


POLYTECHNIC IN FOOD SCIENCE & HE



DIPLOMA IN FOOD TECHNOLOGY AND NUTRITION



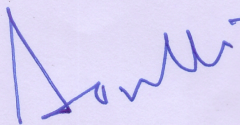
**FACULTY OF FOOD PROCESSING TECHNOLOGY & BE
ANAND AGRICULTURAL UNIVERSITY, ANAND-388 110
(GUJARAT, INDIA), www.aau.in**

| | |
|---|---|
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| No. AAU/FPT-BE/Acad/ 786 /2024, | Date 25/7/2024 |

Endorsement for the Programme specific outcomes, Programme outcome, and Course Outcomes Mapping of Diploma Food Technology and Nutrition curriculum

Anand Agriculture University has undertaken the task of initiating and introducing three year polytechnic programme, first time in nation leading to Diploma in various fields of agriculture and allied sciences i.e. Agriculture, Horticulture, Agricultural engineering etc. Accordingly Diploma in Food Technology and Nutrition course has been formulated and advocated along with meticulously curated syllabi. The course and syllabi have been structured with integral importance placed on precision and alignment with academic standards. They serve as a beacon of academic integrity and rigor, aimed at fostering a harmonized educational landscape within the realm of Food Technology and Nutrition. The recommendations committee set for syllabi have been duly endorsed and ratified, reflecting the discerning evaluation and unwavering commitment to educational excellence. This initiative has been executed with careful consideration of meticulous deliberations and diligent efforts by committee member from various fields like government scoter, other universities, agricultural universities etc.

Diploma Food Technology and Nutrition curriculum is herewith delineates and articulates for the Programme Specific Outcome, Programme Outcomes, and Course Outcomes, Meticulously and mapped to ensure a comprehensive and coherent educational framework. The undersigned hereby affix our official seal and endorsement thereby granting unequivocal approval.


PRINCIPAL & DEAN

"DIPLOMA IN FOOD TECHNOLOGY AND NUTRITION"

DISCIPLINE WISE DISTRIBUTION OF CREDIT LOADS

| No. | Abbreviation | Department | No. of Subjects | Credit Load |
|--------------------|--------------|------------------------------|-----------------|----------------------|
| 1 | BS | Basic Science and Humanities | 9 | 13 + 09 = 22 |
| 2 | FE | Food Engineering | 7 | 10 + 06 = 16 |
| 3 | FS | Food Science | 8 | 12 + 10 = 22 |
| 4 | FT | Food Technology | 6 | 12 + 06 = 18 |
| 5 | HN | Human Nutrition | 6 | 11 + 06 = 17 |
| 6 | DT | Dietetics | 4 | 05 + 04 = 09 |
| 7 | TP | Operational Department | 1 | 00 + 20 = 20 |
| GRAND TOTAL | | | 41 | 63 + 61 = 124 |

BASIC SCIENCE and HUMANITIES DEPARTMENT

| Course No. | Course Title | Credits (T+P=T) | Page No. |
|------------|---|-----------------|------------|
| BS 101 | Basic Chemistry | 1+1 = 2 | 5 |
| BS 102 | Basic Physics | 2+1 = 3 | 6 |
| BS 103 | Environmental Science and Disaster Management | 2+1 = 3 | 7 |
| BS 104 | Human Anatomy and Physiology | 1+2 = 3 | 9 |
| BS 105 | Language and Communication skills | 2+0 = 2 | 10 |
| BS 106 | Health, Hygiene and Sanitation | 1+1 = 2 | 11 |
| BS 201 | Basic Biochemistry | 2+1 = 3 | 12 |
| BS 202 | Computer Application | 1+1 = 2 | 13 |
| BS 501 | Entrepreneurship Development | 1+1 = 2 | 14 |
| NSS 101 | NSS / NCC / Sports | 0+1 = 1* | Non credit |
| NSS201 | NSS / NCC / Sports | 0+1 = 1* | Non credit |
| NSS 301 | NSS / NCC / Sports | 0+1 = 1* | Non credit |
| NSS 401 | NSS / NCC / Sports | 0+1 = 1* | Non credit |
| 9 | TOTAL | 13+9=22 | |

FOOD ENGINEERING DEPARTMENT

| Course No. | Course Title | Credits (T+P=T) | Page No. |
|------------|-------------------------------------|-----------------|----------|
| FE 101 | Applied Mathematics | 1+1 = 2 | 15 |
| FE 201 | Engineering Mathematics I | 2+0 = 2 | 16 |
| FE 202 | Fluid Mechanics | 2+1 = 3 | 17 |
| FE 301 | Engineering Mathematics II | 2+0 = 2 | 19 |
| FE 302 | Engineering Drawing and Graphics | 0+2 = 2 | 20 |
| FE 303 | Food Engineering and Thermodynamics | 2+1 = 3 | 21 |
| FE 401 | Electronics & Instrumentation | 1+1 = 2 | 22 |
| 7 | TOTAL | 10+6=16 | |

FOOD SCIENCE DEPARTMENT

| Course No. | Course Title | Credits (T+P=T) | Page No. |
|------------|--------------------------------------|-----------------|----------|
| FS 201 | Food Chemistry | 2+1 = 3 | 23 |
| FS 202 | Food Science | 2+1 = 3 | 24 |
| FS 203 | General and Food Microbiology | 2+1 = 3 | 25 |
| FS 204 | Food Production and Culinary Science | 1+2 = 3 | 26 |
| FS 301 | Food Preservation and Storage | 2+1 = 3 | 27 |
| FS 401 | Food Product Development | 1+1 = 2 | 28 |
| FS 501 | Convenience and Health Food | 1+1 = 2 | 29 |
| FS 502 | Food Analysis & Quality assurance | 1+2 = 3 | 30 |
| 8 | Total | 12+10=22 | |

FOOD TECHNOLOGY DEPARTMENT

| Course No. | Course Title | Credits (T+P=T) | Page No. |
|------------|---------------------------------------|-----------------|----------|
| FT 301 | Post Harvest Engineering | 2+1 = 3 | 31 |
| FT 302 | Principles of Food Processing | 2+1 = 3 | 32 |
| FT 401 | Cereal, Legume and Oilseed Processing | 3+1 = 4 | 33 |
| FT 402 | Milk and Milk Product Processing | 2+1 = 3 | 34 |
| FT 501 | Bakery and Confectionary Technology | 1+1 = 2 | 35 |
| FT 502 | Fruit and Vegetable Processing | 2+1 = 3 | 36 |
| 6 | Total | 12+6=18 | |

HUMAN NUTRITION DEPARTMENT

| Course No. | Course Title | Credits (T+P=T) | Page No. |
|------------|--------------------------------|------------------|----------|
| HN 101 | Basic Nutrition | 2+1 = 3 | 37 |
| HN 301 | Human Nutrition | 2+1 = 3 | 38 |
| HN 401 | Nutritional Assessment | 1+1 = 2 | 39 |
| HN 402 | Maternal and Child Nutrition | 2+1 = 3 | 40 |
| HN 403 | Public Health Nutrition | 2+1 = 3 | 41 |
| HN 501 | Sports and Geriatric Nutrition | 2+1 = 3 | 42 |
| 6 | Total | 11+6 = 17 | |

DIETETICS DEPARTMENT

| Course No. | Course Title | Credits (T+P=T) | Page No. |
|------------|--|------------------|----------|
| DT 301 | Meal Planning | 1+1 = 2 | 43 |
| DT 401 | Diet Therapy | 1+1 = 2 | 44 |
| DT 501 | Therapeutic Nutrition | 2+1 = 3 | 45 |
| DT 502 | Hospital Dietetics and Patient Counselling | 1+1 = 2 | 46 |
| 4 | Total | 5 + 4 = 9 | |

OPERATIONAL DEPARTMENT

| Course No. | Course Title | Credits T+P=T) | Page No. |
|------------|-----------------------------|--------------------|----------|
| TP 601 | Training and Project Report | 0+20=20 | 47 |
| 1 | Total | 0 + 20 = 20 | |

“DIPLOMA IN FOOD TECHNOLOGY AND NUTRITION”
SEMESTER WISE DISTRIBUTION OF THE COURSES

SEMESTER I

| Course No. | Course Title | Credits (T+P=T) | Page No. |
|------------|---|------------------|------------|
| BS 101 | Basic Chemistry | 1 + 1 = 2 | 5 |
| BS 102 | Basic Physics | 2 + 1 = 3 | 6 |
| BS 103 | Environmental Science and Disaster Management | 2 + 1 = 3 | 7 |
| BS 104 | Human Anatomy and Physiology | 1 + 2 = 3 | 9 |
| BS 105 | Language and Communication skills | 2 + 0 = 2 | 10 |
| BS 106 | Health, Hygiene and Sanitation | 1 + 1 = 2 | 11 |
| FE 101 | Applied Mathematics | 1 + 1 = 2 | 15 |
| HN 101 | Basic Nutrition | 2 + 1 = 3 | 37 |
| NSS 101 | NSS / NCC / Sports | 0 + 1 = 1* | Non credit |
| 8 | Total Credits | 12+8 = 20 | |

SEMESTER II

| Course No. | Course Title | Credits (T+P=T) | Page No. |
|------------|--------------------------------------|--------------------|------------|
| BS 201 | Basic Biochemistry | 2 + 1 = 3 | 12 |
| BS 202 | Computer Application | 1 + 1 = 2 | 13 |
| FE 201 | Engineering Mathematics I | 2 + 0 = 2 | 16 |
| FE 202 | Fluid Mechanics | 2 + 1 = 3 | 17 |
| FS 201 | Food Chemistry | 2 + 1 = 3 | 23 |
| FS 202 | Food Science | 2 + 1 = 3 | 24 |
| FS 203 | General and Food Microbiology | 2 + 1 = 3 | 25 |
| FS 204 | Food Production and Culinary Science | 1 + 2 = 3 | 26 |
| NSS 201 | NSS / NCC / Sports | 0 + 1 = 1* | Non credit |
| 8 | Total Credits | 14 + 8 = 22 | |

SEMESTER III

| Course No. | Course Title | Credits (T+P=T) | Page No. |
|------------|-------------------------------------|--------------------|------------|
| FE 301 | Engineering Mathematics II | 2 + 0 = 2 | 19 |
| FE 302 | Engineering Drawing and Graphics | 0 + 2 = 2 | 20 |
| FE 303 | Food Engineering and Thermodynamics | 2 + 1 = 3 | 21 |
| FS 301 | Food Preservation and Storage | 2 + 1 = 3 | 27 |
| FT 301 | Post Harvest Engineering | 2 + 1 = 3 | 31 |
| FT 302 | Principles of Food Processing | 2 + 1 = 3 | 32 |
| HN 301 | Human Nutrition | 2 + 1 = 3 | 38 |
| DT 301 | Meal Planning | 1 + 1 = 2 | 43 |
| NSS 301 | NSS / NCC / Sports | 0 + 1 = 1* | Non credit |
| 8 | Total Credits | 13 + 8 = 21 | |

SEMESTER IV

| Course No. | Course Title | Credits (T+P=T) | Page No. |
|------------|---------------------------------------|------------------|------------|
| FE 401 | Electronics and Instrumentation | 1 + 1 = 2 | 22 |
| FS 401 | Food Product Development | 1 + 1 = 2 | 28 |
| FT 401 | Cereal, Legume and Oilseed Processing | 3 + 1 = 4 | 33 |
| FT 402 | Milk and Milk Product Processing | 2 + 1 = 3 | 34 |
| HN 401 | Nutritional Assessment | 1 + 1 = 2 | 39 |
| HN 402 | Maternal and Child Nutrition | 2 + 1 = 3 | 40 |
| HN 403 | Public Health Nutrition | 2 + 1 = 3 | 41 |
| DT 401 | Diet Therapy | 1 + 1 = 2 | 44 |
| NSS 401 | NSS / NCC / Sports | 0 + 1 = 1* | Non credit |
| 8 | Total Credits | 13+8 = 21 | |

SEMESTER V

| Course No. | Course Title | Credits (T+P=T) | Page No. |
|------------|--|--------------------|----------|
| BS 501 | Entrepreneurship Development | 1 + 1 = 2 | 14 |
| FS 501 | Convenience and Health Food | 1 + 1 = 2 | 29 |
| FS 502 | Food Analysis & Quality assurance | 1 + 2 = 3 | 30 |
| FT 501 | Bakery and Confectionary Technology | 1 + 1 = 2 | 35 |
| FT 502 | Fruit and Vegetable Processing | 2 + 1 = 3 | 36 |
| HN 501 | Sports and Geriatric Nutrition | 2 + 1 = 3 | 42 |
| DT 501 | Therapeutic Nutrition | 2 + 1 = 3 | 45 |
| DT 502 | Hospital Dietetics and Patient Counselling | 1 + 1 = 2 | 46 |
| 8 | Total Credits | 11 + 9 = 20 | |

SEMESTER VI

| Course No. | Course Title | Credits (T+P=T) | Page No. |
|------------|---|--------------------|----------|
| TP 601 | Training and Project Report Areas of Training: Food Industry / Dairy Industry/Nutritionist or Dietician at Hospital, Health Club, Resort, Gym or such other places/ Food and/or Nutrition Organization, Institutes etc. / Food manufacturing Units / Nutraceuticals, Functional Food, Product Development Industry/ICDS, Public Health Departments, Food & Drug Control Departments etc. Other Related Industries, Organizations, Institutes etc. | 0 + 20 = 20 | 47 |
| 1 | Total Credits | 0 + 20 = 20 | |

SEMESTER WISE DISTRIBUTION OF CREDIT LOAD

| No. | Semester | No. of Subjects | Credits |
|-----|--------------|-----------------|--------------|
| 1 | Semester I | 8 | 12 + 08 = 20 |
| 2 | Semester II | 8 | 14 + 08 = 22 |
| 3 | Semester III | 8 | 13 + 08 = 21 |
| 4 | Semester IV | 8 | 13 + 08 = 21 |
| 5 | Semester V | 8 | 11 + 09 = 20 |
| 6 | Semester VI | 1 | 00 + 20 = 20 |

Syllabus of Polytechnic Programme of Food Technology and Nutrition

Objectives of Programme

- To conduct academic program leading to Diploma in Food Technology and Nutrition to develop human resources in the respective field.
- To carry out extension activities in the above areas keeping the liaison with the different agencies for effective training and transfer of technologies.
- To carry out basic research to support education and extension activities.
- To develop a perspective for multi disciplinary experience.

Program Outcome (PO)

1. Develop knowledge and understanding of the academic field of study as a whole and its applications, and links to related disciplinary areas/subjects of study; including various activities in the area of food technology, food processing, food preservation, food science, food quality assurance, human nutrition and dietetics.
2. Develop knowledge that creates different types of professionals related to the subject area of food technology, food science, human nutrition and dietetics, teaching and government and public service.
3. Develop skills in areas related to food science and technology, foods and nutrition and dietetics.
4. Develop self-employment and to get higher education in the respective fields.

Program Specific Outcome (PSO)

1. Develop the basic knowledge and concepts that are required for food processing, nutrition and dietetics sectors.
2. Expose students to higher education with tools/techniques to carry out various activities in food technology and nutrition domain.
3. Aware the students for use of technologies and instruments in the field of food technology, food engineering and nutrition and dietetics.
4. Develop basic skills in the rea of food science and technology, food engineering, nutrition and dietetics.
5. Develop student for successful academic and industrial carrier in the food processing, as well as nutrition and dietetics.
6. To impart knowledge of professional and ethical responsibilities toward the society.

Mapping between POs and PSOs

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|-----|------|------|------|------|------|------|
| PO1 | | | | | | |
| PO2 | | | | | | |
| PO3 | | | | | | |
| PO4 | | | | | | |

PO = Program outcome with PSO = Program Specific outcome

Semester I

Basic Chemistry (BS 101)

| | | | | | | | |
|-------------------------------------|--|------|------|------|------|------|------|
| Course code | BS 101 | | | | | | |
| Course title | Basic Chemistry | | | | | | |
| Course credit | 2 (1+1) | | | | | | |
| Teaching per week | 3 h | | | | | | |
| Course objectives | 1. Understand principle of chemistry and their application in human nutrition and food processing. 2. To acquaint students with application of basic knowledge of chemical ingredients and various organic products. | | | | | | |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> Basic concept of chemistry : Importance, units, element, compound and mixture, states of matters, structure of atom, atomic weight, molecules, molecular weight, equivalent weight, valency, symbol, chemical formulas and equation. Physical and chemical changes : Types of chemical reactions, factors effecting chemical reactions. Acid and Base : Acid – definition, strength, properties and useful acids; base – definition, strong and weak base, properties and useful base; pH scale – explanation, measurement, formula, importance of pH scale. Solution : Types, methods of preparing standard solution. Specific gravity, melting point, boiling point, crystallization etc. Organic chemistry : Sources of organic chemicals, classification of organic compounds and their formula, functional groups and homologues series. Environmental studies : Introduction, nature of environment and its problems - environmental degradation, greenhouse effect, acid rain, ozone depletion etc; public awareness. <p>Practical :</p> <ol style="list-style-type: none"> Acidity and alkalimeter titration. Determination of pH of the given solutions – baking sods, vinegar, milk, tomato juice, water etc. Measuring boiling point, melting point, specific gravity etc. Detection of elements in organic compounds like carbon, hydrogen, nitrogen, sulphur, phosphorus etc. Identification of functional groups like aldehyde, ketone, carboxylic acid, ester, alcohol, phenol, amines, nitro groups etc. Detection of carbohydrate, amino acids, proteins etc. Preparation of standard solutions. | | | | | | |
| References : | <ol style="list-style-type: none"> Soni PL (1984) : Fundamental Chemistry, Sultan Chand and Sons, New Delhi. Jacob MMS (1979) : Textbook of Applied Chemistry, Bhal BS (1964) : Elementary Organic Chemistry, S. Chand and Co., New Delhi. | | | | | | |
| Course outcomes (CO) | <p>CO1 : Aware about chemistry and its application in human nutrition and in food industry</p> <p>CO2 : Develop skills of basic analytical methods for food analysis used in food industries</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |

Basic Physics (BS 102)

| | | | | | | | |
|-------------------------------------|--|------|------|------|------|------|------|
| Course code | BS 102 | | | | | | |
| Course title | Basic Physics | | | | | | |
| Course credit | 3 (2+1) | | | | | | |
| Teaching per week | 4 h | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. To provide basic knowledge related to physics. 2. Acquaint with principles of physics and their application in different food processing and other instruments. | | | | | | |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Introduction to properties of matter, solid and gases. 2. Measurements and systems of units. 3. Work, energy and power. 4. Simple machine, a brief introduction to mechanical advantages and efficiency -Liver, scissors, holding tongs, nut cracker, rollers and greeters, eggbeaters. 5. Screw and pulleys, crock openers, onion cutter, egg beater etc. 6. Forces : Centripetal and centrifugal forces, spin dryer, gravitational forces and its advantages and utilization in food science etc. 7. Friction : Advantages and disadvantages, concept of ball bearing, vacuum cleaner etc. 8. Light : Introduction to light, properties of light, velocity of light, theories of light – quantum, wavelength, colour – sources of colour, physical properties of material, responses of eye colour, simple mirror and lens. 9. renewable and non-renewable energy sources : Resources, classification, destruction, conservation of energy, problems of energy. <p>Practical :</p> <ol style="list-style-type: none"> 1. To find out refractive index of the glass. 2. To find out focal length of a concave mirror. 3. To find out the focal length of the convex lens. 4. Utilization of various laws of the physics in food science. | | | | | | |
| References : | 1. Bhings RH and Sharma GM (1996) : Practical Physics, Pragati Prakashan, Bombay. | | | | | | |
| Course outcomes (CO) | CO1 : Aware about physics and its application in human nutrition and in food industry CO2 : Develop skills of basic calculative methods for food analysis used in food industries | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |

Environmental Science and Disaster Management (BS 103)

| | |
|--------------------------|---|
| Course code | BS 103 |
| Course title | Environmental Science and Disaster Management |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | 1. To study the environment, ecology and ecosystem and impact of technology on environmental degradation. |

| | |
|------------------------------|--|
| | <p>2. To study population and natural resources.</p> <p>3. To study food processing industry waste and its management: global warming and green house effects</p> <p>4. To learn about the natural and manmade disasters along with their basic management practices.</p> |
| <p>Course content</p> | <p>Theory :</p> <ol style="list-style-type: none"> 1. Scope and importance. 2. Natural Resources: <ol style="list-style-type: none"> a. Renewable and non-renewable resources. Natural resources and associated problems. b. Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. c. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. d. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. e. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. f. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies. g. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. 3. Ecosystems: Concept, Structure, function, Producers, consumers, decomposers, Energy flow, ecological succession, food chains, food webs, ecological pyramids. Introduction, types, characteristic features, structure and function of the forest, grassland, desert and aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). 4. Biodiversity and its conservation:- Introduction, definition, genetic, species & ecosystem diversity and bio-geographical classification of India. <ol style="list-style-type: none"> a. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega-diversity nation. Hot-spots of biodiversity. b. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. c. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. 5. Environmental Pollution: definition, cause, effects and control measures of a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards. 6. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. 7. Social Issues and the Environment from Unsustainable to Sustainable development, Urban problems related to energy. 8. Water conservation, rain water harvesting, watershed management. 9. Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. dies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness. 10. Human Population and the Environment: population growth, variation among nations, population explosion, Family Welfare Programme. Environment and |

| | <p>human health: Human Rights, Value Education, HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.</p> <ol style="list-style-type: none"> 11. Natural Disasters and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion. 12. Man Made Disasters-Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents. 13. Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community-based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations. <p>Practical :</p> <ol style="list-style-type: none"> 1. Case Studies and Field work. 2. Visit to a local area to document environmental assets river/forest/grassland/hill/mountain. 3. Visit to a local polluted site-Urban/ Rural/ Industrial/ Agricultural. 4. Study of common plants, insects, birds and study of simple ecosystems-pond, river, hill slopes, etc. 5. Expected impact of climate change on agricultural production and water resources, Mitigation Strategies, Economics of climate change. 6. Disaster Management introduction, Natural and Manmade Disaster Studies, Informatics for Disaster Management, Quantitative Techniques for Disaster Management 7. Environmental Impact Assessment (EIA) and Disaster Management Disaster Management Policy Environmental Modelling. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|--|------|------|------|------|------|------|------|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|
| References : | <ol style="list-style-type: none"> 1. Text Book of Environmental Studies for Undergraduate Courses by Bharucha Erach. 2005. University Grants Commission, University Press, Hyderabad 2. Introduction to Environment Science by Sharma J P. 2003. Lakshmi Publications. 3. Principles of Environmental Studies by Chary Manohar and Jaya Ram Reddy. 2004. BS Publishers, Hyderabad. 4. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Course outcomes (CO) | <p>CO1 : Understand importance of environment, ecology and ecosystems</p> <p>CO2 : Learn the impact of population growth on environment and precious use of natural resources and renewable energy.</p> <p>CO3 : Familiarization with various types of environmental pollution and their prevention</p> <p>CO4 : Learn the food processing industry waste and its basic management practices and also about global warming and green houses gases effects</p> <p>CO5 : Understand various types of disasters and their management</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mapping between COs and PSOs | <table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <td>CO4</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <td>CO5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table> | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | CO1 | | | | | | | CO2 | | | | | | | CO3 | | | | | | | CO4 | | | | | | | CO5 | | | | | | |
| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Human Anatomy and Physiology (BS 104)

| | | | | | | | |
|-------------------------------------|---|------|------|------|------|------|------|
| Course code | BS 104 | | | | | | |
| Course title | Human Anatomy and Physiology | | | | | | |
| Course credit | 3 (1+2) | | | | | | |
| Teaching per week | 5 h | | | | | | |
| Course objectives | 1. To understand the structure of organs of the body and their functions. 2. To understand the different systems of the body and their functions with special reference to digestion, absorption, transport and uptake of nutrients and elimination of waste products. | | | | | | |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Structure : Plant and animal cell. 2. Digestive system : Brief study of anatomical organization of the digestive tract; process of digestion, absorption and assimilation of food. 3. Circulatory system : Heart- structure and function, blood vessels and their function, composition and functions of blood, blood coagulation, blood groupings. 4. Respiratory systems : Basic anatomy of respiratory system and process of respiration. 5. Excretory system: The excretory organs – structure and their functions. 6. Reproductive system : Anatomy of the male and female reproductive organs – menstrual cycle, conception and contraception, secretion of milk. <p>Practical :</p> <ol style="list-style-type: none"> 1. Estimation of haemoglobin. 2. Determination of blood group. 3. Haematocrit and sedimentation rate. 4. Preparation of blood slide. 5. Identification and counting of blood cells. 6. Measurement of blood pressure. 7. Estimation of normal constituents of urine. | | | | | | |
| References : | <ol style="list-style-type: none"> 1. Wilson JW and Kathben (1987) : Anatomy and Physiology in Health and Illness, Churchill Lenigstone, Edinburg. 2. Derasari HR and Gandhi TP (1975) : Elements of Human Anatomy, Physiology and Health Education, M/S. BS Shah Publishers, Ahmedabad. 3. Pearce E (1993) : Anatomy and Physiology for Nurses, Jaypee Brothers, New Delhi. 4. Menaught ANNB and Callander R (1987) : Illustrated Physiology, BI Churchil Living Stone Pvt. Ltd., New Delhi. 5. Chatterijee CC (1987) : Human Physiology, Medical Allied Agency, Calcutta. | | | | | | |
| Course outcomes (CO) | <p>CO1 : Aware about the structure of organs and their functions</p> <p>CO2 : Aware about the metabolic process of nutrients</p> <p>CO3 : Develop skill of blood and urine tests.</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |

Language and Communication skills (BS 105)

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|-------------------------------------|--|------|------|------|------|------|------|
| Course code | BS 105 | | | | | | |
| Course title | Language and Communication skills | | | | | | |
| Course credit | 2 (2+0) | | | | | | |
| Teaching per week | 2 h | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. Understand the English sentence formation. 2. Acquire knowledge regarding English vocabulary. 3. Understand the importance of grammar in the English. | | | | | | |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Importance of language and communication skills in the engineering profession. 2. Development of vocabulary, Vocabulary building tasks. 3. Reference skills: Dictionary, thesaurus, indexing, contents, glossary. 4. Concept of register. 5. Proper use of nouns and pronouns. 6. Proper use of adjectives and adverbs. 7. Proper use of phrases and clauses. 8. Basic sentence patterns in English: Agreement between subject and verb; Some basic rules of composition. 9. Spoken and conversational English: Main features, agreement, disagreement, likes, dislikes and enquiries. 10. Debate and discussion. 11. Note-taking and note-making. 12. Development of paragraphs; Cohesion, coherence and style <p>Practical :</p> <ol style="list-style-type: none"> 1. Tenses. 2. Voice-change. 3. Direct/indirect narration. 4. Prepositions and determiners. 5. Word-formation with parts of speech. 6. Types of sentences and Composition. 7. Elementary knowledge of English sound with word-stress, intonation pattern. 8. Comprehension. 9. Letter and application writing. 10. Précis and Report writing. | | | | | | |
| References : | <ol style="list-style-type: none"> 1. Alice Oshima and Ann Hogue. 1998. Writing Academic English. Addison Wesley Longman, White Plains, NY, USA. 2. N. Krishnaswamy and T Sriraman. 1995. Current English for Colleges. Macmillan India Ltd., Chennai | | | | | | |
| Course outcomes (CO) | <p>CO1 : Respond to the listening content</p> <p>CO2 : Read and comprehend english texts accutately</p> <p>CO3 : Understand sentence structures in English language</p> <p>CO4 : Get familiarized with English vocabulary and phrases</p> <p>CO5 : Write and speak correctly in formal and informal contexts</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |
| | CO4 | | | | | | |
| | CO5 | | | | | | |

Health, Hygiene and Sanitation (BS 106)

| | |
|--------------------------|--|
| Course code | BS 106 |
| Course title | Health, Hygiene and Sanitation |
| Course credit | 2 (1+1) |
| Teaching per week | 3 h |
| Course objectives | <ol style="list-style-type: none"> 1. Develop correct habits of personal and environmental hygiene. 2. Learn safe handling of food and ensure complete safety of raw and processed foods. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Concept, significance and interrelationship of hygiene, sanitation and cleanliness : Their application to everyday life. 2. Personal hygiene: Care of hands, head, hair, skin, hands, feet, teeth, use of cosmetics and jewellery, good health characteristics, cultivation of hygienic habits to promote health, factor effecting the personal health. 3. Safe handling of food : Personal hygiene including uniform, medical check up, good food handling habits & practices and training & awareness, care while working or handling food. 4. Care of premises and surroundings and equipments : Floors and walls, table tops, floors etc.; good ventilation and lighting, care of dark corners, crevices and cracks; garbage disposal - collection storage and proper disposal from the premises including effluents. 5. Care for equipments and machinery. 6. Care of receipt, storage, transportation, and selling : Storage of food - technique of correct storage, temperatures of different commodities to prevent bacterial contamination of milk, butter, cream, cheese, fruit juices. 7. Control and eradication of flies, cockroaches, rodents and other pests – fumigation technique. 8. Notification, quarantine, segregation, disinfections : Definition of disinfectant, sanitation, antiseptic and germicides; common disinfectants use in case of working surfaces, plant, equipments; dish washing, hand washing etc. and sterilization of plant equipments. 9. Legal administration and quality control : Laws relating to food hygiene, municipal health services. <p>Practical :</p> <ol style="list-style-type: none"> 1. Safe handling of food 2. Cleaning of Floors and walls, table tops, floors etc., garbage disposal - collection storage and proper disposal from the premises including effluents. 3. Cleaning of equipments and machinery. 4. Technique of correct storage, temperatures of different commodities. 5. Control and eradication of flies, cockroaches, rodents and other pests. |
| References : | <ol style="list-style-type: none"> 1. Hobbs BC and Gilbert (1970) : Food Poisoning and Food Hygiene, Edward Arnold, London. 2. Rack BG : Hygiene in Food Manufacturing and Handling, Food Trade Press, London. 3. Longree K and Blaker GG (1971) : Sanitary Techniques in Food Service, John Wiley, New York. 4. Longree K (1967) : Quality Food Sanitation, 2nd Edition, Inter Science Pub., John Wiley & Sons, New York |

| | | | | | | | |
|-------------------------------------|---|------|------|------|------|------|------|
| Course outcomes (CO) | CO1: Aware regarding importance of personal and environmental hygiene CO2: Able to handle raw and processed food with highest level of safety CO3: Familiar with various techniques of maintaining overall hygienic surroundings | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |

Applied Mathematics (FE 101)

| | |
|--------------------------|---|
| Course code | FE 101 |
| Course title | Applied Mathematics |
| Course credit | 2 (1+1) |
| Teaching per week | 3 h |
| Course objectives | <ol style="list-style-type: none"> To provide basic knowledge related to mathematics. Acquaint with principles of mathematics and their application in different food processing and other instruments. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> Algebra : Permutations and Combinations, Value of n_{pr} and n_{Cr} , its properties and simple problems Binomial theorem (without proof) for positive integral index (expansion and general term); Binomial theorem for any index (expansion only) first and second binomial approximation with application to engineering problems Partial fractions (linear factors, repeated linear factors, non reducible quadratic factors) Determinants and Matrices - expansion of determinants (upto third order) using sarrus rule, expansion method and pivotal's condensation method. Properties of determinants, solution of equations (upto 3 unknowns) by Cramer's rule. Definition of matrix, addition, subtraction and multiplication of matrices (upto third order). Inverse of a matrix by adjoint method and elementary row transformations. Solution of equations (up to 3 unknowns) by Matrix method Logarithm: general properties of logarithms, calculations of engineering problems using log tables Trigonometry : Addition and subtraction formulae, product formulae and their application in engineering problems. Transformation from product to sum or difference of two angles or vice versa, multiple and submultiple angles Conditional identities, solution of triangles (excluding ambiguous cases). Vectors : Definition of vector and scalar quantities. Addition and subtraction of vectors. Dot product and cross product of two vectors. Thumb rule. Angle between two vectors, application of dot and cross product in engineering problems, scalar triple product and vector triple product Complex Numbers Definition, Real and Imaginary parts of a complex number, Polar and Cartesian representation of a complex number and conversion from one form to the other, conjugate of a complex number, modulus and argument of a complex number, addition, subtraction, multiplication and division of a complex number. |

| | <p>5. Statistics and Probability Evaluation of standard deviation and process capabilities. Rank, Rank correlation, probability: definition and laws on probability, concept of random variable, probability distribution (Binomial, Poisson and Normal) and their applications. Drawing control charts for average (X) and range (R)</p> <p>Practical :</p> <p>1. Problems related to theory</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|---|------|------|------|------|------|------|------|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|
| References : | <ol style="list-style-type: none"> 1. Applied Mathematics Vol. I by SS Sabharwal and Others by Eagle Prakashan, Jalandhar 2. Applied Mathematics Vol. II by SS Sabharwal and Others by Eagle, Prakashan, Jalandhar 3. Engineering Mathematics Vol. I by Ishan Publishing House 4. Engineering Mathematics Vol. I by S Kohli and Others; IPH, Jalandhar 5. Engineering Mathematics by Dass Gupta 6. Advanced Engineering Mathematics by AB Mathur and VP Jagi; Khanna, Publishers, Delhi 7. Higher Engineering Mathematics by BS Grewal; Khanna Publishers, Delhi Engineering Mathematics by C Dass Chawla; Asian Publishers, New Delhi | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Course outcomes (CO) | <p>CO1 : To gain the knowledge of partial differentiation and to solve that applications.</p> <p>CO2 : Compute the partial and total derivatives and maxima and minima of multivariable functions</p> <p>CO3 : To gain the knowledge of vector and scalar field and learn the application of multivariate calculus.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mapping between COs and PSOs | <table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> </tr> </thead> <tbody> <tr> <th>CO1</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CO2</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CO3</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | CO1 | | | | | | | CO2 | | | | | | | CO3 | | | | | | |
| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | | | | | | | | | | | | | | | | | | | | | | | |
| CO1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Basic Nutrition (HN 101)

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|--------------------------|--|
| Course code | HN 101 |
| Course title | Basic Nutrition |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | <ol style="list-style-type: none"> 1. To understand the functions of food and the role of various nutrients, their requirements, effect of deficiency and excess. 2. To familiarise students with different methods of cooking, their advantages and disadvantages. 3. To gain knowledge of improving nutritional quality of food. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Introduction to nutrition - Concept and definitions commonly used in the field of nutrition, basic terminologies used in food preparation 2. Food guide pyramid : Basic five food groups, how to use food guide pyramid (according to R.D.A.) and Concept of balance diet 3. Interrelationship between nutrition & health : - Functions of food, Visible symptoms of good health, 4. Use of food in body - Digestion, Absorption, transport & utilization |

| | <ol style="list-style-type: none"> 5. Carbohydrates : Functions, classification, food sources, and requirement 6. Fats & oils : Functions, classification, food sources, and requirement 7. Proteins - Functions, classification, food sources, and requirement 8. Water - as a nutrient, function, sources, requirement, water balance & effect of deficiency. 9. Minerals - Functions, classification, food sources, and requirement 10. Vitamins: Functions, classification, food sources, and requirement. <p>Practical :</p> <ol style="list-style-type: none"> 1. Use and care of kitchen equipments. 2. Controlling techniques : Weights and measures - standard and household measures for raw and cooked foods, recipe and evaluation of the product. 3. Food preparation and classifying recipes as good, moderate and poor source of specific nutrients. 4. Amount of ingredients to be used in standard recipe vis-à-vis, portion size : <ol style="list-style-type: none"> (i) Beverages: Tea, coffee, cocoa, fruit juice, milk and milk shakes. (ii) Cereal and flour mixtures: Basic preparations - boiled rice & rice <i>pulo</i>; <i>chappati, puri, paratha</i> ; sandwiches ; pastas. (iii) Pulses and legumes : Using whole, dehsked and sprouted. (iv) Nuts and oilseeds : <i>Chikki, ladoo</i>. (v) Vegetables : Simple salad, dry vegetables, curries. (vi) Fruits : Fruit preparations using fresh fruits - jam, squash, fruit salad; fruit preparations using dried fruits. (vii) Milk : Porridge – <i>dalia</i>; curd, <i>panneer</i> and their commonly made preparations - butter milk, <i>lassi, shrikhand</i>; milk based simple desserts and puddings - custards, <i>kheer</i>, ice-cream. (viii) Meat – cuts of meet : meat preparations, poultry, fish. (ix) Egg : Hard and soft boiled, poached, scrambled, fried, omelette, eggnog. (x) Soups : Basic, clear and cream soups. (xi) Snacks : <i>Pakorras</i>, cheese toast, <i>upma, pohe</i>. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|---|------|------|------|------|------|------|------|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|
| References : | <ol style="list-style-type: none"> 1. Educational Planning Group (1991) : Food and Nutrition - A Textbook of Home Science for Senior Students, 3rd Edition, Arya Publishing House, New Delhi. 2. Swaminathan M (1983) : Human Nutrition and Diet, 1st Edition, The Bangalore Printing and Publishing Co. Ltd. 3. Swaminathan (1977) : Handbook of Foods and Nutrition, 1st Edition, Ganesh & Co. Ltd., Madras. 4. Rajalaksmi R (1978) : Applied Nutrition, 1st Edition. 5. Mudambi SR and Rajgopaln V (1982) : Fundamentals of Foods and Nutrition, 3rd Edition, New Age International Ltd. Publishers. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Course outcomes (CO) | <p>CO1: Able to understand basic functions of food and various nutrients, Over nutrition and under nutrition</p> <p>CO2: Knowledge of various cooking methods, their advantages and disadvantages.</p> <p>CO3: Competent to know the basic concepts of planning balanced meal.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mapping between COs and PSOs | <table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> </tr> </thead> <tbody> <tr> <th>CO1</th> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CO2</th> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CO3</th> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> </tr> </tbody> </table> | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | CO1 | | | | | | | CO2 | | | | | | | CO3 | | | | | | |
| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | | | | | | | | | | | | | | | | | | | | | | | |
| CO1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

NSS / NCC / Sports (NSS 101)

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|-------------------------------------|--|------|------|------|------|------|------|
| Course code | NSS 101 | | | | | | |
| Course title | NSS / NCC / Sports | | | | | | |
| Course credit | (0+1)* | | | | | | |
| Teaching per week | * Non credit course | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. Understand the community in which they work 2. Understand themselves in relation to their community 3. Identify the needs and problems of the community and involve them in problem solving 4. Develop among themselves a sense of social and civic responsibility 5. Utilise their knowledge in funding practical solutions to individual and community problems 6. Develop competence required for group living and sharing of responsibilities. 7. Gain skills in mobilizing community participation 8. Acquire leadership qualities and democratic attitudes 9. Develop capacity to meet emergencies and natural disasters and practice national integration and social harmony | | | | | | |
| Course outcomes (CO) | <p>CO1 : Improve the quality of educated manpower by fostering social responsibility.</p> <p>CO2 : Raising society to a higher material and moral level by preparing students for final dedication in the service of nation.</p> <p>CO3 : Introduce urban students to rural life by living in contact with the community in whose mist their institution is located.</p> <p>CO4 : Making campus relevant to the needs of the community</p> <p>CO5 : Involvement in the tasks of national development</p> <p>CO6: Better understanding and appreciation of the problems of the society</p> <p>CO7 : Encourage community participation</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |
| | CO4 | | | | | | |
| | CO5 | | | | | | |
| | CO6 | | | | | | |
| | CO7 | | | | | | |

Semester II

Basic Bio-chemistry (BS 201)

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|--------------------------|--|
| Course code | BS 201 |
| Course title | Basic Bio-chemistry |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | <ol style="list-style-type: none">1. Develop an understanding of the principles of biochemistry as applicable to food and human nutrition.2. Obtain an insight into the chemistry of major nutrients and physiologically important compound.3. Understand the biological processes and systems as applicable to human nutrition |
| Course content | <p>Theory :</p> <ol style="list-style-type: none">1. Carbohydrates : Introduction, Chemistry of carbohydrates, Classification, structure and properties2. Protein : Introduction, Chemistry of protein, classification, structure and properties, amino acids – classification, Structure and classification of nucleic acid3. Lipid : Introduction, Chemistry of lipid, classification, and properties, fatty acids, Neutral fat, phospholipids, Steroids4. Digestion, Absorption and Transport of Carbohydrates, Proteins and Lipids5. Vitamins & Minerals: Introduction and Classification vitamins, Introduction and classification of minerals6. Enzymes: Introduction, Introduction to enzyme, co-enzyme and Iso-enzymes, Nomenclature of and classification of enzymes, mechanism of action, factors affecting enzyme activities7. Hormones : Endocrine system, Regulation of : Endocrine system, Mechanism of Hormone Action, Biochemical role of Hormone <p>Practical :</p> <ol style="list-style-type: none">1. Introduction to colourimeter.2. Estimation of pH by pH meter.3. Estimation of glucose by DNS method.4. Qualitative analysis carbohydrates.5. Estimation of serum cholesterol.6. Determination of acid value.7. Determination of saponification value.8. Estimation of serum protein by biuret method. |
| References : | <ol style="list-style-type: none">1. West ES and Tode WR, Mson HS and Vanbruggen JT (1974) : Textbook of Biochemistry, 4th Edition, Amerind Publishing Co. Pvt. Ltd.2. White A, Handlar P, Smith EL, Stelten DW (1959) : Principles of Bio-Chemistry, 2nd Edition, McGraw Hill Book Co.3. Murray RK, Granner DK, Mayer PA and Rodwell VW (1993) : Harper's Bio-Chemistry, 23rd Edition, Lange Medical Book.4. Lehninger AL, Nelson DL and Cox MM (1993) : Principles of Bio-Chemistry, 2nd Edition, BS Publishers and Distributers.5. Devlin TM (1986) : Textbook of Bio-Chemistry With Clinical Corrections, 2nd Edition, John Wiley & Sons.6. Stryer L (1995) : Biochemistry, Freeman WH & Co.7. Devlin TM (1986) : Textbook of Bio-Chemistry With Clinical Corrections, 2nd Edition, John Wiley & Sons. |

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|-------------------------------------|---|------|------|------|------|------|------|
| Course outcomes (CO) | CO1: Understanding biochemistry of various nutrients and their effect on human body CO2: Awareness of chemistry of various biochemicals CO3: Knowledge of various biological processes that are continuously going on human body to sustain life | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |

Computer Application (BS 202)

| | | | | | | | |
|-------------------------------------|--|------|------|------|------|------|------|
| Course code | BS 202 | | | | | | |
| Course title | Computer Application | | | | | | |
| Course credit | 2 (1+1) | | | | | | |
| Teaching per week | 3 h | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. Understand the basic concept of the computer. 2. Acquaint with computer and its part. 3. Familiar with operating the computer with MS Office. | | | | | | |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Computer fundamentals; hardware and software; input, output and storage devices. 2. Operating System (Microsoft Windows) 3. Introduction to MS Office - Word, Excel, Power Point. 4. Brief History of Internet. 5. Internet applications. 6. Basics in Web Design, Basic principles in developing a web designing, Planning process, Five Golden rules of web designing, creation of a web site using HTML/ DREAM WEAVER <p>Practical :</p> <ol style="list-style-type: none"> 1. MS Word. 2. MS Excel. 3. MS Power Point. 4. Internet applications: 5. Web Browsing, 6. Creation and operation of Email account. 7. Basic of HTML. 8. Development of Web pages using HTML tags/ Working with DREAM WEAVER | | | | | | |
| References : | <ol style="list-style-type: none"> 1. Computer Fundamentals by P.K. Sinha 2. Office 2013 Quick Start Guides by Microsoft 3. Developing web design latest edition by Jennifer Niederst Robbins. 4. Web Design with HTML5 by Frainand Ben. Responsive 5. Internet Applications in Product Design and Manufacturing by George Q. Huang, K.L. Mak. ISBN:3540434658 | | | | | | |
| Course outcomes (CO) | CO1 : Understand fundamentals of computer. CO2 : Understand the working principle of a computer. CO3 : To understand web browsing | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |

Engineering Mathematics I (FE 201)

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|-------------------------------------|--|------|------|------|------|------|------|
| Course code | FE 201 | | | | | | |
| Course title | Engineering Mathematics I | | | | | | |
| Course credit | 2 (2+0) | | | | | | |
| Teaching per week | 2 h | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. To provide knowledge related to engineering mathematics. 2. Acquaint with principles of mathematics and their application in different food processing and other instruments. | | | | | | |
| Course content | Theory: <ol style="list-style-type: none"> 1. Differential Calculus: Indeterminate forms, curvature, Taylor's Series expansion, Asymptotes 2. Partial differentiation: Euler's theorem, Taylor's series for Function of two variables, Maxima 3. Minima for Function of two Variables, Lagrange's multiplier 4. Integral Calculus: Application of intervals, Double and triple integrals, Gamma and Beta functions 5. Infinite series: Convergence and Divergence of Series, tests of Convergence Alternating Series, Absolutely and conditionally Convergent Series, Uniform Convergence. | | | | | | |
| References : | <ol style="list-style-type: none"> 1. Differential Calculus by Narayan Shanti. 2004. S. Chand and Co. Ltd. New Delhi. 2. Integral Calculus by Narayan Shanti. 2004. S. Chand and Co. Ltd. New Delhi 3. Higher Engineering Mathematics by Grewal B S. 2004. Khanna Publishers Delhi. 4. A Text Book of Vector by Narayan Shanti. 2004. S. Chand and Co. Ltd. New Delhi. | | | | | | |
| Course outcomes (CO) | CO1 : Determine the Taylor's series expansion of functions and learn their applications CO2 : Compute multiple integral and apply them to find areas and volume of geometrical shapes, mass and centre of gravity of plane laminas. CO3 : Compute the partial and total derivatives and maxima and minima of multivariable functions. CO4 : To gain the knowledge of partial differentiation and solve that applications. CO5 : To gain the knowledge of vector and scalar field and learn the application of multivariate calculus. | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |
| | CO4 | | | | | | |
| | CO5 | | | | | | |

Fluid Mechanics (FE 202)

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|----------------------|------------------------|
| Course code | FE 202 |
| Course title | Fluid Mechanics |
| Course credit | 3 (2+1) |

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|-------------------|---|
| Teaching per week | 4 h |
| Course objectives | <ol style="list-style-type: none"> 1. To familiarize with different aspects of fluid mechanics. 2. To gain knowledge of fluid properties, statics, fluid-flow concept, viscous effect of fluids. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Fluid Properties : Definitions of a fluid, continuum, properties of fluid density, specific weight, specific volume, specific gravity, bulk modulus of elasticity, vapour pressure, surface tension, capillary, viscosity, dynamic and kinematic viscosity. 2. Fluid statics : Pressure at a point, basic equation of fluid statics, units and scales of pressure measurements, forces on immersed plane and curved surface, buoyant force, stability of floating and submerged body. 3. Relative equilibrium, uniform linear acceleration of a liquid in horizontal and vertical direction. 4. Fluid-flow concepts and basic equations : Flow characteristics, definitions, concepts of system and control volume. Continuity equation. velocity potential and stream function, flow net, circulation vortex flow, Euler's equation of motion along a stream line, integration of Euler's equation of motion. Bernoulli equation, reversibility, irreversibility and losses. Application of energy equation to steady fluid flow situation. Orifice meter, venturimeter, nozzle meter, pitot tube, notches and weirs. Momentum equation orifice and mouthpiece, applications of linear momentum equation, moment of momentum equation. 5. Dimensional analysis and dynamic similitude : Dimensions and unit, dimensional homogeneity and dimensional less ratios. The Pi Theorem, discussion of dimensionless parameters, similitude, models studies. 6. Viscous effects : Fluid resistance : Laminar incompressible steady flow through circular tubes. Reynold's number. Velocity distribution in turbulent flow. Resistance to turbulent flow in closed and open conduits, steady incompressible flow through simple pipe systems. Steady uniform flow in open channels, transport phenomena, boundary layer concepts, boundary layer growth over a flat plate. Boundary layer thicknesses, drag on immersed bodies. 7. Compressible fluid flow : Perfect gas relations, fundamental equations, continuity, energy and momentum equation, speed of a sound wave, Mach number, propagation of sound wave, stagnation properties, shock waves. <p>Practical :</p> <ol style="list-style-type: none"> 1. Study of different types of pipes, pipe fittings and tools 2. Study of manometers and pressure gauges 3. Study of different types of valves used in pipe lines 4. Plotting flow rate versus pressure drop with U-tube manometer 5. Verification of Bernoulli's theorem 6. Calibration of Rota meter. 7. Determination of coefficient of friction in pipeline 8. Determination of minor head losses in fluid flow 9. Study of reciprocating pump 10. Study of centrifugal pump and determination of performance characteristics 11. Study of submersible pumps 12. Study of gear pumps 13. Study of positive displacement pump |
| References : | <ol style="list-style-type: none"> 1. Hydraulics and fluid mechanics (including hydraulic Machines) by Dr PN Modi and Dr SM Seth, Standard book house Delhi. 2. Engineering Fluid Mechanics by D. S. Kumar, S. K Kataria and sons, New Delhi. 3. Fluid Mechanics and Hydraulic Machines by Dr RK Bansal, Luxmi Publications New Delhi. 4. Fluid Mechanics by Dr Jagdishlal. Books Co. Pvt Ltd New Delhi. |

| | <p>5. Engineering Fluid Mechanics by K. L. Kumar, Eurassia publications (p) Ltd house New Delhi.</p> <p>6. Fluid Mechanics by Jagdish Lal, Published by Metropolitan Book Co.</p> <p>7. Fluid Mechanics, by Streeter V. L. and Wylie E. B. Published by McGraw Hill, SI Edition.</p> <p>8. Fluid Mechanics. by Jain A. K., Published by Khanna Publication</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|--|------|------|------|------|------|------|------|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|
| Course outcomes (CO) | <p>CO1 : To understand about the different pipes, pipes fitting and its uses in food industries.</p> <p>CO2 : To understand the properties of fluids.</p> <p>CO3 : To interpret the flow measurements and transportation of fluids.</p> <p>CO4 : To analyse the fluid kinetics and fluid dynamics.</p> <p>CO5 : To understand the uses and application of pumps in field of food technology.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mapping between COs and PSOs | <table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | CO1 | | | | | | | CO2 | | | | | | | CO3 | | | | | | | CO4 | | | | | | | CO5 | | | | | | |
| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Food Chemistry (FS 201)

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|--------------------------|--|
| Course code | FS 201 |
| Course title | Food Chemistry |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | <ol style="list-style-type: none"> 1. To understand the chemistry of food and food system. 2. Theoretical aspects in increasing food quality. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Introduction to food chemistry. 2. Physical functions of food : Solid and amorphous foods, liquids and role in food products, gases and role in food products, true solutions, dispersions and suspensions, sols, gels, foams and emulsions. 3. Moisture in foods : Hydrogen bond, bound and free water, water activity & food stability. 4. Carbohydrates : Characteristics and properties of mono, oligo and polysaccharides and their use in foods; chemical reactions in food – hydrolysis, thermal degradation, dehydration, caramelization, malliard reaction and their applications in food industries; other sweetening agents; changes on cooking and processing. 5. Proteins : Physical, chemical and functional properties, texturization, foaming, denaturation. 6. Lipid : Physical and chemical aspects, emulsion, role of fat and application in food preparation, deterioration of fats / oils – rancidity, role of lipids in flavour. 7. Minerals : Main elements and trace elements in different food. <p>Practical :</p> <ol style="list-style-type: none"> 1. Determination of moisture content in the food products. 2. Determination of ash (total and acid insoluble) content in the flour and food products. 3. Determination of protein content in food material. |

| | <ol style="list-style-type: none"> 4. Determination of Vitamin C content in food i.e. citrus fruit. 5. Determination of titratable acidity in food i.e. citrus fruit. 6. Effect of acid on coagulation of food like milk. 7. To determine gluten content of flour. 8. To study the effect of low and high temperature on the quality of food products. 9. Determination of total solids in food products like tomato ketchup, milk etc. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|--|------|------|------|------|------|------|------|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|
| References : | <ol style="list-style-type: none"> 1. Lillian Hoagt and Meyer (1987) : Food Chemistry, CBS Publishers & Distributors. 2. Shakuntala Manay (2000) : Food Facts & Principle, Wiley Eastern Co., New Delhi. 3. Srilakshmi (2001) : Food Science, 4th Edition, New Age International Pvt. Ltd. 4. Swaminathan M (1984) : Food Science, Chemistry and Experimental Foods : Bappco Ganesh and Co., Madras. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Course outcomes (CO) | <p>CO1 : Role of vitamins and minerals is well understood.</p> <p>CO2 : Knowledge gained about taste and flavor perception and their causatives.</p> <p>CO3 : Familiarization about natural and synthetic food colorants used in food</p> <p>CO4 : Utility of use of enzyme in food processing is elucidated along with knowledge of anti-nutritional factors.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mapping between COs and PSOs | <table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> </tr> </thead> <tbody> <tr> <th>CO1</th> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <th>CO2</th> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> </tr> <tr> <th>CO3</th> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <th>CO4</th> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table> | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | CO1 | | | | | | | CO2 | | | | | | | CO3 | | | | | | | CO4 | | | | | | |
| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| CO2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Food Science (FS 202)

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| Course code | FS 202 |
| Course title | Food Science |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | <ol style="list-style-type: none"> 1. To understand the major and minor food groups. 2. To know the composition and basic properties of food. |
| Course content | <p>Theory</p> <ol style="list-style-type: none"> 1. Cereals and millets : Structure, chemical composition, effect of heat and acid, functions of cereals and starch in cookery. 2. Legumes : Structure, chemical composition, storage, effect of heat , acid and alkali; factors affecting cooking of pulses, dals; role of pulses in cooking. 3. Nuts and oil seeds : Difference between nuts and oilseeds, commonly used nuts and oilseeds, structure, composition, role in cookery, effect of heat, acid and alkali. 4. Fats and oils : Types, composition, selection and storage, effect of heat and acid, functions in cookery, rancidity in fats. 5. Fruits and vegetables : Types, composition, availability, selection and purchase, storage, pigments, flavour components, change caused by the heat, acid and alkali. 6. Milk and milk products : Composition, classification, storage, spoilage, use, cost, role of milk products in cooking. 7. Egg : Structure, composition, grading of egg, selection and storage, spoilage, functions and changes during cooking. 8. Meat, poultry and fish : Kind, structure, composition, Selection and purchase, storage, use, cost, spoilage, pigments, factor effecting tenderness, post-mortem changes during cooking. |

| | <p>9. Sugars : Types, composition, manufacturing process, selection, storage and use, effect of heat and acid, functions in cookery.</p> <p>10. Condiments and spices : Types and use, importance in daily life.</p> <p>Practical :</p> <ol style="list-style-type: none"> 1. Cereal: Preparations showing dextrinization and gelatinization, functions of starch in cereals, gluten formation and factors affecting it, identification of the food grains. 2. Legumes, nuts and oils seeds: Ways of using – sprouting, fermentation and roasting. 3. Fruits and vegetable: Effect of temperature and pH. 4. Use of oils and fats in food eg. Frying, garnishing, seasoning. 5. Milk and milk products : Effect of heat, acid, alkali and enzymes - coagulation, fermentation by lactic acid, uses of milk and milk products in various preparations. 6. Egg: Preparations showing functions of egg (i.e. coagulation), various ways of using egg - thickening agent, emulsifying agent, coating agent, leavening agent. 7. Meat: Preparations involving various methods of cooking. 8. Sugars : Preparations showing functions of sugar in cookery - caramelization, milliard reaction, syrup. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|--|------|------|------|------|------|------|------|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|
| References : | <ol style="list-style-type: none"> 1. Paul PC and Palmer HH (1972) : Food Theory and Applications, Wiley, New York. Pyke Mangus (1970) : Food Science & Technology, Food & Nutrition Press, 3rd., Connecticut. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Course outcomes (CO) | <p>CO1 : Able to apply basic concepts of food groups in planning of recipes.</p> <p>CO2 : To plan and prepare different types of recipes based on food group properties.</p> <p>CO3 : Capable to know the basic principles and properties of food materials.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | | | | | | | | | | | | | | | | | | | | | | | |
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| CO2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

General and Food Microbiology (FS 203)

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| Course code | FS 203 |
| Course title | General and Food Microbiology |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | <ol style="list-style-type: none"> 1. To acquire knowledge regarding microorganisms. 2. To understand the importance of microorganisms and spoilage caused by them. 3. To understand the principles of various methods used in the prevention of microorganism in foods. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Introduction and Scope of microbiology : Define microorganisms and microbiology, Group of microorganisms, Classification of microorganisms, Applied area or scope of microbiology, Importance and significance of microbes in food science. 2. Microscopes and Microscopic techniques : Introduction to microscope and staining technique, Components of microscope, Types of microscope: Light and Electron microscope, Difference between light and electron microscope. |

| | <ol style="list-style-type: none"> 3. Food Spoilage : Definition, cause and types of food spoilage, Factors affecting the food spoilage: Intrinsic and extrinsic factors. 4. Food Hazard : Introduction to food hazard and its cause, Food borne infections, Food intoxication (poisoning). 5. Food Preservation : Brief idea about food spoilage and food hazard, Different techniques for food preservation. 6. Cultivation of microorganisms : Media for the growth of microorganisms, Nutritional requirements for the growth of microorganisms, Physical conditions for the growth of microorganisms, Brief idea about enumeration of microorganisms. <p>Practical :</p> <ol style="list-style-type: none"> 1. Demonstration of different parts of the microscope, their use and care of the microscope including oil immersion lens. 2. Microscopic examination of microbial cells. 3. Preparation of bacterial smears, simple staining and differential staining. 4. Preparation of common laboratory media for cultivation of bacteria, yeast and mould. 5. Isolation of bacteria by pour plate method (dilution), spread plate method and streak plate method. 6. Microbiological analysis of tap water, well water, pond and river water and testing efficiency of various water treatments. 7. Bacteriological examination of milk, cereals, flour and bread, sugar, spices, egg, meat and pickles. 8. Bacteriological examination of equipments used in the food preparation and services and in nail parings. 9. Standard plate count and coliform count for all of the above. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|---|------|------|------|------|------|------|------|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|
| References : | <ol style="list-style-type: none"> 1. Frazier WC and Westhoff DC (1988) : Food Microbiology, 4th Edition, McGraw Hill Publisher. 2. Jay James M (1986) : Modern Food Microbiology, 3rd Edition, Van Nostrand Reinhold Co., Inc. 3. Collins CH and Layne PM (1996) : Microbiological Methods, Buttersworth, London. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Course outcomes (CO) | <p>CO1 : Understand the significance of microbes associated to food and food products.</p> <p>CO2 : Understand about the various types of microbes associated with food spoilage and pathogenesis.</p> <p>CO3 : Understand and identify the role of microbes in food preservation.</p> <p>CO4 : Comprehend the various techniques for isolation and characterization of microbes.</p> <p>CO5 : Apply the learnt techniques to detect the pathogens associated with the foods to ensure food safety and quality.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Food Production and Culinary Science (FS 204)

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| Course code | FS 204 | | | | | | |
| Course title | Food Production and Culinary Science | | | | | | |
| Course credit | 3 (1+2) | | | | | | |
| Teaching per week | 5 h | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. To acquaint students with national, international, traditional cuisines. 2. To develop skill of food production. | | | | | | |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Introduction to cookery-Aims objectives of cooking food, methods of cooking food, types of cooking fuel. 2. Food preparation techniques-Characteristics of raw materials, flavourings, seasonings, masalas, spices & herbs used in food preparation (Indian and continental). 3. Preparation of stock and soups, Preparation of vegetables, egg preparation, sandwich and pasta preparation, Sauce- mother sauce with recipes, cooking of fish, rice, pulse, meat, chicken and pasta. 4. Indian cookery-Regional cooking styles: Punjab-characteristics, ingredients and equipment used, recipe of popular dish. Bengal-characteristics, ingredients and equipment used, recipe of popular dish. Goa- characteristics, ingredients and equipment used, recipe of popular dish. Kerala- characteristics, ingredients and equipment used, recipe of popular dish. Tamilnadu- characteristics, ingredients and equipment used, recipe of popular dish. Chinese cuisine- Regional styles, characteristics, ingredients and equipment used, recipe of popular dish. 5. Kitchen Management - Hierarchy, layout, kitchen equipments, portion budgetary control and forecasting. <p>Practical :</p> <ol style="list-style-type: none"> 1. Laboratory rules, abbreviations and conversations. 2. Introduction to equipments needed in various cooking procedures. 3. Introduction to pre-preparations of food items for cooking : Cutting, chopping, blending, grating, whipping etc. 4. Preparation of various dishes using different methods of cooking. 5. Preparation of various recipes of traditional cuisines. 6. Preparation of modern recipes. 7. Preparation of national cuisines : Northern region, southern region, western region, eastern region. 8. Preparation of international cuisine : Oriental cuisine – Chinese, Japans, Thai, Turkish, Arabic etc.; Continental cuisine – British, German, French, Spanish, Italian; South American cuisine – Mexican. | | | | | | |
| References : | 1. Tarla Dalal's Books on Preparations of Various Recipes. | | | | | | |
| Course outcomes (CO) | <p>CO1: Capable in using various cooking methods to develop national and international cuisines</p> <p>CO2: Capable of using various cooking apparatus effectively while preparing national and international dishes</p> <p>CO3: Able to develop and designing new food product</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |

NSS / NCC / Sports (NSS 201)

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|-------------------------------------|--|------|------|------|------|------|------|
| Course code | NSS 201 | | | | | | |
| Course title | NSS / NCC / Sports | | | | | | |
| Course credit | (0+1)* | | | | | | |
| Teaching per week | * Non credit course | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. Understand the community in which they work 2. Understand themselves in relation to their community 3. Identify the needs and problems of the community and involve them in problem solving 4. Develop among themselves a sense of social and civic responsibility 5. Utilise their knowledge in funding practical solutions to individual and community problems 6. Develop competence required for group living and sharing of responsibilities. 7. Gain skills in mobilizing community participation 8. Acquire leadership qualities and democratic attitudes 9. Develop capacity to meet emergencies and natural disasters and practice national integration and social harmony | | | | | | |
| Course outcomes (CO) | <p>CO1 : Improve the quality of educated manpower by fostering social responsibility.</p> <p>CO2 : Raising society to a higher material and moral level by preparing students for final dedication in the service of nation.</p> <p>CO3 : Introduce urban students to rural life by living in contact with the community in whose mist their institution is located.</p> <p>CO4 : Making campus relevant to the needs of the community</p> <p>CO5 : Involvement in the tasks of national development</p> <p>CO6: Better understanding and appreciation of the problems of the society</p> <p>CO7 : Encourage community participation</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |
| | CO4 | | | | | | |
| | CO5 | | | | | | |
| | CO6 | | | | | | |
| | CO7 | | | | | | |

Semester III

Engineering Mathematics II (FE 301)

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|-------------------------------------|--|------|------|------|------|------|------|
| Course code | FE 301 | | | | | | |
| Course title | Engineering Mathematics II | | | | | | |
| Course credit | 2 (2+0) | | | | | | |
| Teaching per week | 2 h | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. To provide knowledge related to engineering mathematics. 2. Acquaint with principles of mathematics and their application in different food processing and other instruments. | | | | | | |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Partial Derivatives: : Partial differentiation, total differentials and its application to errors and approximation, total derivatives, chain rule, Taylor's and Maclaurin's series for functions of two variables, Euler's theorem, maxima and minima, methods of Lagrange's multipliers. 2. Multiple Integrals : Double Integral, Evaluation, Change of order of integration, change to polar co-ordinates, evaluation of triple integral, multiple integral in cylindrical and spherical polar coordinates, application to finding area and volume. 3. Vector Calculus : Vector and scalar fields, vector differentiation, gradient, divergence, curl. Line, surface and volume integrals, Gauss, Stoke's and Green's theorem (without proof), applications. 4. Integral functions: Gamma, Beta and error functions definitions, their relationships and properties. Elliptic integral of first and second kind. | | | | | | |
| References : | <ol style="list-style-type: none"> 1. A Text Book of Matrices by Narayan Shanti. 2004. S. Chand and Co. Ltd. New Delhi. 2. Higher Engineering Mathematics by Grewal B S. 2004. Khanna Publishers Delhi. 3. Engineering Mathematics by Ramana B V. 2008. Tata McGraw-Hill. New Delhi. | | | | | | |
| Course outcomes (CO) | <p>CO1 : Acquaint the knowledge about linear equations and diagonalization of matrices, inverse matrix and application of food processing.</p> <p>CO2 : Take the knowledge about complex analysis.</p> <p>CO3 : Gain the knowledge about Fourier series and use to solve the application of food processing.</p> <p>CO4 : Understand the knowledge about partial differential equations and fluid mechanics.</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |
| | CO4 | | | | | | |

Engineering Drawing and Graphics (FE 302)

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| Course code | FE 302 |
| Course title | Engineering Drawing and Graphics |
| Course credit | 2 (0+2) |
| Teaching per week | 4 h |

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| Course objectives | 1. To familiarise with different aspects of engineering computer and its application. | | | | | | |
| Course content | Practical : <ol style="list-style-type: none"> 1. Introduction of drawing scales; 2. First and third angle methods of projection. 3. Principles of orthographic projections; 4. References planes; 5. Points and lines in space and traces of lines and planes; 6. Auxiliary planes and true shapes of oblique plain surface; 7. True length and inclination of lines; 8. Projections of solids (Change of position method, alteration of ground lines); 9. Section of solids and Interpenetration of solid surfaces; 10. Development of surfaces of geometrical solids; 11. Isometric projection of geometrical solids. | | | | | | |
| References : | <ol style="list-style-type: none"> 1. Suggested Reading y Ibrahim Zeid. 2004. Mastering CAD/CAM. McGraw-Hill Book Co., NY, USA. 2. Kunwoo Lee. 1999. Principles of CAD/CAM/CAE Systems. Prentice-Hall, USA. 3. N.D. Bhat and V.M. Panchal. 1995. Machine Drawing. Charotar Publishing House, Anand. 4. N.D. Bhat. 1995. Elementary Engineering Drawing. Charotar Publishing House, Anand. | | | | | | |
| Course outcomes (CO) | CO1: To understand the concept of projection and prepare the different views of projection of points, lines, planes and solids. CO2: To prepare and understand the multiple views from the pictorial view. CO3: To understand the concept of section and draw the different sectional drawings. CO4 : To understand the need of different types of joints, threads, screws and bolts. CO5 : To prepare the missing views. | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |
| | CO4 | | | | | | |
| | CO5 | | | | | | |

Food Engineering and Thermodynamics (FS 303)

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| Course code | FS 303 |
| Course title | Food Engineering and Thermodynamics |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | <ol style="list-style-type: none"> 1. To gain the knowledge and understanding fundamentals of thermodynamics. 2. To learn the thermodynamic relationship, fuel and combustion. |
| Course content | Theory : |

| | |
|-----------------------------|---|
| | <ol style="list-style-type: none"> 1. Fundamental concepts and definitions related to thermodynamics : Ideal and real gases : Concepts of ideal gas, characteristics equation of gas. Universal and characteristics gas constant. Enthalpy and specific heat, deviation of real gas from ideal gas, compressible factor and the Vander Waal's equation of state for real gas. 2. Laws of thermodynamics : Zeroth law : concepts of temperature. Equality of temperature, Zeroth law of thermodynamics. <ol style="list-style-type: none"> a. First law : First law of thermodynamics. Concepts processes, flow processes and control volume, flow work, steady flow energy equation, mechanical, mechanical work in a steady flow process, throttling process, application of first law to open systems. b. Second law : Essence of second law, thermal reservoir, heat engines and thermal efficiency, COP of heat pump and refrigerator, definition of available and non available energy, statement of second law, carnot cycle, Camot's theorem, Clausius in equality, concept of entropy, Entropy change for ideal gases 3. Thermodynamics relations : Maxwell's equations, thermodynamic properties relation for a pure substance, Joule - Kelvin effect, Clausius - Clapeyron equation, Gibbs phase rule, types of equilibrium, conditions of stability. 4. Fuels and combustion : Solid, liquid and gaseous fuels, calorific value and its determination, air requirement for complete combustion. 5. Properties of pure substance (steam) Psychometric chart :Psychometric parameters and their relationships, psychometric properties of air. Mixing of air streams, heating and cooling processes, humidification and de- humidification processes. <p>Practical :</p> <ol style="list-style-type: none"> 1. Study the properties of ideal gas. 2. Study of two stroke engines. 3. Study of four stroke engines. 4. Calorific value and its determination. 5. Study on psycrometric chart. 6. Determination of state of air using psychometric chart and hygrometer. 7. Problems on thermodynamic applications. 8. Determination of dryness fraction of steam. 9. Visit to food plant with steam utilization |
| References : | <ol style="list-style-type: none"> 1. RK Rajput. 2007. Engineering Thermodynamics, 3rd Ed. Laxmi Publications (P) Ltd., Bangalore. 2. JM Smith, HC Van Ness and M.M. Abbott. 2005. Introduction to Chemical Engineering Thermodynamics, 7th Ed. McGraw-Hill, Inc., NY, USA. 3. Warren L. McCabe, Julian Smith, Peter Harriott. 2004. Unit Operations of Chemical Engineering, 7th Ed. McGraw-Hill, Inc., NY, USA. 4. Christie John Geankoplis. 2003. Transport Processes and Separation Process Principles (Includes Unit Operations), 4th Ed. Prentice-Hall, NY, USA. 5. Donald B. Brooker, Fred W. Bakker-Arkema and Carl W. Hall. 1976. Drying Cereal Grains. The AVI Publishing Company, Inc., Connecticut, MA, USA. |
| Course outcomes (CO) | <p>CO1: Students will aquire a strong understanding of fundamental thermodynamic concepts and their relevance to food systems, enabling them to interpret and analyse heat and mass transfer phenomena in food processing.</p> <p>CO2: Students will be apply thermodynamic principles to evaluate and optimize food processing methods.</p> <p>CO3: Students will gain the ability to assess and predict food stability, degradation and shelf life based on thermodynamic principles, aiding in the development of strategies to prolong food freshness and safety.</p> <p>CO4 : With knowledge of food thermodynamics, students will be capable of optimizing food processing techniques, minimizing energy consumption and maximizing efficiency while maintaining or enhancing food quality attributes.</p> |

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| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |
| | CO4 | | | | | | |

Food Preservation and Storage (FS 301)

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| Course code | FS 301 |
| Course title | Food Preservation and Storage |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | <ol style="list-style-type: none"> 1. To acquire knowledge regarding principles & methods of preserving foods. 2. To develop ability in preparing and preserving various foods by household methods. 3. To acquire knowledge and develop ability for storage of food material. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Introduction to food preservation, principles, techniques used and its importance. 2. Principles involved in preserving foods by different methods. 3. Different types of packaging material : Food contact material - Metal, wood, glass, paper, plastic etc. - characteristics in detail, surface finish of material (smoothness, roughness etc.), sanitary standards and designs, contact of packaging material with food and their effect in brief. 4. Food additives : Role of various types of food additives, food dispersions; food sols, food gels, food emulsion and foams in foods. 5. Food preservatives : Mechanism of their use, doses, legal aspects etc. 6. Selection and purchase of foods for preservation. 7. Processing methods for food preservation : <ol style="list-style-type: none"> (i) Canning and bottling - steps involved, principle of processing, acid and non-acid foods; types of containers used, types of lacquers, spoilage of canned foods. (ii) Preservation by use of low temperature - principles involved, types of low temperature storage, types of freezing, changes during freezing & thawing, types of containers used. (iii) Drying and dehydration -principal involved, methods of drying & dehydration, different types of driers, freeze drying, packing & storage. 8. Storage of common perishable and non-perishable foods. <p>Practical :</p> <ol style="list-style-type: none"> 1. Market survey of raw and preserved foods. 2. Preparation of various food product for preservation : Fruit juice, squash and cordial; jam, jelly and marmalades - comparison / difference; pickles, ketchup and chutney, dehydrated product. 3. Preparation of items utilizing cereal and legume flours and their storage. 4. Preparation of instant mixes - <i>Upma / Dhokla / Vadas</i>. 5. Processing methods for food preservation : Bottling of pineapple peas, freezing of fruits / vegetables, drying of vegetables (solar, sun and oven), reconstitution of |

| | | | | | | | |
|-------------------------------------|--|------|------|------|------|------|------|
| | dried vegetables. | | | | | | |
| References : | <ol style="list-style-type: none"> 1. Girdharilal (1967) : Preservation of Fruits and Vegetables, ICAR, New Delhi. 2. Desrosser NW and Desrosser JN (1917) : The Technology of Food Preservation. AVI Publications Co., Connecticut. 3. Srilakshmi B (2000) : Food Science, New Age International Pvt. Ltd. Publishers. | | | | | | |
| Course outcomes (CO) | CO1: Acquaint the knowledge about food preservation techniques. CO2: Gain knowledge about food additives. CO3: Utilize food additives for new product development | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |

Post Harvest Engineering (FT 301)

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|--------------------------|---|
| Course code | FT 301 |
| Course title | Post Harvest Engineering |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | <ol style="list-style-type: none"> 1. To familiarise the students with equipments and principles involved in post harvest operations. 2. To get students understand the importance of post harvest operations. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Introduction : Need for post harvest operations, operations required for agricultural products and flesh foods, machinery involved during post harvest process - transportation, cleaning, separating, grading - uniformity, size, colour, storage etc. 2. Introduction to equipments for post harvest operation to process cereals (rice milling, milling of wheat, corn), pulse, oilseeds, spices etc . 3. Handling equipment for a grain market. 4. Process equipments and machinery for oil extraction, refining, hydrogenation. 5. 6. Processing machinery involved in utilization of by products of cereals, pulses, oil seeds and spices. 7. Packaging equipments of cereals, pulses and oil and their products. 8. Processing equipments for sorting, washing, handling, peeling, slicing, blanching, mixing, handling, chilling, packaging, transportation, storage for fruits and vegetables. <p>Practical :</p> <ol style="list-style-type: none"> 1. Determination of physical properties of agricultural materials e.g. size, shape, density and angle of repose. 2. Study of different types of machines used for post harvest process like cleaner, grader, separator, dryer etc. 3. Study of domestic grain storage structures. 4. Visit to warehouses, cold-storage etc. |

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|-------------------------------------|--|------|------|------|------|------|------|
| References : | <ol style="list-style-type: none"> 1. Amalendu Chakraverty and R. Paul Singh. 2014. Post Harvest Technology and Food Process Engineering. CRC Press, Boca Raton, FL, USA. 2. Chakraverty. 2008. Post Harvest Technology of Cereals, Pulses and Oilseeds, 3rd Ed. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. y 3. K.M. Sahay and K.K. Singh. 2001. Unit Operations of Agricultural Processing. Vikas Publishing House Pvt. Ltd., Noida, UP. 4. G. Boumans. 1985. Grain Handling and Storage. Elsevier Science Publishers, Amsterdam, The Netherlands. 5. Carl W. Hall and Denny C. Davis. 1979. Processing Equipment for Agricultural Products. The AVI Publishing Company, Inc., Connecticut, MA, USA. 6. Post Harvest Technology of Cereal, Pulses, Oil seeds by A Chakraverty; Oxford & IBH Publication Co. 7. Physical properties of plant and animal materials by NN Mohsenin, Gordon and Breach, 1970 8. Post Harvest Technology of fruits & Vegetables by Thompson; CBS Publishers and Distributors, 485 Jain Bhavan, Shandara Delhi-II 0032. 9. Post Harvest (Introduction Physiology Handling fruits & Vegetables by Wills R.B.H. etal; Oxford & IBH Publication Co. | | | | | | |
| Course outcomes (CO) | <p>CO1: Have an idea of the basic post-harvest operations and to be apply the post-harvest technologies to prevent loss.</p> <p>CO2: Gain an understanding of various engineering properties of the food material.</p> <p>CO3: Infer the different cleaning, threshing, separation and grading operations involved in food industry and farm level.</p> <p>CO 4 : To be able to select and utilize the suitable milling equipment's for different food materials.</p> <p>CO5 : Utilize the conveyers in the food industry.</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| CO1 | | | | | | | |
| CO2 | | | | | | | |
| CO3 | | | | | | | |
| CO4 | | | | | | | |
| CO5 | | | | | | | |

Principles of Food Processing (FT 302)

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|--------------------------|--|
| Course code | FT 302 |
| Course title | Principles of Food Processing |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | 1 This course enables students to understand basic principles involved in various operations of food industry. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Principles involved in food processing at high temperatures : Drying : Sun drying, mechanical drying; types of heat - dry and moist; drying of solid, drying rate curve. |

| | <p>Blanching : Technique. Pasteurization - purpose, types - HTST, LTHT etc. Sterilization.</p> <p>Canning - spoilage in canned food. Bottling,</p> <ol style="list-style-type: none"> Principles of food processing at low temperatures : Principles of refrigeration, chilling, freezing, spoilage of chilled and frozen foods. Food processing by irradiation : Systems, intermediate moisture levels in foods, treatment required etc., dosage used in different food stuff, hazards in brief. Filtration, membrane separation, centrifugation : Principles and its applications in processing various foods, reverse osmosis, ultrafiltration. Principles of food processing by chemical methods : Hydrogenation, interesterification, enzymatic process. Principles of food processing by mechanical methods : Aqueous and solvent extraction techniques, extrusion cooking - principle, equipment's, application, types of fabricated foods etc. <p>Practical :</p> <ol style="list-style-type: none"> Studies on the drying, canning, blanching, freezing etc. Study on storage stability of processed food using various methods. Visit to food processing industries. Study of various processing using different techniques eg. extrusion cooking. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|--|------|------|------|------|------|------|------|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|
| References : | <ol style="list-style-type: none"> <u>Fellows P(1996):Food Processing Technology -Principles & Practice</u>, Woodhead Pub. Ltd., Cambridge. Pyke M (1970): <u>Food Science & Technology</u>, _____ 3rd Edition, Food & Nutrition Press, Connecticut. <u>Goel RK</u> : Technology of Food Products - Principles & Practice, Woodhead Pub. Ltd., Cambridge. Barbosa-Canovas GV (2000): <u>Novel Food Processing Technologies</u>, CRC Press, Boca Raton. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Course outcomes (CO) | <p>CO1: Understanding the important concept of food processing</p> <p>CO2: Understanding the food perishability and types of food spoilage</p> <p>CO3: Recognize the concept of conventional food preservation techniques</p> <p>CO4 : Understanding the novel non-thermal food preservation techniques</p> <p>CO5 : Recognize the importance of food quality analysis and shelf life evaluation</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mapping between COs and PSOs | <table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO2</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO3</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> </tr> <tr> <td>CO4</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <td>CO5</td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | CO1 | | | | | | | CO2 | | | | | | | CO3 | | | | | | | CO4 | | | | | | | CO5 | | | | | | |
| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Human Nutrition (HN 301)

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|--------------------------|--|
| Course code | HN 301 |
| Course title | Human Nutrition |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | 1. To familiarize with different aspects of nutrients. |

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|-------------------------------------|--|------|------|------|------|------|------|
| | <ol style="list-style-type: none"> 2. To understand the role of various nutrients, their requirements, effect of deficiency and excess. 3. To gain knowledge of improving nutritional quality of food. | | | | | | |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Protein : Classification, functions, sources, requirement - factors affecting, factors affection on digestion and absorption, effect of excess and deficient intake, factors affecting protein availability. 2. Carbohydrate : Classification, functions, sources, requirement - factors affecting on digestion and absorption, effect of excess and deficient intake, blood glucose and effect of different carbohydrates on blood glucose, glycemic index. 3. Fat : Classification, functions, sources, requirement - factors affecting on digestion and absorption, effect of excess and deficient intake, types of fatty acids, role and nutritional significance of SFA, MUFA, PUFA. 4. Minerals : Classification, functions, sources, requirement - factors affecting on digestion and absorption, effect of excess and deficient intake of the minerals and trace elements, physiological role of minerals, bio-availability. 5. Vitamins : Classification, Functions, sources, requirement - factors affecting on digestion and absorption, effect of excess and deficient intake of the various Vitamins, physiological role of vitamins, bio-availability. 6. Improving nutritional quality of foods : Germination, fermentation, supplementation, substitution, fortification and enrichment. <p>Practical :</p> <ol style="list-style-type: none"> 1. Planning, preparation and calculation of recipes rich (low, medium and high) in major nutrients i.e. energy, protein, fat, carbohydrates. 2. Planning, preparation and calculation of recipes rich (low, medium and high) in minerals, calcium, phosphorus, iron. 3. Planning, preparation and calculation of recipes rich (low, medium and high) in fat soluble vitamins like vitamin A, D, E, K. 4. Classifying recipes as good, moderate and poor source of specific nutrients. | | | | | | |
| References : | <ol style="list-style-type: none"> 1. Educational Planning Group (1991) : Food and Nutrition - A Textbook of Home Science for Senior Students, 3rd Edition, Arya Publishing House, New Delhi 2. Swaminathan M (1983) : Human Nutrition and Diet, 1st Edition, The Bangalore Printing and Publishing Co. Ltd. 3. Swaminathan M (1977) : Handbook of Foods and Nutrition, 1st Edition, Ganesh & Co. Ltd., Madras. 4. Rajalaksmi R (1978) : Applied Nutrition, 1st Edition. 5. Mudambi SR and Rajgopaln V (1982): Fundamentals of Foods and Nutrition, 3rd Edition, New Age International Ltd. Publishers. | | | | | | |
| Course outcomes (CO) | <p>CO1: Understanding the classification, functions, sources and requirement of nutrients for human being</p> <p>CO2: Understanding the digestion and absorption of nutrients</p> <p>CO3: Can plan the nutritional recipes and calculate the nutrient contents of recipes</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |

Meal Planning (DT 301)

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|-------------------------------------|--|------|------|------|------|------|------|
| Course code | DT 301 | | | | | | |
| Course title | Meal Planning | | | | | | |
| Course credit | 2 (1+1) | | | | | | |
| Teaching per week | 3 h | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. To familiarize the students with planning of balanced meals and factors affecting meal Planning. 2. To sensitize the students to difference in dietary requirements and nutritional needs through the different stages of the life span. 3. To equip the students with skills to plan balanced meal. | | | | | | |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Importance of meal planning and factors to be considered while planning meals. 2. Use of food exchange list in planning meals 3. Nutritional requirements through the various stages of life: Infancy, preschool age, school age, adolescent, adult, old age. 4. Nutritional requirements in special conditions: Pregnancy and lactation <p>Practical :</p> <ol style="list-style-type: none"> 1. Planning and preparation of diets for different age groups: Infancy, preschool age, school age, adolescent, adult, old age. 2. Planning and preparation of diets for special conditions: Pregnancy and lactation. | | | | | | |
| References : | <ol style="list-style-type: none"> 1. Srilakshmi B (2000) : Dietetics, 3rd Edition, New Age International Ltd. Publishers. 2. Barber, Mitchell, Rynbergen (1963) : Nutrition in Health and Diseases, 14th Edition, JB Lippincott Co. 3. Fonosc b and Kvitka (1978) : Meal Management - Concept and Application, Harpor and Raw Publisher. 4. Holman SR (1987) : Essential of Nutrition, JB Lippincott Co. 5. Kinder F (1968) : Meal Management, 3rd Edition, McMillan Co. Ltd. 6. Mudamb SR and Rajgopal MV (1982) : Fundamentals of Foods and Nutrition, 3rd Edition, New Age International Ltd. Publishers. 7. Robinson : Normal and Therapeutic Nutrition, 16th Edition. 8. Suitor CW and Crowley MF (1984): Nutrition - Principles and Application in Health Promotion, 2nd Edition, JB Lippincott Co. | | | | | | |
| Course outcomes (CO) | <p>CO1: Knowledge of nutritional requirements during various stages of life and understanding concepts of meal planning</p> <p>CO2: Able to plan balance meals for healthy personals of various age groups</p> <p>CO3: Calculating nutritional values of planned meal and modifications in same</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |

NSS / NCC / Sports (NSS 301)

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|-------------------------------------|--|------|------|------|------|------|------|
| Course code | NSS 301 | | | | | | |
| Course title | NSS / NCC / Sports | | | | | | |
| Course credit | (0+1)* | | | | | | |
| Teaching per week | * Non credit course | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. Understand the community in which they work 2. Understand themselves in relation to their community 3. Identify the needs and problems of the community and involve them in problem solving 4. Develop among themselves a sense of social and civic responsibility 5. Utilise their knowledge in funding practical solutions to individual and community problems 6. Develop competence required for group living and sharing of responsibilities. 7. Gain skills in mobilizing community participation 8. Acquire leadership qualities and democratic attitudes 9. Develop capacity to meet emergencies and natural disasters and practice national integration and social harmony | | | | | | |
| Course outcomes (CO) | <p>CO1 : Improve the quality of educated manpower by fostering social responsibility.</p> <p>CO2 : Raising society to a higher material and moral level by preparing students for final dedication in the service of nation.</p> <p>CO3 : Introduce urban students to rural life by living in contact with the community in whose mist their institution is located.</p> <p>CO4 : Making campus relevant to the needs of the community</p> <p>CO5 : Involvement in the tasks of national development</p> <p>CO6: Better understanding and appreciation of the problems of the society</p> <p>CO7 : Encourage community participation</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |
| | CO4 | | | | | | |
| | CO5 | | | | | | |
| | CO6 | | | | | | |
| | CO7 | | | | | | |

Semester IV

Electronics and Instrumentation (FE 401)

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|-------------------------------------|---|------|------|------|------|------|------|
| Course code | FE 401 | | | | | | |
| Course title | Electronics and Instrumentation | | | | | | |
| Course credit | 2 (1+1) | | | | | | |
| Teaching per week | 3 h | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. To familiarize with different aspects of electronic engineering. 2. To understand the electronic devices. 3. To gain knowledge of microprocessor for food processing. 4. To gain knowledge for basic food processing instrumentation. | | | | | | |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Electronic devices and their characteristics, study of rectifiers, amplifier, oscillators, operational amplifier, multivibrators, digital circuit, sequential and combination systems. 2. A/D and D/A conversion, Thyristors and their application. Modulation and inverters. 3. Introduction to microprocessor, programming of microprocessor, using assembly language, application of microprocessor in data acquisition and control of food processes. 4. Introduction to generalized instrumentation system, Absolute and secondary measurements, accuracy, precision, sensitivity and errors in measurements. Primary sensors and transducer. <p>Practical :</p> <ol style="list-style-type: none"> 1. An instrumentation and measurement of humidity, temperature, moisture contents, fluid flow, pressure, force, strain, resistance strain gauges, torque. | | | | | | |
| References : | <ol style="list-style-type: none"> 1. Anand Kumar. 2014. Fundamentals of Digital Circuits. PHI Pvt. Ltd., New Delhi. 2. A.K. Sawhney. 2010. Course in Electrical and Electronics Measurements and Instrumentation. Dhanpat Rai Publications (P) Limited, New Delhi. 3. V.K. Mehta and Rohit Mehta. 2008. Principles of Electronics. S. Chand and Co., New Delhi. 4. D. Choudhury Roy. 2003. Linear Integrated Circuits. John Wiley International, NY. 5. Sanjeev Gupta. 2002. Electronic Devices and Circuits. Dhanpat Rai Publications (P) Limited, New Delhi. | | | | | | |
| Course outcomes (CO) | <p>CO1: Analyse and application of basic electronic devices</p> <p>CO2: Understand the principles of different types of electronic devices & transducers</p> <p>CO3: Develop and enhance their skills in basics of analog and digital circuits</p> <p>CO4 : Understand different types of transducers, sensors, its working principles & their application</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |
| | CO4 | | | | | | |

Food Product Development (FS 401)

| | | | | | | | |
|-------------------------------------|---|------|------|------|------|------|------|
| Course code | FS 401 | | | | | | |
| Course title | Food Product Development | | | | | | |
| Course credit | 2 (1+1) | | | | | | |
| Teaching per week | 3 h | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. To understand the process of development of food product. 2. To acquire knowledge to develop nutritious, cost effective and marketable new food products. | | | | | | |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Food needs and consumer preferences : Needs and types of food consumption trends; economic, psychological, anthropological and sociological dimensions of food consumption. 2. Trends in social change and its role in diet pattern : Consumer research and the market identification for the need of new products. 3. Developing standard products - Types of product and logistics, primary and secondary, various food ingredients used, use of additives. 4. Designing new products using need based perspective and application in various situations. <p>Practical :</p> <ol style="list-style-type: none"> 1. Need for new products : Identifying areas, subgroups/programmes where new food products are required or can be useful through market survey. 2. Listing variety of possible food products : Establishing selection criteria and target group selecting a food product for development. 3. Planning for food product to be developed : Processing steps, ingredients required, equipments required, standardization, evaluation, large scale preparation, packaging and shelf life studies, drawing up a working plan and time schedule. 4. Visit to commercial food manufacturing, packaging as well as R&D units. | | | | | | |
| References : | <ol style="list-style-type: none"> 1. Rapheal H Jand Olson DL (1976) : Package Production Management, 2nd Edition, AVI Pub., Connecticut. 2. Bendor FE, Kramer A and Kahn G (1976) :Systems Analysis for the Food Industry, AVI Pub. Co., Connecticut. 3. Potty VH and Mulky MJ (1983) : Food Processing, Oxford & IBH Pub. Co Pvt. Ltd., 4. Darrah LB (1971) : Food Marketing, The Ronald Press Co. 5. Bedekar SJ (1991) : Marketing Concepts and Strategies, Oxford University Press. | | | | | | |
| Course outcomes (CO) | <p>CO1: Understand the need and process of new food product development</p> <p>CO2: Develop and design new food products</p> <p>CO3: Understand the equipment's and processing techniques application in new food product development</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |

Cereal, legume and oilseed processing (FT 401)

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|--------------------------|--|
| Course code | FT 401 |
| Course title | Cereal, legume and oilseed processing |
| Course credit | 4 (3+1) |
| Teaching per week | 5 h |
| Course objectives | <ol style="list-style-type: none"> 1. This course enables students to know importance of cereal, legumes and oilseed processing. 2. To acquaint students with processing of various cereals, legumes and oilseeds. 3. Familiarize the students with the development in the processing field. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Grain milling operations : Rice milling, milling of wheat, corn, pulses. 2. Principal methods of parboiling, physical-chemical changes during parboiling, nutritional and cooking qualities. 3. Processing of malting of cereals and legumes, breakfast cereals, pasta products, rice flakes, puffed rice, maize processing-starch preparation, puffed maize; fermentation of cereals etc. 4. Manufacturing methods for extraction, refining and hydrogenation of oils. 5. Manufacture of margarines, shortenings, salad oils and dressing etc. 6. Nutrient loss during processing, fortification, quality control in food industries. 7. Utilization of by products of cereals, pulses and oil seeds processing. 8. Quality control test during platform operations. <p>Practical :</p> <ol style="list-style-type: none"> 1. Determination of quality of different cereals, pulses, oilseeds & their products. 2. Estimation of various biochemical changes during storage of oil & oil products. 3. Malting & germination of cereals and pulses under different conditions, evaluation of nutrient content-proximate principles, vitamins and minerals. 4. Fermentation of various cereals and pulse and their combinations, - evaluation of nutrient content. 5. Visit to various rice mill, dhal mill, flour mill, oil mill, pulse mill etc. |
| References : | <ol style="list-style-type: none"> 1. Desosier NW and Desosier JN (1977) : Technology of Food Preservation, AVI Publishing Co. 2. Joslyn MA and Heid JL (1964) : Food Processing Operations, their Managements, Machines, Materials and Methods, AVI Publishing Co. 3. <u>Chakraverty A</u> and <u>De DS</u> (1981) : Post Harvest Technology of Cereals & Pulses, Oxford & IBH, New Delhi. 4. <u>Chakraverty A</u> (2003) : <u>Postharvest Technology of Cereals, Pulses and Oilseeds</u>, 3rd Edition, Oxford & IBH, New Delhi. 5. <u>Kent NL</u> and <u>Evers AD</u> (1994) : <u>Technology of Cereals</u>, 4th Edition, Elsevier Science, Oxford. <u>Matz SA</u>(1991):<u>Chemistry and Technology of Cereals as Food and Feed</u>,CBSPD,New Delhi. |

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| Course outcomes (CO) | CO1: Understand the structure of the cereal grain and the components of commercial flour CO2: Demonstrate the cereal grain production and quality categorization systems CO3: Understand the milling processing of different cereals CO4 : Can manufacture various breakfast cereal products CO5 : Understand the millets and their processing | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |
| | CO4 | | | | | | |
| | CO5 | | | | | | |

Milk and Milk Product Processing (FT 402)

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|--------------------------|--|
| Course code | FT 402 |
| Course title | Milk and Milk Product Processing |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | <ol style="list-style-type: none"> 1. Understand significance of milk and milk products. 2. Familiar with processing steps involved in milk and milk products. 3. Know the development in the processing field. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Collection, judging and grading of milk; flavour defects in milk - their causes and prevention, platform test and quality. 2. Pasteurization and sterilization of milk, different types of milk and its processing. 3. Processing steps and machinery for milk powder, cheese, butter, icecream etc. 4. Processing of indigenous milk products like <i>khoa</i>, <i>shreekhand</i>, ghee etc. 5. Quality control in dairy industry. 6. Nutrient loss during processing and fortification. 7. Processing of milk based infant food. <p>Practical :</p> <ol style="list-style-type: none"> 1. Conducting platform tests on reception of milk : Sampling, judging & grading of milk. 2. Estimation of fat percentage in milk. 3. Production of different dairy products on laboratory scale. 4. Quality control of milk and milk products. |
| References : | <ol style="list-style-type: none"> 1. <u>Spreer E</u> and <u>Mixa A</u> (2005) : <u>Milk and Dairy Product Technology</u>, Marcel Dekker Publisher, New York. 2. <u>De Sukumar</u> (1980): <u>Outlines of Dairy Technology</u>, Oxford University Press, Delhi. 3. <u>Roninson RK</u> (1986): <u>Modern Dairy Technology</u> - Advances in Milk Processing, Elsevier Applied Science Pub., London. |

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|-------------------------------------|---|------|------|------|------|------|------|
| | 4. <u>Paul PC</u> and <u>Palmer HH</u> (1972): <u>Food Theory and Applications</u> , Wiley, New York. | | | | | | |
| Course outcomes (CO) | CO1: Apply basic properties of milk for product manufacturing CO2: Demonstrate the processing and quality analysis of milk CO3: Operate the dairy processing equipment CO4 : Able to manufacture fermented dairy products CO5 : Able to start a dairy based startup. | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |
| | CO4 | | | | | | |
| | CO5 | | | | | | |

Nutritional assessment (HN 401)

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|--------------------------|--|
| Course code | HN 401 |
| Course title | Nutritional assessment |
| Course credit | 2 (1+1) |
| Teaching per week | 3 h |
| Course objectives | <ol style="list-style-type: none"> 1. Understand the concept of nutritional status and its relationship to health. 2. Know aims, objectives, methods used for assessment of nutritional status. 3. Identify the factors responsible for the malnutrition. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Nutritional status assessment and surveillance : Meaning, need and importance. 2. Diet surveys : Need, importance, methods of dietary survey. 3. Direct nutritional assessment of human groups : <ol style="list-style-type: none"> (i) Clinical signs – need, importance, identifying signs of PEM, vitamin A deficiency, anaemia, iodine deficiency; interpretation of descriptive list of clinical signs. (ii) Nutrition anthropometrics - need and importance, standards for references, techniques of measuring height, weight, head, chest and arm circumference, interpretation of these measurements and use of growth charts. (iii) Biochemical tests. (iv) Biophysical methods. <p>Practical :</p> <ol style="list-style-type: none"> 1. Project work- Assessment of nutritional status of the community using suitable techniques. |
| References : | <ol style="list-style-type: none"> 1. Saln DR, Lockwood R and Scrimshaw NS (1981) : Methods for the Evaluation of the Impact of Food & Nutrition Programme, V.N.University. 2. Rutchie JAS (1967) : Learning Better Nutrition, FAO, Rome. 3. Gopalan C : Nutritional and Health Care, Nutrition Foundation of India, Special Pub. Series. 4. Beghan I, Cap M and Dajardan B (1988) : A Guide to Nutritional Status Assessment, WHO, Geneva. |

| | <p>5. Gopaldas T and Seshadri S (1987) :Nutrition Monitoring and Assessment, Oxford University Press.</p> <p>6. Mason JB, Habicht JP, Tabatabai H and Valverde V (1984) :Nutritional Surveillance, WHO, Geneva.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|---|------|------|------|------|------|------|------|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|
| Course outcomes (CO) | <p>CO1: Basic understanding regarding nutritional status of healthy and malnourished individuals</p> <p>CO2: Capable of using various methods and tools to measure nutritional status of individuals</p> <p>CO3: Knowledge of various deficiency diseases and causes malnutrition</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mapping between COs and PSOs | <table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> </tr> </thead> <tbody> <tr> <th>CO1</th> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CO2</th> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> </tr> <tr> <th>CO3</th> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table> | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | CO1 | | | | | | | CO2 | | | | | | | CO3 | | | | | | |
| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | | | | | | | | | | | | | | | | | | | | | | | |
| CO1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Maternal and Child Nutrition (HN 402)

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|--------------------------|--|
| Course code | HN 402 |
| Course title | Maternal and Child Nutrition |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | <ol style="list-style-type: none"> 1. Understand the physiology of pregnancy and lactation and how these influence nutritional requirements. 2. Learn benefits of breast feeding. 3. Be aware of problem encountered in pregnancy and during breast feeding. 4. Understand the process of growth and development from birth until adulthood. 5. Get familiar with nutritional needs at different stages of growth. 6. Understand the concept of growth promotion. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Physiology of pregnancy, factors (non nutritional) affecting pregnancy outcome, importance of adequate weight gain during pregnancy and antenatal care and its schedule, late effects of feral malnutrition. 2. Nutritional requirements during pregnancy and modification of existing diet and supplementation, nutritional factors affecting breast feeding, deficiency of nutrients and impact – energy, iron, folic acid, protein, calcium, iodine; common problems of pregnancy and their management – nausea, vomiting, pica, pregnancy induced hypertension, obesity, diabetes, adolescent pregnancy – consequences, care. 3. Nutritional requirement during lactation and dietary management, food supplements, preparation for lactation, care and preparation of nipples during lactation, breast hygiene. 4. Infant physiology relevant to feeding and care : Breast feeding, colostrum – its composition and importance in feeding, introduction of breast feeding and duration of breast feeding, nutritional and other advantages of breast feeding. 5. Standardization of complementary food, initiation and management of weaning food breast feeding etc., mixed feeding – breast feeding and artificial feeding, teething and management problems. |

| | <p>6. Characteristics and feeding of toddlers, preschool, school going children and adolescent; management of preschool and low birth weight children, feeding children with special needs, dietary management of children with inborn errors of metabolism (PKU, glycogen storage diseases, Wilson's diseases), malabsorption (lactose intolerance, celiac disease), food allergies.</p> <p>7. Somatic, physical, brain and mental development, puberty, pre-pubertal and pubertal changes, importance of nutrition for ensuring adequate growth and development.</p> <p>Practical :</p> <ol style="list-style-type: none"> 1. Assessment of existing diets of pregnant and lactating women and its improvement. 2. Planning of dietary schedule for infants, 6-12 months. 3. Planning and preparation of nutrient dense, complementary foods for infants, 6-12 months. 4. Preparation of nutritional snack for preschool children. 5. Preparation of packed lunch for primary school age and adolescent. 6. Planning and preparation of food for specific condition i.e. Lactose intolerance, Celiac disease, Amylase Rich Food (ARF) | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|--|------|------|------|------|------|------|------|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|
| References : | <ol style="list-style-type: none"> 1. Gihosh S (1992) : The Feeding and Care of Infant and Young Children, 6th Edition, UHAI, New Delhi. 2. WHO (1978) : A Growth Chart of International Use in Maternal and Child Health Care, WHO, Geneva. 3. Swaminathan M (1985): Essential of Foods and Nutrition, Ganesh & Co., Bangalore. | | | | | | | | | | | | | | | | | | | | | |
| Course outcomes (CO) | <p>CO1: To understand the process of growth and development from birth to adulthood</p> <p>CO2: To aware with nutritional needs at different stages of growth</p> | | | | | | | | | | | | | | | | | | | | | |
| Mapping between COs and PSOs | <table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> </tr> </thead> <tbody> <tr> <th>CO1</th> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <th>CO2</th> <td></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> </tbody> </table> | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | CO1 | | | | | | | CO2 | | | | | | |
| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | | | | | | | | | | | | | | | | |
| CO1 | | | | | | | | | | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | | | | | | | | | | |

Public Health Nutrition (HN 403)

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|--------------------------|---|
| Course code | HN 403 |
| Course title | Public Health Nutrition |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | <ol style="list-style-type: none"> 1. To sensitize the students to the concept of public nutrition and epidemiology 2. To familiarise the students with measures taken by the government to improve the nutritional status of the community. 3. To enable the students to use growth charts for nutritional assessments. 4. To understand the concept of health from the individual and community perspective. 5. To assess health and nutritional status and analysis situation. 6. To know factors affecting health and nutritional status of individual and community. |

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|-------------------------------------|--|------|------|------|------|------|------|
| Course content | Theory: <ol style="list-style-type: none"> 1. Introduction-Definition, Significance, Evolution of Public & Community Health 2. Concept of Health care, Medical Care, and public health 3. Determinants of Health –Biological, Behavioural, Socio-economic, Cultural, Environmental, Geographical etc. 4. Community Health Diagnosis & Needs Assessment 5. Community perception and priorities on health and disease 6. Disease profiles & Epidemiological transition 7. Public Health delivery system in India 8. Nutrition and infection : Relationship, Immunisation 9. Right to health 10. National Health Policies: (National Population Policy, National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM), National Public Health Programs) 11. National Nutritional Programmes (ICDS, MDM, IDD, National anaemia prophylaxis Programme etc.) Practical: <ol style="list-style-type: none"> 1. Survey of local food practices and food availability. 2. Visit to the ongoing public health nutrition programme. 3. Development of nutritional health education materials like charts, posters, puppets etc. 4. Preparation of the scripts either role play / puppet show for nutrition health education. 5. Use of nutrition health education tools in the field of school, <i>anganwadi</i>, <i>mahilamandal</i> or rural area | | | | | | |
| References : | <ol style="list-style-type: none"> 1. Advanced textbook on food and Nutrition: Dr M Swaminathan, The Bangalore Publishing Co. Ltd. Bangalore, 1974 2. Recent Trends in Nutrition, C Gopalan, Oxford University Press, New York 1993. 3. Nutrition for Developing Countries, E. Savage King, Oxford University Press, Oxford, 1992. 4. Nutrition problems and Programmes in South East Asia: Dr C Gopalan, World Health Organization, New Delhi, 1987. 5. Perspective in Nutrition: Gordon M. Wardlaw, Paul M. Injel, Time/Mosby College Publishing, St. Louis, 1990. 6. Fundamentals of food and Nutrition, Sumati R Mudambi, MV Rajagopal, VR Damodharan, Wiley Eastern Ltd. New Delhi, 1982. 7. Clinical Dietetics and Nutrition, FP Antia, Oxford University Press, Delhi, 1993. 8. Human Nutrition and Dietetics, JS Garrods & WPT James, Churchill Livingstone, London, 1993. 9. Nutritional Sciences: Sreelakshmi 10. Nutritive value of Indian foods by C Gopalan, BV Rama Sastri & SC Balasubramanian, National Institute of nutrition, ICMR | | | | | | |
| Course outcomes (CO) | CO1: Understanding basics of public health and nutrition related problems in India CO2: Awareness regarding various government projects of nutrition CO3: Knowledge of various factors that affect health of community | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| CO1 | | | | | | | |
| CO2 | | | | | | | |
| CO3 | | | | | | | |

Diet Therapy (DT 401)

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|-------------------------------------|--|------|------|------|------|------|------|
| Course code | DT 401 | | | | | | |
| Course title | Diet Therapy | | | | | | |
| Course credit | 2 (1+1) | | | | | | |
| Teaching per week | 3 h | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. Understand the role of diet in the therapy. 2. Gain knowledge on dietary modifications for common diseases. 3. Acquire ability to plan and prepare diets for common diseases. | | | | | | |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Basic concepts : Diet therapy, dietician, dietetics and therapeutic diets. 2. Role of dietician in the hospital and community. 3. Therapeutic adaptations of normal diet, progressive diets, liquid, soft and regular diets. 4. Modification of normal diet : Clear liquid, full liquid, soft diet. 5. Diet in relation to fever conditions and infections. 6. Energy modification and nutritional care in weight management : <ol style="list-style-type: none"> (i) Diet in over weight - factors leading to overweight. (ii) Diet in under weight – anorexia nervosa, bulimia. 7. Causes, symptoms and dietary treatments of common gastro intestinal disturbances : Constipation, diarrhoea, peptic ulcer, ulcerative colitis. <p>Practical :</p> <ol style="list-style-type: none"> 1. Planning and preparation of clear liquid, full liquid, semisolid and soft diet. 2. Planning and preparation of diets for fever, typhoid, tuberculosis patients. 3. Planning and preparation of diets for underweight and overweight conditions. 4. Planning and preparation of diets for constipation, diarrhoea, peptic ulcer and ulcerative colitis. | | | | | | |
| References : | <ol style="list-style-type: none"> 1. Anderson L, Dibble MU, Turkki PR, Mitchall HS and Rynbergir HJ (1982) : Nutrition in Health and Diseases, 17th Edition, JB Lippincott & Co., Philaderphia. 2. Antia FP (1973) : Clinical Dietetics and Nutrition, 2nd Edition, Oxford University Press, New Delhi. 3. Mahan LK, Arlin MT (1992) : Krause’s Food Nutrition and Diet Therapy, 8th Edition, WB Sunders Co., London. 4. Robinson CH, Lawler MR, Chenoweth WI and Garwick AE (1986) : Mormaland Therapeutic Nutrition, 17th Edition, McMillan Publishing Co. 5. Willims SR (1986) : Nutrition and Diet Therapy, 6th Edition, Tures Mirroe, Mabsi College Publication, St. Louis. 6. Raheenabegum (1989) : A Text Book of Food, Nutrition and Dietetics, Sterling Publishers, New Delhi. 7. Joshi SA (1992) : Nutrition and Dietetics, Tata McGraw Hill Publications, New Delhi. | | | | | | |
| Course outcomes (CO) | <p>CO1: To understand the diet therapy concept and dietitian role in hospital</p> <p>CO2 : To aware about the acute diseases</p> <p>CO3: To plan and prepare the therapeutic diet for acute disease</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |

NSS / NCC / Sports (NSS 401)

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|-------------------------------------|--|------|------|------|------|------|------|
| Course code | NSS 401 | | | | | | |
| Course title | NSS / NCC / Sports | | | | | | |
| Course credit | (0+1)* | | | | | | |
| Teaching per week | * Non credit course | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. Understand the community in which they work 2. Understand themselves in relation to their community 3. Identify the needs and problems of the community and involve them in problem solving 4. Develop among themselves a sense of social and civic responsibility 5. Utilise their knowledge in funding practical solutions to individual and community problems 6. Develop competence required for group living and sharing of responsibilities. 7. Gain skills in mobilizing community participation 8. Acquire leadership qualities and democratic attitudes 9. Develop capacity to meet emergencies and natural disasters and practice national integration and social harmony | | | | | | |
| Course outcomes (CO) | <p>CO1 : Improve the quality of educated manpower by fostering social responsibility.</p> <p>CO2 : Raising society to a higher material and moral level by preparing students for final dedication in the service of nation.</p> <p>CO3 : Introduce urban students to rural life by living in contact with the community in whose mist their institution is located.</p> <p>CO4 : Making campus relevant to the needs of the community</p> <p>CO5 : Involvement in the tasks of national development</p> <p>CO6: Better understanding and appreciation of the problems of the society</p> <p>CO7 : Encourage community participation</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |
| | CO4 | | | | | | |
| | CO5 | | | | | | |
| | CO6 | | | | | | |
| | CO7 | | | | | | |

Semester V

Entrepreneurship Development (BS 501)

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|--------------------------|--|
| Course code | BS 501 |
| Course title | Entrepreneurship Development |
| Course credit | 2 (1+1) |
| Teaching per week | 3 h |
| Course objectives | <ol style="list-style-type: none"> 1. To understand the importance of the entrepreneurship. 2. To impart information on various schemes of the government useful to the entrepreneurs. 3. To help the students to learn and understand importance of skills and attitudes of a successful entrepreneur. 4. To acquaint the students the basic concepts of project report. 5. To help and motivate students to adopt the career of an entrepreneur in future. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Concept, need and process of entrepreneurship development and qualities of successful entrepreneur. 2. Identification of opportunities as food enterprises. 3. Government policies and schemes for entrepreneurship development : Industrial policy of the central as well as the state governments, incentives given to SSI sector, cottage industries etc., special scheme for woman entrepreneurship, agencies helping and useful to the entrepreneurs other than government such as Banks, DIC, GSFC, DIIC, IDBI, ICICI, GIDC etc. 4. Types of industries, resources available for the industries demand based and resource based, import substitute and export promotion industries. 5. Developing entrepreneurial competencies. 6. Project formulation : Market survey techniques, product selection and development technology, quality control, major steps involved in setting up SSI unit , project formulation (writing), resource mobilization, financing procedure and source, pricing, advertising, packaging, label interventions, plan layout, process planning for the food products. 7. Critical path method : Project evaluation, review techniques as planning tools for establishing SSI. 8. Creativity and innovation- Problem solving, personnel management. 9. Provision of various industrial as well as labour laws, such as factories act, minimum wages act, income tax etc.; legislation - licensing, registration. <p>Practical :</p> <ol style="list-style-type: none"> 1. Conduct of mini market survey : Data collection through questionnaire and personal visits. 2. Entrepreneurship motivation training through games, role playing, discussion and exercises. 3. Working capital and fixed capital assessment and management practice. 4. Analysis of sample project report discussion. 5. Food costing, calculation using relevant information, break even analysis etc. 6. Visit to small scale industries, study of pertinent enterprises in detail. 7. Interaction with successful entrepreneurs. 8. Preparation of project proposal for funding by different agencies. |
| References : | <ol style="list-style-type: none"> 1. Deshpande V (1984) : Entrepreneurship of Small Scale Food Industries, Concept, Growth and Management, Deep and Deep Publication, New Delhi. 2. Meredith GGand Nelson RE (1982) :Practice of Entrepreneurship,ILO, Geneva. |

| | <ol style="list-style-type: none"> 3. Parek U and Rao TV (1978) :Personal Efficacy in Developing Entrepreneurship, Learning Systems, New Delhi. 4. Rao TV and Parekh LU (1982): Developing Entrepreneurship - A Handbook Learning Systems,New Delhi. 5. Entrepreneurship Development - A Handbook for Entrepreneurs, Entrepreneurship Development Institute of India, Bhat Gam, Ahmedabad – Gandhinagar Highway. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|---|------|------|------|------|------|------|------|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|
| Course outcomes (CO) | <p>CO1: Students will have knowledge about foundation of entrepreneurship and its theories</p> <p>CO2 : Students will be able to enhance their entrepreneurial skills</p> <p>CO3 : Learner will understand steps involved in starting new venture</p> <p>CO4 : Students will be able to explore marketing methods and new trends in entrepreneurship</p> <p>CO5 : Enhance employability</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mapping between COs and PSOs | <table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <td>CO4</td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <td>CO5</td> <td></td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table> | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | CO1 | | | | | | | CO2 | | | | | | | CO3 | | | | | | | CO4 | | | | | | | CO5 | | | | | | |
| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| CO2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CO5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Convenience and Health Food (FS 501)

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|--------------------------|--|
| Course code | FS 501 |
| Course title | Convenience and Health Food |
| Course credit | 2 (1+1) |
| Teaching per week | 3 h |
| Course objectives | <ol style="list-style-type: none"> 1. To get students understand the importance of convenience and health food. 2. To familiarise the students to prepare the convenience and health food. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Convenience foods: Introduction, importance, types. 2. Cereal and pulse based convenience foods: Ready to use mixes, extruded products - vermicelli, noodles, spaghetti and macaroni etc. Spices and pulse based convenience foods: Ready to use curry mixes, soup mixes - tomato, mushroom and corn soup mixes, ready to use sweet mixes. 3. Health food : Introduction, definition, importance, scope, types, characteristics, functional foods and nutraceuticals. 4. Health and clinical benefits of consuming health foods. <p>Practical :</p> <ol style="list-style-type: none"> 1. Familiarisation of equipments used for convenience foods. 2. Standardization and preparation of ready to use mixes - <i>idli, rava-dosa, idiappam, adai, vadai, bajji, pakoda</i>; extruded products, cereal and pulse based traditional foods - <i>vadagam, appalam</i>; curry mixes - <i>sambar and rasam powder, masala</i> |

| | <p>powder - chicken, fish and mutton; soup mixes - vegetable, mushroom and corn; sweet mixes - <i>halwa, kheer, gulabjamun, jangiri</i>, cake and ice cream mix.</p> <ol style="list-style-type: none"> 3. Visit to processing unit. 4. Market survey of convenience and health foods. 5. Preparation of dietetic foods. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------------------|--|------|------|------|------|------|------|------|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|
| References : | 1. <u>McGinnies WG(1971):Food, Fiber and the Arid Lands</u> , University of Arizona Press, Tucson | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Course outcomes (CO) | <p>CO1: Knowledge regarding convenience food such as ready to serve and ready to eat type foods</p> <p>CO2: Knowledge regarding functional foods and nutraceutical</p> <p>CO3: Efficiency in preparing health or function foods for various disorders</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | | | | | | | | | | | | | | | | | | | | | | | |
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| CO3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Food Analysis and Quality Assurance (FS 502)

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|--------------------------|---|
| Course code | FS 502 |
| Course title | Food Analysis and Quality Assurance |
| Course credit | 3 (1+2) |
| Teaching per week | 5 h |
| Course objectives | <ol style="list-style-type: none"> 1. To acquaint students with various methods of food analysis. 2. To make the students aware regarding analytical techniques used for food products. 3. To understand the role of food standard in expanding food preparation activities. 4. To be able to use sensory evaluation as an analytical tool |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Introduction to physical, chemical and microbiological analysis of food 2. Sampling : Sample, Population, Proximate Principles, Importance of sampling, Sampling technique, Types of sampling, Sampling Plan, Preparation of samples, Problems in sampling 3. Quality Assurance : Definition of Quality Assurance, Difference between Quality Assurance and Quality Control, Definition of Total Quality Control, its nature, approaches and role of management. 4. Food Laws and standards: Voluntary, Mandatory, National & International 5. Sensory Evaluation of food quality: Appearance of food visual perception, colour, Odour and smell, Flavour, Texture, Threshold test, Difference Test, Ranking Test, Scoring Test, Hedonic Scale <p>Practical :</p> <ol style="list-style-type: none"> 1. Use and care of laboratory equipments, glasswares and labwares 2. Analysis of basic food constituents eg. Carbohydrate, protein, fat, ash etc. 3. Sensory evaluation of food products 4. Visit to quality control laboratory and food processing industries. |

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|-------------------------------------|---|------|------|------|------|------|------|
| References : | <ol style="list-style-type: none"> 1. AACC (1995) : Approved methods of AACC, 9th Edition, American Association of Cereal Chemist. 2. AOAC (1984) : Official Methods of Analysis, 14th Edition, Association of official Analytical Chemists, Washington DC. 3. Hobbs BC and Gilbert (1970) : Food Poisoning and Food Hygiene, Edward Arnold, London. 4. Rack BG : Hygiene in Food Manufacturing and Handling Food, Trade Press, London. 5. Longree K and Blaker GG (1971) : Sanitary Techniques in Food Service, John Wiley & Sons, New York. 6. Longree K (1967) : Quality Food Sanitation, 2nd Edition, Inter Science Pub., John Wiley & Sons, New York. | | | | | | |
| Course outcomes (CO) | CO1: Understanding basic concepts of food analysis and quality assurance CO2: Knowledge of analysis techniques to evaluate basic food components CO3: Capacity to carry out sensory evaluation of various food products | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |

Bakery and Confectionary Technology (FT 501)

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|--------------------------|---|
| Course code | FT 501 |
| Course title | Bakery and Confectionary Technology |
| Course credit | 2 (1+1) |
| Teaching per week | 3 h |
| Course objectives | <ol style="list-style-type: none"> 1. Know the raw materials used in bakery product preparation. 2. Understand the processing of bakery products. 3. Familiarise with problems arise and its possible solution in bakery products. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Bakery ingredients : Introduction, importance, function and use of Flour, sugar, shortening, egg, yeast, salt, water, milk and milk products, leavening agent, additives like flavour, colour, fruits and nuts, condiments and spices, cocoa and chocolate etc. 2. Bread : Processing, characteristics, faults–causes and preventive measures, diseases – causes and preventive measures, Staleness in bread-causes and retardation. 3. Other fermented products: Specific raw material and processing - bun goods, pizza base / crust, doughnut etc. 4. Cake : Formula, processing, characteristics, faults. 5. Cookies, Crackers, pastries : Raw materials and processing. <p>Practical :</p> <ol style="list-style-type: none"> 1. Preparation of fermented bakery products: bread, toast, bun, dinner rolls etc... 2. Manufacturing of fast food bakery products: pizza, puff, burger, hotdog etc... 3. Preparation of various types of biscuits and cookies. 4. Preparation of different types of cakes and icing 5. Planning and Preparation of Novel and healthy bakery products |

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|-------------------------------------|--|------|------|------|------|------|------|
| References : | <ol style="list-style-type: none"> 1. Kamaliya MK and Kamaliya KB (2001) :Baking : Science and Industries, Kamaliya MK, Anand. 2. Dubey SC (2002) : Basic Baking Science and Art, Dubey SC, New Delhi. 3. Pyler EJ (2000) :Baking Science and Technology, Sosland Publishing Co., Kansas, USA. 4. Matz SA (1996) :Ingredients for Bakers, 2nd Edition, Pan-Tech International, Inc, Texas, USA. | | | | | | |
| Course outcomes (CO) | <p>CO1: Expose to the basic principles of baking, confectionery technology for product manufacturing</p> <p>CO2: Demonstrate the different bakery, confectionery product process making</p> <p>CO3: Finding the quality of ingredients and its impact on bread and cake making</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |

Fruit and Vegetable Processing (FT 502)

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|--------------------------|---|
| Course code | FT 502 |
| Course title | Fruit and Vegetable Processing |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | <ol style="list-style-type: none"> 1. This course enables students to know importance of vegetable and fruit processing. 2. To acquaint students with processing steps involved in vegetables and fruit. 3. To familiarise students with the development in the processing field. |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Properties of fruits and vegetables for processing. 2. Processing steps and parameters for sorting, washing, handling, peeling, slicing, blanching, mixing, chilling, packaging, transportation and storage. 3. Dehydration of fruits and vegetables, different methods of dehydration. 4. Beverage preparation, preservation of fruits using sugar, vegetable pickling. 5. Canning : Processing steps and equipments. 6. Nutrient losses during processing and fortification. 7. Online quality control during processing. <p>Practical :</p> <ol style="list-style-type: none"> 1. Sorting, grading, blanching, lye peeling of fruits and vegetables. 2. Canning of fruits and vegetables. 3. Identification and establishment of critical control points in the processing of fruits and vegetables. 4. Production of various fruit and vegetable products on laboratory scale. 5. Visits to commercial fruit and vegetable processing plants. |
| References : | <ol style="list-style-type: none"> 1. Salunkhe DK (1974) : Storage, Processing and Nutritional Quality of Fruits and Vegetables, CRC Press. |

| | <ol style="list-style-type: none"> 2. Girdharilal (1967) : Preservation of Fruits and Vegetables. 3. <u>Thompson AK (2003): Fruit and Vegetables: Harvesting, Handling and Storage, 2nd Edition, Blackwell Publishing Ltd., Oxford.</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Course outcomes (CO) | <p>CO1: Apply basic principles of fruit and vegetable processing in food product development</p> <p>CO2: Skill to develop various fruits and vegetable processed products</p> <p>CO3: Skill to operate the equipment related to canning and other processing</p> <p>CO4: Knowledge and skill to manufacture dehydrated fruits and vegetable products</p> <p>CO5: Skill to develop quality analysis of various fruits and vegetable products</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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Sports and Geriatric Nutrition (HN 501)

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| Course code | HN 501 |
| Course title | Sports and Geriatric Nutrition |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | <ol style="list-style-type: none"> 1. To gain the knowledge and understanding of nutrition required for exercise and sport in order to enhance performance. 2. To learn the role and significance of macro nutrients and micronutrients in achieving fitness. |
| Course content | <p>Theory:</p> <p>I : Sports Nutrition:</p> <ol style="list-style-type: none"> 1. Introduction to sports nutrition. 2. Historical approaches to exercise and nutrition 3. Role of carbohydrates :Factors affecting utilization of carbohydrates during exercise, Exercise intensity, Effect of training, Carbohydrate supplementation during exercise, Lactate production, CHO requirements, Quality concerns. 4. Role of lipids and lipoproteins : Fat as a fuel, Fatty acid oxidation, Strategies to improve fatty acid oxidation., Physical training, Overall fat intake, Influence of dietary factors on fat utilization., Total fat intake. 5. High carbohydrate diets, Dietary fiber, Alcohol, Influence of exercise, Type of exercise, Gender influence, Lipid metabolism, Weight loss <p>II : Geriatric Nutrition:</p> <ol style="list-style-type: none"> 6. Definition of ageing, senescence, old age or aged people, gerontology, geriatrics and Geriatric nutrition. Classification of old population. 7. Physiological and biochemical changes during old age. 8. Assessment of nutritional status of older adults. 9. Nutritional requirements and general dietary guidelines for elderly |

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| | 10. Major nutritional and health problems during old age. Practical : 1. Visit to a Gym 2. Planning a meal for sports man and sports woman: indoor and outdoor sports 3. Planning & preparation of sports drinks 4. Planning & preparation a meal for old male and female | | | | | | |
| References : | 1. Bernadotdan (1999) Nutrition for Serious Athletes , Human Kinetics USA. 2. Brouns Fred and Caustan – Cargill (2002) 3. Essentials of Sports Nutrition– 2 nd edition John Wiley and Sons, England. 4. Burke Louse and Deakin Vicky (2006) 5. Clinical Sports Nutrition , McGraw – Hill Pvt. Ltd. Australia. 9 Summerfield Lianne M (2001), 6. Nutrition Exercise and Behavior An integrated approach to weight management, Belmont (USA). Wadsworth/Thompson Learning Wolinsky Ira (1998) 7. Nutrition in Exercise and Sports CRC press Boca Raton Wolinsky Ira, Drishill Judy (1997) 8. Sports and Nutrition Vitamins and Trace elements , CRC Press BY Wolinsky Ira, Driskell J (2004), 9. Nutritional Ergogenic Aids , CRC Press NY. | | | | | | |
| Course outcomes (CO) | CO1: Understanding sports and geriatric nutrition CO2: Knowledge of macro and micro nutrition with respect to sports CO3: Understanding physical and physiological issues of elderly people and their nutrition related problems | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |

Therapeutic Nutrition (DT 501)

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|--------------------------|---|
| Course code | DT 501 |
| Course title | Therapeutic Nutrition |
| Course credit | 3 (2+1) |
| Teaching per week | 4 h |
| Course objectives | 1. To gain Knowledge on dietary modifications for specific group and in various diseases. 2. To be able to plan and prepare diets for specific group and various diseases. |
| Course content | Theory : 1. Diseases of liver : Functions of liver, Causes of liver damage, Etiology, symptoms and dietary management in : Viral hepatitis, Cirrhosis of liver, Hepatic coma. 2. Diseases of Renal System : Functions of kidney (review), tests used for Kidney functions, etiology, symptoms and dietary management in - nephritis, nephritic syndrome, nephrolithiasis, renal failure and dialysis, low sodium diets, level of sodium restriction. |

| | <ol style="list-style-type: none"> Diseases of cardiovascular system : Introduction, risk factors, dietary management, specific food, dietary guideline, hypertension (high blood pressure), hyperlipidaemia Diet in diabetes mellitus : Introduction, Classification, Etiology, Symptoms, Diagnostic Tests, Glycemic index of foods, Dietary management, Diabetic diet. Diet in cancer : Introduction, Etiology, Symptoms, Dietary Management, Special food for cancer prevention <p>Practical :</p> <ol style="list-style-type: none"> Plan and prepare diets for liver diseases: Viral hepatitis, hepatic coma. Plan and prepare diets for renal diseases : Nephritis, renal failure (using protein and sodium food exchange), nephrolithiasis , nephritic syndrome. Plan and Prepare diet for cardiovascular diseases : Congestive heart failure, hypertension. Plan and prepare diets for diabetes mellitus using food exchanges. | | | | | | | | | | | | | | | | | | | | | |
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| References : | <ol style="list-style-type: none"> Cataldo Debryne : Nutrition and Diet Therapy, 6th Edition, Whitney Wodawath Pub. Co. Allerson L, Dibble MV and Turkki PR (1982) : Nutrition in Health and Disease. Antia FP (1973) : Clinical Dietetics and Nutrition, 2nd Edition, Oxford University Press, Delhi. Mahan LK and Arlin MT (1992) : Krause's Food Nutrition and Diet Therapy, 7th Edition, WB Saunders Co., London. Robinson CH, Lawler MR, Chenoweth WL and Gaewick AE (1986) : Normal and Therapeutic Nutrition, 17th Edition, McMillan Pub. Co. Williams SR, Nutrition and Diet Therapy, 6th Edition, Times Moror Mosby College Pub., St. Louis. Raheenabegum (1989) : A Textbook of Food, Nutrition and Dietetic, Sterling Tata McGraw Hill Pub., New Delhi. Joshi SA (1992) : Nutrition and Dietetics, Tata McGraw Hill Pub, New Delhi. | | | | | | | | | | | | | | | | | | | | | |
| Course outcomes (CO) | <p>CO1: To understand the therapeutic concept of chronic disease</p> <p>CO2: To plan and prepare the therapeutic diet for acute disease</p> | | | | | | | | | | | | | | | | | | | | | |
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| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | | | | | | | | | | | | | | | | |
| CO1 | | | | | | | | | | | | | | | | | | | | | | |
| CO2 | | | | | | | | | | | | | | | | | | | | | | |

Hospital Dietetics and Patient Counselling (DT 502)

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|--------------------------|---|
| Course code | DT 502 |
| Course title | Hospital Dietetics and Patient Counselling |
| Course credit | 2 (1+1) |
| Teaching per week | 3 h |
| Course objectives | <ol style="list-style-type: none"> Understand the dietetic department in the hospital. Plan, organize/supervise, preparation and service of different kinds of therapeutic diets in hospitals dietary services. Develop skill for patient counselling. Interact effectively with patients and their families to give dietary advice, in the |

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| | contest of the patients socio cultural and economic milieu. | | | | | | |
| Course content | <p>Theory :</p> <ol style="list-style-type: none"> 1. Principles of hospital dietetics, dietician as a part of medical team and outreach services. 2. Dietetics department : Structure, administration and function, food service in hospital. 3. Clinical information : Medical history, assessment of patient profile, methods of dietary assessment - dietary diagnosis and test for nutritional status, correlating clinical and dietary information. 4. Patient education and counselling : Counselling process and its significance, assessment of patient needs, establishing rapport, counselling relationship, resources and aids to counselling. 5. Pre requisites and preparation for setting up a counselling centre. 6. Therapeutic adaptation to normal diet for : Consistency, temperature, nutrients and amount. 7. Modes of feeding : Enteral and parenteral feeding, composition of tube feeding. 8. Aesthetic attributes of diets, follow up visits and patients education. <p>Practical :</p> <ol style="list-style-type: none"> 1. Lay out of a dietetics department. 2. Modification and preparation of diets for therapeutic purposes in terms of consistency, nutrients, temperature and quantity. 3. Preparation of audio-visual aids for diet counselling. 4. Planning and preparation of diets for patients suffering from more than one diseases. 5. Visit to dietary department of a hospital: Observation of clinical signs and diet served / consumed by patient. 6. Case studies on dietary counselling for specific diseases: Nutritional and biochemical profile, therapeutic modification of diets, report writing. 7. Organizing counselling camps for specific diseases like GIT disorders, renal disorders, liver diseases, cardio-vascular diseases, hormonal- metabolic disorders, protein energy malnutrition, iodine deficiency disorders. | | | | | | |
| References : | <ol style="list-style-type: none"> 1. Dryden W (1989): Counselling Individuals: The Rationale Motive Approach, Taylor Francis, London. 2. Dave Indu (1984) : The Basic Essential of Counselling, Sterling Pub. Pvt. Ltd., New Delhi. 3. Barki BCand Mukhopadhyay B (1989) : Guidance and Counselling, A Manual Sterling Pvt. Ltd., New Delhi. | | | | | | |
| Course outcomes (CO) | <p>CO1: Understand the dietetic department structure and role of their staff</p> <p>CO2: Aware about how to do patient counselling</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |

Semester VI

Training and Project Report (TP 601)

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| Course code | TP 601 | | | | | | |
| Course title | Training and Project Report | | | | | | |
| Course credit | 20 (0+20) | | | | | | |
| Teaching per week | 40 h | | | | | | |
| Course objectives | <ol style="list-style-type: none"> 1. To develop knowledge and specific skills of working in hospitals as dietician. 2. To develop knowledge and specific skills of working in food industry. | | | | | | |
| Course content | <p>Practical :</p> <ol style="list-style-type: none"> 1. The students will be placed for on the job training at government, semi government, charitable trust, public limited, private hospital or any other institutes related to field for a period of 12 weeks. Where they will be exposed to and will be trained in the following areas : <ol style="list-style-type: none"> (i) Hospital administration, function, structure with special reference to dietetics. (ii) Food service in hospital, feeding methods. (iii) Patient counselling. (iv) Processing of food products (v) Machinery and plant operations of food industry (vi) Quality assurance area of nutraceuticals, functional food, health food, specialized food etc. 2. Report writing and presentation of on the job training. Evaluation will be based on trainees' performance at the training place as well as on report and presentation before a panel of experts as decided by the Principal. | | | | | | |
| References : | - | | | | | | |
| Course outcomes (CO) | <p>CO1: Develop knowledge and experience of hospital and food industry management and their running process</p> <p>CO2: Expose to the industrial production of food products</p> <p>CO3: Familiarization with various equipment's, methods and processing operations</p> <p>CO4: Explore the packaging, product development, quality control and project related activities at industry</p> <p>CO5: Assessing the interests and abilities in food processing field and hospital field and explore career alternatives</p> | | | | | | |
| Mapping between COs and PSOs | | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| | CO1 | | | | | | |
| | CO2 | | | | | | |
| | CO3 | | | | | | |
| | CO4 | | | | | | |
| | CO5 | | | | | | |