving boundary Electrophoresis, Immuno electrophoresis – Principle – components – Applications.

## **UNIT –III COLORIMETRY, FLUORIMETRY AND CENTRIFUGATION (18 HRS.)**

Photoelectric Colorimeters, Fluorimeters –Principle -Applications.

### **CENTRIFUGATION:**

Types of Centrifuge – Ordinary and Ultracentrifuge - Principle and applications.

### **MICROBIOLOGICAL ASSAYS**

Types of Assays -Principle - Requirements for the conduct of Microbiological assays –Applications.

## **UNIT –IV SPECTROSCOPY (18 HRS.)**

### **SPECTROSCOPY:**

Spectrophotometry – Spectrophotometers – Atomic Absorption Spectrophotometry & ICP.

Spectrophotometers –Principle – Applications.

### **NMR and NIR:**

Nuclear Magnetic Resonance- Application and principle

Near Infra Red -Principle and Application

## **UNIT –V ISOTOPES ( 18 HRS.)**

Types – Stable and Radioactive, Units of radio-activity – Uses in biological investigations - Geiger Muller Counter and Scintillation Counter – Effects of ionizing radiation-hazards and prevention - Applications.

### **pH and Buffer:**

pH meter –measurement of pH, Buffer – Definition – Types – Buffer system with special reference to living body

### **BOOK REFERENCES:**

5. Ewing. W.W. (1970). *Instrumental Methods of Chemical Analysis*. McGraw Hill Book Company, New Delhi.
6. Mahinder Singh, (2003). *Analytical Chemistry – Instrumental Techniques*. Dominant Publishers and Distributors, New Delhi.
7. Nikelal, (1973). *Experimental methods in Biophysical Chemistry*. John Wiley Publishers.
8. Yadav M.S (2001). *Instrumental Methods of Chemical Analysis*. Campus Books Internationals, New Delhi.

**Open Educational Resources:**

- 1.<https://microbenotes.com/types-of-chromatography/>
- 2.<https://www.slideshare.net/BlueRose9/electrophoresis-78994484>
- 3.<https://study.com/academy/lesson/spectrophotometer-definition-uses-parts.html>
- 4.<https://www.thermofisher.com/in/en/home/industrial/spectroscopy-elemental-isotope-analysis/spectroscopy-elemental-isotope-analysis-learning-center/molecular-spectroscopy-information/nmr-information/nmr-applications-process-control.html>
- 5.<https://dlc.dcccd.edu/biology1-2/ph-and-buffers>

**COURSE CONTENTS & LECTURE SCHEDULE:**

| <b>Module No.</b>              | <b>Topic</b>  | <b>No. of Lectures</b> | <b>Teaching Pedagogy</b> | <b>Teaching Aids</b> |
|--------------------------------|---|------------------------|--------------------------|----------------------|
| <b>UNIT -1 CHROMATOGRAPHY</b>  |   |                        |                          |                      |
| 1.1                            | Meaning, – principles, components and applications                        | 2                      | Chalk & Talk             | Black Board          |
| 1.2                            | Paper Chromatography – Ascending and descending – One and two dimensional | 5                      | Chalk & Talk             | LCD                  |
| 1.3                            | Thin Layer Chromatography   | 3                      | Seminar                  | PPT & White board    |
| 1.4                            | Gas Chromatography  | 2                      | Seminar                  | Smart Board          |
| 1.5                            | Ion exchange Chromatography   | 2                      | Seminar                  | Black Board          |
| 1.6                            | Gel filtration Chromatography   | 2                      | Chalk & Talk             | LCD                  |
| 1.7                            | High Performance Liquid Chromatography                                    | 2                      | Chalk & Talk             | LCD                  |
| <b>UNIT -2 ELECTROPHORESIS</b> |   |                        |                          |                      |
| 2.1                            | Meaning –Types of Electrophoresis   | 2                      | Lecture                  | Black Board          |
| 2.2                            | Pape Electrophoresis  | 2                      | Chalk & Talk             | LCD                  |
| 2.3                            | Starch Electrophoresis  | 2                      | Seminar                  | PPT & White board    |
| 2.4                            | Gel, Agar-gel Electrophoresis   | 4                      | Seminar                  | Smart Board          |
| 2.5                            | Poly Acrylamide gel   | 3                      | Seminar                  | Black Board          |
| 2.6                            | Moving boundary Electrophoresis   | 2                      | Chalk & Talk             | LCD                  |

|   |  |   |              |             |
|---|--|---|--------------|-------------|
| 2.7   | Immuno electrophoresis   | 3 | Chalk & Talk | LCD         |
| <b>UNIT 3 COLORIMETRY, FLUORIMETRY AND CENTRIFUGATION</b> |  |   |              |             |
| 3.1   | Photoelectric Colorimeters, Principle -Applications.                   | 3 | Lecture      | Black Board |
| 3.2   | Fluorimeters –Principle - Applications.                                | 3 | Seminar      | Smart Board |
| 3.3   | Types of Centrifuge – Ordinary Centrifuge -Principle and applications. | 3 | Seminar      | Black Board |
| 3.4   | Types of Centrifuge – Ultra Centrifuge -Principle and applications.    | 3 | Chalk & Talk | LCD         |
| 3.5   | Types of Assays -Principle   | 3 | Chalk & Talk | LCD         |
| 3.6   | Requirements for the conduct of Microbiological assays                 | 2 | Seminar      | LCD         |
| 3.7   | Applications of Microbiological assays                                 | 1 | Chalk & Talk | LCD         |
| <b>UNIT 4 SPECTROSCOPY</b>                                |  |   |              |             |
| 4.1   | Spectrophotometry – Principle – Applications.                          | 4 | Seminar      | LCD         |
| 4.2   | Atomic Absorption Spectrophotometers - Principle – Applications.       | 5 | Chalk & Talk | LCD         |
| 4.3   | Nuclear Magnetic Resonance-Application and principle                   | 5 | Seminar      | LCD         |
| 4.4   | Near Infra Red -Principle and Application                              | 4 | Seminar      | Smart Board |
| <b>UNIT 5 ISOTOPES</b>                                    |  |   |              |             |
| 5.1   | Types – Stable and Radioactive Isotopes                                | 2 | Seminar      | LCD         |
| 5.2   | Units of radio-activity  | 1 | Chalk & Talk | LCD         |

## CBCS Curriculum for M.Sc Human Nutrition &amp; Nutraceuticals

|     |  |   |         |             |
|-----|--|---|---------|-------------|
| 5.3 | Uses in biological investigations                                    | 2 | Seminar | Smart Board |
| 5.4 | Geiger Muller Counter and Scintillation Counter                      | 3 | Seminar | LCD         |
| 5.5 | Effects of ionizing radiation-hazards and prevention - Applications. | 3 | Seminar | Black Board |
| 5.6 | pH meter –measurement of pH  | 3 | Seminar | LCD         |
| 5.7 | Buffer – Definition – Types  | 1 | Lecture | Black Board |
| 5.8 | Buffer system with special reference to living body.                 | 2 | Seminar | Smart Board |

|                | C1      | C2      | C3      | C4         | C5      | Total Scholastic Marks | Non Scholastic Marks C6 | CIA Total | % of Assessment |
|----------------|---------|---------|---------|------------|---------|------------------------|-------------------------|-----------|-----------------|
| Levels         | T1      | T2      | Seminar | Assignment | OBT/PPT |                        |                         |           |                 |
|                | 10 Mks. | 10 Mks. | 5 Mks.  | 5 Mks      | 5 Mks   | 35 Mks.                | 5 Mks.                  | 40Mks.    |                 |
| K2             | 4       | 4       | -       | -          | -       | 8                      | -                       | 8         | 20 %            |
| K3             | 2       | 2       | -       | 5          | -       | 9                      | -                       | 9         | 22.5 %          |
| K4             | 2       | 2       | -       | -          | 5       | 9                      | -                       | 9         | 22.5 %          |
| K5             | 2       | 2       | 5       | -          | -       | 9                      | -                       | 9         | 22.5 %          |
| Non Scholastic | -       | -       | -       | -          | -       |                        | 5                       | 5         | 12.5 %          |
| Total          | 10      | 10      | 5       | 5          | 5       | 35                     | 5                       | 40        | 100 %           |

## CIA

|                |           |
|----------------|-----------|
| Scholastic     | <b>35</b> |
| Non Scholastic | <b>5</b>  |
|                | <b>40</b> |

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for PG are**

**K2-Understand, K3-Apply, K4-Analyse, K5- Evaluate**

### EVALUATION PATTERN

| SCHOLASTIC |    |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5 | C6               | CIA   | ESE | Total |
| 10         | 10 | 5  | 5  | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test-1

**C2** – Internal Test-2

**C3** - Seminar

**C4** – Assignment

**C5** - OBT/PPT

**C6** – Non – Scholastic

### COURSE OUTCOMES

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

| <b>NO.</b>  | <b>COURSE OUTCOMES</b>  | <b>KNOWLEDGE LEVEL<br/>(ACCORDING TO REVISED BLOOM'S TAXONOMY)</b> | <b>PSOs ADDRESSED</b> |
|-------------|---|--|-----------------------|
| <b>CO 1</b> | Explain the principle and instrumentation of chromatography   | K2   | PSO7                  |
| <b>CO 2</b> | Summarize the working procedure of electrophoresis  | K2   | PSO7                  |
| <b>CO 3</b> | Apply the principle, procedure and application of Photoelectric Colorimeters, Fluorimeters and Microbiological assays | K3   | PSO7                  |
| <b>CO 4</b> | Analyze the types of Spectrophotometry its principle, procedure and application                                       | K4   | PSO7                  |
| <b>CO 5</b> | Explain the different types of pH isotopes, buffers and its application   | K5   | PSO7                  |

### Mapping of COs with PSOs

| CO / PSO | SO1 | SO2 | SO3 | SO4 | SO5 | SO6 | SO7 | SO8 | SO9 | SO10 | SO11 | PSO12 | PSO13 | PSO14 | PSO15 |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|-------|-------|-------|-------|
| CO1      | 1   | 1   | 1   | 1   | 1   | 1   | 3   | 2   | 1   | 1    | 1    | 1     | 1     | 1     | 1     |
| CO2      | 1   | 1   | 1   | 1   | 1   | 1   | 3   | 2   | 1   | 1    | 1    | 1     | 1     | 1     | 1     |
| CO3      | 1   | 1   | 1   | 1   | 1   | 1   | 3   | 2   | 1   | 1    | 1    | 1     | 1     | 1     | 1     |
| CO4      | 1   | 1   | 1   | 1   | 1   | 1   | 3   | 2   | 1   | 1    | 1    | 1     | 1     | 1     | 1     |
| CO5      | 1   | 1   | 1   | 1   | 1   | 1   | 3   | 2   | 1   | 1    | 1    | 1     | 1     | 1     | 1     |

### Mapping of COs with POs

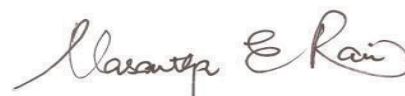
| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 2   | 1   | 3   | 3   |
| CO2     | 2   | 1   | 3   | 3   |
| CO3     | 3   | 2   | 3   | 3   |
| CO4     | 3   | 1   | 1   | 1   |
| CO5     | 2   | 1   | 1   | 1   |

**Note: Strongly Correlated – 3 Moderately Correlated – 2  
Weakly Correlated -1**

#### COURSE DESIGNERS:

1. Dr. K.Karthiga
2. Mrs. J.Josephine Jesintha

**Forwarded By**



(Dr.Vasantha Esther Rani)

**100% SKILL DEVELOPMENT & ENTREPRENEURSHIP**

**II M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS****SEMESTER –III***For those who joined in 2019 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE   | CATEGORY              | HRS/ WEEK | CREDITS  |
|----------------|-------------|--|-----------------------|-----------|----------|
| PSNN           | 19PG3NE1    | <b>FOOD PRODUCT DEVELOPMENT AND SENSORY EVALUATION</b> | <b>Major Elective</b> | <b>4</b>  | <b>4</b> |

**COURSE DESCRIPTION**

This course gives in-depth knowledge on the development, evaluation & marketing of food products.

**COURSE OBJECTIVES**

- To understand the consumer needs and demands in the society.
- To develop innovative food products based on the consumer needs.
- To gain knowledge on the marketing and evaluation of food products.

**UNITS****UNIT –I FOOD NEEDS AND CONSUMER PREFERENCE (12 HRS.)**

Food needs and population, Hierarchy of food needs- Instrumental food, Novel food, Good- tasting food, Reliable, Ongoing access to food, Acceptable food and Enough food, Factors impacting food choices – Physiological, Psychological, Economical and Social. Consumer Preference – Definition, Meeting consumer demands.

**UNIT –II PROCESS OF FOOD PRODUCT DEVELOPMENT (12 HRS.)**

Definition and Need for Product development, Classification and Characteristics of food product, Phases in food product development, Factors influencing product development, Consumer acceptance of new food products, Future trends in food product development.

**UNIT –III SENSORY EVALUATION OF FOOD PRODUCT (12 HRS.)**

Definition, Sensory characteristics of food, Requisites for conducting sensory tests – trained panel members, testing laboratory, preparation of samples, techniques of smelling and tasting, testing time, design of experiment. Types

of tests: Difference tests –Paired comparison test, Duo-trio test, Triangle test. Rating tests – Ranking test, Single sample test, Two sample difference test, Multiple sample difference test, Hedonic rating test, Numeric scoring test, composite scoring test, Sensitivity tests – Sensitivity threshold test, dilution test. Descriptive tests – Descriptive flavour profile method.

#### **UNIT –IV MARKETING OF FOOD PRODUCT (12 HRS.)**

Food Marketing, Historical phases of food marketing, Components of food marketing, Requisites of selling a product; Trends in Food Market; Marketing methods, Advantages and disadvantages of marketing methods; Market testing – Where, When, How, What to market; Evaluating the results; Failures in the Market places – Causes of failure – external and internal reasons.

#### **UNIT –V ECONOMIC EVALUATION OF FOOD PRODUCT (12 HRS.)**

Costing / Pricing- Steps for determining product price; Calculation of selling price; Product cost-Variable and Fixed cost; Categories of Product Cost-Material, Labor, Overhead cost, Breakeven point. Product launch- Meaning, Benefits, Steps to launch a new product. Commercialization of product-Meaning, Key aspects, Commercialization process, Action plan.

#### **BOOK REFERENCES:**

1. Fuller,G.W. (1994) *New Food Product Development from Concept to Market Place*' CRC Press, Boca Raton,USA.
2. Gould,W.A., (1991) 'Research and Development Guidelines for the Food Industry' CTI Pub, Baltimore.
3. Lyon,D.H., (1992) '*Guidelines for Sensory Analysis in Food Product Development and Quality Control*' Chapman and Hall, London.
4. Robinson J, Roberts H, Barnard E, and Shepard T (2001) '*Design and Make It Food Technology*' Nelson Thomes Ltd, UK.
5. Srilakshmi, B. (2008), *Food science*, New age international publishers, New Delhi.

#### **JOURNALS REFERENCES:**

1. Journal of Food Products Marketing, Open Access journal, Taylor and Francis publishers, England.
2. Journal of Food Science and Technology. AFST, CFTRI, Mysore.

#### **OPEN EDUCATIONAL RESOURCES:**

1. [https://www.researchgate.net/publication/230818950\\_FOOD\\_PRODUCT\\_DEVELOPMENT\\_AS\\_OPPORTUNITY\\_FOR\\_SUCCESS\\_OR\\_SURVIVAL\\_IN\\_THE\\_MARKET](https://www.researchgate.net/publication/230818950_FOOD_PRODUCT_DEVELOPMENT_AS_OPPORTUNITY_FOR_SUCCESS_OR_SURVIVAL_IN_THE_MARKET)
2. <https://core.ac.uk/download/pdf/7062218.pdf>
3. <http://www.fao.org/3/i4939e/i4939e.pdf>

4. <https://nzfst.org.nz/resources/foodproductdevelopment/Chapter-3-1-2.htm>
5. [http://samples.jbpub.com/9781449694777/9781449603441\\_CH03.pdf](http://samples.jbpub.com/9781449694777/9781449603441_CH03.pdf)
6. <https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/2844/IDL-2844.pdf?sequence=1>
7. <https://open.lib.umn.edu/principlesmarketing/>
8. <https://eularis.com/7-steps-to-better-your-product-launch/>

**COURSE CONTENTS & LECTURE SCHEDULE:**

| Module No.  | Topic   | No. of Lectures | Teaching Pedagogy                | Teaching Aids           |
|---|---|-----------------|----------------------------------|-------------------------|
| <b>UNIT -1 FOOD NEEDS AND CONSUMER PREFERENCE</b>   |   |                 |                                  |                         |
| 1.1   | Food needs and population-Introduction                                | 3               | Chalk & Talk,Lecture             | Black/white Board       |
| 1.2   | Hierarchy of food needs   | 3               | Chalk & Talk,Lecture             | Black/white Board       |
| 1.3   | Factors impacting food Choices  | 3               | Lecture                          | PPT                     |
| 1.4   | Consumer Preference, Meeting consumer demands                         | 3               | Chalk & Talk,Lecture             | Black/white Board       |
| <b>UNIT – 2 PROCESS OF FOOD PRODUCT DEVELOPMENT</b> |   |                 |                                  |                         |
| 2.1   | Definition and Need for Product development                           | 2               | Chalk & Talk,Lecture, seminar    | PPT & White/Black board |
| 2.2   | Classification,Characteristics and phases of food product development | 3               | Lecture,Discussion               | PPT & White board       |
| 2.3   | Factors influencing product development                               | 3               | Lecture                          | Black/white Board       |
| 2.4   | Consumer acceptance & Future trends in food product development.      | 4               | Lecture,Group Discussion,seminar | PPT & White board       |
| <b>UNIT -3 SENSORY EVALUATION OF FOOD PRODUCT</b>   |   |                 |                                  |                         |
| 3.1   | Definition and sensory characteristics of food                        | 3               | Lecture,Discussion               | Black/white Board       |
| 3.2   | Requisites for food product development                               | 3               | Lecture,Discussion               | Black/white Board       |

|   |  |   |                                    |                                  |
|---|--|---|------------------------------------|----------------------------------|
| 3.3   | Difference and Rating test   | 3 | Lecture                            | Black/white Board                |
| 3.4   | Sensitivity & Descriptive test   | 3 | Lecture                            | Black/white Board                |
| <b>UNIT -4 MARKETING OF FOOD PRODUCT</b>            |  |   |                                    |                                  |
| 4.1   | Food Marketing, Historical phases of food marketing, Requisites of selling a product | 3 | Lecture, Group Discussion, seminar | PPT & White board                |
| 4.2   | Components of food marketing   | 3 | Lecture                            | Black/white Board                |
| 4.3   | Trends in Food Market, Marketing methods   | 3 | Lecture                            | Black/white Board                |
| 4.4   | Market testing & Evaluating the results  | 3 | Lecture, Survey                    | Black/white Board, Questionnaire |
| <b>UNIT - 5 ECONOMIC EVALUATION OF FOOD PRODUCT</b> |  |   |                                    |                                  |
| 5.1   | Costing / Pricing  | 3 | Lecture, Group Discussion, seminar | PPT & White board                |
| 5.2   | Steps for determining product price  | 3 | Lecture                            | Black/white Board                |
| 5.3   | Product cost-Variable and Fixed cost   | 3 | Lecture                            | Black/white Board                |
| 5.4   | Product launch & Commercialization of product  | 3 | Lecture, Survey                    | Black/white Board, Questionnaire |

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|                   | C1         | C2         | C3      | C4         | C5      | Total<br>Scholastic<br>Marks | Non<br>Scholastic<br>Marks<br>C6 | CIA<br>Total | % of<br>Assessment |
|-------------------|------------|------------|---------|------------|---------|------------------------------|----------------------------------|--------------|--------------------|
| Levels            | T1         | T2         | Seminar | Assignment | OBT/PPT |                              |                                  |              |                    |
|                   | 10<br>Mks. | 10<br>Mks. | 5 Mks.  | 5 Mks      | 5 Mks   | 35 Mks.                      | 5 Mks.                           | 40Mks.       |                    |
| K2                | 4          | 4          | -       | -          | -       | 8                            | -                                | 8            | 20 %               |
| K3                | 2          | 2          | -       | 5          | -       | 9                            | -                                | 9            | 22.5 %             |
| K4                | 2          | 2          | -       | -          | 5       | 9                            | -                                | 9            | 22.5 %             |
| K5                | 2          | 2          | 5       | -          | -       | 9                            | -                                | 9            | 22.5 %             |
| Non<br>Scholastic | -          | -          | -       | -          | -       |                              | 5                                | 5            | 12.5 %             |
| Total             | 10         | 10         | 5       | 5          | 5       | 35                           | 5                                | 40           | 100 %              |

CIA

Scholastic **35**

Non Scholastic **5**

**40**

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for PG are :**

**K2-Understand, K3-Apply, K4-Analyse, K5- Evaluate**

**EVALUATION PATTERN**

| SCHOLASTIC |    |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5 | C6               | CIA   | ESE | Total |
| 10         | 10 | 5  | 5  | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test-1**C2** – Internal Test-2**C3** - Seminar**C4** – Assignment**C5** - OBT/PPT**C6** – Non – Scholastic**COURSE OUTCOMES**

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

| NO.  | COURSE OUTCOMES   | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED     |
|------|---|--|--------------------|
| CO 1 | Compare the food needs and consumer demands in the society                                | K2   | PSO9               |
| CO 2 | Explain the classification, characteristics and future trends in food product development | K2   | PSO9 & PSO15       |
| CO 3 | Choose the different sensory tests employed for food evaluation                           | K3   | PSO5, PSO9 & PSO15 |
| CO 4 | Correlate the different marketing methods of food products                                | K4   | PSO9 & PSO15       |
| CO 5 | Estimate the economic evaluation of food products   | K5   | PSO9 & PSO15       |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 1     | 1     | 1     | 2     | 1     | 1     | 1     | 3     | 1      | 1      | 1      | 2      | 1      | 1      |
| CO2      | 1     | 1     | 1     | 1     | 2     | 1     | 1     | 1     | 3     | 1      | 1      | 1      | 2      | 1      | 3      |
| CO3      | 1     | 1     | 1     | 1     | 3     | 1     | 1     | 1     | 3     | 1      | 1      | 1      | 2      | 1      | 3      |
| CO4      | 1     | 1     | 1     | 1     | 2     | 1     | 1     | 1     | 3     | 1      | 1      | 1      | 2      | 1      | 3      |
| CO5      | 1     | 1     | 1     | 1     | 2     | 1     | 1     | 1     | 3     | 1      | 1      | 1      | 2      | 1      | 3      |

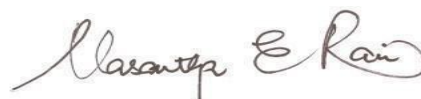
### Mapping of COs with POs

| CO/<br>PSO | PO1 | PO2 | PO3 | PO4 |
|------------|-----|-----|-----|-----|
| CO1        | 2   | 1   | 1   | 3   |
| CO2        | 2   | 1   | 1   | 3   |
| CO3        | 1   | 1   | 1   | 3   |
| CO4        | 1   | 1   | 1   | 3   |
| CO5        | 1   | 1   | 1   | 3   |

**Note:**    " Strongly Correlated – 3    " Moderately Correlated – 2  
               " Weakly Correlated -1

**COURSE DESIGNER:**  
**1.Dr. K.KARTHIGA**

**Forwarded By**



(Dr.Vasantha Esther Rani)

**100% SKILL DEVELOPMENT & ENTREPRENEURSHIP**

**II M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS  
 SEMESTER –III**

*For those who joined in 2019 onwards*

| PROGRAMME<br>CODE | COURSE<br>CODE | COURSE TITLE                | CATEGORY          | HRS/<br>WEEK | CREDITS |
|-------------------|----------------|-----------------------------|-------------------|--------------|---------|
| PSNN              | 19 PG3NE2      | INSTITUTIONAL<br>MANAGEMENT | Major<br>Elective | 4            | 4       |

## **COURSE DESCRIPTION**

The course will describe the concepts of organization and management approaches of food service establishment.

## **COURSE OBJECTIVES**

- To develop a knowledge base in key areas of institutional food administration.
- To impart necessary expertise to function as a food service manager.
- To understand the basic principles of organization and management in food service units.

## **UNIT –I [12 HRS]**

### **INTRODUCTION TO FOOD SERVICE INSTITUTIONS**

Definition of food service institutions, Evolution of food service systems, Characteristics of the various types of food service units.

Kinds of food service systems - Conventional, commissary, ready prepared, assembly/serve

## **UNIT –II [12 HRS]**

### **INSTITUTIONAL MANAGEMENT**

Theories - Classical, Scientific, Behavioral, Systems approach, Contingency approach, Management By Objective(MBO), Just-in- Time(JIT), Total Quality Management (TQM). Functions of management, Principles of management, management tools

## **UNIT –III [12 HRS]**

### **PERSONNEL MANAGEMENT**

Personnel management -Definition, scope, concept of personnel management, approaches of personnel management, personnel policies, Functions of personnel manager.

Selection- Definition, Steps. Induction- Definition, Methods, Check list

Staff welfare provisions- Physical needs, Physiological needs, Psychosocial Needs

Training- Need for training, Katz and Kahn point about change in an organization, Training programmes, Areas of training. Staff development- Principles of development, Process of development.

## **UNIT –IV [12 HRS]**

### **FOOD COST MANAGEMENT**

Costing-Definition of costing, Definition of Cost, Cost components, Behaviour of cost,

Cost control-Definition, Factors responsible for losses, Methods of controlling food cost

Food cost analysis. Pricing-Definition, Methods of pricing- Cost plus pricing, Rate of return pricing.

#### **UNIT -V**

#### **LAWS GOVERNING FOOD SERVICE ESTABLISHMENTS [12 HRS]**

Labour laws- The Indian Contract Act, Workmen's Compensation Act, The Trade Unions Act, Payment of Wages Act, Industrial Disputes Act, The Factories Act, The Minimum Wages Act, Employees State Insurance (ESI) Act, Employees Pension Scheme, Shops and Establishments Act, Hostel Scheme, Annapurna Scheme.

#### **REFERENCES:**

1. Knosotz, H.O Donnel C (1968) *Principles of Management*, McGraw Hill Book Company.
2. Kotas Richard & Jayawardardene.C (1994): *Profitable food and Beverage Management*, Hodder & Sloughton Publication.
3. Sethi Mohini (2000), *Catering Management An integrated Approach*, 2<sup>nd</sup> Ed Wiley Publication.
4. West, B Bessie & Wood, Levelle (1986) *Food Service in Institutions* 6<sup>th</sup> Ed, Macmillian Publication Company, New York.

#### **JOURNAL REFERENCES:**

1. Journal of Foodservice Management & Education.
2. Journal of Foodservice.

#### **OPEN EDUCATION RESOURCES:**

1. [http://oer.nios.ac.in/wiki/index.php/Tourism\\_and\\_Hospitality\\_Management](http://oer.nios.ac.in/wiki/index.php/Tourism_and_Hospitality_Management)
2. <https://open.umn.edu/opentextbooks/textbooks/71>
3. <https://openstax.org/details/books/principles-management>
4. [https://link.springer.com/referenceworkentry/10.1007%2F978-94-007-0929-4\\_80](https://link.springer.com/referenceworkentry/10.1007%2F978-94-007-0929-4_80)

5. <https://digitalcommons.fiu.edu/cgi/viewcontent.cgi?referer=https://www.google.com/&httpsredir=1&article=1190&context=hospitalityreview>
6. <https://tygroupa.files.wordpress.com/2010/03/chapter-29-food-cost-control.pdf>
7. [https://www.oracle.com/webfolder/s/delivery\\_production/docs/FY16h1/doc29/Cost-Control-F-B-Report.pdf](https://www.oracle.com/webfolder/s/delivery_production/docs/FY16h1/doc29/Cost-Control-F-B-Report.pdf)

**COURSE CONTENTS & LECTURE SCHEDULE:**

| Module No.   | Topic   | No. of Lectures | Teaching Pedagogy | Teaching Aids |
|--|---|-----------------|-------------------|---------------|
| <b>UNIT -1 INTRODUCTION TO FOOD SERVICE INSTITUTIONS</b> |   |                 |                   |               |
| 1.1  | Definition of food service institutions, Evolution of food service systems.   | 4               | Chalk & Talk      | Black Board   |
| 1.2  | Characteristics of the various types of food service units.   | 4               | Chalk & Talk      | Black Board   |
| 1.3  | Kinds of food service systems - Conventional, commissary, ready prepared, assembly/serve.   | 4               | Lecture           | PPT           |
| <b>UNIT -2 INSTITUTIONAL MANAGEMENT</b>                  |   |                 |                   |               |
| 2.1  | Theories - Classical, Scientific, Behavioral, Systems approach, Contingency approach, Management By Objective(MBO), Just-in- Time(JIT), Total Quality Management (TQM). | 4               | Lecture           | PPT           |
| 2.2  | Functions and Principles of management.   | 4               | Lecture           | PPT           |
| 2.3  | Management tools  | 4               | Lecture           | PPT           |
| <b>UNIT -3 PERSONNEL MANAGEMENT</b>                      |   |                 |                   |               |
| 3.1  | Personnel management - Definition, scope, concept of personnel management, approaches of personnel management.  | 3               | Chalk & Talk      | Black Board   |
| 3.2  | Personnel policies, Functions of personnel manager.   | 2               | Chalk & Talk      | Black Board   |

|   |   |   |              |             |
|---|---|---|--------------|-------------|
| 3.3   | Selection- Definition, Steps.<br>Induction- Definition, Methods,<br>Check list.   | 2 | Chalk & Talk | Black Board |
| 3.4   | Staff welfare provisions- Physical needs, Physiological needs, Psychosocial Needs   | 2 | Chalk & Talk | Black Board |
| 3.5   | Training- Need for training, Katz and Kahn point about change in an organization, Training programmes, Areas of training. Staff development- Principles of development, Process of development. | 3 | Lecture      | PPT         |
| <b>UNIT -4 FOOD COST MANAGEMENT</b>                       |   |   |              |             |
| 4.1   | Costing-Definition of costing, Definition of Cost, Cost components, Behaviour of cost.  | 4 | Lecture      | PPT         |
| 4.2   | Cost control-Definition, Factors responsible for losses, Methods of controlling food cost.  | 4 | Chalk & Talk | Black Board |
| 4.3   | Food cost analysis. Pricing- Definition, Methods of pricing- Cost plus pricing, Rate of return pricing.   | 4 | Chalk & Talk | Black Board |
| <b>UNIT -5 LAWS GOVERNING FOOD SERVICE ESTABLISHMENTS</b> |   |   |              |             |

CBCS Curriculum for M.Sc Human Nutrition & Nutraceuticals

|     |   |   |         |     |
|-----|---|---|---------|-----|
| 5.1 | Labour laws- The Indian Contract Act, Workmen's Compensation Act, The Trade Unions Act, Payment of Wages Act, Industrial Disputes Act, The Factories Act. | 6 | Lecture | PPT |
| 5.2 | The Minimum Wages Act, Employees State Insurance (ESI) Act, Employees Pension Scheme, Shops and Establishments Act, Hostel Scheme, Annapurna Scheme.      | 6 | Lecture | PPT |

|                | C1      | C2      | C3      | C4         | C5      | Total Scholastic Marks | Non Scholastic Marks C6 | CIA Total |
|----------------|---------|---------|---------|------------|---------|------------------------|-------------------------|-----------|
| Levels         | T1      | T2      | Seminar | Assignment | OBT/PPT |                        |                         |           |
|                | 10 Mks. | 10 Mks. | 5 Mks.  | 5 Mks      | 5 Mks   | 35 Mks.                | 5 Mks.                  | 40Mks.    |
| K2             | 4       | 4       | -       | -          | -       | 8                      | -                       | 8         |
| K3             | 2       | 2       | -       | 5          | -       | 9                      | -                       | 9         |
| K4             | 2       | 2       | -       | -          | 5       | 9                      | -                       | 9         |
| K5             | 2       | 2       | 5       | -          | -       | 9                      | -                       | 9         |
| Non Scholastic | -       | -       | -       | -          | -       |                        | 5                       | 5         |
| Total          | 10      | 10      | 5       | 5          | 5       | 35                     | 5                       | 40        |

## CIA

Scholastic **35**Non Scholastic **5****40**

- **All the course outcomes are to be assessed in the various CIA components.**
- **The levels of CIA Assessment based on Revised Bloom's Taxonomy for PG are :**

**K2-Understand, K3-Apply, K4-Analyse, K5-Evaluate**

### EVALUATION PATTERN

| SCHOLASTIC |    |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5 | C6               | CIA   | ESE | Total |
| 10         | 10 | 5  | 5  | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test-1

**C2** – Internal Test-2

**C3** - Seminar

**C4** – Assignment

**C5** - OBT/PPT

**C6** – Non - Scholastic

### COURSE OUTCOMES

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

| NO.  | COURSE OUTCOMES  | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|------|--|--|----------------|
| CO 1 | Outline the key areas of food service institutions.              | K2   | PSO14          |
| CO 2 | Discuss the theories and concepts of institutional management.   | K2   | PSO14          |
| CO 3 | Determine the scope and theories of personnel management.        | K3   | PSO14          |
| CO 4 | Examine the aspects of food cost management.                     | K4   | PSO14          |
| CO 5 | Explain the different laws governing food service establishment. | K5   | PSO14          |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 3      | 1      |
| CO2      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 3      | 1      |
| CO3      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 3      | 1      |
| CO4      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 3      | 1      |
| CO5      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 3      | 1      |

### Mapping of COs with POs

| CO/<br>PSO | PO1 | PO2 | PO3 | PO4 |
|------------|-----|-----|-----|-----|
| CO1        | 2   | 1   | 1   | 1   |
| CO2        | 2   | 1   | 1   | 1   |
| CO3        | 2   | 1   | 1   | 1   |
| CO4        | 2   | 1   | 1   | 1   |
| CO5        | 2   | 1   | 1   | 1   |

**Note: Strongly Correlated – 3**

**“ Moderately Correlated – 2**

**“ Weakly Correlated -1**

**COURSE DESIGNER:**

**Mrs. P.Madalene Virjini**

**Forwarded By**



(Dr.Vasantha Esther Rani)

**100% SKILL DEVELOPMENT**

**II M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS**

**SEMESTER –III**

*For those who joined in 2019 onwards*

| <b>PROGRAMME CODE</b> | <b>COURSE CODE</b> | <b>COURSE TITLE</b>            | <b>CATEGORY</b> | <b>HRS/ WEEK</b> | <b>CREDITS</b> |
|-----------------------|--------------------|--------------------------------|-----------------|------------------|----------------|
| <b>PSNN</b>           | <b>19PG3N14</b>    | <b>Community Nutrition Lab</b> | <b>Lab</b>      | <b>4</b>         | <b>2</b>       |

### **COURSE DESCRIPTION**

The practical course provides hands -on training on assessing the nutritional status, preparation of supplementary foods and imparting nutritional education for the vulnerable groups in the community.

### **COURSE OBJECTIVES**

- To impart skills in the planning and execution of nutrition awareness programmes among various sections of the population.
- To develop skill in the assessment of nutritional status

### **UNITS**

#### **UNIT –I Assessment of nutritional status (ABC) (12 HRS.)**

Assessment and interpretation of nutritional status (ABC) - pregnant woman, lactating mother, preschool children, school going children and elderly people.

#### **UNIT –II Assessment of nutritional status (D) (12 HRS.)**

Dietary assessment- 24 hour recall method, weighment method and food frequency method.

#### **UNIT –III Audio-Visual Aids (12 HRS.)**

Preparation of audio- visual aids- charts, posters, pamphlets, folders and videos. Principles of campaign, exhibition and demonstration.

#### **UNIT –IV Nutrition education (12 HRS.)**

Planning nutrition education for different age group.

#### **UNIT –V Supplementary foods (12 HRS.)**

Formulation of supplementary foods.

**REFERENCES:**

1. Rajammal P. Devadas (1980) *Nutrition and Nutritional Development*, Saradalaya Press, Coimbatore, Tamil Nadu.
2. Sach Dev. H.P.S. & Choudhury, P. (1994). *Nutrition in Children – Developing Country Concerns*, Cambridge Press, New Delhi.
3. Shanthi Ghosh, (1992) *The Feeding and care of Infants and Young Children*, Voluntary Health Association of India, New Delhi.
4. Shanthi Ghossh (1997) *Nutrition and Child Care, A Practical Guide*, Jay Pee Brothers, Medical Publishers (P) Ltd., New Delhi.
5. UNICEF (1990). *Children and Women in India*, Situation Analysis, New Delhi.

**WEB REFERENCES:**

1. [www.icmr.nic.in](http://www.icmr.nic.in)
2. [www.who.int](http://www.who.int)

**COURSE CONTENTS & LECTURE SCHEDULE:**

| Module No.  | Topic  | No. of Lectures | Teaching Pedagogy   | Teaching Aids                                 |
|---|--|-----------------|---------------------|---|
| <b>UNIT -1 Assessment of nutritional status (ABC)</b> |  |                 |                     |   |
| 1.1   | Assessment of nutritional status of pregnant woman                       | 3               | Hands on experience | Weighing balance, measuring tape & callipers. |
| 1.2   | Assessment of nutritional status of lactating mother                     | 3               | Hands on experience | Weighing balance, measuring tape & callipers. |
| 1.3   | Assessment of nutritional status of pre-school and school going children | 3               | Hands on experience | Weighing balance, measuring tape & callipers. |
| 1.4   | Assessment of nutritional status of elderly people                       | 3               | Hands on experience | Weighing balance, measuring tape & callipers. |
| <b>UNIT -2 Assessment of nutritional status (D)</b>   |  |                 |                     |   |
| 2.1   | Dietary assessment- 24 hour recall method                                | 4               | Hands on experience | Standard measuring cups                       |
| 2.2   | Dietary assessment-weighment method                                      | 4               | Hands on experience | Standard measuring cups                       |

|                                    |  |    |                     |                         |
|------------------------------------|--|----|---------------------|-------------------------|
| 2.3                                | Dietary assessment- food frequency method  | 4  | Hands on experience | Standard measuring cups |
| <b>UNIT -3 Audio-Visual Aids</b>   |  |    |                     |                         |
| 3.1                                | Preparation of audio- visual aids- charts, posters, pamphlets, folders and videos. | 6  | Hands on experience | Essential materials     |
| 3.2                                | Principles of campaign, exhibition and demonstration.                              | 6  | Hands on experience | Essential materials     |
| <b>UNIT -4 Nutrition education</b> |  |    |                     |                         |
| 4.1                                | Planning nutrition education for different age group                               | 12 | Role play           | Audio- visual aids      |
| <b>UNIT -5 Supplementary foods</b> |  |    |                     |                         |
| 5.1                                | Formulation of supplementary foods   | 12 | Demonstration       | Raw materials           |

**EVALUATION PATTERN**

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 10         | 10 | 10 | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test - 1**C2** – Internal Test - 2**C3** – Model Practical Exam

**C4** – Record**C5** – Non – Scholastic**COURSE OUTCOMES**

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

| <b>NO.</b>  | <b>COURSE OUTCOMES</b>   | <b>KNOWLEDGE LEVEL<br/>(ACCORDING TO REVISED BLOOM'S TAXONOMY)</b> | <b>PSOs ADDRESSED</b> |
|-------------|--|--|-----------------------|
| <b>CO 1</b> | Interpret the nutritional status of various age groups                         | K2   | PSO6                  |
| <b>CO 2</b> | Estimate the dietary assessment of various age groups                          | K2   | PSO6                  |
| <b>CO 3</b> | Develop different audio visual aids  | K3   | PSO6                  |
| <b>CO 4</b> | Examine the nutrition awareness programmes for community                       | K4   | PSO6                  |
| <b>CO5</b>  | Choose and plan supplementary foods for the vulnerable groups in the community | K5   | PSO6                  |

**Mapping of COs with PSOs**

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 1     | 2     | 1     | 1     | 3     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO2      | 1     | 1     | 2     | 1     | 1     | 3     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO3      | 1     | 1     | 2     | 1     | 1     | 3     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO4      | 1     | 1     | 2     | 1     | 1     | 3     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO5      | 1     | 1     | 2     | 1     | 1     | 3     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 3   | 3   | 2   | 1   |
| CO2     | 3   | 3   | 2   | 1   |
| CO3     | 3   | 3   | 2   | 2   |
| CO4     | 3   | 3   | 1   | 2   |
| CO5     | 3   | 3   | 3   | 1   |

**Note: Strongly Correlated – 3**

**“ Moderately Correlated – 2**

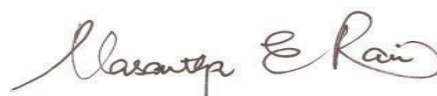
**” Weakly Correlated -**

### COURSE DESIGNER:

1. Mrs. C.Helen

2. Mrs. D.Mouna

**Forwarded By**



(Dr.Vasantha Esther Rani)

## 100% SKILL DEVELOPMENT

## II M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS

### SEMESTER -III

***For those who joined in 2019 onwards***

| PROGRAMME CODE | COURSE CODE | COURSE TITLE                                 | CATEGORY | HRS/WEEK | CREDITS |
|----------------|-------------|--|----------|----------|---------|
| PSNN           | 19PG3N15    | Techniques for Experimental Nutrition -I Lab | Lab      | 4        | 2       |

## COURSE DESCRIPTION

The practical course provides hands –on training in the use of hi-tech precision equipments to identify and analyze the various nutrients present in the food.

## COURSE OBJECTIVES

- To understand the techniques involved in analyzing the nutrients present in foods.
- To familiarize in handling analytical instruments.

## UNITS

|                |                               |                  |
|----------------|-------------------------------|------------------|
| <b>UNIT –I</b> | <b>Estimation of Carotene</b> | <b>(12 HRS.)</b> |
|----------------|-------------------------------|------------------|

## Carotene in Fruits

Carotene in Vegetables

**UNIT –II Estimation of Ascorbic acid (12 HRS.)**

Ascorbic acid in Fruits

Ascorbic acid in Vegetables

**UNIT –III Estimation of Carbohydrate & Peroxide Value (12 HRS.)**

Estimation of Carbohydrate

Peroxide value

**UNIT –IV Estimation of Free fatty acids & Saponification Value(12 HRS.)**

Saponification value in fats & oils

Free fatty acids

**UNIT –V Estimation of Antioxidants (12 HRS.)**

Antioxidant in Fruits

Antioxidant in Vegetables

**REFERENCES:**

8. Berwal. J.S.,Grewal R.B.,Kapoor C.M &.Garg M.R (2004).*Practical Methods in Food Analysis*. Agrotech Publishing Academy, Udaipur.
9. Horwitz W.,(2000).*Official Methods of Analysis of AOAC International*.AOAC International publishers,Rockville,Mary Land.
10. Jayaraman J. (1996), *Laboratory Manual in Biochemistry*. New Age International Ltd. New Delhi.
11. Ranganna S. (1986), *Hand Book of Analysis and Quality Control for fruits and Vegetable Products*. Tata Mc Graw –Hill Publishing Company Limited, New Delhi.
12. Sadasivam S. & Manickam A. (1991), *Biochemical Methods*. New Age International Pvt. Ltd.,New Delhi.
13. Swaminathan.G & George.M (2002). *Laboratory Chemical Methods in Food Analysis*.Margham Publications, Chennai.
14. Yeshajahu Pomeranz & Clifton E. Meloan,( 2004), *Food Analysis –Theory and Practice*. CBS Publishers and Distributors, New Delhi.

**COURSE CONTENTS & LECTURE SCHEDULE:**

| <b>Module No.</b>  | <b>Topic</b>   | <b>No. of Lectures</b> | <b>Teaching Pedagogy</b>       | <b>Teaching Aids</b>     |
|--|--|------------------------|--------------------------------|--------------------------|
| <b>UNIT -1 ESTIMATION OF CAROTENE</b>                                    |  |                        |                                |                          |
| 1.1  | Carotene in Vegetables<br>Carotene in Fruits               | 12                     | Chalk & Talk,<br>Demonstration | Glasswares,<br>Equipment |
| <b>UNIT -2 ESTIMATION OF ASCORBIC ACID</b>                               |  |                        |                                |                          |
| 2.1  | Ascorbic acid in Fruits<br>Ascorbic acid in Vegetables     | 12                     | Chalk & Talk,<br>Demonstration | Glasswares,<br>Equipment |
| <b>UNIT -3 Estimation of Carbohydrate &amp; Peroxide Value</b>           |  |                        |                                |                          |
| 3.1  | Estimation of Carbohydrate<br>Peroxide value               | 12                     | Chalk & Talk,<br>Demonstration | Glasswares               |
| <b>UNIT -4 Estimation of Free fatty acids &amp; Saponification Value</b> |  |                        |                                |                          |
| 4.1  | Saponification value in fats<br>& oils<br>Free fatty acids | 12                     | Chalk & Talk,<br>Demonstration | Glasswares               |
| <b>UNIT -5 Estimation of Antioxidants</b>                                |  |                        |                                |                          |
| 5.1  | Antioxidant in Fruits<br>Antioxidant in Vegetables         | 12                     | Chalk & Talk,<br>Demonstration | Glasswares,<br>Equipment |

### EVALUATION PATTERN

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 10         | 10 | 10 | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test - 1

**C2** – Internal Test - 2

**C3** – Model Practical Exam

**C4** – Record

**C5** – Non - Scholastic

## COURSE OUTCOMES

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

| <b>NO.</b>  | <b>COURSE OUTCOMES</b>  | <b>KNOWLEDGE<br/>LEVEL<br/>(ACCORDING<br/>TO REVISED<br/>BLOOM'S<br/>TAXONOMY)</b> | <b>PSOs<br/>ADDRESSED</b> |
|-------------|---|--|---------------------------|
| <b>CO 1</b> | Explain the principles of analytical techniques                           | K2   | PSO7& PSO8                |
| <b>CO 2</b> | Trace the amount of ascorbic acid in foods                                | K2   | PSO2 &PSO8                |
| <b>CO 3</b> | Compute the procedure for the estimation of $\beta$ -carotene             | K3   | PSO2 &PSO8                |
| <b>CO 4</b> | Examine the amount of free fatty acid and peroxide values in fats and oil | K4   | PSO2 &PSO8                |
| <b>CO 5</b> | Choose the method of analyzing amount of antioxidant present in foods     | K5   | PSO2 &PSO8                |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 1     | 1     | 1     | 1     | 1     | 3     | 3     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO2      | 1     | 3     | 2     | 1     | 1     | 2     | 1     | 3     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO3      | 1     | 3     | 2     | 1     | 1     | 2     | 1     | 3     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO4      | 1     | 3     | 2     | 1     | 1     | 2     | 1     | 3     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |
| CO5      | 1     | 3     | 2     | 1     | 1     | 2     | 1     | 3     | 1     | 1      | 1      | 1      | 1      | 1      | 1      |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 3   | 3   | 2   | 1   |
| CO2     | 3   | 3   | 2   | 1   |
| CO3     | 3   | 3   | 2   | 2   |
| CO4     | 3   | 3   | 1   | 2   |
| CO5     | 3   | 3   | 2   | 1   |

**Note: Strongly Correlated – 3**

**“ Moderately Correlated – 2**

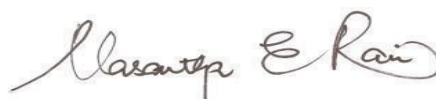
**“ Weakly Correlated -1**

### COURSE DESIGNER:

**1. Dr. K.KARTHIGA**

**2. Mrs. J.JOSEPHINE JESINTHA**

**Forwarded By**



(Dr.Vasantha Esther Rani)

**100% SKILL DEVELOPMENT**

**II M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS**

**SEMESTER –IV**

***For those who joined in 2019 onwards***

| PROGRAMME CODE | COURSE CODE | COURSE TITLE      | CATEGORY   | HRS/ WEEK | CREDITS |
|----------------|-------------|-------------------|------------|-----------|---------|
| PSNN           | 19PG4N16    | Food Microbiology | Major Core | 6         | 5       |

### COURSE DESCRIPTION

The course outlines the role of micro-organism in food spoilage, preservation and processing.

### COURSE OBJECTIVES

- To gain knowledge of role of micro-organisms in humans and environment
- To understand the importance of micro-organisms in food spoilage and to learn advanced, techniques used in food preservation
- To understand the latest procedures adopted in various food operations to prevent food-borne disorders and legal aspects involved in these areas.

### UNITS

#### UNIT –I FOOD AND MICROORGANISMS (18 HRS.)

Food Microbiology – Definition, Basic concept, History of Food Microbiology

Food as substrate for microorganisms – Hydrogen ion concentration, Water activity, Oxidation-Reduction potential, Nutrient content.

Microorganisms important in Food – Industrial importance of Mold, Yeast and Bacteria.

#### UNIT –II FOOD BORNE INFECTIONS (18 HRS.)

Classification of Food borne diseases

Food infection – Definition, Classification, Types – Salmonellosis, *Clostridium perfringes* Gastroenteritis, *Bacillus cereus* Gastroenteritis, E.coli infection, Shigellosis

#### UNIT-III FOOD BORNE INTOXICATION (18 HRS.)

Food Intoxication – Bacterial food intoxication – Botulism, Staphylococcal gastroenteritis, Mycotoxins – Definition, Types – Ochratoxin, Aflatoxin, Patulin.

Identification and Enumeration of Microbes in food – Preparation and Distribution of Culture Media, Inoculation of Culture media, Examination of Organisms, Plating techniques.

#### **UNIT-IV CONTAMINATION, SPOILAGE AND PRESERVATION OF FOODS**

**18 HRS.**

Contamination, Spoilage and Preservation - Cereals, Vegetables, Fruits, Meat, Fish, Egg, Poultry, Milk and its products, Canned foods.

General Principles of Food Preservation; Methods of Food Preservation- Asepsis, Removal of microorganisms, Maintenance of anaerobic conditions, Use of high temperature, Use of low temperature, Use of chemicals, Drying, Use of Radiation, Non thermal methods – Ohmic heating, High Pressure Processing, Cold Plasma Processing, Pulsed electric field.

#### **UNIT -V WATER MICROBIOLOGY (18 HRS.)**

Microbial analysis of water- Sanitary tests for coliforms, MPN of coliforms

Water borne diseases – Definition – common microorganism involved in water borne diseases.

Typhoid - Causes- incubation period – clinical symptoms – mode of transmission – prevention and control.

Diarrhoea- Causes- incubation period – clinical symptoms – mode of transmission- prevention and control.

Cholera – Causes- incubation period – clinical symptoms – mode of transmission- prevention and control.

#### **REFERENCES:**

8. Adams M.R.and M.O.Moss (2005), *Food Microbiology*, New Age International (P) Ltd., Publishers, New Delhi.
9. Frazier W.C, (2000), *Food Microbiology*, New Age International (P) Ltd., Publishers, New Delhi.
10. George J.Banwart (2004), *Basic Food Microbiology*, S.K.Jain for CBS Publishers and Distributors, New Delhi.
11. James.M.Jay, (1996), *Modern Food Microbiology*, S.K.Jain for CBS Publishers and Distributors ,4596/1A,11 Darya Ganj,New Delhi- 110 002,.
12. Pelczar.J, Jr.E.C.S.Chan, Noel R.Kieg, (1993), 5<sup>th</sup> edition *Microbiology*, Tata McGraw Hill Publishing Co., New Delhi,.
13. Rao A.S., (1998), *Introduction to Microbiology*, Asoke K, Ghosh, Pentice-Hall of India Pvt., New Delhi-110 001,
14. Sharma.P.D, (1996), *Microbiology*, Rakesh Kumar Rastogi for rastogi Publications “Gangotri” Shivaji road, Meerut.

#### **JOURNAL REFERENCES:**

6. International Journal of Food Microbiology.
7. Frontiers in Microbiology.

8. Annals of Microbiology.
9. Indian Journal of Microbiology.
10. Applied Microbiology and Biotechnology.

#### **OPEN EDUCATION RESOURCES**

6. <https://mediahub.unl.edu/media/9239#:~:text=This%20lecture%20provides%20an%20overview,affect%20bacterial%20growth%20and%20survival.>
7. [https://www.researchgate.net/publication/285514362\\_Basic\\_Food\\_Microbiology](https://www.researchgate.net/publication/285514362_Basic_Food_Microbiology)
8. <https://www.frontiersin.org/articles/10.3389/fmicb.2020.00237/full>
9. <https://courses.lumenlearning.com/boundless-microbiology/chapter/food-preservation/#:~:text=Preservation%20usually%20involves%20preventing%20the,or%20otherwise%20reduce%20food%20spoilage.>
10. <https://food.unl.edu/food-poisoning-foodborne-illness>

#### **COURSE CONTENTS & LECTURE SCHEDULE:**

| Module No.                              | Topic  | No. of Lectures | Teaching Pedagogy | Teaching Aids |
|---|--|-----------------|-------------------|---------------|
| <b>UNIT -1 FOOD AND MICROORGANISMS</b>  |  |                 |                   |               |
| 1.1                                     | Food Microbiology – Definition, Basic concept  | 2               | Chalk & Talk      | Black Board   |
| 1.2                                     | History of Food Microbiology   | 4               | Lecture           | PPT           |
| 1.3                                     | Food as substrate for microorganisms – Hydrogen ion concentration, Water activity, Oxidation-Reduction potential, Nutrient content | 4               | Lecture           | PPT           |
| 1.4                                     | Industrial importance of Mold, Yeast   | 5               | Lecture           | Videos        |
| 1.5                                     | Industrial importance of bacteria  | 3               | Chalk & Talk      | Black Board   |
| <b>UNIT -2 FOOD BORNE INFECTIONS</b>    |  |                 |                   |               |
| 2.1                                     | Classification of Food borne diseases<br>Food infection – Definition, types  | 4               | Chalk & Talk      | Black Board   |
| 2.2                                     | Salmonellosis, Clostridium Perfringes  | 5               | Chalk & Talk      | Black Board   |
| 2.3                                     | Gastroenteritis, Bacillus cereus gastroenteritis   | 5               | Lecture           | PPT           |
| 2.4                                     | E.coli infection, Shigellosis  | 4               | Lecture           | PPT           |
| <b>UNIT -3 FOOD BORNE INTOXICATIONS</b> |  |                 |                   |               |

|  |  |   |                           |                   |
|--|--|---|---------------------------|-------------------|
| 3.1  | Food Intoxication – Bacterial food intoxication – Botulism, Staphylococcal gastroenteritis,                                      | 4 | Lecture                   | PPT               |
| 3.2  | Mycotoxins – Definition, Types – Ochratoxin, Aflatoxin, Patulin.   | 4 | Lecture                   | PPT               |
| 3.3  | Identification and Enumeration of Microbes in food – Preparation and Distribution of Culture Media, Inoculation of Culture media | 5 | Lecture cum demonstration | Hands on training |
| 3.4  | Examination of Organisms, Plating techniques.  | 5 | Lecture cum demonstration | Hands on training |
| <b>UNIT -4 CONTAMINATION, SPOILAGE AND PRESERVATION OF FOODS</b> |  |   |                           |                   |
| 4.1  | Contamination, Spoilage and Preservation - Cereals, Vegetables, Fruits   | 3 | Lecture                   | PPT               |
| 4.2  | Contamination, Spoilage & Preservation - Meat, Fish  | 2 | Lecture                   | PPT               |
| 4.3  | Contamination, Spoilage & Preservation - Egg, Poultry  | 3 | Lecture                   | PPT               |
| 4.4  | Contamination, Spoilage & Preservation - Milk and its products, Canned foods   | 2 | Lecture                   | Smart Board       |

|                                   |  |   |              |             |
|-----------------------------------|--|---|--------------|-------------|
| 4.5                               | General Principles of Food Preservation; Methods of Food Preservation- Asepsis, Removal of microorganisms, Maintenance of anaerobic conditions | 2 | Lecture      | Videos      |
| 4.6                               | Use of high temperature, Use of low temperature, Use of chemicals, Drying, Use of Radiation  | 3 | Lecture      | Videos      |
| 4.7                               | Non thermal methods – Ohmic heating, High Pressure Processing, Cold Plasma Processing, Pulsed electric field                                   | 3 | Chalk & Talk | Black Board |
| <b>UNIT -5 WATER MICROBIOLOGY</b> |  |   |              |             |
| 5.1                               | Microbial analysis of water- Sanitary tests for coliforms, MPN of coliforms  | 4 | Chalk & Talk | Black Board |
| 5.2                               | Water borne diseases – Definition – common microorganism involved in water borne diseases  | 3 | Lecture      | PPT         |
| 5.3                               | Typhoid - Causes- incubation period – clinical symptoms – mode of transmission – prevention and control  | 4 | Chalk & Talk | Black Board |

CBCS Curriculum for M.Sc Human Nutrition & Nutraceuticals

|     |  |   |            |        |
|-----|--|---|------------|--------|
| 5.4 | Diarrhoea- Causes-<br>incubation period –<br>clinical symptoms –<br>mode of transmission-<br>prevention and<br>control | 4 | Discussion | Videos |
| 5.5 | Cholera – Causes-<br>incubation period –<br>clinical symptoms –<br>mode of transmission-<br>prevention and<br>control  | 3 | Lecture    | PPT    |

|                   | C1         | C2         | C3      | C4         | C5      | Total<br>Scholastic<br>Marks | Non<br>Scholastic<br>Marks<br>C6 | CIA<br>Total | % of<br>Assessment |
|-------------------|------------|------------|---------|------------|---------|------------------------------|----------------------------------|--------------|--------------------|
| Levels            | T1         | T2         | Seminar | Assignment | OBT/PPT |                              |                                  |              |                    |
|                   | 10<br>Mks. | 10<br>Mks. | 5 Mks.  | 5 Mks      | 5 Mks   | 35 Mks.                      | 5 Mks.                           | 40Mks.       |                    |
| K2                | 4          | 4          | -       | -          | -       | 8                            | -                                | 8            | 20 %               |
| K3                | 2          | 2          | -       | 5          | -       | 9                            | -                                | 9            | 22.5 %             |
| K4                | 2          | 2          | -       | -          | 5       | 9                            | -                                | 9            | 22.5 %             |
| K5                | 2          | 2          | 5       | -          | -       | 9                            | -                                | 9            | 22.5 %             |
| Non<br>Scholastic | -          | -          | -       | -          | -       |                              | 5                                | 5            | 12.5 %             |
| Total             | 10         | 10         | 5       | 5          | 5       | 35                           | 5                                | 40           | 100 %              |

## CIA

|                |           |
|----------------|-----------|
| Scholastic     | <b>35</b> |
| Non Scholastic | <b>5</b>  |
| Total          | <b>40</b> |

✓ **All the course outcomes are to be assessed in the various CIA components.**

✓ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I PG are :**

**K2-Understand, K3-Apply, K4-Analyse, K5- Evaluate**

### EVALUATION PATTERN

| SCHOLASTIC |    |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5 | C6               | CIA   | ESE | Total |
| 10         | 10 | 5  | 5  | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test-1

**C2** – Internal Test-2

**C3** - Seminar

**C4** – Assignment

**C5** - OBT/PPT

**C6** – Non - Scholastic

### COURSE OUTCOMES

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

| NO.         | COURSE OUTCOMES  | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|-------------|--|--|----------------|
| <b>CO 1</b> | Discuss the basic concepts of food microbiology                    | K2   | PSO11          |
| <b>CO 2</b> | Describe food borne infections                                     | K2   | PSO11          |
| <b>CO 3</b> | Identify food borne intoxications                                  | K3   | PSO11          |
| <b>CO 4</b> | Analyze the contamination, spoilage and food preservation of foods | K4   | PSO11          |
| <b>CO 5</b> | Assess the water quality and explain water borne diseases          | K5   | PSO11          |

### Mapping of COs with PSOs

| CO / PSO   | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| <b>CO1</b> | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 1      |
| <b>CO2</b> | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 2      |
| <b>CO3</b> | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 1      |
| <b>CO4</b> | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 2      |
| <b>CO5</b> | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 1      |

### Mapping of COs with POs

| CO/<br>PSO | PO1 | PO2 | PO3 | PO4 |
|------------|-----|-----|-----|-----|
| CO1        | 3   | 2   | 2   | 1   |
| CO2        | 3   | 2   | 2   | 2   |
| CO3        | 1   | 1   | 1   | 1   |
| CO4        | 3   | 2   | 1   | 3   |
| CO5        | 2   | 2   | 2   | 3   |

**Note: Strongly Correlated – 3**

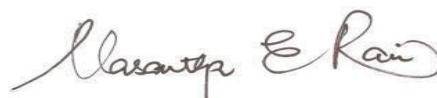
**“ Moderately Correlated – 2**

**“ Weakly Correlated -1**

**COURSE DESIGNER:**

**1. Mrs. C.Helen**

**Forwarded By**



(Dr.Vasantha Esther Rani)

**100% EMPLOYABILITY****II M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS****SEMESTER –IV***For those who joined in 2019 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE             | CATEGORY   | HRS/ WEEK | CREDITS |
|----------------|-------------|--------------------------|------------|-----------|---------|
| PSNN           | 19PG4N17    | Nutritional Biochemistry | Major Core | 6         | 5       |

**COURSE DESCRIPTION**

The course provides understanding on the structure, metabolism and energetic of macro and micro nutrients and the integration of metabolic systems.

**COURSE OBJECTIVES**

- To understand the application of biochemistry in the field of foods and nutrition.
- To understand the mechanisms adopted by the human body for regulation of metabolic pathways.
- To understand integration of cellular level metabolic events to nutritional disorders and imbalances.

**UNITS****UNIT –I CARBOHYDRATE (18 HRS.)**

Structure, Metabolism –Definition, Types of metabolism, Carbohydrate metabolism – Glycogenesis, Glycogenolysis, Glycolysis, Fate of pyruvic acid, Citric Acid cycle, Energetics of glucose metabolism, Hexose Monophosphate Shunt, Gluconeogenesis, Cori Cycle, Uronic Acid pathway.

Inborn errors of carbohydrates metabolism- galactosaemia, fructose intolerance, lactose intolerance

**UNIT –II PROTEIN (18 HRS.)**

Structure, Mechanism of protein synthesis, Metabolism - Oxidative and non-oxidative Deamination, Transamination, Decarboxylation, Transmethylation, Krebs Urea Cycle, Linkage of Krebs Urea Cycle and Krebs Citric Acid Cycle, Catabolism of Ketogenic amino acids, Catabolism of Glycogenic amino acids,

Catabolism of amino acids that are both Ketogenic and Glycogenic, Biosynthesis of amino acids, Energetics of amino acids.

Inborn errors of amino acid metabolism – albinism, phenylketonuria (PKU), maple syrup urine disease (MSUD)

### **UNIT –III LIPID (18 HRS.)**

Structure, Metabolism of fat –  $\beta$ -Oxidation Cycle, Energetics of fatty acid oxidation, Ketosis, Ketogenesis, Ketolysis, Biosynthesis of fatty acids.

Inborn errors of fat metabolism - Gaucher's disease, Tay-sachs disease, Niemann-Pick disease.

### **UNIT –IV NUCLEIC ACIDS (18 HRS.)**

Nucleic acid - Definition and types.

DNA – Structure, Replication, Enzymes involved in replications.

RNA- types and comparison of DNA and RNA.

Metabolism of Nucleic acids - Synthesis and breakdown of purine and pyrimidine.

### **UNIT –V CELL RESPIRATION AND BIOLOGICAL OXIDATION (18 HRS.)**

Site of biological oxidation, pathway of biological oxidation, electron transport system, bioenergetics system.

### **REFERENCES:**

1. Abraham Cantrarrow and Bernard Schepartz, (1967). *Biochemistry*. W.B.Saunders Company, London.
2. Albert L.Lehninger, (1984). *Principles of Biochemistry*. CBS Publishers and Distributors, Delhi.
3. Ambika Shanmugam, (1983). *Fundamentals of Biochemistry for Medical Students*. Published by the author, Madras.
4. Jain.J.L., (1988). *Fundamentals of Biochemistry*. S.Chand and company (Pvt.) Ltd., New Delhi.
5. Joseph S. Fruton and Sofia Simmonds, (1960). *Biochemistry*. Asia Publishing House, New Delhi.
6. Singh.S.P, (1998). *A Text Book of Biochemistry*. CBS Publishers and Distributors, New Delhi.

### **JOURNAL REFERENCES:**

1. Journal of Nutritional Biochemistry

2. Journal of Biochemistry
3. International Journal of Biochemistry and Cell Biology
4. Journal of Biological Chemistry
5. Indian Journal of Medical Biochemistry

**OPEN EDUCATIONAL REFERENCES:**

1. <https://www.chem.purdue.edu/courses/chm333/>
2. <https://nios.ac.in/media/documents/dmlt/Biochemistry/Lesson-04.pdf>
3. <https://courses.lumenlearning.com/suny-ap2/chapter/carbohydrate-metabolism-no-content/#:~:text=Carbohydrate%20metabolism%20begins%20in%20the,down%20complex%20sugars%20into%20monosaccharides.&text=In%20the%20cells%2C%20glucose%2C%20a,inside%20the%20molecule%20is%20released.>
4. <https://courses.lumenlearning.com/ap2/chapter/lipid-metabolism/>
5. [http://ocw.ump.edu.my/pluginfile.php/9893/mod\\_resource/content/1/Nucleic%20Acid%20Metabolism.pdf](http://ocw.ump.edu.my/pluginfile.php/9893/mod_resource/content/1/Nucleic%20Acid%20Metabolism.pdf)
6. [http://yengage.yenepoya.edu.in/idata/YenepoyaUniversity/ilFile/4/89/file\\_48906/001/Biological%20oxidation.pdf](http://yengage.yenepoya.edu.in/idata/YenepoyaUniversity/ilFile/4/89/file_48906/001/Biological%20oxidation.pdf)

**COURSE CONTENTS & LECTURE SCHEDULE:**

| Module No.                  | Topic  | No. of Lectures | Teaching Pedagogy            | Teaching Aids |
|-----------------------------|--|-----------------|------------------------------|---------------|
| <b>UNIT -1 CARBOHYDRATE</b> |  |                 |                              |               |
| 1.1                         | Structure of carbohydrate  | 2               | Chalk & Talk                 | Black Board   |
| 1.2                         | Glycogenesis, Glycogenolysis, Gluconeogenesis  | 3               | Chalk & Talk                 | Black Board   |
| 1.3                         | Glycolysis, Fate of pyruvic acid   | 2               | Lecture                      | PPT           |
| 1.4                         | Citric Acid cycle  | 2               | Lecture                      | Smart class   |
| 1.5                         | Hexose Monophosphate Shunt   | 3               | Chalk & Talk                 | Black Board   |
| 1.6                         | Cori Cycle, Uronic Acid pathway  | 3               | Lecture                      | PPT           |
| 1.7                         | Galactosaemia, fructose intolerance, lactose intolerance                                   | 3               | Lecture and Group Discussion | PPT           |
| <b>UNIT -2 PROTEIN</b>      |  |                 |                              |               |
| 2.1                         | Structure of protein   | 2               | Chalk & Talk                 | Black Board   |
| 2.2                         | Mechanism of protein synthesis   | 3               | Lecture                      | Videos        |
| 2.3                         | Oxidative and non-oxidative Deamination, Transamination, Decarboxylation, Transmethylation | 2               | Lecture                      | PPT           |
| 2.5                         | Krebs Urea Cycle, Linkage of Krebs Urea Cycle and Krebs Citric Acid Cycle                  | 2               | Lecture                      | Smart Board   |

|   |   |   |              |             |
|---|---|---|--------------|-------------|
| 2.6   | Catabolism of Ketogenic amino acids, Catabolism of Glycogenic amino acids, Catabolism of amino acids that are both Ketogenic and Glycogenic | 3 | Lecture      | PPT         |
| 2.7   | Biosynthesis of amino acids, Energetics of amino acids.   | 3 | Lecture      | PPT         |
| 2.8   | Inborn errors of amino acid metabolism – albinism, phenylketonuria, maple syrup urine disease   | 3 | Discussion   | Videos      |
| <b>UNIT -3                      LIPID</b>         |   |   |              |             |
| 3.1   | Structure of fats   | 3 | Lecture      | Model       |
| 3.2   | Metabolism of fat – $\beta$ -Oxidation Cycle, Energetics of fatty acid oxidation  | 3 | Lecture      | PPT         |
| 3.3   | Ketosis, Ketogenesis, Ketolysis   | 4 | Chalk & Talk | Black Board |
| 3.4   | Biosynthesis of fatty acids   | 3 | Lecture      | Smart class |
| 3.5   | Inborn errors of fat metabolism - Gaucher's disease, Tay-sachs disease, Niemann-Pick disease  | 5 | Discussion   | Black Board |
| <b>UNIT -4                      NUCLEIC ACIDS</b> |   |   |              |             |
| 4.1   | Nucleic acid - Definition and types   | 3 | Lecture      | Smart class |

|  |  |   |              |             |
|--|--|---|--------------|-------------|
| 4.2  | Structure of DNA & RNA   | 4 | Chalk & Talk | Black Board |
| 4.3  | Replication of DNA<br>Enzymes involved in replication                          | 3 | Lecture      | Smart class |
| 4.4  | RNA- types and comparison of DNA and RNA                                       | 4 | Lecture      | PPT         |
| 4.5  | Metabolism of Nucleic acids - Synthesis and breakdown of purine and pyrimidine | 4 | Lecture      | Smart class |
| <b>UNIT -5 CELL RESPIRATION AND BIOLOGICAL OXIDATION</b> |  |   |              |             |
| 5.1  | Site of biological oxidation   | 2 | Chalk & Talk | Black Board |
| 5.2  | Pathway of biological oxidation  | 3 | Lecture      | PPT         |
| 5.3  | Electron transport system  | 2 | Lecture      | Smart class |
| 5.4  | Bioenergetics system   | 2 | Lecture      | Smart class |

CBCS Curriculum for M.Sc Human Nutrition & Nutraceuticals

|                   | C1      | C2      | C3      | C4             | C5      | Total<br>Scholastic<br>Marks | Non<br>Scholastic<br>Marks<br>C6 | CIA Total |
|-------------------|---------|---------|---------|----------------|---------|------------------------------|----------------------------------|-----------|
| Levels            | T1      | T2      | Seminar | Assignme<br>nt | OBT/PPT |                              |                                  |           |
|                   | 10 Mks. | 10 Mks. | 5 Mks.  | 5 Mks          | 5 Mks   | 35 Mks.                      | 5 Mks.                           | 40Mks.    |
| K2                | 4       | 4       | -       | -              | -       | 8                            | -                                | 8         |
| K3                | 2       | 2       | -       | 5              | -       | 9                            | -                                | 9         |
| K4                | 2       | 2       | -       | -              | 5       | 9                            | -                                | 9         |
| K5                | 2       | 2       | 5       | -              | -       | 9                            | -                                | 9         |
| Non<br>Scholastic | -       | -       | -       | -              | -       |                              | 5                                | 5         |
| Total             | 10      | 10      | 5       | 5              | 5       | 35                           | 5                                | 40        |

CIA

Scholastic **35**

Non Scholastic **5**

**40**

- All the course outcomes are to be assessed in the various CIA components.
- The levels of CIA Assessment based on Revised Bloom's Taxonomy for PG are :

**K2-Understand, K3-Apply, K4-Analyse, K5-Evaluate**

## EVALUATION PATTERN

| SCHOLASTIC |    |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5 | C6               | CIA   | ESE | Total |
| 10         | 10 | 5  | 5  | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test-1

**C2** – Internal Test-2

**C3** - Seminar

**C4** – Assignment

**C5** - OBT/PPT

**C6** – Non - Scholastic

## COURSE OUTCOMES

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

| NO.  | COURSE OUTCOMES                                   | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|------|---|--|----------------|
| CO 1 | Describe the structure of carbohydrates           | K2   | PSO12          |
| CO 2 | Discuss protein metabolism                        | K2   | PSO12          |
| CO 3 | Determine the metabolism of fat                   | K3   | PSO12          |
| CO 4 | Compare the structure and metabolism of RNA & DNA | K4   | PSO12          |
| CO 5 | Explain biological oxidation                      | K5   | PSO12          |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO2      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO3      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO4      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |
| CO5      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 3      | 1      | 1      | 1      |

### Mapping of COs with POs

| CO/<br>PSO | PO1 | PO2 | PO3 | PO4 |
|------------|-----|-----|-----|-----|
| CO1        | 2   | 1   | 1   | 1   |
| CO2        | 2   | 1   | 1   | 1   |
| CO3        | 2   | 1   | 1   | 1   |
| CO4        | 2   | 1   | 1   | 1   |
| CO5        | 2   | 1   | 1   | 1   |

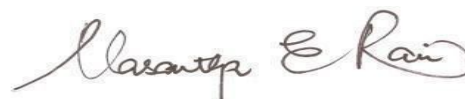
**Note: Strongly Correlated – 3 Moderately Correlated – 2  
Weakly Correlated -1**

**COURSE DESIGNER:**

**1. Dr. K.Karthiga**

**2. Mrs. C.Helen**

**Forwarded By**



(Dr.Vasantha Esther Rani)

**100% SKILL DEVELOPMENT**

**II M.Sc., HUMAN NUTRITION AND NUTRACEUTICALS  
SEMESTER –IV**

***For those who joined in 2019 onwards***

| PROGRAMME CODE | COURSE CODE | COURSE TITLE                                    | CATEGORY   | HRS/ WEEK | CREDITS |
|----------------|-------------|---|------------|-----------|---------|
| PSNN           | 19PG4N18    | Advanced Food Science and Processing Techniques | Major Core | 6         | 5       |

### COURSE DESCRIPTION

The course offers the understanding of processing techniques involved to transform raw ingredients into processed food products for human consumption.

### COURSE OBJECTIVES

- To understand the science behind processing of foods and its impact on physico-chemical properties of foods
- To provide in-depth knowledge on production of processed food products.

### UNITS

#### UNIT –I CEREAL PROCESSING (18 HRS.)

Structure, Processing of Rice and Wheat- Parboiling and Milling, Physico-chemical changes during parboiling. Corn-dry and wet milling, Oats-Milling, Ragi and Samai - Milling. Processing of Cereal products- Puffed rice, Flaked rice, Quick cooking rice, Rice flour. Wheat products - Vermicelli, Semolina, Extruded products. By- products – Rice bran, Rice bran oil and Husk.

#### UNIT –II PULSE PROCESSING AND OILSEED PROCESSING (18 HRS.)

**Pulse Processing:** Structure, Processing of pulses- Decortication, Milling, Germination, Fermentation, Parching, Puffing, Extrusion. Antinutritional factors, Methods to eliminate toxic constituents. Pulse products- dhal, Instant legume powders, Legume protein concentrates. Effect of processing on the physiochemical properties of pulses.

**Oil Seed Processing:** Structure, Processing of edible oil, Hydrogenated fat and Margarine, Effect of processing on the physiochemical properties of oil seeds. By- products- Oilseed cake, Rancidity-Types and prevention methods

#### UNIT –III VEGETABLE PROCESSING AND FRUIT PROCESSING (18 HRS.)

**Vegetable Processing:** Classification of vegetables, General structure of edible portion of vegetables and fruits, Harvesting and storage, Post harvest practices, Vegetable products-Dehydrated vegetables, Canned vegetables, frozen vegetables, Paste, Powder, Pickled vegetables-Sauerkraut, Gherkins.

**Fruit Processing:** Classification, Maturity concepts, Ripening- Definition, Chemicals for ripening, Changes occurred during ripening and senescence, Harvesting and processing, Storage. Fruit products- dried fruits, Canned fruits, Powders, Fruit juice concentrates.

#### **UNIT –IV MILK AND EGG PROCESSING (18 HRS.)**

**Milk Processing:** Milk processing steps, Properties of milk, Effect of heat on milk. Milk products: Definition, Manufacturing process -Milk powder, Ice cream, Butter, Cheese, Yoghurt and Sweetened condensed milk.

**Egg processing:** Structure, Egg storage, Egg quality- Evaluation, deterioration during storage, Egg product- Egg powder.

#### **UNIT –V MEAT PROCESSING (18 HRS.)**

**Meat-** Structure, Classes, Post-mortem changes, Ageing, Tenderizing, Curing, Cuts and grades and changes during cooking.

**Fish-** Classification, Selection criteria, - Processing of Smoked fish and canned fish

**Poultry-** Classification, Processing of poultry and storage. Products- Ham, Sausages, Bacon.

#### **BOOK REFERENCES:**

1. Avantina Sharma, (2006)), *Textbook of Food Science and Technology*, International book distributing company, Lucknow.
2. Potter, N.N. (1978), *Food Science*. AVI Publishing company, INC, Westport, Connecticut.
3. Shakuntala Manay. N., *Foods, Facts and Principles*, New Age International Publishers, New Delhi, II edition.
4. Sivasankar.B, (2002), *Food Processing and Preservation*, PHI Learning Private Limited, New Delhi.
5. Subbulakshmi.G and Udipi.A.S, (2006), *Food Processing and Preservation*, New Age International Publisher, New Delhi.
6. Vijaya Khader, (2001), *Textbook of Food Science and Technology*, Indian Council of Agricultural Research, New Delhi.

#### **JOURNAL REFERENCES:**

1. Journal of Food Science and Technology. AFST, CFTRI, Mysore.
2. Journal of Food Science. The Institute of Food Technologies, Illinois, USA.

**OPEN EDUCATIONAL RESOURCES:**

1. [https://www.researchgate.net/publication/323167448\\_1\\_-\\_Introduction\\_to\\_cereal\\_processing\\_and\\_by-products](https://www.researchgate.net/publication/323167448_1_-_Introduction_to_cereal_processing_and_by-products)
2. [https://www.unido.org/sites/default/files/2009-04/Small\\_scale\\_cereal\\_milling\\_and\\_bakery\\_products\\_0.pdf](https://www.unido.org/sites/default/files/2009-04/Small_scale_cereal_milling_and_bakery_products_0.pdf)
3. <https://ccsuniversity.ac.in/bridge-library/pdf/FST-Paper-II%20Technology%20of%20cereals,%20pulses%20and%20oilseeds-%20II%20Semester.pdf>
4. <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=805>
5. <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=807>
6. <http://www.fao.org/3/V5030E/V5030E03.htm#1.2%20Importance%20of%20fruit%20and%20vegetables%20in%20world%20agriculture>
7. <https://meridian.allenpress.com/jfp/article/33/2/64/425033/EGG-PROCESSING-TECHNOLOGY-PROGRESS-AND-SANITATION>
8. <https://www.britannica.com/technology/meat-processing>

**COURSE CONTENTS & LECTURE SCHEDULE:**

| <b>Module No.</b>                                      | <b>Topic</b>                            | <b>No. of Lectures</b> | <b>Teaching Pedagogy</b>           | <b>Teaching Aids</b>            |
|--|---|------------------------|------------------------------------|---------------------------------|
| <b>UNIT -1 CEREAL PROCESSING</b>                       |   |                        |                                    |                                 |
| 1.1  | Structure, Processing of Rice and Wheat | 4                      | Chalk & Talk, Lectures, Discussion | Black/white Board, ppt, videos  |
| 1.2  | Corn and Oats milling                   | 3                      | Chalk & Talk, Lectures, Discussion | Black/white Board, ppt, videos  |
| 1.3  | Ragi and Samai milling                  | 3                      | Chalk & Talk, Lectures, Discussion | PPT & White/black board         |
| 1.4  | Processing of rice products             | 3                      | Lecture, seminar                   | PPT & White/black board, videos |
| 1.5  | Processing of wheat products            | 3                      | Lecture, seminar                   | Black/white Board, ppt, videos  |
| 1.6  | By products of rice                     | 2                      | Discussion, seminar, Lectures      | PPT & White/black board, videos |
| <b>UNIT -2 PULSE PROCESSING AND OILSEED PROCESSING</b> |   |                        |                                    |                                 |
| 2.1  | Structure and Processing of pulses      | 4                      | Chalk & Talk, Lectures, Discussion | Black/white Board, ppt, videos  |
| 2.2  | Anti-nutritional factors                | 3                      | Chalk & Talk, Lectures, Discussion | Black/white Board, ppt, videos  |
| 2.3  | Pulse products                          | 3                      | Chalk & Talk, Lectures, Discussion | PPT & White/black board         |
| 2.4  | Structure and oilseed processing        | 4                      | Lecture, seminar                   | PPT & White/black board, videos |

|  |  |   |                                   |                              |
|--|--|---|-----------------------------------|------------------------------|
| 2.5  | By-products of oilseed processing                | 3 | Lecture,seminar                   | Black/white Board,ppt,videos |
| 2.6  | Rancidity  | 1 | Lectures                          | PPT & White/black board      |
| <b>UNIT 3- VEGETABLE PROCESSING AND FRUIT PROCESSING</b> |  |   |                                   |                              |
| 3.1  | General structure & Classification of vegetables | 3 | Chalk & talk,Lectures             | White/black board            |
| 3.2  | Harvesting and Storage                           | 2 | Lectures,seminar                  | Black/white Board,ppt,videos |
| 3.3  | Vegetable processing                             | 4 | Lectures,Discussion               | PPT,Videos                   |
| 3.4  | General structure & Classification of fruits     | 3 | Chalk & talk,Lectures             | White/black board            |
| 3.5  | Harvesting and Storage                           | 2 | Lecture,seminar                   | Black/white Board,ppt,videos |
| 3.6  | Fruit Processing                                 | 4 | Lectures,Discussion               | PPT,Videos                   |
| <b>UNIT – 4 MILK AND EGG PROCESSING</b>                  |  |   |                                   |                              |
| 4.1  | Milk processing steps                            | 3 | Chalk & Talk,Lectures,Discussion  | Black/white Board,ppt,videos |
| 4.2  | Properties of milk, Effect of heat on milk       | 3 | Chalk & Talk, Lectures,Discussion | Black/white Board,ppt,videos |
| 4.3  | Fermented Milk Products                          | 3 | Chalk & Talk, Lectures,Discussion | PPT & White/black board      |

|                                 |   |   |                                   |                                |
|---------------------------------|---|---|-----------------------------------|--------------------------------|
| 4.4                             | Non-Fermented Milk Products                         | 3 | Lecture,seminar                   | PPT & White/black board,videos |
| 4.5                             | Egg structure & storage                             | 3 | Lecture,seminar                   | Black/white Board,ppt,videos   |
| 4.6                             | Egg quality & egg product                           | 3 | Discussion,seminar, Lectures      | PPT & White/black board,videos |
| <b>UNIT – 5 MEAT PROCESSING</b> |   |   |                                   |                                |
| 5.1                             | Meat-Structure and Classes                          | 3 | Chalk & Talk,Lectures,Discussion  | Black/white Board,ppt,videos   |
| 5.2                             | Post-mortem changes, Ageing, Tenderizing            | 3 | Chalk & Talk, Lectures,Discussion | Black/white Board,ppt,videos   |
| 5.3                             | Curing, Cuts and grades and changes during cooking. | 3 | Chalk & Talk, Lectures,Discussion | PPT & White/black board        |
| 5.4                             | Fish-Processing                                     | 3 | Lecture,seminar                   | PPT & White/black board,videos |
| 5.5                             | Poultry-Processing                                  | 3 | Lecture,seminar                   | Black/white Board,ppt,videos   |
| 5.6                             | Products-Ham, Sausages, Bacon                       | 3 | Lectures                          | PPT & White/black board        |

|                   | C1      | C2      | C3      | C4         | C5      | Total<br>Scholastic<br>Marks | Non<br>Scholastic<br>Marks<br>C6 | CIA Total |
|-------------------|---------|---------|---------|------------|---------|------------------------------|----------------------------------|-----------|
| Levels            | T1      | T2      | Seminar | Assignment | OBT/PPT |                              |                                  |           |
|                   | 10 Mks. | 10 Mks. | 5 Mks.  | 5 Mks      | 5 Mks   | 35 Mks.                      | 5 Mks.                           | 40Mks.    |
| K2                | 4       | 4       | -       | -          | -       | 8                            | -                                | 8         |
| K3                | 2       | 2       | -       | 5          | -       | 9                            | -                                | 9         |
| K4                | 2       | 2       | -       | -          | 5       | 9                            | -                                | 9         |
| K5                | 2       | 2       | 5       | -          | -       | 9                            | -                                | 9         |
| Non<br>Scholastic | -       | -       | -       | -          | -       |                              | 5                                | 5         |
| Total             | 10      | 10      | 5       | 5          | 5       | 35                           | 5                                | 40        |

CIA

Scholastic **35**Non Scholastic **5****40**

**All the course outcomes are to be assessed in the various CIA components.**

- **The levels of CIA Assessment based on Revised Bloom's Taxonomy for PG are :**

**K2-Understand, K3-Apply, K4-Analyse, K5-Evaluate**

### **EVALUATION PATTERN**

| SCHOLASTIC |    |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5 | C6               | CIA   | ESE | Total |
| 10         | 10 | 5  | 5  | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test-1

**C2** – Internal Test-2

**C3** - Seminar

**C4** – Assignment

**C5** - OBT/PPT

**C6** – Non – Scholastic

## COURSE OUTCOMES

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

| NO.         | COURSE OUTCOMES   | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|-------------|---|--|----------------|
| <b>CO 1</b> | Illustrate the structure and milling of cereals.                      | K2   | PSO2 & PSO15   |
| <b>CO 2</b> | Explain the processing methods of pulses and oilseeds.                | K2   | PSO2 & PSO15   |
| <b>CO 3</b> | Identify the methods of harvesting & storage of vegetables and fruits | K3   | PSO2 & PSO15   |
| <b>CO 4</b> | Analyze the processing methods of milk & egg products                 | K4   | PSO2 & PSO15   |
| <b>CO 5</b> | Assess the processing & preservation methods of fleshy foods          | K5   | PSO2 & PSO15   |

## Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 2     | 3     | 2     | 1     | 2     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 2      | 3      |
| CO2      | 2     | 3     | 2     | 1     | 2     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 2      | 3      |
| CO3      | 2     | 3     | 2     | 1     | 2     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 2      | 3      |
| CO4      | 2     | 3     | 2     | 1     | 2     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 1      | 2      | 3      |

### Mapping of COs with POs

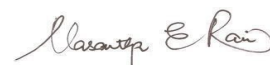
| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 2   | 1   | 1   | 3   |
| CO2     | 2   | 1   | 1   | 3   |
| CO3     | 2   | 1   | 1   | 3   |
| CO4     | 2   | 1   | 1   | 3   |
| CO5     | 2   | 1   | 1   | 3   |

**Note:** Strongly Correlated – 3” Moderately Correlated – 2  
Weakly Correlated -1

### COURSE DESIGNER:

1. Mrs. P. MAGDALENE VIRJINI
2. Dr. K. KARTHIGA

**Forwarded By**



(Dr.Vasantha Esther Rani)

**100% SKILL DEVELOPMENT**

## II M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS SEMESTER –IV

*For those who joined in 2019 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE                    | CATEGORY         | HRS/WEEK | CREDITS |
|----------------|-------------|---------------------------------|------------------|----------|---------|
| PSNN           | 19PG4NE3    | FOOD SAFETY AND QUALITY CONTROL | Major Elective 3 | 4        | 4       |

### COURSE DESCRIPTION

The course provides an outline on the standards, tools and techniques to ensure safety and integrity of foods in food preparation and processing.

### COURSE OBJECTIVES

- To develop approaches to identify food safety hazards in food processing.
- To apply preventive measures and control methods to minimize microbiological hazards and maintain quality of foods.
- To identify the wide variety of parameters affecting food quality.
- To develop quality control strategies.

### UNITS

#### UNIT –I BASIC CONCEPTS OF FOOD SAFETY AND FOOD LAWS (12 Hrs.)

Food and its safety concerns, Importance of safe food, Factors affecting food safety, Threats to safety of food supply, Principles of food quality.

Food Laws: PFA, Essential Commodity Act, Standards of Weights and measures Act, Export Act.

Voluntary Laws: BIS, AGMARK, Consumer Protection Act, FSSAI

International Laws: Codex Alimentarius. Code India, ISO, FAO, WHO.

#### UNIT –II NATURAL TOXINS IN FOOD (12 Hrs.)

Toxicants in animal foods – Shellfish

Toxicants in plant foods - Favism, Gossypol, Toxic amino acids, Toxic alkaloids, Cyanogens, Lima beans, Mushroom poisoning.

Antinutritional factors – Protease inhibitors, Trypsin inhibitors, Haemagglutinins, Phytates, Tannins, Oxalates, Goitrogens

**Environmental Toxins** - Mercury; Polybrominated biphenyl (PBB); Polychlorinated biphenyl (PCB); Lead; Cadmium; Pesticide residues; Contaminants from plastics

### **UNIT – III FOOD ADDITIVES**

**(12 Hrs.)**

Definition, Importance of use in foods, Classification, Types - Preservatives, antioxidants, artificial colours, Flavour enhancers, bleaching agents, nutrient additives, Thickening and stabilizing agents, anticaking, antifoaming, sequestrants sweetening agents, GRAS - Generally Recommended As Safe (GRAS).

### **UNIT – IV QUALITY ASSURANCE IN FOOD**

**(12 Hrs.)**

HACCP – Definition, principles, Guidelines for application of HACCP principles.

ISO 22000, Halal

### **UNIT – V FOOD PACKAGING**

**(12 Hrs.)**

Definition, Functions of Packaging, Classification of Packaging materials, Packaging methods, Moisture Sorption Properties of foods and selection of packaging materials,

Interaction between packaging and foods.

Nutrition labeling and nutrition claims.

#### **REFERENCES:**

1. Judith E. Brown, (2002), 3<sup>rd</sup> Ed, Nutrition Now, Wadsworth, London.
2. Pomeranz Y and Meloan CE (1996), *Food Analysis : Theory and Practice*, CBS Publishers and Distributors, New Delhi.
3. Shirley J. Van Grade, Margy Woodburn. (1999), “*Food Preservation and Safety Principles & Practice*”; Surabhi Publications.
4. Subbulakshmi.G; Shobha.A.Udipi, (2001), “*Food Processing and Preservation*”, New Age International Publishers.

#### **JOURNAL REFERENCES:**

1. Journal of Food Quality Hazards Control
2. Journal of Food Safety
3. International Journal of Food Safety and Public Health

#### **OPEN EDUCATION RESOURCES:**

1. [https://old.fssai.gov.in/Portals/0/Training\\_Manual/Presentation%20on%20concepts%20of%20Food%20Safety%20and%20Quality%20Management%20Systems](https://old.fssai.gov.in/Portals/0/Training_Manual/Presentation%20on%20concepts%20of%20Food%20Safety%20and%20Quality%20Management%20Systems)
2. <https://www.ag.ndsu.edu/foodlaw/overview/introhaccp>
3. <https://www.sesotec.com/apac/en/resources/blog/what-is-food-safety>
4. <https://ncert.nic.in/textbook/pdf/lehe106.pdf>
5. <https://www.who.int/news-room/fact-sheets/detail/natural-toxins-in-food#:~:text=Cassava%2C%20sorghum%2C%20stone%20fruit>

[s%2C,important%20foods%20containing%20cyanogenic%20glycosides.](#)

6. [https://www.cfs.gov.hk/english/multimedia/multimedia\\_public/multimedia\\_public/fsf\\_11\\_02.html](https://www.cfs.gov.hk/english/multimedia/multimedia_public/multimedia_public/fsf_11_02.html)
7. <https://www.who.int/news-room/fact-sheets/detail/food-additives>
8. <https://foodinsight.org/food-additives-and-ingredients-resources-you-can-use/>
9. <https://fssai.gov.in/upload/uploadfiles/files/Chapter1.pdf>
10. <https://fssai.gov.in/upload/uploadfiles/files/FSSAI-regulations.pdf>

## **COURSE CONTENTS & LECTURE SCHEDULE:**

| Module No.   | Topic   | No. of Lectures | Teaching Pedagogy | Teaching Aids |
|--|---|-----------------|-------------------|---------------|
| <b>UNIT -1 BASIC CONCEPTS OF FOOD SAFETY AND FOOD LAWS</b> |   |                 |                   |               |
| 1.1  | Food and its safety concerns, Importance of safe food, Factors affecting food safety, Threats to safety of food supply, Principles of food quality. | 3               | Chalk & Talk      | Black Board   |
| 1.2  | Food Laws: PFA, Essential Commodity Act, Standards of Weights and measures Act, Export Act.   | 3               | Lecture           | PPT           |
| 1.3  | Voluntary Laws: BIS, AGMARK, Consumer Protection Act, FSSA.   | 3               | Lecture           | PPT           |
| 1.4  | International Laws: Codex Alimentarius. Code India, ISO, FAO, WHO.  | 3               | Lecture           | PPT           |
| <b>UNIT -2 NATURAL TOXINS IN FOOD</b>                      |   |                 |                   |               |
| 2.1  | Toxicants in animal foods – Shellfish.  | 3               | Lecture           | PPT           |
| 2.2  | Toxicants in plant foods – Favism, Gossypol, Toxic amino acids, Toxic alkaloids, Cyanogens, Lima beans, Mushroom poisoning.                         | 3               | Lecture           | PPT, Video    |

|  |   |   |              |                 |
|--|---|---|--------------|-----------------|
| 2.3                                      | Antinutritional factors –<br>Protease inhibitors, Trypsin<br>inhibitors, Haemagglutinins,<br>Phytates, Tannins, Oxalates,<br>Goitrogens.  | 3 | Lecture      | PPT             |
| 2.4                                      | Environmental Toxins -<br>Mercury; Polybrominated<br>biphenyl (PBB);<br>Polychlorinated biphenyl<br>(PCB); Lead; Cadmium;<br>Pesticide residues;<br>Contaminants from plastics. | 3 | Lecture      | PPT             |
| <b>UNIT -3 FOOD ADDITIVES</b>            |   |   |              |                 |
| 3.1                                      | Definition, Importance of use in<br>foods, Classification.  | 3 | Chalk & Talk | Black<br>Board  |
| 3.2                                      | Types - Preservatives,<br>antioxidants, artificial colours,<br>Flavour enhancers, bleaching<br>agents, nutrient additives.  | 3 | Lecture      | PPT,<br>Samples |
| 3.3                                      | Thickening and stabilizing<br>agents, anticaking, antifoaming,<br>sequestrants sweetening agents.   | 3 | Lecture      | PPT,<br>Samples |
| 3.4                                      | GRAS - Generally Recommended<br>As Safe (GRAS).   | 3 | Chalk & Talk | Black<br>Board  |
| <b>UNIT -4 QUALITY ASSURANCE IN FOOD</b> |   |   |              |                 |

|                               |   |   |              |             |
|-------------------------------|---|---|--------------|-------------|
| 4.1                           | HACCP – Definition, principles, Guidelines for application of HACCP principles.<br>ISO 22000, Halal | 6 | Lecture      | PPT         |
| 4.2                           | ISO 22000, Halal  | 6 | Lecture      | PPT         |
| <b>UNIT -5 FOOD PACKAGING</b> |   |   |              |             |
| 5.1                           | Definition, Functions of Packaging, Classification of Packaging materials,                          | 6 | Lecture      | PPT         |
| 5.2                           | Packaging methods, Moisture Sorption Properties of foods and selection of packaging materials,      | 6 | Chalk & Talk | Black Board |

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|                   | C1      | C2      | C3      | C4             | C5      | Total<br>Scholastic<br>Marks | Non<br>Scholastic<br>Marks<br>C6 | CIA Total |
|-------------------|---------|---------|---------|----------------|---------|------------------------------|----------------------------------|-----------|
| Levels            | T1      | T2      | Seminar | Assignme<br>nt | OBT/PPT |                              |                                  |           |
|                   | 10 Mks. | 10 Mks. | 5 Mks.  | 5 Mks          | 5 Mks   | 35 Mks.                      | 5 Mks.                           | 40Mks.    |
| K2                | 4       | 4       | -       | -              | -       | 8                            | -                                | 8         |
| K3                | 2       | 2       | -       | 5              | -       | 9                            | -                                | 9         |
| K4                | 2       | 2       | -       | -              | 5       | 9                            | -                                | 9         |
| K5                | 2       | 2       | 5       | -              | -       | 9                            | -                                | 9         |
| Non<br>Scholastic | -       | -       | -       | -              | -       |                              | 5                                | 5         |
| Total             | 10      | 10      | 5       | 5              | 5       | 35                           | 5                                | 40        |

CIA

Scholastic **35**

Non Scholastic **5**

**40**

- All the course outcomes are to be assessed in the various CIA components.
- The levels of CIA Assessment based on Revised Bloom's Taxonomy for PG are :

**K2**-Understand, **K3**-Apply, **K4**-Analyse, **K5**-Evaluate

**EVALUATION PATTERN**

| SCHOLASTIC |    |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5 | C6               | CIA   | ESE | Total |
| 10         | 10 | 5  | 5  | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test-1

**C2** – Internal Test-2

**C3** - Seminar

**C4** – Assignment

**C5** - OBT/PPT

**C6** – Non - Scholastic

**COURSE OUTCOMES**

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

| NO.  | COURSE OUTCOMES   | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|------|---|--|----------------|
| CO 1 | Outline the concept of food safety and food laws.                               | K2   | PSO13          |
| CO 2 | Explain the toxicants in animal and plant foods.                                | K2   | PSO13          |
| CO 3 | Identify food additives   | K3   | PSO13          |
| CO 4 | Examine the various quality assurance systems in food industries.               | K4   | PSO13          |
| CO 5 | Determine the functions, methods and properties of packaging and its materials. | K5   | PSO13          |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 3      | 1      | 1      |
| CO2      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 3      | 1      | 1      |
| CO3      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 3      | 1      | 1      |
| CO4      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 3      | 1      | 1      |
| CO5      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 1      | 1      | 3      | 1      | 1      |

### Mapping of COs with POs

| CO/<br>PSO | PO1 | PO2 | PO3 | PO4 |
|------------|-----|-----|-----|-----|
| CO1        | 2   | 1   | 1   | 1   |
| CO2        | 2   | 1   | 1   | 1   |
| CO3        | 1   | 2   | 1   | 1   |
| CO4        | 1   | 2   | 1   | 1   |
| CO5        | 2   | 1   | 1   | 1   |
| CO6        | 1   | 1   | 2   | 1   |

**Note: Strongly Correlated – 3**

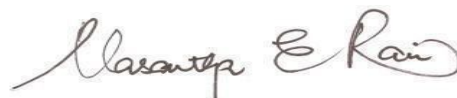
**“ Moderately Correlated – 2**

**“ Weakly Correlated -1**

**COURSE DESIGNER:**

**1. Mrs.P.Madalene Virjini**

**Forwarded By**



(Dr.Vasantha Esther Rani)

**100% SKILL DEVELOPMENT**

**II M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS  
SEMESTER –IV**

***For those who joined in 2019 onwards***

| PROGRAMME CODE | COURSE CODE | COURSE TITLE                             | CATEGORY       | HRS/WEEK | CREDITS |
|----------------|-------------|--|----------------|----------|---------|
| PSNN           | 19PG4NE4    | NUTRITION IN CRITICAL CARE AND DISASTERS | Major Elective | 4        | 4       |

### COURSE DESCRIPTION

The course offers comprehensive knowledge on the assessment and management of nutritional support systems for critically ill.

### COURSE OBJECTIVES

- To understand the physiology, metabolism and special nutritional requirements of the critically ill.
- To be familiar with special nutritional support techniques and feeding formulations to meet their nutritional requirements.

### UNITS

#### UNIT –I NUTRITIONAL SCREENING AND ASSESSMENT FOR THE CRITICALLY ILL (12 HRS.)

Nutritional screening and nutritional status assessment of the critically ill. Nutritional support system and other life saving measures for the critically ill.

#### UNIT –II IMMUNO ENHANCERS AND SPECIAL DIETS IN CRITICAL CARE (12 HRS.)

Role of immuno enhancers, conditionally essential nutrients, immuno suppressants and special diets in critical care.

#### UNIT –III SPECIAL NUTRITIONAL THERAPY IN CRITICAL ILLNESSES – BURNS, CV AND KIDNEY (12 HRS.)

Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like stress, trauma, sepsis, burns, CV complications and surgery, dialysis, transplant, multiple organ failure.

#### UNIT –IV SPECIAL NUTRITIONAL THERAPY IN CRITICAL ILLNESSES –GI AND LIVER (12 HRS.)

Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like

GI tract surgery, hepatic transplants.

**UNIT –V REFEEDING SYNDROME AND ETHICAL ISSUES IN TERMINALLY ILL (12 HRS.)**

Complications of nutritional support system including refeeding syndrome  
Diet related ethical issues in the terminally ill.

**REFERENCES:**

1. Escott – Stump.S. (2000), *Krause's food Nutrition and Diet Therapy*, 10<sup>th</sup> Ed.W.S.Saunders Ltd.
2. Shields, R. (1992), *Bailliere's Clinical Gastroenterology*, Baillere Tindall London.
3. Shikora, S.A. and Blackburn. G.L. (1999). *Nutritional Support – Theory and Therapeutics*, Chapman and Hall, ITP (International Thompson Publishing).

**JOURNAL REFERENCES:**

1. Indian Journal of Critical Care Medicine.
2. Journal of Parenteral and Enteral Nutrition
3. Journal of American Dietetic Association, American Dietetic Association, Mount Marris, Illinois, 61054, USA.
4. The American Journal of Clinical Nutrition, Waverfy Press, USA.
5. The Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi

**OPEN EDUCATIONAL RESOURCES:**

- 1.<https://scholar.google.co.in/scholar?q=oer+nutritional+support+for+>
- 2.<https://www.sciencedirect.com/science/article/abs/pii/S0899900704001649>
- 3.<https://www.sciencedirect.com/science/article/abs/pii/S0012369215321097>
- 4.<https://www.nejm.org/>
- 5.<https://aspenjournals.onlinelibrary.wiley.com/doi/abs/10.1177/0148607103027005355>

**COURSE CONTENTS & LECTURE SCHEDULE:**

| Module No.   | Topic   | No. of Lectures | Teaching Pedagogy             | Teaching Aids         |
|--|---|-----------------|-------------------------------|-----------------------|
| <b>UNIT -1 NUTRITIONAL SCREENING AND ASSESSMENT FOR THE CRITICALLY ILL</b>             |   |                 |                               |                       |
| 1.1  | Nutritional screening and nutritional status assessment of the critically ill.  | 6               | Lecture                       | PPT                   |
| 1.2  | Nutritional support system and other life saving measures for the critically ill.   | 6               | Chalk & Talk<br>Demonstration | Black Board<br>Models |
| <b>UNIT -2 IMMUNO ENHANCERS AND SPECIAL DIETS IN CRITICAL CARE</b>                     |   |                 |                               |                       |
| 2.1  | Role of immuno enhancers, conditionally essential nutrients in critical care.   | 6               | Lecture                       | PPT                   |
| 2.2  | Role of immuno suppressants and special diets in critical care.   | 6               | Lecture                       | PPT                   |
| <b>UNIT -3 SPECIAL NUTRITIONAL THERAPY IN CRITICAL ILLNESSES –BURNS, CV AND KIDNEY</b> |   |                 |                               |                       |
| 3.1  | Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like stress, trauma, sepsis, burns. | 4               | Lecture                       | PPT                   |
| 3.2  | Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like CV complications and surgery.  | 4               | Chalk & Talk                  | Black Board           |

|  |  |   |               |             |
|--|--|---|---------------|-------------|
| 3.3  | Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like dialysis, transplant, multiple organ failure. | 4 | Demonstration | Model       |
| <b>UNIT -4 SPECIAL NUTRITIONAL THERAPY IN CRITICAL ILLNESSES –GI AND LIVER</b> |  |   |               |             |
| 4.1  | Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like GI tract surgery.                             | 6 | Lecture       | PPT         |
| 4.2  | Patho physiological, clinical and metabolic aspects, understanding the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like hepatic transplants.                          | 6 | Lecture       | PPT         |
| <b>UNIT -5 REFEEDING SYNDROME AND ETHICAL ISSUES IN TERMINALLY ILL</b>         |  |   |               |             |
| 5.1  | Complications of nutritional support system including refeeding syndrome.  | 6 | Lecture       | PPT         |
| 5.2  | Diet related ethical issues in the terminally ill.   | 6 | Chalk & Talk  | Black Board |

CBCS Curriculum for M.Sc Human Nutrition & Nutraceuticals

|                | C1      | C2      | C3      | C4         | C5      | Total Scholastic Marks | Non Scholastic Marks C6 | CIA Total |
|----------------|---------|---------|---------|------------|---------|------------------------|-------------------------|-----------|
| Levels         | T1      | T2      | Seminar | Assignment | OBT/PPT |                        |                         |           |
|                | 10 Mks. | 10 Mks. | 5 Mks.  | 5 Mks      | 5 Mks   | 35 Mks.                | 5 Mks.                  | 40Mks.    |
| K2             | 4       | 4       | -       | -          | -       | 8                      | -                       | 8         |
| K3             | 2       | 2       | -       | 5          | -       | 9                      | -                       | 9         |
| K4             | 2       | 2       | -       | -          | 5       | 9                      | -                       | 9         |
| K5             | 2       | 2       | 5       | -          | -       | 9                      | -                       | 9         |
| Non Scholastic | -       | -       | -       | -          | -       |                        | 5                       | 5         |
| Total          | 10      | 10      | 5       | 5          | 5       | 35                     | 5                       | 40        |

CIA

Scholastic **35**

Non Scholastic **5**

**40**

- **All the course outcomes are to be assessed in the various CIA components.**
- **The levels of CIA Assessment based on Revised Bloom's Taxonomy for PG are :**

**K2-Understand, K3-Apply, K4-Analyse, K5-Evaluate**

**EVALUATION PATTERN**

| SCHOLASTIC |    |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5 | C6               | CIA   | ESE | Total |
| 10         | 10 | 5  | 5  | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test-1**C2** – Internal Test-2**C3** - Seminar**C4** – Assignment**C5** - OBT/PPT**C6** – Non - Scholastic**COURSE OUTCOMES**

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

| <b>NO.</b>  | <b>COURSE OUTCOMES</b>   | <b>KNOWLEDGE<br/>LEVEL<br/>(ACCORDING<br/>TO REVISED<br/>BLOOM'S<br/>TAXONOMY)</b> | <b>PSOs<br/>ADDRESSED</b> |
|-------------|--|--|---------------------------|
| <b>CO 1</b> | Explain nutritional screening, assessment and support system for critically ill                | K2   | PSO10                     |
| <b>CO 2</b> | Discuss the role of immuno-enhancers and special diets in critical care                        | K2   | PSO10                     |
| <b>CO 3</b> | Plan special nutrition therapy in critical illness - stress, burns, cardiovascular and kidney  | K3   | PSO10                     |
| <b>CO 4</b> | Examine the special nutrition therapy in gastrointestinal tract surgery and hepatic transplant | K4   | PSO10                     |
| <b>CO 5</b> | Determine the refeeding syndrome and ethical issues in terminally ill                          | K5   | PSO10                     |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 3      | 1      | 1      | 1      | 1      | 1      |
| CO2      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 3      | 1      | 1      | 1      | 1      | 1      |
| CO3      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 3      | 1      | 1      | 1      | 1      | 1      |
| CO4      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 3      | 1      | 1      | 1      | 1      | 1      |
| CO5      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 3      | 1      | 1      | 1      | 1      | 1      |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 2   | 1   | 1   | 1   |
| CO2     | 2   | 1   | 1   | 1   |
| CO3     | 1   | 1   | 2   | 1   |
| CO4     | 1   | 1   | 2   | 1   |
| CO5     | 1   | 1   | 1   | 3   |

**Note: Strongly Correlated – 3**

**“ Moderately Correlated – 2**

**“ Weakly Correlated -1**

**COURSE DESIGNER:**

**Dr.Vasantha Esther Rani**

**Forwarded By**



(Dr.Vasantha Esther Rani)

**100% SKILL DEVELOPMENT**

**II M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS**

**SEMESTER –IV*****For those who joined in 2019 onwards***

| <b>PROGRAMME CODE</b> | <b>COURSE CODE</b> | <b>COURSE TITLE</b>          | <b>CATEGORY</b> | <b>HRS/WEEK</b> | <b>CREDITS</b> |
|-----------------------|--------------------|------------------------------|-----------------|-----------------|----------------|
| <b>PSNN</b>           | <b>19PG4N19</b>    | <b>Food Microbiology Lab</b> | <b>Lab</b>      | <b>4</b>        | <b>2</b>       |

**COURSE DESCRIPTION**

The course gives the clear idea of assessing the microbes present in foods causing spoilage

**COURSE OBJECTIVES**

- To enable the students to identify the microbes causing spoilage in foods
- To determine the shelf life of the foods by assessing the microbial count
- To provide insight on the effect of packaging on the microbial load in foods

**UNITS****UNIT-I INTRODUCTION TO MICROBIOLOGICAL LABORATORY TECHNIQUES (12 HRS.)**

Safety Procedures and Precautions, General Laboratory Directions, Good microbiological laboratory practice (GMLP), Spillage management, Use of equipments, apparatus and materials of microbiological lab.

**UNIT –II MICROSCOPY (12 HRS.)**

Principles, construction and mode of operation of microscopes; Care and handling of microscopes; Microscopic examination of slide preparation.

**UNIT-III STERILIZATION AND DISINFECTANTS (12 HRS.)**

Sterilization using the autoclave/pressure cooker, Sterilization of equipment and materials; Choice, preparation and use of disinfectants.

**UNIT-IV CULTURE MEDIA (12HRS.)**

Culture media –types, preparation, sterilization and storage

**UNIT –V INOCULATION, INCUBATION, ENUMERATION (12HRS.)**

Serial dilution; Inoculation/Plating techniques – Pour Plate method, Spread Plate method, Streak Plate method; Incubation; Enumeration

**REFERENCES:**

1. Manual of methods of analysis of foods, FSSAI, Govt. of India, New Delhi.
2. Josephine A. Morello, (2003). *Laboratory manual and workbook in Microbiology*, The McGraw–Hill Companies.

**JOURNAL REFERENCES:**

1. International Journal of Food Microbiology.
2. Frontiers in Microbiology.

**WEB REFERENCES:**

1. [www.biosci.org.uk/misac](http://www.biosci.org.uk/misac)
2. [www.microbiologyonline.org](http://www.microbiologyonline.org)

**COURSE CONTENTS & LECTURE SCHEDULE:**

| Module No.   | Topic  | No. of Lectures | Teaching Pedagogy                 | Teaching Aids          |
|--|--|-----------------|-----------------------------------|------------------------|
| <b>UNIT -1 INTRODUCTION TO MICROBIOLOGICAL LABORATORY TECHNIQUES</b> |  |                 |                                   |                        |
| 1.1  | Safety Procedures and Precautions, General Laboratory Directions     | 3               | Chalk & Talk                      | Black board            |
| 1.2  | Good microbiological laboratory practice (GMLP), Spillage management | 4               | Demonstration                     | Equipments & apparatus |
| 1.3  | Use of equipments, apparatus and materials of microbiological lab.   | 5               | Demonstration                     | Equipments & apparatus |
| <b>UNIT -2 MICROSCOPY</b>  |  |                 |                                   |                        |
| 2.1  | Principles, construction and mode of operation of microscopes        | 3               | Demonstration & hands on training | Microscope             |
| 2.2  | Care and handling of microscopes                                     | 4               | Demonstration & hands on training | Microscope             |
| 2.3  | Microscopic examination of slide preparation                         | 5               | Demonstration & hands on training | Microscope             |
| <b>UNIT -3 STERILIZATION AND DISINFECTANTS</b>                       |  |                 |                                   |                        |
| 3.1  | Sterilization using the autoclave/pressure cooker                    | 4               | Hands on training                 | Equipments & apparatus |

|   |  |   |                   |                        |
|---|--|---|-------------------|------------------------|
| 3.2   | Sterilization of equipment and materials     | 4 | Hands on training | Equipments & apparatus |
| 3.3   | Choice, preparation and use of disinfectants | 4 | Hands on training | Equipments & apparatus |
| <b>UNIT -4 CULTURE MEDIA</b>                        |  |   |                   |                        |
| 4.1   | Types & preparation of Culture media         | 6 | Hands on training | Equipments & apparatus |
| 4.2   | Sterilization and storage of culture media   | 6 | Hands on training | Equipments & apparatus |
| <b>UNIT -5 INOCULATION, INCUBATION, ENUMERATION</b> |  |   |                   |                        |
| 5.1   | Serial dilution                              | 2 | Hands on training | Equipments & apparatus |
| 5.2   | Pour Plate method                            | 2 | Hands on training | Equipments & apparatus |
| 5.3   | Spread Plate method                          | 3 | Hands on training | Equipments & apparatus |
| 5.4   | Streak Plate method                          | 3 | Hands on training | Equipments & apparatus |
| 5.5   | Incubation; Enumeration                      | 2 | Hands on training | Equipments & apparatus |

### EVALUATION PATTERN

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 10         | 10 | 10 | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test - 1

**C2** – Internal Test - 2

**C3** – Model Practical Exam**C4** – Record**C5** – Non – Scholastic**COURSE OUTCOMES**

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

| NO.         | COURSE OUTCOMES  | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|-------------|--|--|----------------|
| <b>CO 1</b> | Describe the microbiological laboratory techniques           | K2   | PSO11, PSO13   |
| <b>CO 2</b> | Demonstrate the working principles of microscope             | K2   | PSO11, PSO13   |
| <b>CO 3</b> | Select the optimum sterilization and disinfection techniques | K3   | PSO11, PSO13   |
| <b>CO 4</b> | Analyse the preparation and storage of culture media         | K4   | PSO11, PSO13   |
| <b>CO5</b>  | Choose the different enumeration techniques                  | K5   | PSO11, PSO13   |

**Mapping of COs with PSOs**

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 1      |
| CO2      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 2      |
| CO3      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 1      |
| CO4      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 2      |
| CO5      | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1      | 3      | 1      | 2      | 1      | 1      |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 3   | 2   | 2   | 1   |
| CO2     | 3   | 2   | 2   | 2   |
| CO3     | 1   | 1   | 1   | 1   |
| CO4     | 3   | 2   | 1   | 3   |
| CO5     | 2   | 2   | 2   | 3   |

**Note: Strongly Correlated – 3**

**“ Moderately Correlated – 2**

**“ Weakly Correlated -1**

**COURSE DESIGNER:**

**1. Mrs. C.Helen**

**Forwarded By**



(Dr.Vasantha Esther Rani)

**100% SKILL DEVELOPMENT****II M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS****SEMESTER –IV***For those who joined in 2019 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE          | CATEGORY | HRS/ WEEK | CREDITS |
|----------------|-------------|-----------------------|----------|-----------|---------|
| PSNN           | 19PG4N20    | Nutrient Analysis Lab | Lab      | 4         | 2       |

**COURSE DESCRIPTION**

The practical course provides hands –on training in the use of hi-tech precision equipments to identify and analyze the various nutrients present in the food.

**COURSE OBJECTIVES**

- To enable the students to get practical experience in the laboratory
- To develop the skill to undertake research work and carryout experiments in nutrition individually

**UNITS****UNIT –I ESTIMATION OF CALORIES AND MOISTURE (8 HRS.)**

- ❖ Calories in Cereals
- ❖ Moisture in foods

**UNIT –II ESTIMATION OF ACIDITY AND PROTEIN (12 HRS.)**

- ❖ Acidity in Fruits
- ❖ Protein in pulses

**UNIT –III ESTIMATION OF FATS (8 HRS.)**

- ❖ Fats in Nuts
- ❖ Fats in Oilseeds

**UNIT –IV ESTIMATION OF CRUDE FIBRE (12 HRS.)**

- ❖ Crude Fibre in Vegetables
- ❖ Crude Fibre in Fruits

**UNIT –V ESTIMATION OF ASH & MINERALS (20 HRS.)**

- ❖ Ash in foods
- ❖ Calcium in Green leafy Vegetables
- ❖ Calcium in Millets
- ❖ Phosphorus
- ❖ Iron

**REFERENCES:**

1. Berwal. J.S.,Grewal R.B.,Kapoor C.M &.Garg M.R (2004).*Practical Methods in Food Analysis*. Agrotech Publishing Academy, Udaipur.
2. Horwitz W.,(2000).*Official Methods of Analysis of AOAC International*.AOAC International publishers,Rockville,Mary Land.
3. Jayaraman J. (1996), *Laboratory Manual in Biochemistry*. New Age International Ltd. New Delhi.
4. Ranganna S. (1986), *Hand Book of Analysis and Quality Control for fruits and Vegetable Products*. Tata Mc Graw –Hill Publishing Company Limited, New Delhi.
5. Sadasivam S. & Manickam A. (1991), *Biochemical Methods*. New Age International Pvt. Ltd.,New Delhi.
6. Swaminathan.G & George.M (2002). *Laboratory Chemical Methods in Food Analysis*.Margham Publications, Chennai.
7. Yeshajahu Pomeranz & Clifton E. Meloan,( 2004), *Food Analysis –Theory and Practice*. CBS Publishers and Distributors, New Delhi.

**COURSE CONTENTS & LECTURE SCHEDULE:**

| <b>Module No.</b>                                  | <b>Topic</b>  | <b>No. of Lectures</b> | <b>Teaching Pedagogy</b>       | <b>Teaching Aids</b>       |
|--|---|------------------------|--------------------------------|----------------------------|
| <b>UNIT -1 ESTIMATION OF CALORIES AND MOISTURE</b> |   |                        |                                |                            |
| 1.1  | Calories in Cereals<br>Moisture in foods  | 8                      | Chalk & Talk,<br>Demonstration | Glasswares,<br>Instruments |
| <b>UNIT -2 ESTIMATION OF ACIDITY AND PROTEIN</b>   |   |                        |                                |                            |
| 2.1  | Acidity in Fruits<br>Protein in pulses  | 12                     | Chalk & Talk,<br>Demonstration | Glasswares,<br>Equipments  |
| <b>UNIT -3 ESTIMATION OF FATS</b>                  |   |                        |                                |                            |
| 3.1  | Fats in Nuts<br>Fats in Oilseeds  | 8                      | Chalk & Talk,<br>Demonstration | Glasswares<br>Apparatus    |
| <b>UNIT -4 ESTIMATION OF CRUDE FIBRE</b>           |   |                        |                                |                            |
| 4.1  | Crude Fibre in Vegetables<br>Crude Fibre in Fruits  | 12                     | Chalk & Talk,<br>Demonstration | Glasswares<br>Equipments   |
| <b>UNIT -5 ESTIMATION OF ASH &amp; MINERALS</b>    |   |                        |                                |                            |
| 5.1  | Ash in foods<br>Calcium in Green leafy Vegetables<br>Calcium in Millets<br>Phosphorus<br>Iron | 20                     | Chalk & Talk,<br>Demonstration | Glasswares,<br>Instruments |

**EVALUATION PATTERN**

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 10         | 10 | 10 | 5  | 5                | 40    | 60  | 100   |

**C1** – Internal Test - 1

**C2** – Internal Test - 2

**C3** – Model Practical Exam

**C4** – Record

**C5** – Non - Scholastic

## COURSE OUTCOMES

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

| NO.         | COURSE OUTCOMES   | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|-------------|---|--|----------------|
| <b>CO 1</b> | Estimate the calories and moisture content present in foods.        | K2   | PSO2& PSO8     |
| <b>CO 2</b> | Explain the estimation of acidity and protein content in foods.     | K2   | PSO2& PSO8     |
| <b>CO 3</b> | Calculate the amount of fat present in Nuts and oilseeds.           | K3   | PSO7 & PSO8    |
| <b>CO 4</b> | Analyze the amount of crude fibre present in fruits and vegetables. | K4   | PSO7 & PSO8    |
| <b>CO5</b>  | Determine the Ash and Mineral content present in foods.             | K5   | PSO2 & PSO8    |

## Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 1     | 3     | 1     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 2      | 1      | 2      | 1      | 1      |
| CO2      | 1     | 3     | 1     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 2      | 1      | 2      | 1      | 2      |
| CO3      | 1     | 1     | 1     | 1     | 1     | 1     | 3     | 3     | 1     | 1      | 2      | 1      | 2      | 1      | 1      |
| CO4      | 1     | 1     | 1     | 1     | 1     | 1     | 3     | 3     | 1     | 1      | 2      | 1      | 2      | 1      | 2      |
| CO5      | 1     | 3     | 1     | 1     | 1     | 1     | 1     | 3     | 1     | 1      | 2      | 1      | 2      | 1      | 1      |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 3   | 2   | 2   | 1   |
| CO2     | 3   | 2   | 2   | 2   |
| CO3     | 1   | 1   | 1   | 1   |
| CO4     | 3   | 2   | 1   | 3   |
| CO5     | 2   | 2   | 2   | 3   |

**Note: Strongly Correlated – 3**

**“ Moderately Correlated – 2**

**“ Weakly Correlated -1**

### COURSE DESIGNER:

**1. Dr. K.KARTHIGA**

**2. Mrs. D.MOUNA**

**Forwarded By**



(Dr.Vasantha Esther Rani)

**100% SKILL DEVELOPMENT**

**I M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS**  
**SEMESTER – I**

*For those who joined in 2021 onwards*

| <b>PROGRAMME CODE</b> | <b>COURSE CODE</b> | <b>COURSE TITLE</b>                 | <b>CATEGORY</b>      | <b>HHRS /WEEK</b> | <b>CREDITS</b> |
|-----------------------|--------------------|-------------------------------------|----------------------|-------------------|----------------|
| <b>PSNN</b>           | <b>21PG1ZSL</b>    | <b>Intellectual Property Rights</b> | <b>Self-Learning</b> | <b>-</b>          | <b>2</b>       |

**COURSE DESCRIPTION**

The course will be helpful for the students to understand the different forms of IP which could be utilized for the protection of inventions

**COURSE OBJECTIVES**

- To understand the concept of Intellectual Property and Intellectual Property Rights with special reference to India.
- To appreciate the significance of Intellectual Property in modern times, in the light of its international legal regime.
- To study the important Agreements, Treaties and Conventions relating to Intellectual Property Rights.
- To understand the intricacies of grant of Patent, Patentability, Licensing and Revocation at National and International level

**UNITS:****UNIT 1: INTRODUCTION TO INTELLECTUAL PROPERTY RIGHT (IPR)**

IPR – Concept, scope and History, IPR in India and world, Types, Economic importance of IPR.

**UNIT 2: PATENTS AND COPYRIGHTS**

Patent Act 1970 and its amendments - Patent filing in India and abroad: determination of patentability of inventions. Copyrights - Introduction, Works protected under copyright law, Rights, Transfer of Copyright, Infringement.

**UNIT 3: TRADEMARKS AND GEOGRAPHICAL INDICATIONS**

Trademarks - Objectives, Types, Rights, Protection of goodwill, Infringement, Passing off, Defenses and Domain name. Geographical Indications -

Objectives, Justification - International Position - Multilateral Treaties - current scenario in Indian.

#### **UNIT 4: TRADITIONAL KNOWLEDGE**

Traditional Knowledge Digital Library - Information Technology Related Intellectual Property Rights - Computer Software and Intellectual Property, Database and Data Protection. WTO- International Arena and National level - Bio-Propecting and Bio-Piracy

**UNIT 5: BIOTECHNOLOGY AND INTELLECTUAL PROPERTY RIGHTS** Plant and Animal genetic resources GATT & TRIPS; Patent for genes and DNA sequence; International convention; Plant breeder's rights and farmers rights -Intellectual Property Protection (IPP) - WTO, WIPO and TRIPS. Biosafety concepts and issues- Biosafety protocol 2000. Bioethics – Principles, autonomy, human rights, beneficence, privacy, justice and equity.

#### **REFERENCES**

1. N.S. Gopalakrishnan& T.G. Agitha, (2009) Principles of Intellectual Property Eastern Book Company, Lucknow.
2. Kerly's Law of Trade Marks and Trade Names (14th Edition) Thomson, Sweet &Maxweel
3. AjitParulekar and Sarita D' Souza, (2006) Indian Patents Law – Legal & Business Implications; Macmillan India Ltd.
4. B.L.Wadehra (2000) Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India.
5. 1. Dutfield G. (2003). Intellectual Property Rights and the Life Science Industries: A Twentieth Century History (Globalization and Law).Routledge. 2. Mahop, M.T. (2010).
6. Intellectual Property, Community Rights and Human Rights: The Biological and Genetic Resources of Developing Countries.Routledge.
7. Martin Khor (2002). Intellectual Property, Biodiversity and Sustainable Development: Resolving the Difficult Issues. Zed Books limited.

#### **DIGITAL OPEN EDUCATIONAL RESOURCES**

- USPTO – United States Patent and Trademark Office (<http://www.uspto.gov/>)
- IPINDIA – Indian Patent Office (<http://www.ipindia.nic.in/>)
- Google Patents – Worldwide Patents (<https://patents.google.com/>)
- WIPO – World Intellectual Property Organisation (<http://www.wipo.int/patentscope/en/>)
- FPO – Free Patents Online (<http://www.freepatentsonline.com/>)

#### **EVALUATION PATTERN**

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 5          | 10 | 15 | 5  | 5                | 40    | 60  | 100   |

### COURSE OUTCOMES

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

| NO.  | COURSE OUTCOMES  | KNOWLEDGE LEVEL<br>(ACCORDING TO<br>REVISED BLOOM'S<br>TAXONOMY) | PSOs<br>ADDRESSED |
|------|--|--|-------------------|
| CO 1 | List the types of IPR  | K1   | PSO1&             |
| CO 2 | Explain the procedure for obtaining patents and copyright                    | K2   | PSO6              |
| CO 3 | Identify the importance of Trademarks and Geographical Indications           | K3   | PSO6              |
| CO 4 | Analyze the concepts of traditional knowledge and information technology.    | K4   | PSO6              |
| CO 5 | Assess the biosafety and bioethical principles followed in Biotechnology Lab | K5   | PSO1& PSO6        |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 2     | 2     | 2     | 3     | 1     | 3     | 1     | 1     | 2     | 1      | 1      | 1      | 2      | 1      | 1      |

|     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO2 | 2 | 2 | 2 | 3 | 1 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 |
| CO3 | 2 | 2 | 2 | 3 | 1 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 |
| CO4 | 2 | 2 | 2 | 3 | 1 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 |
| CO5 | 2 | 2 | 2 | 3 | 1 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 1 |

### Mapping of COs with POs

| CO/<br>PSO | PO1 | PO2 | PO3 | PO4 |
|------------|-----|-----|-----|-----|
| CO1        | 3   | 3   | 2   | 1   |
| CO2        | 3   | 3   | 2   | 1   |
| CO3        | 3   | 3   | 2   | 1   |
| CO4        | 3   | 3   | 2   | 1   |
| CO5        | 3   | 3   | 2   | 1   |


**Note: Strongly Correlated – 3**  
**Weakly Correlated -1**

**“ Moderately Correlated – 2**

#### COURSE DESIGNER:

1. Dr. N.Nagarani (Zoology)
2. Mrs. C. Helen (Home Science)

**Forwarded By**

  
**Dr. A. TAMIL SELVI**  
 Head, Dept. of Zoology  
 FATIMA COLLEGE (AUTONOMOUS)  
 MADURAI-625 018

**HOD'S**

**100% SKILL DEVELOPMENT**

**Signature**

**I M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS****SEMESTER-II***For those who joined in 2021 onwards*

| <b>PROGRAMME CODE</b> | <b>COURSE CODE</b> | <b>COURSE TITLE</b>      | <b>CATEGORY</b>      | <b>HRS/ WEEK</b> | <b>CREDITS</b> |
|-----------------------|--------------------|--------------------------|----------------------|------------------|----------------|
| <b>PSNN</b>           | <b>21MSW 2SL</b>   | <b>GERIATRIC SCIENCE</b> | <b>SELF LEARNING</b> | <b>-</b>         | <b>2</b>       |

**COURSE DESCRIPTION:**

This course analyzes the social aspects of aging in by giving an introduction to the field of gerontology, its history, theories, and research methods.

**COURSE OBJECTIVES:**

To make the students aware of the problems of the old people in the present-day situation and its sociological implications.

To equip the learners to explores the sociological aspects of aging.

**UNIT -I INTRODUCTION TO SOCIAL GERONTOLOGY**

Nature (Self Study) and Scope of Social Gerontology. Theories of Social Gerontology- Activity Theory, Disengagement Theory, Continuity Theory, Age Stratification Theory, Labelling Theory

**UNIT -II CHANGES DURING OLD AGE**

Physical aging: Changes in body composition, organ systems - Psychological aging: changes in memory and learning- Social aging: Role changes, age norms and role adaptation (Self Study).

**UNIT -III GERIATRIC NUTRITION**

Definition, Aging Society and Nutrition Epidemiology, Physical and Physiological Changes, Nutritional Assessment

**UNIT -IV AGEING & NUTRITION**

Nutritional Changes and Requirement, Role of Nutrition in the Prevention of Age-Associated Diseases, Health and Feeding Problems among Elderly, Nutrition Support-Parenteral/ Enteral/ Oral

## UNIT –V SUPPORT SYSTEM OF THE ELDERLY

Role of family (Self Study), Government and Non government in the care of elderly, Rights of Elderly – Care and maintenance, Indian Laws and welfare schemes related to Elderly. Palliative Care, Dying and Death, Bereavement

### TEXT BOOK:

1. Krishanandsanwal, Fundamentals of Gerontology Akansha publishing house, New Delhi, 2008.

### REFERENCES:

1. Simone de Behavior, Old Age, Cox and Wyman Ltd. London, 1972.
2. S. IrudayaRajan, U.S. Mishra and P. Sankarasarma, India's Elderly Burden or Challenge, Sage publications, New Delhi, 1999.
3. L. Thara Bhai, Aging Indian, Perspective Decent Books, New Delhi, 2002.
4. P.V.Ramamurti, Handbook of Indian gerontology, D. Jamuna Serialspublications, New Delhi, 2004.
5. K. Kapoor, India's Elderly, satwanti Kapoor amittal publications, New Delhi, 2004.
6. R. K. A. Subrahmanya, Social Security for the elderly, shiprapublications, 2005.
7. D. P. Saxena, Sociology of Aging, Concept publishing company, New Delhi, 2006.
8. Asiya Nasreen. "Urban elderly – coping strategies and societal responses", Concept publishing company, New Delhi, 2009.
9. Shills, M.E and Young, M.E, (1996), Modern Nutrition in Health and Disease. Varghese Company (Indian).
10. John E. Morley and David R. Thomas, (2007), Geriatric Nutrition. CRC Press Taylor & Francis Group.

### OPEN EDUCATIONAL RESOURCES:

<https://www.allpsychologycareers.com/topics/social-gerontology.html>

<https://www.encyclopedia.com/medicine/encyclopedias-almanacs-transcripts-and-maps/geriatric-nutrition-0>

<https://www.bestvalueschools.com/faq/what-is-social-gerontology>

**EVALUATION PATTERN**

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 5          | 10 | 15 | 5  | 5                | 40    | 60  | 100   |

**COURSE OUTCOMES (CO)**

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

| NO.         | COURSE OUTCOMES   | KNOWLEDGE LEVEL ( REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|-------------|---|---|----------------|
| <b>CO 1</b> | Recall the nature, scope and theories of Social Gerontology           | K1  | PSO1& PSO2     |
| <b>CO 2</b> | Classify the physical, psychological and social changes of aging      | K2  | PSO3           |
| <b>CO 3</b> | Interpret the geriatric nutrition and its importance                  | K3  | PSO5           |
| <b>CO 4</b> | Analyze the nutritional change and requirement of old age people      | K4  | PSO5           |
| <b>CO 5</b> | Analyse the rights and care for old age people provided by government | K4  | PSO4           |

**Mapping of COs with PSOs**

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 2     | 2     | 2     | 3     | 1     | 3     | 1     | 1     | 2     | 1      | 1      | 1      | 2      | 1      | 1      |
| CO2      | 2     | 2     | 2     | 3     | 1     | 3     | 1     | 1     | 2     | 1      | 1      | 1      | 2      | 1      | 1      |
| CO3      | 2     | 2     | 2     | 3     | 1     | 3     | 1     | 1     | 2     | 1      | 1      | 1      | 2      | 1      | 1      |
| CO4      | 2     | 2     | 2     | 3     | 1     | 3     | 1     | 1     | 2     | 1      | 1      | 1      | 2      | 1      | 1      |
| CO5      | 2     | 2     | 2     | 3     | 1     | 3     | 1     | 1     | 2     | 1      | 1      | 1      | 2      | 1      | 1      |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 |
|---------|-----|-----|-----|-----|
| CO1     | 3   | 3   | 2   | 1   |
| CO2     | 3   | 3   | 2   | 1   |
| CO3     | 3   | 3   | 2   | 1   |
| CO4     | 3   | 3   | 2   | 1   |
| CO5     | 3   | 3   | 2   | 1   |

**Note: Strongly Correlated – 3**  
**Weakly Correlated -1**

**“ Moderately Correlated – 2**

**COURSE DESIGNERS:**

**Ms.P. Magdalene Virjini**

**Forwarded By**



(Dr. Vasantha Esther Rani)



**II M.Sc.,HUMAN NUTRITION AND NUTRACEUTICALS****SEMESTER –III***For those who joined in 2021 onwards*

| <b>PROGRAMME CODE</b> | <b>COURSE CODE</b> | <b>COURSE TITLE</b>  | <b>CATEGORY</b>      | <b>HRS/WEEK</b> | <b>CREDITS</b> |
|-----------------------|--------------------|----------------------|----------------------|-----------------|----------------|
| <b>PSNN</b>           | <b>21PG3SLN</b>    | <b>Nutrigenomics</b> | <b>SELF LEARNING</b> | <b>-</b>        | <b>2</b>       |

**COURSE DESCRIPTION**

This course aims to understand, in depth, the influence of genetics on micronutrient metabolism, and implications for complex human diseases.

**COURSE OBJECTIVES**

- To understand the concept of genes and genomes
- To become aware of the interactions of nutrients with human disease conditions.
- To explore the influence of genes on cellular and molecular metabolism.

**UNITS****UNIT –I THE STRUCTURE OF GENES AND GENOMES**

Structure and functions of genes- Chromatin, genome organization, DNA, histones and RNA; Epigenetic modifications- histone acetylation, methylation, phosphorylation, ubiquitination; Genetic variations - SNPs, copy number variations, nucleotide repeats, addition, insertions and deletions.

**UNIT –II NUTRIGENETICS**

Gene concept- one Gene one polypeptide concept; Brief account on Transcriptome, proteome and Metabolome. Genetic bases of complex diseases – cardiovascular diseases, obesity, diabetes, cancer; Inborn errors of metabolism - Fructose intolerance, Galactosemia, Maple sugar urine disease, Phenylketonuria.

**UNIT –III GENE-DIET INTERACTIONS**

Concepts of Nutrients and Genetic Interaction, Personalised Nutrition, Nutritional Epigenetics, Concepts of Microbiome and Nutrients Interaction, Contribution of the microbiome to health and disease.

#### **UNIT –IV NUTRIGENOMICS OF COMPLEX DISEASES**

Modifying disease risk through nutrigenomics - Modulating the risk of Cardio Vascular Diseases, Diabetes Mellitus, Obesity and Cancer through nutrigenomics.

#### **UNIT –V NUTRITIONAL REGULATION OF GENE EXPRESSION**

Regulation of intake. Nutrients as Regulators- Macronutrients -carbohydrate, lipids, and protein Micronutrients - vitamins A and D. The intestinal microbiota - role in nutrigenomics.

#### **UNIT –VI DYNAMISM(For CIA only)**

##### **NUTRIGENOMICS & INDUSTRY AND PUBLIC:**

Scope and Importance to Human Health and Industry. Bringing nutrigenomics to the food industry- important challenges; Public health - significance of nutrigenomics.

#### **REFERENCES:**

1. Brown T. A. (2007), Genomes 3. Garland Science Publishing, New York.
2. Griffiths, A.J.F., J.H. Miller, Suzuki, D.T., Lewontin, R.C. and Gelbart, W.M.(2009). An Introduction to Genetic Analysis. IX Edition. Freeman and Co., N.Y., USA.
3. Snustad, D.P. and Simmons, M.J. (2009). Principles of Genetics. V Edition, JohnWiley and Sons Inc.
4. Watson, J.D., Myers, R.M., Caudy, A. and Witkowski, J.K. (2007). Recombinant DNA- Genes and Genomes- A Short Course. III Edition, Freeman and Co., N.Y.,USA.
5. Journal Nutrigenetics Nutrigenomics 2011;4:69–89; Nutrigenetics and Nutrigenomics: Viewpoints on the Current Status and Applications in Nutrition Research and Practice.

6. Journal Nutrients 2012, 4, 1898-1944; Molecular Nutrition Research—The Modern Way Of Performing Nutritional Science.
7. Journal Nutrients 2013, 5, 32-57; Nutrigenetics and Metabolic Disease: Current Status and Implications for Personalized Nutrition

**Open Educational Resources (OER) :**

1. <http://www.ga-online.org/files/Antalya2011/WS2-Daniel.pdf>
2. <http://www.authorstream.com/Presentation/winingneeraj01-1272374-nutritional-genomics/>
3. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3121546/>
4. <https://pubmed.ncbi.nlm.nih.gov/17378721/>
5. <https://pubmed.ncbi.nlm.nih.gov/15485344/>
6. <https://pubmed.ncbi.nlm.nih.gov/17684398/>

**EVALUATION PATTERN**

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 5          | 10 | 15 | 5  | 5                | 40    | 60  | 100   |

**COURSE OUTCOMES**

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

| NO.  | COURSE OUTCOMES   | KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|------|---|---|----------------|
| CO 1 | Describe the fundamental concepts of genome organization and the genetic variations | K2  | PSO 1          |

| NO.  | COURSE OUTCOMES  | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|------|--|--|----------------|
| CO 2 | Analyze the genetic basis of complex diseases                    | K2, K3   | PSO 1          |
| CO 3 | Summarize the concepts of Nutrient-Gene Interaction              | K2, K4   | PSO 1 & PSO 2  |
| CO 4 | Build knowledge on modify the disease risk through nutrigenomics | K2   | PSO 3 & PSO 4  |
| CO 5 | Identify the nutrients as regulators in nutrigenomics            | K3& K5   | PSO 2          |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 3     |       | 3     | 3     |       |       |       |       |       |        |        |        |        |        |        |
| CO2      | 2     |       | 3     | 3     |       | 2     |       |       |       |        |        |        |        |        |        |
| CO3      | 3     | 2     | 2     | 2     |       | 2     |       |       |       |        |        |        |        |        |        |
| CO4      | 2     |       | 3     | 3     |       | 2     |       |       |       |        |        |        |        |        |        |
| CO5      | 2     | 2     | 3     | 3     |       | 2     |       |       |       |        |        |        |        |        |        |

### Mapping of COs with POs

| CO/ PSO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1     | 3   | 3   | 3   |     | 2   |

|            |          |          |          |  |          |
|------------|----------|----------|----------|--|----------|
| <b>CO2</b> | <b>3</b> | <b>2</b> | <b>2</b> |  |          |
| <b>CO3</b> | <b>3</b> | <b>3</b> |          |  |          |
| <b>CO4</b> | <b>3</b> | <b>3</b> |          |  | <b>2</b> |
| <b>CO5</b> | <b>3</b> | <b>2</b> |          |  |          |

**Note: Strongly Correlated – 3      " Moderately Correlated – 2**  
**" Weakly Correlated -1**

**COURSE DESIGNERS:**

**3. Mrs. J.Thelma**

**4. Mrs. D.Mouna**

**Forwarded By**



**HOD'S**

**Signature**

**100% EMPLOYABILITY**

**FATIMA COLLEGE (AUTONOMOUS) MADURAI – 18.**  
**II M.Sc. HUMAN NUTRITION AND NUTRACEUTICALS**  
**SEMESTER –III& IV**

*For those who joined in 2019 onwards*

| PROGRAMME CODE | COURSE CODE | COURSE TITLE     | CATEGORY      | HRS/WEEK | CREDITS |
|----------------|-------------|------------------|---------------|----------|---------|
| PSNN           | 21PG4SLN    | SPORTS NUTRITION | Self Learning | -        | 2       |

### **COURSE DESCRIPTION**

The course explains the medical nutrition therapy for sports personnel, common diseases, and special conditions like sports related disease conditions.

### **COURSE OBJECTIVES**

- To identify and describe the nutritional needs of normal & sports personnel.
- To identify and describe various sports related disease conditions.
- To gain knowledge on appropriate medical nutritional therapy for sports injury, sports anaemia, dehydration, gut disorders & allergies.
- To develop the attitude and capacity for taking up sport nutrition counselling as a profession.

### **Units**

#### **Unit-I Introduction to Health & Exercise:**

Concept of health, Wellness, Wellbeing . Specific fitness and health status. Physical Activities & Fitness: Concept to Fitness, Exercise -Definition, components of fitness, energy system – aerobic & anaerobic, nutritional demands of sports and dietary recommendations – objectives, nutritional requirements, dietary guidelines-

#### **Unit-II Holistic approach to the management of fitness and health:**

Energy input and output. Diet and Exercise Effect of specific nutrients on work performance and physical fitness. Nutrition, exercise, Physical fitness and health – inter-relationship.

### **Unit III Nutrition in Sports:**

Sports specific requirement, Diet manipulation - Pre-game and post game meals. Assessment of different nutrigenic aids and commercial supplements. Diets for persons with high energy requirements, stress, fracture and injury.

### **Unit IV Medical nutrition therapy (MNT):**

MNT for athletes with Nutrition related disorders; Diabetes and Cardiovascular disease: Physiological effect of exercise; Physical activity. Effects of long-term physical activity; Acute effects of exercise; Dietary guidelines and Nutrient timing; type of carbohydrate and timing; Pre and post event carbohydrate loading and fluids; Osteoporosis: Causes and consequences; Physiological effects of exercise; Sports Anaemia: Causes and consequences; .Physiological effects of exercise

### **Unit V Sports Nutritional Therapy for Gut disorders:**

Athletes with gastrointestinal disorders: food allergies and food intolerance; GI disturbance; Excessive flatulence; Abdominal distention; Intermittent diarrhoea; Constipation; Food related adverse reactions (FRAR). Fluid intake- Water and electrolyte balance, losses and their replenishments during exercise and sports events, dehydration and its effects.

### **References:**

1. "Fitness and Wellness" : Warner W. K Hoeger and Sharvon A. Hoeger.
2. "Fitness & Wellness concepts": Charles B. Corbina & Ruth Lindsey.
3. "Lifetime Fitness & Wellness - A personal choice": Melvin H. Williams
4. Oxford Textbook of Public Health, Helen Liepman. · Sunderlal, Aadarsh, Pankaj, 2007.
5. Textbook of Community Medicine, CBS Publishers & Distributors. · Kirch, Wilhelm, 2008.
6. Encyclopedia of Public Health, Volume 1 & 2, Kluwer Academic Publishers.
7. Mary -Jane Schneider and Henrey Schneider, 2006 (2nd edition), Introduction to Public Health, Jones and Bartlett Publishers.
8. Kathleen Mahan. L. Sylvia Escott-Stump, Janice L Raymond & Krause (2011) .*Food & Nutrition Therapy*, (13<sup>th</sup> ed), Elsevier Publications.
9. Robinson CH.(1994) . *Normal & Therapeutic Nutrition* XVIII Edition, Macmillan Publishers Company, New York.
10. Srilakshmi.B (1995). *Dietetics*, New Age International Private Ltd., New Delhi.
11. Sue Rodwell Williams. (2001). *Basic Nutrition and Diet therapy*, Mosby publications.

**JOURNAL REFERENCES:**

1. Food and Nutrition Bulletin United Nations University Press, Japan.
2. Journal of American Dietetic Association, The American Dietetic Association, Mount Marris, Illinois, 61054, USA.
3. Nutrition Abstracts and Reviews, CBB International, UK.
4. Nutrition Reviews, Nutrition Foundation, Washington, DC..
5. The Indian Journal of Medical Research, The Indian Council of Medical Research, New Delhi.

**WEB REFERENCES:**

1. [www.faseb.org/asns](http://www.faseb.org/asns)
2. [www.nutritionfoundation.org](http://www.nutritionfoundation.org)
3. [www.lifelines.com/ntnlk.html](http://www.lifelines.com/ntnlk.html)
4. [www.diabetes.org](http://www.diabetes.org)
5. [www.americanheart.org](http://www.americanheart.org)
6. [www.cancer.org](http://www.cancer.org)
7. [www.pugmarks.com/aims](http://www.pugmarks.com/aims)
8. [www.eatright.org/](http://www.eatright.org/)
9. [www.sea&airtravelnutrition.org](http://www.sea&airtravelnutrition.org)

**EVALUATION PATTERN**

| SCHOLASTIC |    |    |    | NON - SCHOLASTIC | MARKS |     |       |
|------------|----|----|----|------------------|-------|-----|-------|
| C1         | C2 | C3 | C4 | C5               | CIA   | ESE | Total |
| 5          | 10 | 15 | 5  | 5                | 40    | 60  | 100   |

**COURSE OUTCOMES**

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

| NO.  | COURSE OUTCOMES                | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|------|--------------------------------|--|----------------|
| CO 1 | Concept of health and wellness | K2   | PSO 1          |

| NO.  | COURSE OUTCOMES  | KNOWLEDGE LEVEL<br>(ACCORDING TO REVISED BLOOM'S TAXONOMY) | PSOs ADDRESSED |
|------|--|--|----------------|
|      | Physical activity and fitness  |  |                |
| CO 2 | Analyze Energy input and output. Physical fitness and health – inter-relationship. | K2, K3   | PSO 1          |
| CO 3 | Summarize the concepts of Nutrition in sports                                      | K2, K4   | PSO 1 & PSO 2  |
| CO 4 | Build knowledge on Medical Nutrition Therapy                                       | K2   | PSO 3 & PSO 4  |
| CO 5 | Identify the sports nutrition therapy for gut disorders                            | K3& K5   | PSO 2          |

### Mapping of COs with PSOs

| CO / PSO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 | PSO 8 | PSO 9 | PSO 10 | PSO 11 | PSO 12 | PSO 13 | PSO 14 | PSO 15 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| CO1      | 3     |       | 3     | 3     |       |       |       |       |       |        |        |        |        |        |        |
| CO2      | 2     |       | 3     | 3     |       | 2     |       |       |       |        |        |        |        |        |        |
| CO3      | 3     | 2     | 2     | 2     |       | 2     |       |       |       |        |        |        |        |        |        |
| CO4      | 2     |       | 3     | 3     |       | 2     |       |       |       |        |        |        |        |        |        |
| CO5      | 2     | 2     | 3     | 3     |       | 2     |       |       |       |        |        |        |        |        |        |

### Mapping of COs with POs

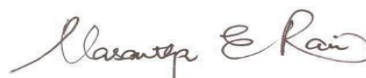
| CO/<br>PSO | PO1 | PO2 | PO3 | PO4 | PO5 |
|------------|-----|-----|-----|-----|-----|
| CO1        | 3   | 3   | 3   |     | 2   |
| CO2        | 3   | 2   | 2   |     |     |
| CO3        | 3   | 3   |     |     |     |
| CO4        | 3   | 3   |     |     | 2   |
| CO5        | 3   | 2   |     |     |     |

**Note: Strongly Correlated – 3                      " Moderately Correlated – 2**  
**" Weakly Correlated -1**

**COURSE DESIGNERS:**

**Ms.P. Magdalene Virjini**

**Forwarded By**



(Dr. Vasantha Esther Rani)