Sant Gadge Baba Amravati University

Faculty: Interdisciplinary Studies

Two Years- Four Semesters Master's Degree Programme

NEPv23 (with **Exit and Entry Option)**

M. Sc H o m e S c i e n c e (Food Science and Nutrition) First Year Semester - I

Part A

Programme: MSc (Home Science) Food Science and Nutrition

Programme Outcomes

1. Develop interdisciplinary and intra disciplinary skills which enable students for knowledge acquisition
2. Enable to pursue higher education and research
3. Facilitate students for betterment of individual and community through health and nutrition promotion
4. Provide scope to develop self-dependency among the desirous students to set up their own enterprise in the field of food and nutrition
5. Make students competent to work at local, regional, national and international level

Programme Specific Outcomes

1. Acquire comprehensive and advanced knowledge in the field of Food Science and Nutrition
2. Develop capacity to explore opportunities in scientific research in the subject related areas
3. Understand the physiology, biochemical markers in disease conditions and plan diets considering the modified nutrient requirements
4. Facilitate analytical and technical skills in food formulations, nutrient estimations, food processing, and food preservation to work as skilled human resources in the food and health sectors
5. Boost the communication skills, presentation skills, oratory skills and technological skills among students
6. Perceive the role and responsibilities of dietitian and nutritionist in different healthcare organizations
7. Develop the necessary skills for diet planning and diet counselling for patients
8. Get acquainted with food processing and preservation techniques along with learning food safety and quality management issues
9. Provide scope for trainings and internships to get real exposure to work environment and professional abilities
10. Enable to explicitly formulating and analyzing value added and innovative products

Employability Potential of the Programme:

A master's degree in Food Science and Nutrition entails studying a generalized version of the field as well as associated areas including community nutrition, food service management, human nutrition, food processing and preservation etc. Therefore, it offers many career alternatives to consider for e.g. working in food sector or health sector, become an academician, set up own clinic, working with agencies related to community welfare etc.

Acquiring post graduate degree in Food Science and Nutrition opens the door for the higher qualification PhD degree and research. The students can also avail fellowships and scholarships for research and pursuing higher education. Various employment opportunities are available in the field of research as a Project fellow, project assistant, research associate, scientific officer, technical assistant, project trainees in the government funded projects or sponsored projects by various agencies or in research institutions or in the universities.

Post graduate degree is a prerequisite for the adoption of academic jobs in the colleges and Universities. students are eligible to appear for the National Eligibility Test (NET) and State Level Eligibility Test (SLET) for teaching profession in higher education institutes which offer post graduate degree, graduate degree, diploma and certificate courses in Food Science and Nutrition.

Students of Food Science and Nutrition can opt for a very lucrative career as a dietitian or diet/nutrition consultants by offering their expertise in the government hospitals, private hospitals, clinics, nursing homes, where they can plan diet for the patients, manage dietetic departments and counsel patients. Their primary responsibility is to help people regarding the proper nutritional care and adopt wholesome eating practices. By raising awareness about diet and nutrition as well as promoting healthy eating practices for the prevention or treatment of particular diseases, the profession works for the better health of the people.

In health clubs, wellness clinics and in fitness centers, students can work as a diet counsellor, wellness coach, lifestyle expert, and trainers. People now a day are health conscious and to lead a healthy lifestyle, they prefer an expert advice. Students have tremendous opportunities in this sector and can also work as a freelancer and can set up their own nutrition clinic or diet clinic and give diet prescription.

In this technological era, many ventures are offering online diet and nutrition consultation through specifically designed applications (Apps) and software. Various companies provide job opportunities to dietitians and nutritionists for online consultation. Students have scope to develop their own diet and nutrition based fitness programs and can launch their own application (Apps) and software as a Startup. Students of Food Science and nutrition well versed with the oratory and presentation skills can opt for use of social media platforms like YouTube and Facebook and can be a content creator. Students have good opportunity as a writer to produce books, articles, promos, and television programmes on the best nutritional practices on television, radio, magazines and newspapers. Also, they can choose to become a food blogger and explore many new things.

Institutions for old age people, residential institutions for students like hostels, schools and corporate kitchens, industrial kitchen, rehabilitation centers and hotels offers professional opportunities for students as a nutrition expert and advise various target groups about the healthy eating habits and proper nutrition.

Students have an opportunity to be a part of the team in the development of the production procedures and recipes for food and drink items as well as work as food technologists to guarantee that food products are safe and adhere to strict requirements. Many private and public agencies hire food safety inspectors to make sure that laws governing food safety and food processing are being followed. Also, the restaurants and other food service establishments must be inspected by state health officials for food safety so students can take up career as food safety officer.

Students may decide to pursue a career as a culinary expert and work in the various food industries, food service establishments or education/communication where they can develop nutritional recipes, plan nutritious menus or organize cooking shows. In various establishments having large scale kitchens, students can work as production managers to make sure goods and services are produced safely, cost-effectively and on time and meet the required quality standards.

Students can pursue a career as a public health nutritionist, which will allow them to play a significant part in the creation of various nutrition interventions to address nutritional concerns on a wide scale and play a crucial role in the growth and development of the vulnerable groups, such as children and women in the reproductive age group.

Students who successfully complete the Food Science and Nutrition programme may work for national and international agencies such as UNICEF (United Nations Childrens' Fund), Save the Children, United Nations Development Programme, World Food Programme etc. Students have career in government sector in the Department of Women and Child Development as ICDS project officers, superintendent and probationary officers, can be a part of nutrition surveillance programmes as Project workers for carrying out surveys and facilitators for nutrition education programmes. There is an opportunity to join Krishi Vigyan Kendra as a Subject Matter Specialist and work at grass root level for nutritional as well as financial upliftment and empowerment of rural women.

There is a tremendous scope for self-employment for the students after completing the course in Food Science and Nutrition. They can set up home industry for Processed products, value added food products, nutrient

enriched mixes, therapeutic food products and recipes for various nutritional disorders and diseases. They can set up their own catering unit to serve ready to eat foods, packed meals, packed lunches for schools, canteens, hospitals and other institutions. Students can also make careers as skill trainers in cookery, bakery and home scale preservation.

To sum up, students opting for the post graduate degree in Food Science and Nutrition have many different kinds of career opportunities as listed –

- Perusing Higher degree (Ph.D)
- Research
- Academician
- Dietitian
- Nutritionist
- Freelance diet consultants
- Wellness coach
- Lifestyle experts
- Content creator in Food and Nutrition
- Food bloggers
- Nutrition experts in various institutions
- Food safety inspectors
- Culinary experts
- Food product developer
- Public health nutritionists
- ICDS and Government Schemes
- Subject matter specialist in KVK
- Skill trainers in cookery, bakery and home scale preservation
- Self-employment

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M. Sc. H o m e S c i e n c e (Food Science and Nutrition) First Year Semester- I

Part B

NEPv23 Syllabus Prescribed for First Year PG Programme

Programme: MSc (Home Science) Food Science and Nutrition

Semester 1

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 101	**Research Methodology and IPR**	**60**

Course Outcomes

After completion of the course students will -

1. Acquaint with the research and its types
2. Apply the techniques of research methodology
3. Use the knowledge of intellectual property right

Unit	Content	Periods
Unit I	**Introduction to Research** Research – meaning and definition, Importance of research in the developmental context Research process	10
Unit II	**Research Design and Sampling** Meaning, Basic components of research design and types of research design Concept of Population and Sample, Characteristics of good sample Sample Design - Types and procedure of drawing Probability sampling and Non probability sampling	12
Unit III	**Data Collection** Concept of data, Types of Data – Qualitative and Quantitative data, Primary and Secondary data Levels of data measurements Construction of measurement scales- Rating scale, Attitude scale Tools of data collection and their uses - Questionnaire , Schedule, Interview – structured and unstructured , Observation – participant and non-participant	12
Unit IV	**Descriptive and Inferential Analysis of Data** Measures of central tendency-mean, median, mode-arithmetic mean and its uses Measures of dispersion /variability- range, variance, standard deviation, standard error, coefficient of variation, Large and Small Sample tests and interpretation Coefficient of correlation, t tests, Z test, F test, ANOVA Application of non-parametric tests ·Chi square test ·Spearman's Rank correlation	14
Unit V	**Intellectual Property Right** Concept of IPR Kinds of IPR- Patent, Copyright, Trademark, Design, Geographical indication. IT Act 2000 World Intellectual Property Organisation (WIPO)	12

Course Material/Learning Resources
References

1. Devadas.R., 2000.A Handbook on methodology of Research, Sri Ramakrishna Vidyalaya, Coimbatore,
2. Gupta.S.P., 2002 .Statistical Methods, Sultan Chand & Sons, New Delhi,
3. Srivastava.A.B.L and Sharma. K.K., 2003 .Elementary Statistics in Psychology and Education, Sterling Publishers Pvt.ltd.
4. Kothari.G.R., 2004 Research Methodology, Methods and Techniques, Wiley EasternLimited, New Delhi,
5. Gosh.B.N., 2006. Scientific Methods and Social Research Sterling Publishers Pvt.ltd.,New Delhi.
6. Kulbir Singh. S., 2006 Methodology of Research in Education Sterling PublishersPvt. Ltd., New Delhi.
7. Coolican, H. 2014. *Research methods and statistics in psychology* (6th ed.). Psychology Press.
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9. Wilkinson, T.S. and Bhandarkar, P.L. Methodology and Techniques of Social Research, Himalaya Publishing House, Bombay.
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Programme: MSc (Home Science) Food Science and Nutrition

Semester 1

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 102	**Food Science**	**60**

Course Outcomes

After completion of the course students will -

1. Use the theoretical knowledge in various application and food preparations
2. Apply the knowledge of cooking methods and evaluation of food
3. Learn to grade the raw and processed food product

Unit	Content	Periods
Unit I	Basic concept and definitions of food science Food dispersions - Types of food dispersion sol, gel, emulsion and foam, Colloidal systems Cooking – Preliminary preparation, Dry heat and moist heat cooking methods Microwave cooking, Ohmic cooking, Induction cooking, Solar cooking Merits and demerits of different cooking methods	12
Unit II	Cereal, Millets and their Products Structure, composition and nutritive value of cereals and millets Gluten formation, Gelatinization, Dextrinization Flour Mixtures – Batters and Doughs Fermented and unfermented cereal products, Leavening agents – types Role of cereals and millets in cookery Sugars - Different forms of sugars, Stages of sugar cookery Factors affecting crystallization, crystallized and non- crystallized candies Role of sugar in cookery	12
Unit III	Pulses, Nuts and Oil seeds - Composition and nutritive value, toxic constituents present and processing Soaking, germination and fermentation of pulses Role of pulses, nuts and oilseeds in cookery Egg, Meat, Fish and Poultry - Structure, composition, nutritive value, preservation and storage Quality of egg and role of egg in cookery Aging, tenderizing, and curing of meat Post mortem changes in meat, changes of meat during cooking Different methods of cooking egg, meat, fish and poultry Role of egg, meat, fish and poultry in cooking	12
Unit IV	Fats and oils - Composition, nutritional importance, processing and refining of fats Hydrogenation, smoking point, Rancidity and storage of fats Role of fat in cookery Milk and milk products - Composition and nutritive value Types of milk and milk products, effect of heat on milk Processing of milk - Homogenization, Evaporation, Drying and fermentation Pasteurization of milk, Cheese making, Role of milk in cookery	12
Unit V	Vegetables and Fruits - Classification, composition, nutritive value, selection and storage Pigments present in vegetables and fruits Effect of different cooking methods, acid and alkali on pigments Enzymatic and non- enzymatic browning Beverages - Classification, Alcoholic beverages, carbonated and non-carbonated beverages Composition and phenolic compounds in beverages -coffee and tea Spices and Condiments - Active components present, use of spices and condiments in Indian cookery	12

Course Material/Learning Resources

References

1. Charley, H (1982) Food science (2nd edition) John Willey & Sons, New York, ISBN no- 0471097209
2. Potter, N and Hotchkins, JH (1996) Food science fifth edition, CBS publishers and Distributors New Delhi
3. Pomeranz'y (Ed) (1981) functional properties of Academic Food components (2nd edition) press, New York
4. .ISBN no. 13: 9780125612807
5. Fulters G W (1999) New food product Development, From concept to market place CRC press, New york.
6. ISBN-13 978-01995 6689)
7. Sunetra Roday, Food Science & Nutrition. Oxford University process ISBN 13- 978-0199489089
8. Peckham G. and Freeland Grages G.H. (1979) Foundations of Food Preservations
9. Meyer L.H. (1998) Food Chemistry. CBS publishers and distributors, Shahdara, Delhi 110032
10. Manay M.S., Shadaksharaswamy M. (1997) Food Facts and Principles. 3rd edition, New Age International (P) Ltd. publishers, New Delhi

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Programme: MSc (Home Science) Food Science and Nutrition

Semester 1

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN103	**Clinical Nutrition and Dietetics - I**	**60**

Course Outcomes
After completion of the course students will -

1. Perceive the principles of diet therapy and modification of normal diet for therapeutic purpose
2. Correlate the physiological conditions with the altered dietary requirements
3. Describe foods allowed and restricted in different disease conditions

Unit	Content	Periods
Unit I	Definitions and concepts– Food, Nutrition, Therapeutic nutrition, Dietetics Dietitian – Qualifications, types of dietitians, Role and responsibilities of dietitian in hospital and community Diets – Balanced diet, basic and therapeutic diets Nutritional screening and assessment of nutritional status of hospitalized and outdoor patients	**12**
Unit II	**Medical Nutrition Therapy for fevers, infections and trauma conditions** Etiology, signs and symptoms, complications, Nutritional care and medical management for Fevers - Acute and Chronic; Typhoid, Tuberculosis Infections – HIV/AIDS, SARS-CoV-2 Preoperative and post-operative diets Diet for trauma care and Burns	**12**
Unit III	**Medical Nutrition Therapy for Upper Gastro Intestinal Tract Disorders** Etiology, signs and symptoms, complications, Nutritional care and medical management for upper gastro intestinal tract disorders Disorders of Oesophagus – Oesophagitis, Hiatal Hernia Disorders of Stomach – Indigestion/Dyspepsia, Gastritis, Peptic Ulcer and Duodenal Ulcer, Dumping Syndrome	**12**
Unit IV	**Medical Nutrition Therapy for Lower Gastro Intestinal Tract Disorders** Etiology, signs and symptoms, complications, Nutritional care and medical management for lower gastro intestinal tract disorders Disorders of Small Intestine and Colon - Intestinal Gas and Flatulence, Constipation, Diarrhoea, Steatorrhoea, Celiac Disease, Irritable Bowel Syndrome, Diverticular Disease Inflammatory Bowel Disease: Ulcerative Colitis, Crohn's Disease	**12**
Unit V	**Nutritional Anemias and Neurologic Disorders** - Etiology, classification, signs and symptoms, complications, nutritional care and Medical Nutrition Therapy **Nutrition for oral and dental health, Allergies and Migraine**	**12**

Course Material/Learning Resources

References:

1. Antia F.P. and Philip Abraham (2001) Clinical Nutrition and Dietetics, Oxford PublishingCompany.
2. B. Srilakshmi, (2007): Dietetics, published by K.K. Gupta for New Age International Pvt.Ltd. New Delhi.
3. Benion M.: Clinical Nutrition, Harper and Row Publishing M.Y.
4. Gopalan C., Ram Sastri B.V. and Balsubramaniam S.C., (2006) Nutritive Value of Indian Foods, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research.
5. Mahan L.K., Sylvia Escott-Stump (2000): Krause's Food Nutrition and Diet Therapy 10thEdition, W.B. Saunders Company London.
6. Passmore P. and M.A. East Wood: Human Nutrition and Dietetics, Churchill LivingStone.
7. Raheena M. Begum (1989):A Text Book of Foods Nutrition and Dietetics, WileyEastern Ltd., New Delhi.
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10. WohlShilsand Goodheart: Modern Nutrition in Health and Disease, McLArenandUbrman, Philadelphia.

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Programme: MSc (Home Science) Food Science and Nutrition

Semester 1

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 104	**Advance Nutrition**	**45**

Course Outcomes

After completion of the course students will -

1. Learn the human nutritional and energy requirements and basis for recommendations of nutrients
2. Describe the nutritional significance of macro and micronutrients and changing trends in dietary intake
3. Know the sources and bioavailability of macro and micronutrients

Unit	Content	Periods
Unit I	**Nutrition and Human Nutritional Requirements** Basic concepts and History of Nutrition Human Nutritional Requirements, Methods determining human nutrient needs Description of basic terms and concepts in relation to human nutritional requirements, guidelines and recommendations **Body Composition** Significance of body Composition, Methods of assessment and factors affecting body composition	**9**
Unit II	**Human Energy Requirements** Components of energy requirement- factors affecting energy expenditure and requirement. Methods of estimation of energy expenditure and requirement **Carbohydrates** Classification, Food sources and functions Digestion, absorption, storage and utilization, Regulation of bold glucose Dietary fiber, Resistant Starch,	**9**
Unit III	**Proteins and Amino acids** Classification, Food sources, Functions, Digestion and absorption Essential and non-essential amino acids, Evaluation of protein quality Lipoproteins **Fats and fatty acids** Classification, Food sources and functions, Digestion, absorption, storage and utilization Nutritional significance of fatty acids-SFA, MUFA, PUFA Trans fats	**9**
Unit IV	**Vitamins** Functions, storage, bioavailability, sources, deficiency, toxicity and Recommended Dietary Allowances Water soluble vitamins - B complex and C Vitamin**,** Fat soluble Vitamins - A,D, E and K **Minerals** Functions, storage, bioavailability, sources, deficiency, toxicity and Recommended Dietary Allowance Macro minerals - Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chloride Micro minerals - Iron, Copper, Manganese, Iodine, Fluoride, Zinc, Selenium, Chromium, Molybdenum	**9**
Unit V	**Water** Functions of water in the body Water distribution and compartments of body water, Water balance Requirements of water and disturbances in fluid balance **Anti-nutritional factors in foods** Phytates, Oxalates, Hemaglutinins, Saponins, Goitoestrogens, Cyanogenic glucosides, Trypsin inhibitors, Tannins	**9**

Course Material/Learning Resources

Reference:

1. Conn, E.E., Stumpt. P.K. Bruening G. and Doi, R. H. (2001) 5th Ed. Outlines of Biochemistry, John Wiley and Sons.
2. Devlin, T. M. (1947): 4th Ed. Text book of Biochemistry with Clinical Correlations, Wiley Liss Inc.
3. Shils, M.E.; Olson, J.; Shike, M. and Roos, C. (1998): Modern Nutrition in Health and Disease. 9th edition. Williams and Williams. A Beverly Co. London.
4. Indian Council of Medical Research. Nutritive Value of Indian Foods – Latest Publication.
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8. Voet D. Voet, J.G. & Prat. C.W. (1999): Fundamentals of biochemistry.
9. Winton, A.L., and Winton, K.B., (1999) Techniques of Food Analysis Allied Scientific Publishers.
10. Indian Council of Medical Research. Recommended Dietary Intakes for Indians - Latest Recommendations

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Programme: MSc (Home Science) Food Science and Nutrition

Semester 1

Code of the Course/Subject	Title of the Course/Subject	(Total Number of Periods)
FSN 105 A	**Applied Physiology**	**45**

Course Outcomes

After completion of the course students will -

1. Know the alteration of structure and functions in various organs and systems in disease conditions
2. Get insight into role of enzyme and hormones in digestion and absorption
3. Learn the mechanism of regulation of various physiological conditions

Unit	Content	Periods
Unit I	• **Cell and Tissue** Structure and function of cell, transport across cell membrane and intracellular communication, Formation of tissue, organ and system • **Musculoskeletal system** Types of muscle (Skeletal, smooth and cardiac muscles) their properties, characteristics, structure and function.	9
Unit II	• **Endocrine system** Endocrine glands- structure, function, role of hormones, regulation of hormonal secretion, Disorders of endocrine glands • **Nervous system** Structure and function of brain, spinal cord, neuron, neurotransmitters Nerve impulse – Afferent and Efferent nerves Hypothalamus and it's role in various body functions obesity, sleep and memory	**9**
Unit III	• **Digestive system** Introduction and function of digestive system Salivary gland and it's secretion, stomach it's section, pancreas, bile, small intestine, large intestine. The role of enzyme and hormones in digestion and absorption • **Excretory system** Structure and functions of kidney, Urine formation Role of kidney in maintaining pH of blood Electrolyte and acid base balance	9
Unit IV	• **Respiratory system** Review of structure and function. Role of lungs in the exchange of gases Transport of oxygen and carbon dioxide, Respiratory quotient • **Circulatory system** Structure and function of heart and blood vessel Regulation of cardiac output and blood pressure, heart failure, hypertension	9
Unit V	• **Blood** Formulation, function and composition of blood Hematopoiesis, erythropoiesis and leukopoiesis Blood clotting, hemoglobin synthesis • **Immune system** Natural immune system, cell mediated and humoral immunity, components of immune mechanism Activation of WBC and production of antibodies	9

Course Material/Learning Resources

Reference:

1. Ganong. W.F. (1985): Review of Medical Physiology, 12 th Edition, Lange Medical Publication.
2. Moran Campell E. J., Dickinson, C.J., Slater, J.D., Edwards, C.R.W. and Sikora, K. (1984): Clinical Physiciology, 5 th Edition, ELBS, Blackwell Scientific Publications.
3. Guyton. A.C. (1985): Function of the Human Body, 4 th Edition, B. Sanders Company, Philadelphia.
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5. Wilsion. K. J. W. and Waugh. A (1996): Ross and Wilson Anatomy and Physiology in Health and illness. 8 th Edition. Churchill Livingstone.
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Programme: MSc (Home Science) Food Science and Nutrition

Semester 1

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 105 B	**Approaches in Nutrition**	**45**

Course Outcomes

After completion of the course students will -

1 Comprehend the basic approaches in nutrition for development

2 Use the proper nutrition approach for awareness in the individual and community

3 Prepare the projected and non projected aids according to the necessity

Unit	Content	Periods
Unit I	Participatory learning – Meaning and principles Participatory Approach - Promoting participation, Community participation and mobilization, solutions to the community participation	9
Unit II	Traditional Approach – Meaning and advantages of Instructional approach and folk approaches including folk music, ballad form, puppets, Impact of modern electronic media on folk approaches Efficacy of traditional approaches	9
Unit III	Modern Approaches – Meaning and advantages of Analytical approach, dialogue approach, persuative approach, and educational games	9
Unit IV	Presentation of traditional and modern approaches as per the set norms Mode of operation of various traditional and modern approaches Role of nutrition and health educator in selecting the approach	9
Unit V	Tools of communication Preparation and presentation of communication tools Projected aids Non projected aids Advantages and disadvantages of projected and non projected aids	9

Course Material/Learning Resources

Reference:

1. Maan, Gurmeet Singh (1987) The Story of Mass Communication :An Indian Perspective. New Delhi, Harnam Publishers.
2. Tiwari I.P. (1987) Communication Technology and Development.New Delhi, Ministry of Information and Broadcasting.
3. Sharma S.C. (1987) Media Communication and Development. Jaipur,Rawat Publishers.
4. Gamble M.W. and Gamble T.K. (1989) Introducing MassCommunication. IInd Ed. New York, MaGraw Hill Book.
5. Day P.R. (1977) Methods of Learning Communication Skills. Oxford,Peragamon.
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11. Mahajan K. (1990) Communication and Society. New Delhi, ClassicalPublications

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Semester 1

Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)	No. of Periods/Week
FSN 106	**Food Science Practical**	**2/Week**

Course Outcomes

By the end of the Lab/Practical Course, generally students will -

1. Define the use of cereal, millet and pulse flours in the cookery
2. Apply the knowledge of sugar cookery in the development of various recipes
3. Prevent the undesirable changes in vegetables and fruits due to browning

*** List of Practical/Laboratory Experiments/Activities etc.**

1	Cereal cookery – Gelatinization of starch, bread making, fermented and leavened cereal and millet products
2	Sugar cookery - Stages of sugar cookery, crystallization of sugar, crystalline and non-crystalline candies
3	Use of pulse flours in recipes and experiments with eggs to study the properties of coagulation, foaming, emulsifying agent and leavening agent
4	Fats and Oils – Smoking temperatures ,factors affecting absorption of fat
5	Preparation and evaluation of recipes out of milk, meat and poultry
6	Factors affecting colour, texture and flavour of vegetables and fruits, browning reactions

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Semester 1

Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)	No. of Periods/Week
FSN 107	**Clinical Nutrition and Dietetics – I Practical**	**2/Week**

Course Outcomes

By the end of the Lab/Practical Course, generally students will -

1. Modify regular diets and apply the principles of nutrition and menu planning for therapeutic diets
2. Plan appropriate diets for patients with necessary dietary instructions
3. Prepare planned diets and evaluate

*** List of Practical/Laboratory Experiments/Activities etc.**

1	Preparation of regular, clear liquid, full liquid, soft diets and mechanically altered diets
2	Planning and preparation of diets/recipes in fevers, infections and burns
3	Planning and preparation of diets in upper gastrointestinal tract diseases
4	Planning and preparation of diets in lower gastrointestinal tract diseases
5	Planning and preparation of diets in conditions of nutritional anemias, neurologic disorders, dental problems and allergies

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Semester 1

Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)	No. of Periods/Week
FSN 108	**Advance Nutrition**	**2/Week**

Course Outcomes

By the end of the Lab/Practical Course, generally students will -

1. Learn the methods of assessment of energy expenditure to be applied in diet planning
2. Critically evaluate the dietary guidelines and recommendations
3. Illustrate the food sources of various nutrients and application of glycemic index of foods

*** List of Practical/Laboratory Experiments/Activities etc.**

1	Critical review of dietary allowances of micronutrients for all age groups
2	Critically evaluate national and international dietary guidelines.
3	Qualitative analysis of macronutrients
4	Methods of calculating energy expenditure for assessing energy requirement
5	Enlisting high and low glycemic index rich foods.

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Semester 1

Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)	No. of Periods/Week
FSN 109 A	**Applied Physiology**	**2/Week**

Course Outcomes

By the end of the Lab/Practical Course, generally students will -

1. Record blood pressure using various apparatus
2. Precisely measure heart rate, pulse rate and oxygen level in the blood
3. Know the various laboratory tests

*** List of Practical/Laboratory Experiments/Activities etc.**

1	Measurement of blood pressure by manual and digital apparatus
2	Measurement of heart rate and pulse rate oxygen level in the blood
3	Performance of Step test, trade mill test
4	Hemoglobin estimation
5	Visit to organizations/ laboratories conducting tests related to physiology

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Semester 1

Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)	No. of Periods/Week
FSN 109 B	**Approaches in Nutrition Practical**	**2/Week**

Course Outcomes

By the end of the Lab/Practical Course, generally students will -

1 Initiate the individual and community participation for nutritional awareness

2 Learn to choose and implement effective approach for nutrition education

3 Develop skills in preparation of projected and non projected aids

*** List of Practical/Laboratory Experiments/Activities etc.**

1	Develop and participate in any one traditional approach
2	Develop educational games related to food and nutrition
3	Prepare different types of puppets – String puppet, rod puppet, shadow puppet and hand puppet
4	Prepare one projected aid
5	Prepare one non projected aid

Sant Gadge Baba Amravati University

Faculty: Interdisciplinary Studies

Two Years- Four Semesters Master's Degree Programme

NEPv23 with **Exit and Entry Option**

M. Sc. H o m e S c i e n c e (Food Science and Nutrition) First Year Semester- II

NEPv23 Syllabus Prescribed for First Year PG Programme

Programme: MSc (Home Science) Food Science and Nutrition

Semester 1I

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 201	**Nutritional Biochemistry**	**60**

Course Outcomes

After completion of the course students will -

1. Gain knowledge on the concepts of biochemistry and metabolism of nutrients
2. Relate metabolism of different nutrients with dietary intake
3. Suggest preventive measures to overcome metabolic abnormalities

Unit	Content	Periods
Unit I	**Carbohydrate metabolism** Energy from dietary carbohydrate through Glycolysis, Tricarboxylic acid cycle Utilization of glycogen. Gluconeogenesis. Significance of Pentose phosphate pathway and glucoronic acid pathway Effect of starvation in Carbohydrate metabolism Inborn errors of carbohydrate metabolism	**12**
Unit II	**Protein and Amino acid Metabolism** Urea Biosynthesis - Transamination and Deamination, Nitrogen excretion and the urea cycle Essential and non-essential amino acids - Biosynthesis of the nutritionally non-essential amino acids Effect of starvation in protein metabolism Inborn errors of amino acid metabolism	**12**
Unit III	**Lipid metabolism** Biosynthesis and oxidation of saturated and unsaturated fatty acids, glycerides, phospholipids and cholesterol, bioenergetics Disorders of lipid metabolism, lipoproteins and their significance Inborn errors of lipid metabolism	**12**
Unit IV	**Vitamins** Review of chemistry of vitamins Biochemical role of water soluble vitamins - Thiamin, Riboflavin, Niacin, Pyridoxine, Folate, Cyanocobalamin, Ascorbic acid Biochemical role fat soluble vitamins - Vitamin A,D, E and K **Minerals** Review of chemistry of minerals Biochemical role of macro minerals - Iron, Copper, Selenium, chromium, Manganese, Iodine, Fluorine. Biochemical role of micro minerals - Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chloride	**12**
Unit V	**Enzymes** Classification, properties and mechanism of action Factors affecting enzyme activity- coenzymes and cofactors **Oxidative stress and Antioxidants** Free radicals – Sources, types and formation in biological systems Antioxidants – Classification, types, sources and defense against free radicals Role of free radicals and antioxidants in health and disease	**12**

Course Material/Learning Resources

Reference:

1. Conn, E.E., Stumpt. P.K. Bruening G. and Doi, R. H. (2001): 5th Ed. Outlines of Biochemistry, John Wiley and Sons.
2. Devlin, T. M. (1947): 4th Ed. Text book of Biochemistry with Clinical Correlations, Wiley Liss Inc.
3. King, E.J. and Wootton, I.D.P., (1956): 3rd Ed. Micro-Analysis in Medical Biochemistry, J. and A. Churchill Ltd.
4. Murray, R. K., Granner, D, K., Mayes, P.A. and Rodwell, VW. (2000): 25th Ed. Harpers Biochemistry, Macmillan Worth Publishers.
5. Nelson D. L. and Cox, M.M. (2000): 3rd Ed. Lehninger's Principles of Biochemistry, Macmillan Worth Publishers.
6. Plummer, D. T., (1987): 3rd Ed., An Introduction to Practical Biochemistry, McGraw- Hill Publishing Co. Ltd.
7. Raghuramulu, N., Madhavan Nair and K. Kalyanasundram, S. (1983) A manual of Laboratory Techniques NIN, ICMR.
8. Voet D. Voet, J.G. & Prat. C.W. (1999): Fundamentals of biochemistry.
9. Winton, A.L., and Winton, K.B., (1999) Techniques of Food Analysis Allied Scientific Publishers.
10. Varley, H., Goweklock, A.H. and Bell, M. (1980): 5th Ed. Practical Clinical Biochemistry, Heinemann Medical Books Ltd

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Programme: MSc (Home Science) Food Science and Nutrition

Semester 1I

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 202	**Clinical Nutrition and Dietetics – II**	**60**

Course Outcomes

After completion of the course students will -

1. Know the metabolic conditions of the lifestyle related diseases
2. Relate the causes, symptoms and onset of various diseases
3. Acumen the eating disorders and strategies to overcome

Unit	Content	Periods
Unit I	**Nutritional Care in Weight Management** Obesity– Etiology, Classification, Energy balance, Metabolic aberrations & clinical manifestations, Consequences/risk factors, Dietary modifications, Lifestyle modifications, Pharmaceutical management, Surgical management, Preventive aspects Underweight – Etiology, Metabolic aberrations & clinical manifestations, Dietary management	**14**
Unit II	**Nutritional Therapy for Liver, Biliary System and Exocrine Pancreas Disorders** Etiology, classification, risk factors, signs and symptoms, complications, Nutritional care and medical management for Liver diseases – Hepatitis, Cirrhosis and Hepatic Coma Gall bladder diseases - Cholelithiasis and Cholecystitis Pancreatic Disorders - Acute and Chronic Pancreatitis	**12**
Unit III	**Medical Nutrition Management of Metabolic disorder – Diabetes Mellitus** Prevalence, Etiology, Symptoms, Types, Factors affecting normal blood glucose levels, Diagnostic and screening criteria for diabetes, Complications of diabetes - macro and micro-vascular, Management of Diabetes, medications and Lifestyle modification, Meal planning approaches-Food exchange list, Glycemic index of foods,Sweeteners and sugar substitutes for - Type 1 Gestational Diabetes Mellitus - Type 2 Gestational Diabetes Mellitus - Gestational Diabetes Mellitus	**14**
Unit IV	**Nutrition and Cancer** Development and Characteristics of cancer, Etiology, Metabolic alterations during cancer - Cancer cachexia, Energy metabolism, Othermetabolic abnormalities, Sensory changes Cancer therapy - Chemotherapy, Radiation therapy, Surgery Nutritional considerations - Oral nutritional management, Enteral tube feeding, Totalparenteral nutrition	**10**
Unit V	Medical Nutrition Therapy for Pulmonary Diseases Relationship between nutrition and pulmonary system Medical nutrition therapy in - Aspiration, Asthma, Chronic Obstructive Pulmonary Disease, Cystic Fibrosis, lung cancer, Pneumonia, Respiratory failure	**10**

Course Material/Learning Resources

Reference Books:

1. Antia F.P. and Philip Abraham (2001) Clinical Nutrition and Dietetics, Oxford PublishingCompany
2. B. Srilakshmi, (2007): Dietetics, published by K.K. Gupta for New Age International Pvt.Ltd. New Delhi.
3. Benion M.: Clinical Nutrition, Harper and Row Publishing M.Y.
4. Gopalan C., Ram Sastri B.V. and Balsubramaniam S.C., (2006) Nutritive Value of IndianFoods, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research.
5. Mahan L.K., Sylvia Escott-Stump (2000): Krause's Food Nutrition and Diet Therapy 10thEdition, W.B. Saunders Company London.
6. Passmore P. and M.A. East Wood: Human Nutrition and Dietetics, Churchill LivingStone.
7. Raheena M. Begum (1989): A Text Book of Foods Nutrition and Dietetics, Wiley Eastern Ltd., New Delhi.
8. Robinson Ch., M.B. Lawlea, W.L., Chenoweth, and A.E., Carwick: Normal andTherapeutic Nutrition, Macmillan Publishing Company.
9. Sue Rodwell Williams, (1993): Nutrition, Diet Therapy, (7th Ed):W.B. SaundersCompany London.
10. WohlShils and Goodheart: Modern Nutrition in Health and Disease, McLArenand Ubrman, Philadelphia.

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Programme: MSc (Home Science) Food Science and Nutrition

Semester 1I

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 203	**Community Nutrition**	**45**

Course Outcomes

After completion of the course students will -

1. Describe and discuss concept of health with individuals, target groups and community
2. Plan, implement and evaluate nutrition education programmes for identified target groups
3. Use effective communication methods for disseminating nutrition and health information among people

Unit	Content	Periods
Unit I	Community Nutrition and Health Concept of community, concept of nutrition and its relation to health Definition and Concept of health, dimensions and determinants of health, Right to health, Indicators of health, concept of wellbeing Responsibility of health – Individual, community, state, international Demographic profile and vital statistics	9
Unit II	Problems in Human Nutrition – Low birth weight, Protein energy malnutrition, Vitamin A deficiency, Nutritional anemia, Iodine deficiency, Fluorosis, Lathyrism Strategies to combat Nutritional Deficiencies- vitamin A Prophylaxis Programme, prophylaxis against nutritional anemias, control of Iodine deficiency disorders	9
Unit III	Nutrition Education and Communication Nutrition education – Definition, meaning and importance, Process of nutrition education – Principles of Panning, implementation and evaluation, Methods of Nutrition education, Problems of Nutrition Education Programmes Process of communication, types of communication, and methods in health communication	9
Unit IV	Natural and manmade disasters resulting in emergency situation- famine, draught food, earthquake cyclone, war and Political emergencies Assessment and Surveillance of nutritional status in emergency affected Population Indicators of malnutrition, Clinical Signs Screening acute malnutrition Nutritional relief and Rehabilitation, Assessment of food needs, Mass and Supplementary feeding, Local foods in rehabilitation, Scarcity ratio	9
Unit V	Food Production, food and nutritional Security Food Production, Post-harvest technology, food grain Storage Food requirements various food availability, food and nutritional Security Food Security and Food Security programmes - Public Distribution system (PDS) - Antyodaya Anna Yojana (AAY) - Annapurna Scheme - National food for work Programme	9

Course Material/Learning Resources

References:

1. Park K. (2009) Park's Text Book of Preventive and Social medicine, 20th Edition M/S Banarasidas Bhanot, Jabalpur
2. Gupta Piyush (2010): Textbook of Preventive and social medicine, CBS Publishers Pvt Ltd, New Delhi
3. Indian Agriculture year Book (2006): Govt of India Publication, ministry of Agriculture,Government Press, New Delhi
4. National Nutrition Policy (1993), Depth of WCD, Govt. of India
5. Sharma S, C. (1987) media communication and Development, Jaipur, ISBN 13-978-817033) 387
6. The management of Nutrition in major Emergencies (2002): WHO, Published by ATTBS Publishers, New Delhi
7. Indian Agriculture Year Book (2006) Govt of India, Publication ministry; Agriculture, Government press, New Delhi
8. Gayatri Mewethy (1996). food and Nutrition Asya Publication House, Education Publishers, New Delhi
9. Food and Nutsition Board National Plan of Acton on Nutrition Department of Women and Child Development Ministry of HRD, Govt of India

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Programme: MSc (Home Science) Food Science and Nutrition

Semester 1I

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 204 A	**Principles of Food Preservation**	**45**

Course Outcomes

After completion of the course students will -

1. Gain knowledge on various methods of food preservation
2. Appropriately use the method of preservation as per the need
3. Realize the importance of food preservation

Unit	Content	Periods
Unit I	Food Preservation - Meaning, mode of action and changes in foods Traditional Methods of Food Preservation with their advantages and disadvantages- Smoking Sun drying Pickling/ Salting Fermentation	**9**
Unit II	Use of High temperature (Heat preservation) Moist and Dry heat methods, Blanching, Dehydration, Concentration, Canning, Commercial sterilization, Pasteurization	**9**
Unit III	Use of Low Temperatures Cold Preservation: Freezing and Refrigeration- Air freezing, Indirect contact freezing, Immersion freezing, Dehydro-freezing Cryo-freezing Changes in foods during refrigeration and frozen storage	**9**
Unit IV	Use of Ionizing radiation and microwave heating Ionizing radiations and sources – Units of radiation, Radiation effects Mechanism of microwave heating, Application of radiation technology	**9**
Unit V	Use of Fermentation Benefits and mechanisms of fermentation, Fermented food products e.g Beer, Wine, Soya sauce, Cheese, Soya bean products, Microbial vs Industrial Fermentation Application of Hurdle Technology	**9**

References:

1. Borvers, J. (1992). Food Theory and Application (2ndEd), New York: Maxwell MacMillan International Edition.
2. Manay, N. S. and Sharaswamy, S. M. (1997).Foods: Facts and Principles New Delhi: New Age International Publishers.
3. McWilliams, M (2007). Foods:Experimental Perspectives 5th Ed, New Jersey: Macmillar Publishing Co.
4. Potter, N. N. and Hutchkiss, J. H. (1997).Food Science, 5th Ed, New Delhi: CBS Publishers and Distributors.
5. Rick Parker (2003) Introduction to Food Science, New York: Delmar Thomson Learning.
6. Scottsmith and Hui Y.H (Editiors) (2004) Food Processing – Principles and Applications London Blackwell Publishing.
7. Subbulakshmi, G and Udipi, S. A. (2001).Foods Processing and Preservation, New Delhi: New Age International (P) Ltd. Publishing.
8. Swaminathan, M. (1995).Food Science Chemistry and Experimental Food. The Bangalore Printing and Publishing Co. Ltd.
9. Vacklavick, V. and Christian, E. (2003).Essentials of Food Science.New York: Kluwer Academic/ Plenum Publisher

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Programme: MSc (Home Science) Food Science and Nutrition

Semester 1I

Code of the Course/Subject	Title of the Course/Subject	Total Number of Periods
FSN 204 B	**Food Service Management**	**45**

Course Outcomes

After completion of the course students will -

1. Gain knowledge about the principle and functions of food service management
2. Comprehend about various types of food services
3. Realize the importance of sanitation and hygiene in food institutions

Unit	Content	Periods
Unit I	**Food Service establishments-** history and development, types of food service establishments - commercial and noncommercial **Food service management -** Principles and functions, tools of management **–** Organization chart, job description, job specification, work/time schedule, job analysis **Approaches to food service management –** Traditional approach, classical approach, scientific approach, management by objectives, system approach, quantitative approach, behavioral and human relations approach, contingency approach, just-in-time, total quality management approach	**9**
Unit II	**Food Management** - Characteristics, types and quality of food, food purchasing, receiving and storage of food, menu planning, food production and processing, quantity cooking techniques F**ood service** - Style of service and types of service, environmental hygiene and sanitation, legal responsibilities of food service institutions, food standards	**9**
Unit III	**kitchen space** - types of kitchen, kitchen plan, work simplification in kitchen, designing and layout of kitchen **Storage space**- types of storage, planning and layout of storage space, sanitation and safety, service area planning and decoration of service area **Equipments –** Classification, factors affecting selection of equipments, purchase and installation, Care and maintenance of equiments	**9**
Unit IV	**Personnel management**- Definition, scope, concept of personnel management approaches of personnel management, personnel policies, staff employment, training, placement, promotion, personnel records, and work appraisals. **Financial management**- definition Accounting, cost concept, components of cost, cost control, Pricing, book keeping and accounting	**9**
Unit V	**Fuel** - Types of fuel, advantages of fuel in relation to economy in quantity cookery, fuel saving economy input in service institutions **Hygiene sanitation and safety in food service institution** - definition, importance, hygiene in food handling, control of spoilage, safety of leftover foods, disposal of food waste, HACCP and Good hygiene practices	**9**

Course Material/Learning Resources

References:

1. Sethi M. (2004) Institutional food management. new Age International Publisher, New Delhi. ISBN no. 978-8122439618
2. Sethi M.(2015) Catering management an integrated approach. ISBN no. 978-8122436891
3. Kaufman,R. Mega planning- Practical tools for Organisational Success, Sage Publications Inc, 2000. ISBN no. 337340: 337
4. Shring Y, P. Effective Food Service Management, Anmol publications Pvt Ltd,New Delhi, 2001.ISBN no. 978-0133762754
5. Stephen, B, , Williams, S, R, "Bill Jardine, and Richard, J, N, Introduction to Catering, ISBN no. 978-1599185941
6. Yadav, C, P. Management of Hotel and Catering Industry, Anmol publications Pvt ISBN no. 978-8179928844
7. Bhushan, V.K., Bussiness organization and Management, Sultan Chand and Co. 1973
8. Longree, K. and Balaker, B.C., Sanitary Techniques in Food Service, John Wiley and Sons, New York, 1979
9. Green Eric, Profitable Food and Beverage Management Operations, John Williams Company
10. Jagmohan Negi, Managing Hotels and Restaurants, Authors's Press, Delhi

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Semester 1I

Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)	No. of Periods/Week
FSN 205	**Nutritional Biochemistry Practical**	**2/Week**

Course Outcomes

By the end of the Lab/Practical Course, generally students will -

1. Illustrate the practical skills in handling the laboratory equipments
2. Develop an understanding of how to follow laboratory procedures safely and accurately
3. Demonstrate the analysis and calculate the selected nutrients in foods

*** List of Practical/Laboratory Experiments/Activities etc.**

1	Introduction to Laboratory Equipments – Digital weighing balance, pH meter, Photo Electric Colorimeter, Spectrophotometer and other instruments exclusively used for food and nutrient analysis
	Analysis of food- Total protein content Total fat content Total carbohydrate content
2	Determination of pH (in acids, alkalis and buffers using pH meter and indicators)
3	Estimation of Iron in foods
4	Estimation of calcium (titrimetric method/)
5	Estimation of ascorbic acid (titrimetric/ colorimetric method)

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Semester 1I

Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)	No. of Periods/Week
FSN 206	**Clinical Nutrition and Dietetics- II Practical**	**2/Week**

Course Outcomes

By the end of the Lab/Practical Course, generally students will -

1. Learn basis for dietary management of metabolic diseases
2. Develop skills in calculations of nutritional requirements in the diseases
3. Plan and prepare diets based on modified nutritional requirements

***List of Practical/Laboratory Experiments/Activities etc.**

1	Planning and preparation of diets in obesity and underweight
2	Planning and preparation of diets in liver, glall bladder and diseases of exocrine pancreas
3	Planning and preparation of diets in diabetes mellitus – Type 1 and Gestational Diabetes Mellitus
4	Planning and preparation of diets for Type 2 Diabetes Mellitus
5	Planning and preparation of diets for Pulmonary Diseases

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Semester 1I

Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)	No. of Periods/Week
FSN 207	**Community Nutrition Practical**	**2/Week**

Course Outcomes

By the end of the Lab/Practical Course, generally students will -

1. Plan, implement and evaluate nutrition education programme for different target groups
2. Observe and evaluate ongoing public health nutrition programmes
3. Assess the benefits and problems in food security programmes

*** List of Practical/Laboratory Experiments/Activities etc.**

1	Aware individuals/groups/communities about right to health and responsibilities for health and prepare report.
2	Plan, implement and evaluate nutrition education programme for different target groups
3	Preparing Massages, posters, leaflets, videos for nutrition promotion
4	Survey of at schools with ongoing mid day meal programme and survey of at Anganwadi Centre with ongoing ICDS programme with major focus tothe quality of food provided
5	Critical review of food security programmes through contacting beneficiaries

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Semester 1I

Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)	No. of Periods/Week
FSN 208 A	**Principles of Food Preservation**	**2/Week**

Course Outcomes

By the end of the Lab/Practical Course, generally students will -

1. Use various drying methods of food preservation
2. Preserve different foods using salt, sugar and acid
3. Get insight into food preservation industry

***List of Practical/Laboratory Experiments/Activities etc.**

1	Preservation by drying – Sun drying and mechanical drying
2	Preservation by moist heat methods
3	Preservation by salt, sugar and acid
4	Preservation by fermentation
5	Visit any organization related with food preservation

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Semester 1I

Code of the Course/Subject	Title of the Course/Subject (Laboratory/Practical/practicum/hands-on/Activity)	No. of Periods/Week
FSN 208 B	**Food Service Management**	**2/Week**

Course Outcomes

By the end of the Lab/Practical Course, generally students will –

1. Develop skill in organizing and managing food service Institutions
2. Get knowledge about the food purchasing and costing

*** List of Practical/Laboratory Experiments/Activities etc.**

1	Visit to different types of food service institutions and studying the following: Organization, Physical Plan and Layout, Food Service equipments, Sanitation and Hygiene. Submit report for the same.
2	Market survey of all food groups to find out the cost.
3	Calculation of total cost of the recipes/meals including food, labour, fuel, electricity and other costs
4	Analysis of relationship between the purchase amount, edible portion and cooked weight of foodstuff
5	Preparing a planning prospect for setting up of food service unit