LOYOLA ACADEMY DEGREE & PG COLLEGE

M.SC. FOOD SCIENCE & NUTRITION (2022-24)

(Choice-Based Credit System)

Year	Sem.	Course -1	Course -2	Course -3	Course -4	Course -5	Course -6		Hr	Remedial courses/ Bridge courses/ Competitive exam guidance	Credits	
I	I	*Communicative Competence (2) (AECC-1)	Bakery Science (2) (SEC-1)	Human Physiology (4) (Core-1)	Principles of food science (4+2) (Core-2)	Advanced Nutritional biochemistry & Instrumentation (4+2) (Core-3)	Advanced Human Nutrition (4+2) (Core -4)		34	2	26	AECC-1 CORE-4 SEC-1
I	II	*Human values & Professional Ethics (2) (AECC-2)	Research Methods (4) (Core-5)	Advanced Food Science (4) (Core – 6)	Food Microbiology & Food Safety (4+2) (Core-7)	Therapeutic Nutrition (4+2) (Core -8)	Public Health & Nutrition (4+2) (Core -9)		31	5	28	AECC-1 CORE- 5
II	I	* Computer Applications (2) (AECC-3)	Institutional Food Management/Program planning in public Health Nutrition (4+2) (DSE-1)	Clinical Nutrition (4+2) (Core-10)	Community Nutrition (4) (Core – 11)	Programs & Policies for Food & Nutritional Security (4) (Core -12)	Nutraceuticals and functional foods (4) (Core-13)	**Course 7** Minor Project – (1)	31	5	28	AECC-1 DSE-1 CORE-4
II	**II**	Food preservation Techniques (2) (SEC-2)	$Nutrition for Health & Fitness (4) (GE-1)	Nutrition Communication for Health Promotion/ Nutrition Communication & Diet Counseling (4) (DSE- 2)	Project work (10)				32	4	20	SEC- 1 GE – 1 DSE – 1
Legend	**1. Ability Enhancement Compulsory Course (AECC) : 03** **2. Generic Elective (GE) : 01** **3. Skill Enhancement Course (SEC) : 02** **4. Core : 13** **5. Discipline-Specific Elective (DSE) : 02**							**Total**	**128**		**102**	

- *Ability Enhancement Compulsory Course (AECC) Marks are not included in CGPA score in the main certificate, but it is compulsory to pass in the examination.
- $GE paper will be offered to the students of other PG departments.
- ≠In third semester students will take one month summer project of 2 credits (non-CGPA)

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF SUBJECTS
M.Sc. FOOD SCIENCE AND NUTRITION
FIRST SEMESTER
ACADEMIC YEAR 2022-2024 BATCH 2022-24(CBCS)

S. No	Part	Subject Code	Title of the Subject	Hours /Week	Duration of Exam (hrs)	Marks			Credits
						Internal	External	Total	
1	I	MFSN20101	*Communicative Competence (2) (AECC-1)	2	2	20	30	50	2
2	II	MFSN20102	Bakery Science (SEC-1)	3	3	40	60	100	2
3	II	MFSN20103	Human Physiology (CORE-1)	5	3	40	60	100	4
4	II	MFSN20104	Principles of Food Science (CORE-2)	5	3	40	60	100	4
5	II	MFSN20105	Advanced Nutritional Biochemistry and Instrumentation (Core-3)	5	3	40	60	100	4
6	II	MFSN20106	Advanced Human Nutrition (Core -4)	5	3	40	60	100	4
PRACTICALS									
7	II	MFSN20107	Principles of Food Sciences Lab	3	3	40	60	100	2
8	II	MFSN20108	Advanced Nutritional Biochemistry and Instrumentation Lab	3	3	40	60	100	2
9	II	MFSN20109	Advanced Human Nutrition Lab	3	3	40	60	100	2
	TOTAL			34		340	510	850	26

- *Ability Enhancement Compulsory Course (AECC) marks not included in CGPA score in the main certificate, but it is compulsory to pass in the examination.
- **CIA components for internal marks of theory paper:** (i) Weekly test: 5M (ii) Mid Sem: 10 M (iii) Prefinal: 16M (iv) Assignment : 2M (v) Viva : 2M (vi)Attendance: 4M
- **CIAcomponents for practical Internal marks:** (i) Attendence/Record 5M (ii) Practical skill : 10M (iii) Prefinal : 15M

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF SUBJECTS
M.Sc. FOOD SCIENCE AND NUTRITION
SECOND SEMESTER
ACADEMIC YEAR 2022-2024 BATCH 2021-23(CBCS)

S. No	Part	Subject Code	Title of the Subject	Hours /Week	Duration of Exam (hrs)	Marks			Credits
						Internal	External	Total	
1	I	MFSN22201	*Human Values & Professional Ethics (AECC-2)	2	2	20	30	50	2
2	II	MFSN20202	Research Methods (Core-5)	4	3	40	60	100	4
3	II	MFSN20203	Advanced Food Science (Core- 6)	4	3	40	60	100	4
4	II	MFSN20204	Food Microbiology and Food safety (Core-7)	4	3	40	60	100	4
5	II	MFSN20205	Therapeutic Nutrition (Core-8)	4	3	40	60	100	4
6	II	MFSN20206	Public Health Nutrition (Core -9)	4	3	40	60	100	4
PRACTICALS									
7	II	MFSN20207	Applied Food Microbiology Lab	3	3	40	60	100	2
8	II	MFSN20208	Therapeutic Nutrition Lab	3	3	40	60	100	2
9	II	MFSN20209	Public Health Nutrition Lab	3	3	40	60	100	2
	TOTAL			31		340	510	850	28

- *Ability Enhancement Compulsory Course (AECC) marks not included in CGPA score in the main certificate, but it is compulsory to pass in the examination.
- CIA components for internal marks of theory paper: (i) Weekly test: 5M (ii) Mid Sem: 10 M (iii) Prefinal: 16M (iv) Assignment : 2M (v) Viva : 2M (vi)Attendance: 4M
  CIAcomponents for practical internal marks: (i) Attendence/Record 5M (ii) Practical skill : 10M (iii) Prefinal : 15M

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF SUBJECTS
M.Sc. FOOD SCIENCE AND NUTRITION
THIRD SEMESTER
ACADEMIC YEAR 2022-2024 BATCH 2022-24(CBCS)

S. No	Part	Subject Code	Title of the Subject	Hours /Week	Duration of Exam (hrs)	Marks			Credits
						Internal	External	Total	
1	I	MFSN19301	*Computer Applications (AECC -3)	2	2	20	30	50	2
2	II	MFSN20302 A / MFSN20302 B	Institutional Food Management / Programme Planning in public Health Nutrition (DSE-1)	4	3	40	60	100	4
3	II	MFSN20303	Clinical Nutrition (Core-10)	4	3	40	60	100	4
4	II	MFSN20304	Community Nutrition (Core – 11)	4	3	40	60	100	4
5	II	MFSN20305	Programmes and Policies for Food and Nutritional Security (Core -12)	4	3	40	60	100	4
6	II	MFSN20306	Nutraceuticals and Functional Foods (Core-13)	4	3	40	60	100	4
PRACTICALS									
7	II	MFSN20307 A & MFSN20307 B	Institutional Food Management / Programme planning in public Health Nutrition Lab	3	3	40	60	100	2
8	II	MFSN20308	Clinical Nutrition Lab	3	3	40	60	100	2
		MFSN20309	Minor project	3	3	40	-	40	1
	TOTAL			31		340	450	790	28

- *Ability Enhancement Compulsory Course (AECC) marks not included in CGPA score in the main certificate, but it is compulsory to pass in the examination.
- CIA components for internal marks of theory paper: (i) Weekly test: 5M (ii) Mid Sem: 10 M (iii) Prefinal: 16M (iv) Assignment : 2M (v) Viva : 2M (vi)Attendance: 4M CIAcomponents for practical Internal marks: (i) Attendence/Record 5M (ii) Practical skill : 10M (iii) Prefinal : 15M

Note: Minor Project Evaluation along with third semester end exams (SEE).

YEAR-WISE AND SEMESTER-WISE DISTRIBUTION OF SUBJECTS
M.Sc. FOOD SCIENCE AND NUTRITION
FOURTH SEMESTER
ACADEMIC YEAR 2022-2024 BATCH 2021-23(CBCS)

S. No	Part	Subject Code	Title of the Subject	Hours /Week	Duration of Exam (hrs)	Marks			Credits
						Internal	External	Total	
1	I	MFSN20401	Food Preservation Techniques (SEC-2)	2	3	40	60	100	2
2	II	MFSN20402	Nutrition for health and Fitness (GE-1)	4	3	40	60	100	4
3	II	MFSN20403 A / MFSN20403 B	Nutrition communication for health promotion/ Nutrition communication and Diet counseling (DSE- 2)	4	3	40	60	100	4
4	II	MFSN20404	Project work	22		40	60	100	10
	TOTAL			32		160	240	400	20

- Skill Enhancement Course (SEC)
- Generic Elective (GE)
- Discipline Specific Elective (DSE)
- CIA components for internal marks of theory paper: (i) Weekly test: 5M (ii) Mid Sem: 10 M (iii) Prefinal: 16M (iv) Assignment: 2M (v) Viva: 2M (vi)Attendance: 4M
  CIA components for practical Internal marks: (i) Attendance /Record 5M (ii) Practical skill: 10M (iii) Prefinal: 15M

BAKERY SCIENCE

Credits:2 **1 Year/ 1 Semester**

Subject Code: MFSN20102 (SEC-1) **No. of Lecture Hours: 30**

Objectives:

1. To impart students with knowledge related to baking technology
2. To introduce them to the techniques of cakes, biscuits and pastry processing.

Outcomes:

Students gain knowledge about different baking techniques and processing of bakery products.

Unit I: **(6Hrs)**

INTRODUCTION TO BAKERY

- Baking industry and its scope in the Indian economy.
- Present Trends and Prospects
- Baking principles - classification - role of ingredients in bakery products - chemistry and technology.
- Dough rheology - equipments used for quality evaluation.
- Baking principles and classification of bakery products
- Role of ingredients in bakery products

Unit II: **(6Hrs)**

Biscuits and cookies

- Role of ingredients - various types of biscuits - basic procedure in production
- Role of ingredients in biscuits and cookies
- Types of biscuits
- Basic procedure of biscuits and cookies
- Characteristic features of ingredients of cookies
- Quality assessment of raw ingredients used in cookies

UNIT-III: **(6Hrs)**

Cakes

- Cake-role of ingredients - flours, oils and fats, eggs, suger, dried fruits and nuts.- types of cakes - methods of mixing - preparation of fancy cakes and techniques - quality - cake faults and remedies.
- Role of ingredients in sponge goods
- Types of cakes
- Techniques and quality of fancy cakes
- Cake faults and remedies

UNIT –IV: **(6Hrs)**

Pastry

- Pastry basic formulation - different types - flaky, puff and danish pastry- bakery products that combines flour and fat.
- Pie - types and methods.

- Introduction to pastry preparation
- Types of pastries and preparation
- Preparation methods of danish pastries and the role of ingredients used.
- Cold and hot pastries

UNIT- V: **(6Hrs)**

Bakery products – standards and quality control

- Standards, regulations and quality control for bakery products.
- Specifications for bakery ingredients BIS/FSSA standards for ingredients and products
- Specifications for bakery products BIS/FSSA standards for ingredients and products
- Morphology, types of baker's yeast, yeast freshness test gassing activity of yeast.
- Reproduction, physiology, quality tests of yeast

RECOMMENDED READINGS:

- Dubey SC. Basic Baking-Science and Craft. Society of Indian Bakers, Delhi 2007.
- Encyclopedia of Food Science and Technology, Academic Press. 1993.
- Khanna K, Gupta S, Seth R, Mahana R, Rekhi T. The Art and Science of Cooking. Phoenix Publishing House Private Limited, Delhi .2004.
- Matz A. Bakery Technology and Engineering. CBS Publishers, Delhi. 1998.

HUMAN PHYSIOLOGY

Credits:4 **1 Year/ 1 Semester**

Subject Code: MFSN20103 **No. of Lecture Hours: 60**

Objectives:

To understand the normal functioning of various organ systems of the body and their interactions and to be able to comprehend the pathophysiology of commonly occurring diseases.

Outcomes:

Student will be able to -

1. Understand the current state of knowledge about the functional organization of the human body.
2. Develop insight of normal functioning of all the organ systems of the body and their interactions.
3. Comprehend the pathophysiology of commonly occurring diseases.
4. Correlate physiology with various disorders and their pathogenesis.

UNIT I: **(12Hrs)**

Blood and Cardio-Thoracic Physiology

- Blood and Plasma Protein -Composition and Function
- Blood formation and factors controlling Erythropoiesis.
- Pathophysiology of Anaemia and Jaundice
- Cardiac cycle, Cardiac output ,Heart sounds
- Heart rate & regulation
- Blood pressure, Hypertension
- Coronary Artery Disease
- Hemorrhage; Compensatory changes after hemorrhage
- Transport and exchange of gases
- Control of Respiration and Respiratory function tests
- Lung volume & Capacities and COPD

UNIT II: **(12Hrs)**

Excretory Physiology

- Urine formation
- Renal function tests
- Acid Base balance
- Pathophysiology of Renal Stones, Urinary Tract Infection, Glomerulonephritis
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UNIT III: **(12Hrs)**

Gastrointestinal Physiology

- Functions of Stomach, Liver, Pancreas and Gall Bladder
- Composition, function and regulation of:
  - Salivary juice
  - Gastric juice
  - Pancreatic juice
  - Bile juice
  - Intestinal juice
  - GI hormones
- Pathophysiological overview of some common diseases in relation to Gastrointestinal Tract (Peptic ulcer/GERD, Cholelithiasis, Portal Hypertension, Fatty liver and Liver Cirrhosis

UNIT IV: **(12Hrs)**

Neuro-Endocrine Physiology

- Review of structure and function of neuron, nerve, conduction of nerve impulse, synapse, and neurotransmitters.
- General organization of the nervous system, protection structure and function of brain and spinal cord. Cerebrospinal fluid.
- Structure, function and role of sensory organs (skin, eyes, ears, nose and tongue) in perception of stimuli.
- Effects of Pituitary, Thyroid, Parathyroid, Adrenal and Pancreatic hormones
- Patho physiology of Diabetes Mellitus, Metabolic Syndrome, Hashimoto's disease. Tetany and Cushing Syndrome

UNIT V: **(12Hrs)**

Reproductive Physiology

- Physiology of Menstruation and Menopause
- Physiology of Ageing
- Physiology of Pregnancy, Lactation
- Pathophysiology of PCOD and Infertility

RECOMMENDED READINGS:

- Ganong W.F.(2003)-*Review of Medical Physiology*.21st ed. McGraw Hill.
- Guyton A.C. and Hall J.E.(2000)*Textbook of Medical Physiology*.10th ed. India: Harcourt Asia..
- Tortora G.J and Grabowski S.R.(2000) *Principles of Anatomy and Physiology*.9th ed. John Wiley and Sons.Inc.
- West J.B.(1996): *Physiological Basis of Medical Practice*.12th Edition. B. I. Waverly Pvt.Ltd.

- Marieb E.N(2001) *Human Anatomy and Physiology*(5th ed)Pearson Education ,Inc, publishing as Benjamin Cummings.
- Jain A. K (2014) Human Physiology for BDS(5th Edition), Publisher: Avichal Publishing Company; ISBN: 9788177394337 .
- Pal G.K and Pal Pravati (2016) *Comprehensive Textbook Of Medical Physiology* (2Vols) Publisher: Jaypee Brothers Medical Pub (P) Ltd.) ISBN: 5551234080758;

PRINCIPLES OF FOOD SCIENCE

Credits:4 **1 Year/ 1 Semester**

Subject Code: MFSN20104 **No. of Lecture Hours: 60**

Objectives

The course aims to provide systematic knowledge and understanding of chemistry of food components like water, proteins, carbohydrates and lipids, various aspects of food product development and systematic interpretation of sensory evaluation and get an insight in to the additives that are relevant to processed food industry for shelf life extension, processing aids and sensory appeal.

Outcomes

The student will be able to understand:

1. Understand the chemistry of food components like proteins, carbohydrates and lipids.
2. Understand basic concepts of new food product development.
3. Enable to learn about the food additives that are relevant to processed food industry for shelf life extension, processing aids and sensory appeal.

UNIT I Food Chemistry (12Hrs)

- Water: Definition of water in foods, structure, water activity, phase diagram of water, phase transition of food containing water, interaction of water solute and food compounds, water activity and its influence on quality and stability of foods, methods for stabilization of food systems by control of water activity, sorption isotherm, colloidal properties of foods.
- pH: Hydrogen ion concentration in food, oxidation reduction potential of foods and their applications in food systems.

- Enzymes: Classification, application of enzymes in food industry and immobilized enzymes.

UNIT –II – Food Components (12Hrs)

- Protein: Physical, chemical, nutritional and functional properties and interactions with other food constituents
- Sugars: Composition and properties of different types of sugars, their application in food systems, crystallization, caramelization, Maillard reaction and its industrial application. Fondants, fudges and icings etc
- Lipids: Properties of fats, functional properties of fats and oils, fat stabilizers, fat deterioration and antioxidants, Emulsions such as mayonnaise, inter esterification of fats, auto-oxidation of lipids and rancidity

UNIT III : Basic concepts of new product development (12Hrs)

- Stages of product development and standardization, sensory evaluation of foods, packaging, labelling and marketing of new food products.

UNIT- IV: Food Ingredients and additives (12Hrs)

- Food additives- definitions, classification and functions, Preservatives, antioxidants, colours and flavours (synthetic and natural), emulsifiers, sequestrants, humectants, hydrocolloids, sweeteners, acidulants, buffering salts, anticaking agents, etc. - chemistry, food uses and functions in formulations; indirect food additives; toxicological evaluation of food additives.

UNIT V: Food Processing and preservation (12Hrs)

- **By heat-** Principle, theory and effect of blanching, pasteurization, sterilization, UHT, canning, extrusion cooking and frying on food.
- **By low temperature-** Principle, theory and effect of refrigeration, chilling, freezing, freeze-drying (lypholization) and freeze-concentration on food.
- **By non-thermal technologies-** Principle, theory and effect of irradiation, high pressure, pulsed electric field and other innovative technologies on food
- **By other methods-** Principle, theory and effect on food of drying, osmotic dehydration, concentration, evaporation and distillation, Hurdle technology.

RECOMMENDED READINGS:

- Branen AL, Davidson PM & Salminen S. (2001) *Food Additives*. 2nd Ed. Marcel Dekker.
- Fellows P J (2002*) Food Processing Technology- Principles and Practices*, 2nd Edition. Woodhead Publishing Ltd.
- Food and Agriculture Organization. (1980*) Manual of Food Quality Control. Additive Contaminants Techniques.* Rome.
- Fuller, G.W. (1999) *New Food Product Development. From concept to market place.* CRC press, New York.

- Mahindru, S N (2000) *Food Additives- Characteristics Detection and Estimation*. Tata Mc Graw Hill Publishing Co. Ltd.
- Peter Murano , *Understanding Food Science and Technology* (with InfoTrac) 1st
- *BIS standards for food products and analysis manual*.
- *Manuals of methods of analysis of various food products*, FSSAI, 2016
- Branen AL, Davidson PM & Salminen S. (2001) *Food Additives*. 2nd Ed. Marcel Dekker.
- Fellows P J (2002) *Food Processing Technology- Principles and Practices*, 2nd Edition. Woodhead Publishing Ltd.
- Food and Agriculture Organization (1980) M*anual of Food Quality Control, Additive Contaminants Techniques*. Rome.
- Fuller, G.W. (1999) *New Food Product Development. From concept to market place*. CRC press, New York.
- Mahindru, S N (2000) *Food Additives- Characteristics Detection and Estimation*. Tata Mc Graw Hill Publishing Co. Ltd.

PRINCIPLES OF FOOD SCIENCE
(Practical)

Credits:2 **1 Year/ 1 Semester**

Subject Code: MFSN20107 **No. of Lecture Hours: 30**

Objectives

- To learn quality control of raw and processed food products.
- To conduct physical, chemical and nutritional analysis of commonly consumed raw and processed foods with or without additives.

Outcomes

- Students will gain practical knowledge in determining and estimating chemical composition of various food components through chemical and instrumental analysis.

Contents:

1. Proximate composition of foods: Analysis of carbohydrates, proteins, fats, total ash, moisture content.
2. Estimation of sugar in foods.
3. Determination of active alcoholic and aqueous acidity in foods, measurement of pH and preparation of buffer solutions.
4. Refractive index, melting point, solidification point of fats & oils.
5. Determination of peroxide value and acid value in fats & oils.
6. Estimation of polyphenols in foods.
7. Determination of ascorbic acid/dehydroascorbic acid ratio in foods.
8. New Product Development and its package evaluation

RECOMMENDED READINGS

- Bureau of Indian standards: Specifications and standard methods. Volume I to XII.
- Fellows P J (2002), Food Processing Technology- Principles and Practices, 2nd Edition. Woodhead Publishing Ltd.
- Food and Agriculture Organization. (1980) Manual of Food Quality Control. Additive Contaminants Techniques. Rome.
- Fuller, G.W. (1999) New Food Product Development. From concept to market place. CRC press, New York.
- Graf E and Saguy I S, (1991) Principles and practices for the safe processing of foods. Butterw Heinemann Ltd., Oxford.
- Mahindru, S N (2000) Food Additives- Characteristics Detection and Estimation. Tata Mc Graw Hill Publishing Co. Ltd.

ADVANCED NUTRITIONAL BIOCHEMISTRY AND INSTRUMENTATION

Credits:4 **1 Year/ 1 Semester**

Subject Code: MFSN20105 **No. of Lecture Hours: 60**

Objectives

- To augment the biochemistry knowledge acquired at the postgraduate level.
- To understand the mechanisms adopted by the human body for regulation of metabolic pathways.
- To get an insight into interrelationships between various metabolic pathways.
- To understand the principles and use of Instruments used for biochemical analysis.

Outcomes

- Students will be able to understand various metabolisms and their interrelationships adopted by human body.
- Students will be able to understand principle and applications of various Instruments used in biochemical analysis.

UNIT I: **(12Hrs)**

CARBOHYDRATES, LIPIDS AND THEIR REGULATION

(a) Carbohydrates

- Glycolysis.
- Gluconeogenesis
- Hexose monophoshate shunt.
- Citric acid cycle.

(b) Lipids

- Fatty acids – synthesis of saturated and unsaturated
- Triacylglycerols – synthesis
- Phospholipids – synthesis
- Lipoproteins – synthesis
- Cholesterol – synthesis and regulation

UNIT II- **(12Hrs)**

Proteins

(a) **Proteins**

- Genetic code.
- Translation
- Post translational modification.

(b) Genetic mutations.

Genetic recombination and nutrigenomics

Elementary knowledge of DNA recombinant technology.

UNIT III- **(12Hrs)**

Nucleotides and Nucleic acids

(a) **Nucleotides**

- Structure.
- Biosynthesis and breakdown of purine and pyrimidine nucleotides.

(b) Nucleic acids

- DNA organization, replication and repair.
- RNA synthesis and processing (in prokaryotes and eukaryotes)
- Regulation of gene expression(lac operon)
- Restriction enzymes.
- Chimeric DNA.
- Cloning.
- Genomic library and cDNA library.
- Basic principles of nutrigenomics

UNIT IV **(12Hrs)**

HORMONES

Mechanism of action of hormones

- Target cell concept.
- Receptors.
- Classification of hormones.
- Signal transduction.
- Intracellular messengers.

UNIT V **(12Hrs)**

Instrumentation in Nutritional Biochemistry

(a) Basic principles of spectrophotometry.

- Beer Lambert`s law.
- Colorimetry.
- Atomic absorption.
- Flame photometry.

(b) Basic principle of chromatography.

- Gel filtration.
- Ion exchange chromatography.
- Affinity chromatography.
- HPLC.
- Gas chromatography.

(c) Basic principles of:

- Electrophoresis-Polyacrylamide gel eletrophoresis (Native and SDS),
- Agarose gel electrophoresis.
- pH meter.
- Radioisotopes and their application

RECOMMENDED READINGS

- Berg JM, Tymoczko JL and Stryer L. (2002) Biochemistry 5 ed. W.H. Freeman. th G and Doi RH (2001) Outlines of Biochemistry. 5th ed. John Wiley and Sons (Asia).
- Devlin TM. (2002) Text Book of biochemistry with Clinical Correlations 5ed. John Wiley and Sons. th
- Horton RH, Moran LA, Ochs RS, Rawn JD and Scrimgeour.(2002) Principles of Biochemistry 3 ed. Prentice Hall.
- Murray RK, Granner DK, Kayes PA and Rodwell VW. (2003) Harper's Illustrated Biochemistry. 26rd ed. McGraw-Hill. Asia.
- Nelson DL and Cox MM. (2005) principles of Biochemistry. 4th ed.Freeman and Company. th
- Voet D and Voet JG. (2004)Biochemistry. 3 ed. John Wiley and Sons.

ADVANCED NUTRITIONAL BIOCHEMISTRY AND INSTRUMENTATION (PRACTICAL)

Credits:2 **1 Year/ 1 Semester**

Subject Code: MFSN20108 **No. of Lecture Hours: 30**

Objectives

- To understand the principles and use of Instruments used for biochemical analysis.

Outcomes

- Students will gain practical knowledge in methods of estimating biochemical components in food by using Instrumental methods of food analysis.

Contents

1. Spectrophotometry
   - Estimation of Phosphorous
   - Estimation of Proteins.
   - Estimation of Iron.
   - Estimation of Cholesterol.
   - Determination of blood glucose – oxidase method.
   - Estimation of Vitamin-C.
2. Chromatographic Techniques
   - Separation of amino acids, sugars and lipids.
3. Buffers
   - Preparation of acidic buffers.
   - Preparation of basic buffer

RECOMMENDED READINGS

- A manual of laboratory techniques edited by Raghuramulu N. Madhavan Nair K. and Kalyansundaram S. NIN ICMR 1983.
- Fiske C and Subba Rao Y. the colorimetric determination of Phosphorous J. Biol. Chem. 1925.
- Fundamentals of clinical chemistry edited by Tietz NW WB Saunders Co.1976.
- Hawk's Physiological Chemistry. Edited by Oser B.L. McGraw-Hill Book Co. 14th ed. 1965.
- Instrumental methods of chemical analysis by Sharma BK Goel Publishing house 8th ed. 1986.
- Organic Laboratory Techniques, 3 rd Ed. Fessenden, Fessenden, Feist Brooks/Cole, 2000.
- Practical clinical biochemistry. Varley H. Gowenlock. A. H. and Bell M.
- William Heinemann medical books limited. Vol. 1. 5th 3d. 1980.
- Berg JM, Tymoczko JL and Stryer L. (2002) Biochemistry 5th ed. W.H.Freeman.
- Devlin TM. (2002) Text Book of biochemistry with Clinical Correlations 5thed. John Wiley and Sons.
- Horton RH, Moran LA, Ochs RS, Rawn JD and Scrimgeour.(2002) Principles of Biochemistry 3rd ed. Prentice Hall.
- Murray RK, Granner DK, Kayes PA and Rodwell VW.(2003) Harper's Illustrated Biochemistry. 26th ed. McGraw-Hill. Asia.
- Voet D and Voet JG. (2004)Biochemistry. 3rd ed. John Wiley and Sons.

ADVANCED HUMAN NUTRITION

Credits:4 **1 Year/ 1 Semester**

Subject Code: MFSN20106 **No. of Lecture Hours: 60**

Objectives

- To understand the historical perspective of nutrient requirements.
- To learn to critically evaluate the methodology and derivation of requirements for specific macronutrients.
- To appreciate importance of nutrition immunity interactions and their implications.
- To learn various measures for enhancing nutritional quality of diets.
- To stay updated with emerging concepts in nutrition.

Outcomes

- Students will be able to understand the importance of nutrition and learn various methods of enhancing nutrition and maintaining the quality in diets given to vulnerable groups.

UNIT I: Human Nutrient Requirements –Macronutrients (12Hrs)

- Historical perspective of nutrient requirements
- Methods of assessment of nutrient needs – a critical review
- Critical evaluation of sensitive methods and derivations of requirements and recommended dietary allowances of macronutrients for all age groups:
    - Energy
    - Carbohydrates and dietary fibre
    - Proteins and amino acids
    - Lipids
    - Water
- Critical evaluation of national and international nutrient allowances; factors affecting the requirements.

UNIT II: Human Nutrient Requirements - Micronutrients (12Hrs)

- Critical evaluation of sensitive methods and derivations of requirements and recommended dietary allowances of micronutrients for all age groups:
  - Water soluble vitamins
  - Fat soluble vitamins
  - Minerals and trace elements
- Critical evaluation of national and international nutrient allowances; factors affecting the requirements, dietary guidelines for Indians.

UNIT III: Nutrition in Special Conditions (12Hrs)

- Extreme temperatures - low and high
- High altitude
- Space nutrition and food systems
- Sports nutrition

UNIT IV: Interactions of Nutrition, Immunity and Infection and emerging concepts (12Hrs)

- Host defense mechanisms and nutrients essential in the development of immune system.
- Effect of Infections on the nutritional status of an individual.
- Nutrient deficiencies and excesses affecting the immuno-competence and susceptibility to infections.
- Ongoing nutrition transition and its implications.
- Changing trends in life style patterns in population groups and their implications.
- Nutrigenomics, nutraceuticals, bioactive compounds.

UNIT V: Improving Nutritional Quality of Diets (12Hrs)

- Ways of enhancing nutritional quality of diets.
- Assessment of protein quality- By various indices and their interpretation
- Dietary diversification.
- Bioavailability of nutrients.
- Nutrient losses during cooking and processing.

RECOMMENDED READINGS

- ICMR (1990). Nutrient Requirements and Recommended Dietary Allowances for Indians.
- FAO/WHO/UNU (2004). Human Energy Requirements. Report of a Joint Expert Consultation.
- WHO (2007). Protein and Aminoacid Requirements in Human Nutrition.
- Report of a joint WHO/FAO/UNU expert consultation. WHO Technical Report Series 935.
- Bamji M.S., Rao N.P., Reddy V. Eds. (2009). Textbook of Human
- Nutrition. 3rd Edition. Oxford and IBH Publishing Co. Pvt. Ltd.
- Nutrition in Developmental Transition. NFI-WHO (SEARO) Symposium. NFI (2006).

ADVANCED HUMAN NUTRITION
(PRACTICAL)

Credits:2 **1 Year/ 1 Semester**

Subject Code: MFSN20109 **No. of Lecture Hours: 30**

Objectives

- To learn the techniques of measuring energy expenditure in individuals
- To be able to assess the protein quality of diets and dishes
- To be able to conduct nutrient balance studies
-

Outcomes:

- Students will gain practical knowledge in assessing nutrition and its quality in various dishes.

I: Field Visits

- To institutions to elicit dietary intake of individuals to calculate energy intake through 24 hour recall method.

II: **Energy Expenditure**

- Measurement of Oxygen saturation levels
- Pulse rate measurements
- Computing energy expenditure by bioelectric impedance.
- Determining total energy expenditure using activity records and energy cost of activities
- Energy balance: Calculation of total energy expenditure (TEE) and energy intake.
- Measuring height, body mass, MUAC and skin fold thickness.
- Measuring body composition using various techniques: Skin fold technique, BOD POD, DEXA and In Body.

III: Assessment of Protein Quality

- Calculation of Net Dietary protein Cal % of diets and dishes.

RECOMMENDED READINGS

- ICMR. A Manual of Laboratory Techniques.
- WHO (2007). Protein and Amino acid Requirements in Human Nutrition
- Report of a joint WHO/FAO/UNU expert consultation. WHO Technical Report Series 935.
- Gibney MJ, Margetts BM, Kearney JM, Arab L (2004). Public Health
- Nutrition. The Nutrition Society. Blackwell Publishing, Oxford, UK.

- Sundararaj P, Siddhu A (2006). Qualitative tests and quantitative procedures in Biochemistry- A Practical Manual. Third edition. Elite Publishers, New Delhi.
- AOAC (1997). Official Methods of analysis. 16th edition. Association of official Analytical Chemists.
- Bamji M.S., Rao N.P., Reddy V. Eds. (2009). Textbook of Human Nutrition. 3rd Edition. Oxford and IBH Publishing Co. Pvt. Ltd.
- ICMR (1990) Nutrient Requirements and Recommended Dietary Allowances for Indians.
- FAO/WHO. (2004) Vitamin and Mineral Requirements in Human Nutrition. Report of a Joint Expert Consultation.
- Gibson R S. (2005) Principles of Nutritional Assessment. 2nd ed. Oxford University Press.
- WHO (1995) Physical Status: The Use and Interpretation of Anthropometry. Report of a WHO Expert Committee. WHO Tech Rep Series 854.
- WHO (2006).WHO Child Growth Standards.

HUMAN VALUES&PROFESSIONAL ETHICS

Credits : 2 **I Year/Semester II**
Subject Code : MFSN20201 (AECC-2) **No. of lecture hours: 30**

Objective

- To emphasize the importance of human values and inculcating them for the betterment of the society.

Outcome

- The student will learn about the human values and professional ethics.

UNIT- I **6hrs**

INTRODUCTION TO ETHICS

- Reasons to have Ethics for Life 1
- Accepted Norms and Counter Values 1
- Happiness as life Goal 2
- Human Context-self and another 2

UNIT-II **6hrs**

TOWARDS A NEW SOCIETY

- What is true society 1
- Moral problem of the society 1
- Social desire, social fear, social satence, social indifference 1
- Values revealed and lived in various religions-practicing religious harmony 2
- Eradication of social evil-towards a new society 1

UNIT-III **6hrs**

GENDER SENSITIZATION

- Why we study it 1
- Socialization-making women and men 1
- Being together as equals-through the lens of gender 1
- Knowledge through the lens of gender 1
- Gender spectrum-beyond the binary 1
- Just relationship-being together as equals 1

UNIT-IV **6hrs**

PROFESSIONAL ETHICS

- Ethics, Professional Ethics, Environmental Ethics 1
- Ethical Situation, Current Ethical Issues 1
- Values, Policies and Organisation Culture 2
- Moral Situation, Rights and Duties, Codes of Ethics, Their Limitation 2

UNIT-V **6hrs**

ETHICS IN SCIENCE

- Professional Research in Academia and Industry, Scientific fraud 1
- Plagiarisum, Conflict of Interest 1
- Student-Advisor relationship, Intelectual property and Patents 2
- Acountability and Institutional Practices 2

TEXT BOOKS:

1. *Human Values - Development Programme - AIACHE*
2. S.S. Dara and D.D. Mishra 2010.**Environmental Chemistry and Pollution Control**New Delhi: *S. Chand Publisher.*
3. Jeffery Kovac, Ethics in Science, **Accountability in Research** *22*, 312, **2015**.
4. A.Suneetha, B.Uma, D. Vasanta, M. Rama, N. Vasundha, A. Raheed, G**,** Shamala, D. Sreenivas and S. Tharu 201. **Towardsa World of Equals: A Bilingual Text on Gender**. Hyderabad: Telugu Akademi.

RESEARCH METHODOLOGY

Credits:4 **1 Year/ II Semester**

Subject Code: MFSN20202 **No. of Lecture Hours: 60**

Objectives:

To provide students understandings about the basic concepts, approaches and methods in conducting research thereby enabling them to appreciate and critique the nuances of designing a research study as well the ethical dimensions of conducting researches.

Outcomes:

Student will be able to -

1. Demonstrate knowledge of the scientific method, purpose and approaches to research
2. Compare and contrast quantitative and qualitative research
3. Explain research design and the research cycle
4. Prepare key elements of a research proposal
5. Explain ethical principles, issues and procedures

UNIT-I **(12 Hrs)**

Introduction

Definition of research – meaning – nature – scope and objectives of research
basic research terms – types of research
research problem defined – necessity – factors to be considered while defining research problem procedure and pre-requisites for undertaking research.

UNIT-II **(12 Hrs)**

Hypothesis and Research Design

Hypothesis and related terms – formation of hypothesis – characteristics of good Hypothesis
Fundamentals of Research Design – significance – features – steps – types of research design
Review of literature – operational definitions
IPR: Introduction, Classification and Emerging forms

UNIT-III **(12 Hrs)**

Data Collection

Data collection and measurement – definition and characteristics of data – primary data and secondary data – characteristics – advantages and disadvantages
Sources of data – methods of data collection – observation method – personal interview forms, schedules and questionnaire method Documented sources of data – case study method.

UNIT-IV **(12 Hrs)**

Sampling

Sampling and sampling design – definitions – variables – methods of sampling – probability sampling methods
simple random sampling – stratified sampling – systematic sampling – multi-stage sampling – non-probability sampling – judgement sampling – convenience sampling – quota sampling – hit or accidental sampling
size of sample – determination of sampling size – sampling and non-sampling errors.

UNIT-V **12 Hrs**

Attitude Measurement, Data Processing, Report Writing

Attitude measurement and scales – definition of attitude – importance – measurement of attitudes – concept of scale
basis for scale classifications – attitude scales – Thurston's scale – Likert's scale – Guttman's or cumulative scale – radio scales – opinion scales
basic statistical tools.
Data Processing – editing – codification – classification and tabulation of data quantitative analysis of data.

Report writing and presentation – definition – purpose – report synopsis – types of report – characteristics of a good report – structure of a good research report – writing and formatting of reports.

RECOMMENDED READINGS:

1. Kothari, C.R. **Research Methodology.** 2013 print. New Delhi: Sage publications.
2. Swamy Krishna, R. and Ranganathan, M. 2008. **Methodology of Research in Social Sciences.** 1st edition. 2nd revised reprint. Mumbai: Himalaya Publications.
3. Sachdeva, J.K. 2008. **Business Research Methodology.** 1st edition. Mumbai: Himalaya Publications.

ADVANCED FOOD SCIENCE

Credits:4 **1 Year/ 1I Semester**

Subject Code: MFSN20203 **No. of Lecture Hours: 60**

Objectives

- To understand principles of food preservation and its application.
- To understand nature of various food products constituents, additives and adulterants**.**

Outcomes

The student will be able to understand:

- 1. Understand the chemistry of food components like proteins, carbohydrates and lipids.
- 2. Understand basic concepts of new food product development.
- 3. Enable to learn about the food additives that are relevant to processed food industry for shelf life extension, processing aids and sensory appeal.

UNIT-I **(12Hrs)**

Application of heat : processing, effect on food texture, colour, flavour and nutritional value of foods by

1. Heat processing using steam or water –Pasteurization and Heat sterilization, Evaporation and distillation:
2. Extrusion
3. Heat processing by hot air
4. Baking
5. Frying using oil

UNIT-II **(12Hrs)**

Effects of Cold Processing on Food:

1 Chilling
2 Controlled and modified atmosphere storage and packaging-
3 Freezing
4 Freeze drying and freeze concentration.

UNIT III **(12Hrs)**

Preservation of food by –

- Fermentation

Food conversion, Food cultures, lactic acid bacteria and other bacteria, lactic acid bacteria with yeast, lactic acid bacteria with moulds, miscellaneous fermentation.

- Irradiation of foods

Theory, equipment, application and effect on food colour, flavour, nutrients and micro organisms, effect on packaging and detection of irradiated foods.

UNIT IV **(12Hrs)**

- Food Additives, Classification ,Interactions with foods.

- Food Adulterants
- Methods of improving nutritional value of foods
- Food enrichment,
- Restoration and fortification of Food

UNIT V **(12Hrs)**

Post processing operations

1 Coating and enrobing
2 Packaging: theory, types of packaging material, printing, interaction between packaging and foods, environmental consideration.
3 Filling and sealing of containers: rigid and semi rigid containers, flexible containers, types of sealers, shrink wrapping and stretch wrapping, temperature evident packaging, labelling, check weighing, metal detection.
4 Material handling, storage and distribution, food plant sanitation.
Waste management, disposal, storage and distribution.

RECOMMENDED READINGS

- Fellows P J (2002), Food Processing Technology- Principles and Practices, 2nd Edition. Woodhead Publishing Ltd
- Harper J C, (1975) Elements of Food Engineering. A VI, West port.
- Fennema O R, (1985), Principles of Food Science: Part- II Physical Principles of Food Preservation. Marcel Decker New York
- Peter S. Murano (2003), Understanding Food Science and Technology. Peter Marshall Publisher.
- Winton & Winton, (1991) Techniques of Food Analysis. Allied Scientific Publishers.
- Rahman M S, (2007) Handbook of Food Preservation 2nd Edition by Taylor & Francis Group, CRC Press

FOOD MICROBIOLOGY AND FOOD SAFETY

Credits:4 **1 Year/ 1I Semester**

Subject Code: MFSN20204 **No. of Lecture Hours: 60**

Objectives

- To understand the nature of microorganisms involved in food spoilage, food infections and intoxications and also those used in food biotechnology (food fermentation and various food processing industries)
- To gain knowledge of principles of various techniques used in the prevention and control of the microorganisms in foods(food preservation)
- To understand criteria for microbiological safety in various foods operations to avoid public health hazards due to food contamination

Outcomes

- Students will gain knowledge on various qualitative and quantitative aspects related to microorganisms associated with foods and different rapid techniques to detect microorganisms in food.
- Students will gain knowledge on various quality control parameters of foods. They will be through with the basic pre-requisite programmers, national and international food regulations.

UNIT I: Overview of Basic Microbiology (12Hrs)

- Definition, Scope of Food Microbiology
- An introduction to microbial world: Bacteria, Fungi, Yeast, Viruses
    - Bacterial groups based on their morphology:
    - Gram+ve/Gram –ve bacteria, Motile/Non-motile bacteria, Sporulating/Non-sporulating bacteria
    - Bacterial groups based on their physiological growth factors: Temperature, pH, water activity, availability of oxygen.
- Fungi and Yeast: General features & their importance in food microbiology
- Viruses and Bacteriophages: Definition, their general characteristics & multiplication.

UNIT II: Food Spoilage and Preservation (12Hrs)

- Food spoilage: Definition, sources of contamination and microorganisms involved in spoilages of various foods: Milk, Bread, Canned food, Vegetables and fruits, Fruit juices, Meat, Eggs and Fish
- Physical and chemical means used in destruction of microbes: Definition of sterilization and disinfection, role of heat, filtration and radiation in sterilization, use of chemical agents-alcohol, halogens and detergents

UNIT III: Microorganisms in Human Welfare (12Hrs)

- Importance of microbes in food biotechnology: genetically engineered organisms, probiotics and single cell proteins.
- Dairy products (cheese and yoghurt) and traditional Indian fermented foods and their health benefits.

UNIT IV: Food Hygiene

- Sources of contamination of food, cleaning and sanitation in food processing in home and industry. Food plant sanitation, hygienic handling, processing, packaging and service of food.
- Contamination of water –Microorganisms in contaminated water, test for contamination, standards for drinking water.
- Food Borne Diseases – Sources, symptoms and methods of prevention and control.

UNIT V: Food safety and Quality Control (12Hrs)

- Public health hazards due to microbial contamination of foods: Important food borne infections and intoxications due to bacteria, moulds, viruses (*Salmonella typhi, Helicobacter pylori, Campylobacter jejuni, Yersinia enterocolitica, Bacillus cereus, Staphylococcus aureus, Clostridium botulinum, Escherichia coli, Mycotoxins, Hepatitis A virus & Rota virus*)- Symptoms, mode of transmission and methods of prevention.
- Assessing the microbiological quality of food: indicator organisms, microbiological standards, principles of GMP & HACCP in food processing. Safety management at household and industrial level.

RECOMMENDED READINGS

- Banwart GJ.(1987) *Basic Food Microbiology* . CBS Publishers and Distributors.
- Frazier WC, Westoff DC.(1998*)Food Microbiology. 4thed*. Tata McGraw- Hill Publishing Co. Ltd.
- Garbutt John (1997) *Essentials of Food Microbiology*. Arnold London.
- Jay JM, Loessner DA, Martin J.(2005) *Modern Food Microbiology. 7th ed*. Springer
- Pelczar MJ, Chan ECS, Krieg N. (1993) *Microbiology. 5th ed*. Tata McGraw-Hill Publishing Co. Ltd.
- Prescott LM, Harley JP, Klein DA.(2008) *Microbiology. 6th ed*. WMC Brown Publishers.

FOOD MICROBIOLOGY AND FOOD SAFETY

(PRACTICAL)

Credits:2 **1 Year/ 1I Semester**

Subject Code: MFSN20207 **No. of Lecture Hours: 30**

Objectives

- To familiarize with the techniques used for cultivation and purification of microbes
- To know the methods used for quality check of food and water
- To know the techniques used for identification of different pathogenic microbes.

Outcomes

- Students will gain practical knowledge in different techniques used for identification of different pathogens and will be able to understand the quality aspects of food and water.

1. Study of various microbiological laboratory equipment.
2. Preparation of different culture medium.
3. Determination of bacteria and viable microbes by different techniques.
4. Simple staining, Gram staining, acid fast staining spore staining, capsule staining of culture.
5. Use of Biochemical tests for identifying bacteria.
6. Microbiological analysis of water, milk and curd
7. Microbiological analysis of fruits, vegetables, meat, cereals and canned foods.
8. Assessment of surface sanitation and hygiene of food preparation units.
9. Visit to food processing unit or any other organization dealing with advanced method in food microbiology.

RECOMMENDED READINGS

- Bell C, Neaves P, Williams AP.(2006) *Food Microbiology and Lab Practice*.
- Yousef AL (2003). *Food Microbiology. A Laboratory Manual*. Wiley Interscience New Jersey.
- Cappuccino JG, Sharman N (2002). Lab Manual of Microbiology. Pearson Education Publishing Co.
- Benson HJ (1990). *Microbiological Application.5th ed*. WMC Brown Dubugue.

THERAPEUTIC NUTRITION

Credits:4 **1 Year/ 1I Semester**

Subject Code: MFSN20205 **No. of Lecture Hours: 60**

Objectives

- To understand causative factors and metabolic changes in various disease/disorders
- To gain knowledge of the principles of diet therapy
- To learn principles of dietary counseling
- To understand the rationale of prevention of various diseases/disorders.

Outcomes

- Students will be able to understand the various principles in diet therapy and diet counseling.

UNIT I **(12Hrs)**

NUTRITIONAL ASSESSMENT & CARE OF PATIENTS

a) Nutrition care process
   - Nutrition care process
   - Nutritional screening and assessment of patients – out patient & hospitalized
   - Nutritional interpretation of routine medical and laboratory data
   - Nutrition care plan and implementation
   - Monitoring and follow up
   - Ethical issues

b) Dietary Counseling

c) Nutrition Support: Enteral Nutrition

UNIT II **(12Hrs)**

WEIGHT MANAGEMENT & DIABETES MANAGEMENT

Etiopathophysiology, metabolic & clinical aberrations, diagnosis, complications, treatment, MNT, dietary counseling and recent advances in

a) Weight imbalance disorders – Overweight and Underweight
b) Diabetes Mellitus – Type 1, Type 2 and Gestational diabetes

Unit III **(12Hrs)**

CARDIOVASCULAR DISORDERS & GI TRACT DISORDERS Etiopathophysiology, metabolic & clinical aberrations, diagnosis, complications, treatment, MNT, dietary counseling and recent advances in

a) Cardio Vascular Diseases – hypertension, hyperlipidemia, metabolic syndrome, peripheral and cerebro vascular disease
b) Gastrointestinal tract Disorders – GERD, peptic ulcer, diarrhea, lactose intolerance, celiac disease

Unit IV: **(12Hrs)**

LIVER AND GALL BLADDER DISORDERS & RENAL DISORDERS

Etiopathophysiology, metabolic & clinical aberrations, diagnosis, complications, treatment, MNT, dietary counseling and recent advances in

a) Liver and Gall bladder disorders : Jaundice, Hepatitis-B and Liver Cirrhosis
b) Renal Disorders: Nephritis, Nephrosis, Renal Failure, Kidney stones.

Unit V **(12Hrs)**

OVERVIEW OF SOME DEGENERATIVE DISORDERS

a) Cancer - Role of diet in etiology and management
b) Alzheimer's disease and Parkinson's disease
c) HIV-AIDS

RECOMMENDED READINGS

- Mahan, L. K. and Escott Stump. S. (2008) *Krause's Food & Nutrition Therapy 12th ed.* Saunders-Elsevier
- Shils, M.E., Shike, M, Ross, A.C., Caballero B and Cousins RJ (2005) *Modern Nutrition in Health and Disease. 10th ed*. Lipincott, William and Wilkins.
- Gibney MJ, Elia M, Ljungqvist &Dowsett J. (2005) *Clinical Nutrition*. The Nutrition Society Textbook Series. Blackwell Publishing Company.
- World Cancer Research Fund & American Institute for Cancer Research (2007) *Food, Nutrition, Physical Activity and the Prevention of Cancer-*
  A Global Perspective. Washington E.D. WCRF.
- Lee RD & Neiman DC. (2009). Nutritional Assessment.. 5th edition. Brown & Benchmark.

THERAPEUTIC NUTRITION

(PRACTICAL)

Credits:2 **1 Year/ 1I Semester**

Subject Code: MFSN20208 **No. of Lecture Hours: 30**

Objectives

- To understand causative factors and metabolic changes in various disease/disorders
- To gain knowledge of the principles of diet therapy
- To learn principles of dietary counseling
- To understand the rationale of prevention of various diseases/disorders.

Outcomes

- Students will gain practical knowledge in various principles in diet therapy and diet counseling.

1. Planning and preparation of receipies of following type – Normal, soft, semi- solid, low fat, low calorie, high fibre, low fibre, low residue, bland, high protein, low protein etc.
2. Market survey of commercial nutritional supplements and nutritional supports substrates.
3. Diet plan for following disorders
   a. Weight imbalance.
   b. Diabetese Mellitus .
   c. Gastrointestinal disorders.
   d. Renal disease.
   e. Liver disease
   f. Lactose intolerance.
   h. Heart Disease.
4. Preparation of diet counseling aids for common disorders.

RECOMMENDED READINGS

- Mahan, L. K. and Escott Stump. S. (2008) *Krause's Food & Nutrition Therapy 12th ed.* Saunders-Elsevier
- Shils, M.E., Shike, M, Ross, A.C., Caballero B and Cousins RJ (2005) *Modern Nutrition in Health and Disease. 10th ed*. Lipincott, William and Wilkins.
- Gibney MJ, Elia M, Ljungqvist &Dowsett J. (2005) *Clinical Nutrition*. The Nutrition Society Textbook Series. Blackwell Publishing Company.
- Lee RD & Neiman DC. (2009). Nutritional Assessment.5th edition. Brown & Benchmark.

PUBLIC HEALTH NUTRITION

Credits:4 **1 Year/ 1I Semester**

Subject Code: MFSN20206 **No. of Lecture Hours: 60**

Objectives

- To understand the concept of public health nutrition.
- To be familiar with the national health care delivery system.
- To learn about the current concerns in public health nutrition.
- To understand the demographic transition and its implications on the quality of life.
- To understand the economic consequences of malnutrition.
- To learn about the strategies for improving the nutritional status of communities.

Outcomes

- Students will be able to understand demographic transition and its implications on the quality of life, economic consequences of malnutrition and strategies for improving the nutritional status of communities.

UNIT I **(12Hrs)**

PUBLIC HEALTH NUTRITION AND HEALTH CARE SYSTEM

- Aim, scope and content of public health nutrition
- Current Concerns in Public Health Nutrition: An Overview
- Role of public health nutritionists in national development
    - -Health – definition, dimensions, determinants, indicators
    - -Community Health Care
- National Health Care Delivery System

UNIT II **(12Hrs)**

POPULATION DYNAMICS

- Demographic transition
- Population structure: Implications on quality of life
- Population Policy

UNIT III **(12Hrs)**

Public Health Aspects of Undernutrition

- Etiology, clinical features, public health implications, preventive strategies for:

o Chronic Energy Deficiency/ Protein Energy Malnutrition and Severe Acute Malnutrition

o Micronutrient deficiencies - Vitamin A deficiency, Nutritional Anemias, Iodine deficiency disorders, Vitamin D deficiency and Osteoporosis, Zinc Deficiency

- Health Economics and Economics of Malnutrition – impact on productivity and national development

Unit IV **(12Hrs)**

Approaches/ Strategies for Improving nutrition status and health status of the community

- Health based interventions including immunization, provision of safe drinking water/ sanitation, prevention and management of diarrhoeal diseases
- Food based interventions including food fortification, dietary diversification, supplementary feeding and biotechnological approaches.
- Education based interventions including growth monitoring and promotion (GMP), health/ nutrition related behavior change communication

UNIT V **(12Hrs)**

Food and Nutrition Security

- Concepts and definitions of food and nutrition security at the national, regional, household and individual levels
- Impact of food production, losses, distribution, access, availability, consumption on food and nutrition security

RECOMMENDED READINGS

- Achaya, K.T. (Ed) (1984) *Interface Between Agriculture, Nutrition and*
- *Food Science*,
- Beaton, G. H and Bengoa, J. M. (Eds) (1996) *Nutrition in Preventive*
- *Medicine*, WHO.
- Gibney M.J., Margetts, B.M., Kearney, J. M. Arab, I., (Eds) (2004) *Public*
- *Health Nutrition,* NS Blackwell Publishing.
- Gopalan, C. (Ed) (1987) Combating Under nutrition – *Basic Issues and*
- *Practical Approaches,* Nutrition Foundation of India.
- Kaufman M. (2007) *Nutrition in promoting the public health strategies, principles and practice.* Jones and Bartlett Publishers.
- Park, K. (2009) *Park's Textbook of Preventive and Social Medicine, 20th*
- *ed*. Jabalpur M/s. Banarsidas Bhanot.
- Vir, S. (2011). *Public health nutrition in developing countries Part-1 & 2*. Woodhead
- Publishing India limited.

PUBLIC HEALTH NUTRITION

PRACTICAL

Credits:2 **1 Year/ 1I Semester**

Subject Code: MFSN20209 **No. of Lecture Hours: 30**

Objectives

- To develop skills in preparation of communication strategies and communication aids for nutrition / health promotion of the community.
- To plan, implement and evaluate nutrition education programme for the community.
- To prepare an evaluation plan for a public health nutrition programme.
- To implement and evaluate an action plan for a public health nutrition programme in the community.

Outcomes

- Students will gain practical knowledge in evaluating public health and various aspects in implementing action plan for vulnerable groups

CONTENTS

- Planning and preparation of diet for PEM
- Development of nutritious food supplements/ dishes (suitable at micro/macro level) for various vulnerable segments of population
- Assessment of food habits and dietary patterns of the underprivileged population
- Assessment of the type of nutritional problems and their determinants in different population groups
- Field visit to Primary Health Centre or to an ongoing public health nutrition programmes.
- Planning of a communication strategy for a nutrition education programme in the community; field testing of messages

RECOMMENDED READINGS

- Beaton, G. H and Bengoa, J. M. (Eds) (1996) *Nutrition in Preventive Medicine*, WHO.
- Gibney M.J., Margetts, B.M., Kearney, J. M. Arab, I., (Eds) (2004) *Public Health Nutrition,* NS Blackwell Publishing.
- Gopalan, C. (Ed) (1987) Combating Under nutrition – *Basic Issues and Practical Approaches,* Nutrition Foundation of India.
- Kaufman M. (2007) *Nutrition in promoting the public health strategies, principles and practice.* Jones and Bartlett Publishers.
- Park, K. (2009) *Park's Textbook of Preventive and Social Medicine, 20th ed*. Jabalpur M/s. Banarsidas Bhanot.
- Vir, S. (2011). *Public health nutrition in developing countries Part-1 & 2*. Woodhead Publishing India limited.

COMPUTER APPLICATIONS

Credits: 2 **II Year/ III Semester**
Subject code: MFSN20301 **No. of lecture hours: 30**

Objective: To study the applications of computer and its techniques in food industry.
Outcome: Students will gain knowledge on the use of computers in food industry**.**

UNIT–I **(6Hrs)**

- History of computers, generations of computers 1
- Characteristics of computers 1
- Data representation – number system 1
- Binary, octal and hexadecimal 1
- Conversion from one number system to another 1
- Hardware, Software, Translators, Compilers and interpreters 1

UNIT – II **(6Hrs)**

- System software, application software 1
- Simple operating concepts, flowchart 1
- Algorithms with simple examples 1
- DOS commands – Internal and external commands 2
- File management and directory structure 1

UNIT – III **(6Hrs)**

- **WINDOWS** 3
  - Working with windows explorer
  - Creating a new directory, copy files from one directory to another, deleting files.
  - Control panel- background, Mouse settings, screen saver
- M.S-WORD 3
  - Creating a new document, designing documents setting margins, headers and footers, tabs & tables
  - Formatting a document editing – find and replace text
  - Protecting documents, Mail Merge and Newsprint.

UNIT – IV **(6Hrs)**

- **POWERPOINT** 2
  - Creating, opening and saving presentations
  - Working on different views - Working with slides
  - Formatting paragraphs, drawing and working with objectives

EXCEL **4**

- *Creating a new worksheet-select, edit (Copy, move, format, setting column width etc.)*
- *Referencing cells (Addressing methods).*
- *Functions-logical, mathematical, statistical, date and time.*
- *Formulae, charts, macros.*
- *Creating an excel database-sort and filter database. Performing what –if analysis on worksheet data.*
- *Analysis data with pivot tables.*

UNIT- V ***(6Hrs)***

ACCESS

- Access basics: Database, tables, records, fields 1
- The database window: Tables, Queries, forms, reports, Macros, and modules 1
- Creating a table, setting field properties, modifying thestructure, setting primary key, adding and deleting fields 1
- Entering table data. Creating forms 1
- Queries on data- select query, update query, delete Query, Append query 1
- Designing reports 1

RECOMMENDED READINGS

1. Deepak, B. 2002. **Fundamentals of Information Technology**. New Delhi: Pentagon Press publishers.
2. Sharon Crawford and Neil, J. 1998. **ABCs of Windows**. New Delhi: BPB Publications.

INSTITUTIONAL FOOD MANAGEMENT

Credits : 4 **II Year/ III Semester**
Course Code : MFSN20302-A (DSE-1) **No. of Lecture hours: 60**

Objectives

· To develop a knowledge base about the different types of Food service units and its evolution
· To impart necessary expertise to function as a food service manager
· To provide practical
· To equip individuals to understand and manage human resource

Outcome

- Students will gain knowledge about different types of food service units and the responsibilities of food service managers
- Students will gain practical experience in managing food material for food service management.

UNIT I **(12 Hrs)**

Historical Perspective of Food Service
· Evolution of the food service industry
· Kinds of food service systems 2
Conventional, commissary, ready prepared, assembly/serve.

UNIT 2 **(12 Hrs)**

Management & Organisation
· Management Theories Classical, Scientific, Behavioral, Systems approach, Contingency approach, MBO, JIT, TQM
· Managerial operations
a) Functions of management /manager
b) Principles of management
c) Definition of Organization and steps in organizing
· Tools of Management
a) Tangible Tools: Organization chart, Job description, Job specification, Job analysis: Pathway chart, Process chart, Work schedule, Production schedule, Staff and service analysis, Budget
b) Intangible tools: Communication, Leadership, Decision making

UNIT 3 **(12 Hrs)**

Material Management

- Menu planning: Functions, Factors affecting menu planning, Menu construction, Types of menu, Menu card, Qualifications of menu planners Purchase:– Market, Buyer, Vendor, Methods of Purchase: Formal and Informal, Purchasing procedure
- Storage: Types of storage, Store room requirement, Appropriate temperature for storage of different foods, Storeroom Records
- Food production: Production planning and control: Importance of planning, Production forecast, Estimating quantities to buy Quantity preparation techniques Production schedule Product evaluation, Standardization of recipes, Recipe adjustments and portion control

- Food delivery and service: Centralized and decentralized, factors affecting selection , Styles of service, delivery and service equipments.

UNIT 4 **(12 Hrs)**

Manpower Planning: Functions of a personnel manager, Need of Unit Menu, type of operations, Type of service, Job description and job specification
Manpower placement: Recruitment: Process and Sources-Internal and External

- Selection: Process interview, Tests
- Orientation: Importance, Content of programme, Developing an Orientation programme
- Training: Importance; Types - OJT, Group; continuous training, training for development , Developing a training programme
- Contract negotiation with employee : appointment letter, establishment of wages, components of wages , rules and regulations, duties, and service and benefits , contact with vendors
- Performance appraisal: Importance, Methods, Limitations

UNIT 5 Leadership **(12 Hrs)**

- Leadership: Importance; Styles, traits and skills
- Motivation: Role; Motivation theories and their application-Content theories: Maslow, Herzberg, McClelland; Process theories: Vroom, Equity; Reinforcement theory; Motivational plan and incentives
- Dealing with organizational behaviour: Absenteeism, Labour turnover, conflict
- Trade unions and collective bargaining, Labor Laws and policies

RECOMMENDED READINGS:

- West B Bessie & Wood Levelle (1988) Food Service in Institutions 6th Edition Revised By Hargar FV, Shuggart SG, &Palgne Palacio June, Macmillian Publishing Company New York.
- Sethi Mohini (2005) Institution Food Management New Age International Publishers
- Tripati P C & Reddy PW (2008) Principles of Management 3rd edition. Tata Mc Graw Hill Book Company
- Knight J B &Kotschevar LH (2000) Quantity Food Production Planning & Management 3rd edition John Wiley & Sons
- Dessler Gary (2007) Human Resource Management 11th edition Prentice Hall New Jersey
- Luthans Fred (2004) Organisational Behaviour 10th Edition Mc Graw Hill International

INSTITUTIONAL FOOD MANAGEMENT

PRACTICAL

Credits : 4 **II Year/ III Semester**
Course Code : MFSN20307-A (DSE-1) **No. of Lecture hours: 30**

Objectives

- To understand the operations of food service units
- To be knowledgeable about products and their price in market
- To develop skills to plan menus for various food service organizations within specific budgets.
- To standardized recipes for quantity cooking.

Outcome

- Students will gain knowledge about different types of food service units and the responsibilities of food service managers
- Students will gain practical experience in managing food material for food service management.

1. **To conduct a Market survey and write the report –**
   - To assess the products and commodities of various brands (Retail and Wholesale) in the market
   - To formulate price list and to compare among the various brands
   - To list and categorize food production and service equipments.

2. **Planning of menus for different institutions – Quantity Cookery**
   - Institutions that cater to children- Midday Meal Programme, Nandi Foundation
   - Food service units in Hostels
   - Canteen – National Institutes, Railway Catering , Air catering , Hospitals

3. **STANDARDIZING RECIPES – Quantity Cookery**
   - Nutritious Snacks
   - Cakes
   - Cereal preparation
   - Curry preparations

4. **Visit to any of the CANTEEN to write a report**

PROGRAMME PLANNING IN PUBLIC HEALTH NUTRITION

Credits : 4 **II Year/ III Semester**
Course Code : MFSN20302-B (DSE-1) **No. of Lecture hours: 60**

Objectives:

- Understand the concept of health from the individual and community perspective.
- Understand the common nutritional problems of the community their causes, symptoms, treatment and prevention.
- To know the schemes, programmes and policies of Government of India to Combat Malnutrition.

Outcome

- Students will gain knowledge about nutritional problems of the community their causes and schemes and policies of Government of India to Combat Malnutrition.

UNIT I **(12 Hrs)**

- Concept of Community Health & Nutrition
- Concept of Community- types of community, factors affecting health of the community.
- Health Care- Levels of health care- Primary Health Care- Primary health care, health care delivery, National immunization schedule, Role of public nutritionist in health care delivery.

UNIT II **(12 Hrs)**

- Nutritional Problem of Community
- Nutritional and Non- nutritional- Incidence of nutritional problems, signs, symptoms and treatment- Protein Energy Malnutrition-Micro Nutrient deficiencies (Vit-A, Iron, Iodine and Zinc),Fluorosis.
- Communicable Diseases -cholera, polio, measles, HIV.
- Impact of NCD's on public health :Obesity, DM 2, CVD, Cancers and Osteoporosis and hip fractures.

UNIT III **(12 Hrs)**

- Demography, nutrition and quality of life
- Demographic cycle- Population trends in India- Population structure- sex compositionAge composition- Fertility behavior- Vital statistics in vulnerable groups ,population growth (Maternal Mortality rate, Infant Mortality Rate, Net Reproduction Rate).
- Causes of malnutrition, consequences of malnutrition, Intervention in malnutrition-
- Food security- PDS,Food production- Food Pricing

UNIT IV **(12 Hrs)**

- Method and Assessment of Nutritional Status
- Identification of risk groups(random and purposive) Direct assessment – Diet surveys,
- Anthropometry, Clinical and Biochemical Estimation- Indirect assessments- Food balance sheets and Agricultural Data. Use of growth charts.

UNIT V **(12 Hrs)**

- Intervention Programmes:
  - ✔ ICDS, Mid-Day Meal Programme, NIPPCD
- Fortification and Enrichment of foods.

RECOMMENDED READINGS

- Bamji SM, Rao NP and Reddy V, Text book of human nutrition, oxford and IBH publishing co.,New Delhi.
- Gopalan C,Combating undernutrition-basic issues and practical approaches, Nutrition Foundation of India,1987.
- Gopalan C,Women and nutrition in India, NFI,New Delhi,1992.
- Jelliffe D.D.1966. The assessment of Nutritional Status of the Community. WHO, monograph series.
- Jelliffe D.D.1966. The assessment of Nutritional Status of the Community. WHO, monograph series.
- Michael.J.G,Barrie.M.M:Public health nutrition,Blackwell publishing,2005.
- Nweze Eunice Nnakwe.,Community Nutrition – planning health promotion and disease prevention., Jones And Bartlett publishers, 2009.
- Park.K,Park's textbook of preventive and social medicine.,12th edition.M/S Banarsidasbhanot publishers,2009.
- Reddy V, PrahladRaoN, Sastry G and Nath KK, Nutrition trends in India, Hyderabad, NIN,1993

PROGRAMME PLANNING IN PUBLIC HEALTH NUTRITION (PRACTICAL)

Credits : 4 **II Year/ III Semester**
Course Code : MFSN20307-B (DSE-1) **No. of Lecture hours: 30**

OBJECTIVES

· To plan and prepare low cost nutritious dishes and menus for vulnerable groups.
· To develop skills in analysing of nutritional assessment data.
· To become aware of the field level functioning of the ongoing national public health nutrition programmes.

OUTCOME

- Students will gain practical knowledge about have hand on experience in making Nutritious dishes for vulnerable groups.
- Students will gain practical skills in analysing of nutritional assessment data

1. Development and sale/ exhibition of nutritious food supplements for the following vulnerable segments of population.
   a) Infant – weaning mix
   b) Preschool child
   c) Pregnant Woman
   d) Lactating woman
   e) Geriatrics
2. Develop a schedule to assess the nutritional status in the following communities
   A) Orphanage
   B) Old age home
   C) Social welfare hostels
   D) Missionaries
   E) Gurukulas –where students are given vedic education or schools with propagate holy education for their community
3. Assessment of nutritional status using the prepared schedule in different communities (Balwadis, Anganwadi, PHC) and Report writing
4. Field visits to ongoing public health nutrition programmes –ICDS centers, Midday meal programmes , Canteens, Concessional food canteens for workers and Report writing

RECOMMENDED READINGS:

- Bamji SM, Rao NP and Reddy V, Text book of human nutrition, oxford and IBH publishing co.,New Delhi.
- Gopalan C,Combating undernutrition-basic issues and practical approaches, Nutrition Foundation of India,1987.
- Gopalan C,Women and nutrition in India, NFI,New Delhi,1992.
- Jelliffe D.D.1966. The assessment of Nutritional Status of the Community. WHO, monograph series.
- Jelliffe D.D.1966. The assessment of Nutritional Status of the Community. WHO, monograph series.
- Michael.J.G,Barrie.M.M:Public health nutrition,Blackwell publishing,2005.
- Nweze Eunice Nnakwe.,Community Nutrition – planning health promotion and disease prevention., Jones And Bartlett publishers, 2009.

- Park.K,Park's textbook of preventive and social medicine.,12th edition.M/S Banarsidasbhanot publishers,2009.
- Reddy V, PrahladRaoN, Sastry G and Nath KK, Nutrition trends in India, Hyderabad, NIN,1993

CLINICAL NUTRITION

Credits : 4 **II Year/ III Semester**
Course Code : MFSN20303 **No. of Lecture hours: 60**

OBJECTIVES

- To understand the etiology, physiological and metabolic anomalies of acute and chronic disorders / diseases
- To understand the effect of various disorders / diseases on nutritional status, nutritional and dietary requirements
- To be able to recommend and provide appropriate nutrition care for prevention and treatment of various disorders / diseases
- To remain updated on recent advances in Medical Nutrition Therapy (MNT) for various diseases

COURSE OUTCOME:

- The students will be able to become health care professionals in the hospitals can perform teaching and research work in the institutions and the industries and can give nutrition education and create awareness among the society.

UNIT I **(12 Hrs)**
NUTRITION CARE

- Diet, Nutrient and Drug interactions
- Nutrition Support – Parenteral Nutrition

UNIT II **(12 Hrs)**
METABOLIC STRESS & CANCER

Metabolic & clinical aberrations, diagnosis, complications, treatment, MNT and dietary counselling in

- Metabolic Stress -Surgery, Burns, Sepsis & Trauma
- Critical care
- Cancer- General & Specific cancers, Effect of Cancer therapy on MNT

UNIT III **(12 Hrs)**
Gastrointestinal Tract Disorders

Etiopathophysiology, metabolic & clinical aberrations, diagnosis, complications
and recent advances in prevention, treatment, MNT and dietary counseling in

- GI Tract Disorders - Diverticular Diseases, IBD: Crohn's Disease & Ulcerative Colitis
- Liver, Gallbladder and Pancreatic Disorders – Cirrhosis, Encephalopathy, Liver Transplant; Cholecystitis, Cholecystectomy; Pancreatitis.

Unit IV **(12 Hrs)**
Diseases of Heart and Blood Vessels
Etiopathophysiology, metabolic & clinical aberrations, diagnosis, complications
and recent advances in prevention, treatment, MNT and dietary counselling in

- Myocardial Infarction
- Congestive Heart failure
- Coronary Bypass Surgery

Unit V **(12 Hrs)**

Renal Disorders :
Etiopathophysiology, metabolic & clinical aberrations, diagnosis, complications and recent advances in prevention, treatment, MNT and dietary counselling in

- Nephrotic Syndrome
- Glomerulonephritis
- Acute Renal Failure,
- Chronic Kidney Disease
- Dialysis, Transplant
- Renal Stones.

RECOMMENDED READINGS

- Mahan, L. K. and Escott Stump. S. (2008) Krause's Food & Nutrition Therapy 12th ed. Saunders-Elsevier
- Shils, M.E., Shike, M, Ross, A.C., Caballero B and Cousins RJ (2005) Modern Nutrition in Health and Disease. 10th ed. Lipincott, William and Wilkins.
- Gibney MJ, Elia M, Ljungqvist &Dowsett J. (2005) Clinical Nutrition. The Nutrition Society Textbook Series. Blackwell Publishing Company
- Garrow, J.S., James, W.P.T. and Ralph, A. (2000)Human Nutrition and Dietetics. 10th ed. Churchill Livingstone.
- Marian M, Russel M, Shikora SA. (2008) Clinical Nutrition for Surgical Patients. Jones and Bartlett Publishers

CLINICAL NUTRITION

(Practicals)

Credits : 4 **II Year/ III Semester**
Course Code : MFSN20308 **No. of Lecture hours: 30**

OBJECTIVES

- To gain practical knowledge in calculating and preparing diet plans for various vulnerable groups.

OUTCOME:

- Students will gain practical knowledge in preparing diet plans and calculating nutritional content for vulnerable groups.

Contents:

1. Market Survey and report writing of commercial nutritional therapeutic products
2. Planning, Nutrient calculation & preparation of diets
    - Burns
    - Cancer
    - Crohn's Disease
    - Ulcerative Colitis
    - Liver Cirrhosis
    - Cholecystitis,
    - Pancreatitis.
    - Myocardial Infarction
    - Coronary Bypass Surgery
    - Nephrotic Syndrome
    - Glomerulonephritis
    - Acute Renal Failure,
    - Renal Stones.

3. Develop Diet counselling aids for various diseases

RECOMMENDED READINGS:

1. Antia, F.P. and Philip A. Clinical Dietetics and Nutrition, 4th Ed.
2. Bamji, M.S. Rao, P.N. and Reddy. Text book of Human Nutrition. 1996.Oxford and IBH publishing housing.
3. Garrow, J.S. and James WPT. Human Nutrition and Dietetics, 9th Ed.
4. Williams, S.R. Nutrition and Diet Therapy, 6th Ed. Jones Mirror College Publishing.

COMMUNITY NUTRITION

Credits : 4 **II Year/ III Semester**
Course Code : MFSN20304 **No. of Lecture hours: 60**

OBJECTIVES:

- To gain knowledge about Latest Concepts of nutrition National Nutrition Policy.
- To familiarize with Health problems due to over nutrition and under nutrition.

- To gain knowledge about National and International agencies that monitor and improve community nutrition by implementing several programmes.

OUTCOMES:

- Students will gain knowledge about different nutritional policies and several National and International agencies who play an active role in controlling the Health problems due to over nutrition and under nutrition.

UNIT-1 **(12 Hrs)**

- **Nutrition of a Community:-**
  Introduction• Definition of community nutrition • role of nutrition in community development• methods of improving nutritional quality
- **Modern Methods of Improving Nutritional Quality**
- **Food Fortification:-** definition• methods • advantages • disadvantages
- **Nutrient Supplementations**:- introduction • types of supplement • advantages • disadvantages
  Nutrition education themes and messages in nutrition and health,
  Antenatal Care:- definition • importance • objectives • methods• nutrition education
  Postnatal Care. :- definition • importance • objectives • methods• nutrition education

UNIT-2 **(12 Hrs)**

Nutrition Deficiency Diseases

- Protein Energy malnutrition – etiology, prevalence, causes, prevention and control.

Other Major nutritional problems – Macro nutrient deficiencies and micronutrient deficiencies, etiology, symptoms, prevention and control

- Assessment of nutritional status – meaning need, objectives, and techniques.
- Primary Methods: Anthropometric measurement, Weight, Height skin fold, Head circumference MUAC. Chest circumference, use of growth chart, Biochemical assessment, clinical assessment, Diet surveys.
- Secondary Methods: Vital statistics, Mortality rates, survival rate, morbidity rate, fertility rate.

UNIT-3 **(12 Hrs)**

- Nutrition Monitoring and Nutrition surveillance objectives and components of
- nutrition monitoring and current programmes. Nutrition Surveillance –Objectives, Uses, infrastructure and computerization
- Nutrition Education – Need and scope, importance, theories,
- Nutrition education programmes – formulations, Implementation and Evaluation.

UNIT-4 **(12 Hrs)**

Community Nutrition Programme Planning

- Introduction
- definition of community nutrition
- Identification of problem
- nutritional assessment
- analysis of causes
- resources
- constraints
- selection of interventions
- setting a strategy

- implementations
- •evaluation of the programme

UNIT-5 **(12 Hrs)**

- Nutrition Programmes in developing and developed countries
- **National & International Agencies:** Introduction, mission, vision, objectives, functions, policies of **CFTRI ,NIN, FAO, NIPCCD, CARE, WHO, UNICEF, ICMR, ICAR, CSIR**

RECOMMENDED READINGS:

- Mayer, J., Human Nutrition, Charles, C. Thomas, spring field.
- Michael, J. Gibney, Barrie, M. Margetis, John, M. Kearney. Lenore Arab. Public Health Nutrition.
- Blackwell science, Blackwell Publishing Company (2004). Willet Walter. Nutritional Epidemiology. Oxford University Press, Oxford, New York (1990).
- Park, J.E. and Park, K. Text Book of Preventive and social medicine. Banarsi Das Bhanot Publishes.

PROGRAMMES AND POLICIES FOR FOOD AND NUTRITIONAL SECURITY

Credits : 4 **II Year/ III Semester**
Course Code : MFSN20305 **No. of Lecture hours: 60**

OBJECTIVES

· To understand the concept of food and nutrition security.
· To gain knowledge regarding the national / public sector policies and programmes for improving food and nutrition security.
· To become familiar with some successful development programmes in attaining nutrition security.

OUTCOMES:

- Students will gain knowledge and become familiarized with the national / public sector policies and programmes for improving food and nutrition security and development programmes in attaining nutrition security.

Unit I **(12 Hrs)**

- Food and Nutrition Security
- Concepts and definitions of food and nutrition security at national, regional, household and individual levels.
- Impact of food production, losses, distribution, access, availability,
- consumption on food and nutrition security
    - o critical appraisal of the current scenario.

Unit II **(12 Hrs)**

- National / Public Sector Policies for Improving Food and Nutrition Security
- Role of national public policies in improving food and nutrition security (agriculture, food, nutrition, water and sanitation and health sectors)
- National Plan of Action on Nutrition

Unit III **(12 Hrs)**

- Public Sector Programmes for Improving of Food and Nutrition Security Rationale
- implementation status
- monitoring / evaluation and critical appraisal of ongoing programmes.
- Impact of Development Programmes on Nutrition Security: Some Success Stories

UNIT:4 **(12 Hrs)**

- Food labeling and advertising
- principles of information economics to decisions about regulating food labeling and advertising
- Understand legal principles that regulate commercial speech

· Describe the Nutrition Facts Panel and merits of mandatory food labelling

· Review the policy dilemma surrounding food and beverage advertising targeting children

Unit IV **(12 Hrs)**

- Agriculture policy
- Food production and the environment
- International food and agricultural trade
- The food manufacturing industry
- The food retail and restaurant industries
- Food safety
- Dietary guidance
- Child nutrition programs
- Food insecurity and the Supplemental Nutrition Assistance Program (SNAP)

RECOMMENDED READINGS:

- Achaya, K.T. (Ed) (1984) Interface Between Agriculture, Nutrition and Food Science
- Gibney M.J., Margetts, B.M., Kearney, J. M. Arab, I., (Eds) (2004) Public Health Nutrition, NS Blackwell Publishing.

- Gopalan, C. and Kaur, S. (Eds) (1993) Towards Better Nutrition, Problems and Policies, Nutrition Foundation of India.
- Park, K. (2009) Park's Textbook of Preventive and Social Medicine, 20th ed. Jabalpur M/s. BanarsidasBhanot.
- National Nutrition Policy, GoI, 1993.
- National Plan of Action on Nutrition, GoI, 1995.

NUTRACEUTICALS AND FUNCTIONAL FOODS

Credits : 4 **II Year/ III Semester**
Course Code : MFSN20306 **No. of Lecture hours: 60**

Objective: To familiarize the students with basics of Functional foods and Nutraceuticals and their applications.

Outcomes: Students will gain knowledge on major nutraceuticals and functional foods.

Unit I **12Hrs**

- Functional foods and Nutraceuticals terminology

- Historical perspective and classification of functional foods and Nutraceuticals
- The food industry's role in promoting functional foods
- The role of marketing Communication in the introduction of functional foods to the consumer
- Sources of functional foods and Nutraceuticals.

Unit II **12 Hrs**

- Relation of functional foods & Nutraceutical (FFN) to foods & drugs
- Applications of herbs to functional foods.
- Functional foods and Nutraceuticals remedies for common disorders like Arthritis, Bronchitis, circulatory problems, hypoglycaemia, Nephrological disorders, Liver disorder

Unit III **12 Hrs**

- Brief idea about some Nutraceutical rich supplements
- Soy proteins and soy isoflavones in human health
- Probiotics and prebiotics
- Polyunsaturated fatty acids, lecithin
- Bee pollen, Caffeine, Green tea,
- Lecithin, Mushroom extract,
- Chlorophyll, Kelp and *Spirulina*
- Role of Dietary fibers in disease prevention.

Unit IV **12 Hrs**

- Effect of Functional foods on Immune system
- Antioxidant system of the human organism
- Cardiovascular diseases
- Types of cancer
- Osteoporosis
- Psoriasis and Ulcers

Unit V **12Hrs**

- Vegetables, Cereals, milk and dairy products as Functional foods
- Use of proanthocyanidins, grape products, flaxseed oil as Nutraceuticals
- Glucosamine, Lycopene and Melatonin
- Health effects of common beans, *Capsicum,* mustards, Ginseng,
- Health effects of garlic, grape, citrus fruits, fish oils, and sea foods

RECOMMENDED READINGS:

- Aluko, Rotimi E. ***Functional Foods and Nutraceuticals*** 2012. University of Manitoba, Winnipeg, Canada.
- Robert, E.C. **Handbook of Nutraceuticals and Functional Foods** (Modern Nutrition) 1st Edition, Kindle Edition
- Casimir C. Akoh***Functional Foods and Nutraceuticals*** *The University of Georgia, Athens, USA CRC Press*

MINOR PROJECT

Credits : 1 **II Year/ III Semester**
Course Code : MFSN20309

Objective:

- To gain practical knowledge, develop research and project writing skills and paper publications.

Outcome:

Students get a hand on experience related to different aspects of new Product development. Its Nutrition, food standards and regulations and clinical assessments.

A minor project will be allotted to each student after the II semester. They will be required to complete the data collection, analysis and writing of report so as to submit it at the end of III Semester and to present it as seminar.

FOOD PRESERVATION TECHNIQUES

Credits : 2 **II Year/ IV Semester**
Course Code : MFSN20401 (SEC-2) **No. of Lecture hours: 30**

OBJECTIVES:

To familiarize students with food preservation using different techniques which are widely followed in all food industries.

Outcome:
Students will gain knowledge about the impact of preservation techniques in maintaining the shelflife of foods.

UNIT I: **(12 Hrs)**

Introduction & High Temperature Processing

- Food preservation and processing – Scope, historical developments, principles
- Processing and preservation by heat;
    - blanching, pasteurization, sterilization and UHT processing
    - canning, extrusion cooking, dielectric heating
    - Microwave heating, baking, roasting and frying, etc.

UNIT II: **(12 Hrs)**

Low Temperature Processing

- Processing and preservation by low-temperature-
    - refrigeration, freezing, dehydro freezing
    - CA, MA
- Processing and preservation by
    - Drying– Types of dryers - suitability for different food products.
    - Concentration, evaporation
    - Crystallization

UNIT III: **(12 Hrs)**

Food Additives

- Preservation by Food additives: types and functions
- Permissible limits and safety aspects.
- Use and application of;
    - Enzymes & Microorganisms in processing and preservation of foods

UNIT IV **(12 Hrs)**

Membrane Technology

- Membrane technology - Introduction to pressure activated membrane processes:
    - micro- filtration
    - UF
    - NF
    - RO
- Industrial applications of Membrane technology

UNIT V **(12 Hrs)**

New Techniques of Preservation

- New techniques in food processing
- Processing and preservation by non-thermal methods
    - Irradiation, high pressure,
    - pulsed electric field,
    - ohmic heating

- IR heating, pulsed X-rays
- Hurdle technology
- Nanotechnology: Principles and applications in foods

RECOMMENDED READINGS:

1. Arsdel WB, Copley MJ & Morgan AI. 1973. *Food Dehydration*. 2nd Ed.Vols. I, II. AVI Publ.
2. Desrosier NW & James N.1977. *Technology of Food Preservation*. 4th Ed.AVI. Publ.
3. Fellows PJ. 2005. *Food Processing Technology: Principle and Practice*. 2nd Ed. CRC.
4. Jelen P. 1985. *Introduction to Food Processing*. Prentice Hall.
5. Potter NN & Hotchkiss 1997. *Food Science*. 5th Ed. CBS.
6. Potty VH &Mulky MJ. 1993. *Food Processing*. Oxford & IBH.
7. Ramaswamy H & Marcotte M. 2006. *Food Processing: Principles and Applications*. Taylor & Francis.

NUTRITION FOR HEALTH AND FITNESS

Credits : 4 **II Year/ IV Semester**
Course Code : MFSN20402 (GE-1) **No. of Lecture hours: 60**

OBJECTIVES:

- To familiarize students with different aspects of nutrition and its importance in maintaining healthy life

OUTCOME:

- Students will gain knowledge about different aspects of nutrition and its importance in maintaining healthy life.

UNIT:1 **(12 Hrs)**

- Carbohydrates – Classification, functions, sources, Digestion and absorption, Regulation of blood glucose concentration, dietary fibre, resistant starch, Glycaemic Index.
- Proteins – Classification, food sources, functions, Digestion, absorption and transport, nutritional requirements.

UNIT:2 **(12 Hrs)**

- Fats – Types, Functions, sources and its metabolism, nutritional requirements, diseases, excessive fat intake.
- Water and Electrolyte Balance.
- Vitamins and Minerals – Types, sources, functions, requirements, deficiency, toxicity and preventive measures.

UNIT:3 **(12 Hrs)**

- Food components other than essential nutrients – Functional foods, Bioactive substances from protein foods, Non glycerides in edible oils
- Probiotics and Prebiotics,
- Polyphenols,
- Phytoestrogens,
- other dietary factors with antinutritional effects like: Protease inhibitors, Saponins, Amylase inhibitors, Lectins or Haemagglutinins, Phytates and their health benefits.

UNIT:4 **(12 Hrs)**

- Nutrition during different stages of life cycle.
- Sports Nutrition – Concept Techniques of measuring body composition, work capacity, physical fitness, Nutritional demands of sports and dietary recommendations, ergogenic aids.
- Holistic approach to the management of fitness and health – Energy input and output Diet and exercise. Effect of specific nutrients on work performance and physical fitness.

UNIT:5 **(12 Hrs)**

- Nutrition, exercise, physical fitness and health inter – relationship.
- Review of different energy systems for endurance and power activity – fuels and nutrients to support physical activity
- shifts in carbohydrate and fat metabolism
- Mobilization of fat stores during exercise.

RECOMMENDED READINGS:

- Williams, S.R. B.S. Worthington Roberts (1988). Nutrition throughout the life cycle. Times mirror, mostly college publishing St. Louis.
- Whitney. E.R. and S.R Kolfes (2002) Understanding Nutrition 9th ed. Wadsworth Thomson Learning,Australia.

- Thompson, L.U. (1993) Potential Health Benefits and problems associated with antinutrients in foods. Food Research International. 26; 134 – 149.
- Gibson, G.R. and M.B. Roberfroil (1999) ColoricMirobio, Nutrition and health, Kluwer Academic Publishers, Dordecht.

NUTRITION COMMUNICATION FOR HEALTH PROMOTION

Credits : 4 **II Year/ IV Semester**
Course Code : MFSN20403-A (DSE-2) **No. of Lecture hours: 60**

OBJECTIVES

· To be familiar with the national/international dietary guidelines addressing nutrition and health aspects.
· To learn about the determinants of food behaviour.
· To be able to plan, implement and evaluate behaviour change communication for promotion of nutrition and health among the vulnerable groups.

· To understand the concept of nutrition advocacy.

OUTCOMES

- Students gain understanding about determinants of food behaviour and concept of nutrition advocacy.
- Students will gain knowledge about how to implement and evaluate behaviour change communication for promotion of nutrition and health among the vulnerable groups.

Unit I **(12 Hrs)**

- Dietary guidelines for nutrition and health related concerns.
- National / international guidelines and their role in nutrition promotion.
- Critical appraisal of the current guidelines.

Unit II **(12 Hrs)**

- Nutrition and Behaviour Inter-relationship
- Food and health behaviour
- Models/theories of health behaviour
- Food choice, strategies for intervention at the ecological and individual level

Unit III **(12 Hrs)**

- Behaviour Change Communication for nutrition and health promotion
- Concept and objectives of communication for behaviour change
- Implementing behaviour change communication intervention : overview.
- Evaluation of communication for behaviour change programmes

UNIT 4 **(12 Hrs)**

- Planning of communication strategies for behaviour change programme Communication needs analysis, stakeholders in nutrition promotion, developing nutrition education plan, identifying communication strategies and approaches for nutrition and health promotion (e.g. social marketing), designing nutrition and health messages, selecting communication channels, developing and field testing of communication materials, designing training strategy for trainers and building capacity.
- Ethics in nutrition and health communication

Unit V **(12 Hrs)**

- Nutrition Advocacy – Role in policy formulation and execution.
- Theory of advocacy, Advocacy vs Behaviour Change Communication, analysis of the policy environment, preparation of policy briefs.
- Monitoring and evaluation of policy related activities and outcomes.

RECOMMENDED READINGS:

· Gibney M.J., Margetts, B.M., Kearney, J.M., Arab, L. (Eds) (2004) Public Health Nutrition.NS Blackwell Publishing.

· Prochaska, K.L., The Transtheoretical Model of Behavioural Change, Shumaker SA(Eds).

· Public Health Communication: Evidence for Behavior Change by Robert C. Hornik © 2002 by Lawrence Erlbaum Associates, Inc.

· Communication and Health: Systems and Applications. Edited by Eileen Berlin Ray and Lewis Donohew © 1990 by Lawrence Erlbaum Associates, Inc.
· Designing health messages: Approaches from Communication Theory and Public Health Practice. Editors: Edward Maibach and Roxanne Louiselle Parrott © 1995 by Sage Publications, Inc.
· Community Nutrition in Action: An Entrepreneurial Approach. Fourth Edition. Marie A. Boyle and David H. Holben. © 2006 Thomson Wadsworth.

NUTRITION COMMUNICATION AND DIET COUNSELING

Credits : 4 **II Year/ IV Semester**
Course Code : MFSN20403-B (DSE-2) **No. of Lecture hours: 60**

OBJECTIVES

· To be familiar with the national/international dietary guidelines addressing nutrition and health aspects.
· To be able to understand the vulnerable group behaviours for proper diet counseling
· To be able to plan, implement and evaluate behaviour change communication for promotion of nutrition and health among the vulnerable groups.

OUTCOMES:

- Students will gain knowledge about national/international dietary guidelines
- Students will gain knowledge about causes for behaviour change in vulnerable groups and understand the methods of diet counselling.

Unit I **(12 Hrs)**

- Nutrition and Behaviour Inter-relationship
- Food and health behaviour
- Models/theories of health behaviour
- Food choice, strategies for intervention at the ecological and individual level

Unit II **(12 Hrs)**

- Behaviour Change Communication for nutrition and health promotion
- Concept and objectives of communication for behaviour change
- Implementing behaviour change communication intervention : overview.
- Evaluation of communication for behaviour change programmes

UNIT III **(12 Hrs)**

- Planning of communication strategies for behaviour change programme Communication needs analysis, stakeholders in nutrition promotion, developing nutrition education plan, identifying communication strategies and approaches for nutrition and health promotion (e.g. social marketing), designing nutrition and health messages, selecting communication channels, developing and field testing of communication materials, designing training strategy for trainers and building capacity.
- Ethics in nutrition and health communication

UNIT IV **(12 Hrs)**

- Dietitian as part of the Medical Team and Outreach Services.
- Clinical Information - Medical History and Patient Profile Techniques of obtaining relevant information, Retrospective information, Dietary Diagnosis, Assessing food and nutrient intakes, Lifestyles, Physical activity, Stress, Nutritional Status.
- Correlating Relevant Information and identifying areas of need.
- The Care Process - Setting goals and objectives short term and long term, Counselling and Patient Education, Dietary Prescription.

UNIT:5 **(12 Hrs)**

- Motivating Patients.
- Working with - Hospitalized patients (adults, pediatric, elderly, and handicapped), adjusting and adopting to individual needs.
- Outpatients (adults, pediatric, elderly, handicapped), patients' education, techniques and modes.
- Follow up, Monitoring and Evaluation of outcome, Home visits.

RECOMMENDED READINGS:

- Gibney M.J., Margetts, B.M., Kearney, J.M., Arab, L. (Eds) (2004) Public Health Nutrition.NS Blackwell Publishing.
- Prochaska, K.L., The Transtheoretical Model of Behavioural Change, Shumaker SA(Eds).
- Public Health Communication: Evidence for Behavior Change by Robert C. Hornik © 2002 by Lawrence Erlbaum Associates, Inc.
- Communication and Health: Systems and Applications. Edited by Eileen Berlin Ray and Lewis Donohew © 1990 by Lawrence Erlbaum Associates, Inc.
- Designing health messages: Approaches from Communication Theory and Public Health Practice. Editors: Edward Maibach and Roxanne Louiselle Parrott © 1995 by Sage Publications, Inc.
- Community Nutrition in Action: An Entrepreneurial Approach. Fourth Edition. Marie A. Boyle and David H. Holben. © 2006 Thomson Wadsworth.
- Modern Nutrition in Health and Disease – Goodhearth, R. S.
- Recommended dietary allowance for Indian – I.C.M.R., 1980
- Nutrition and Development- Winick 1973, Univ. of Calombia.
- Biology of Nutrition – Eclames 1972, Palaniuma Press
- Foods & Nutrition – Krause 1972, Saunders.
- Human Nutrition and dietetics- Davidson, S. Passmore, R. Brock- J.F. and Turswell A.S.
- Clinical Dietetics and Nutrition - Anita, F.P.
- Food Science and Technology: Pyke, Maonus.
- Modern Nutrition in health and disease by Goodhearth R.S. Shills

PROJECT WORK

Credits : 10 **II Year/ IV Semester**

Course Code : MFSN20404

Objective:

- To develop research and project writing skills in students.

Outcome:

Students get a hand on experience related to different aspects of new Product development. Its Nutrition, food standards and regulations and clinical assessments.

A research project will be allotted to each student after the III semester. They will be required to complete the data collection, analysis and writing of dissertation so as to submit it at the end of IV Semester and to present it at seminar.