



PERIYAR UNIVERSITY

PERIYAR PALKALAI NAGAR

SALEM – 636011

DEGREE OF MASTER OF SCIENCE
CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR
M.SC. FOOD AND NUTRITION
(SEMESTER PATTERN)

**(For Candidates admitted in the Colleges affiliated to
Periyar University from 2017-2018 onwards)**

REGULATIONS

OBJECTIVES OF THE COURSE:

1. Be familiar with effects of reactions on the quality and Gain knowledge regarding the physical and chemical properties of the food constituents.
2. Be able to recommend and provide appropriate nutritional care for prevention and treatment of various diseases.
3. Be familiar with the recent advances and research in the field.

1. ELIGIBILITY FOR ADMISSION

B.Sc Nutrition and Dietetics, B.Sc Food Science and Nutrition, B.Sc Clinical Nutrition and Dietetics, B.Sc Home science, B.Sc Home science related subjects.

2. DURATION OF THE COURSE

The course for the degree of Master of Food and Nutrition shall consist of two academic years divided in to four semesters. Each semester consist of 90 working days.

3. COURSE OF STUDY

The course of study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time.

SEMESTER I

Core Paper 1 Food Science-1
Core Paper 2 Nutrition Through Life Cycle
Core Paper 3 Physiological of Nutrition
Elective 1 Food Processing
Core Pract- 1 Food Quality Control Practical
Core Pract- 2 Food Analysis Practical

SEMESTER II

Core Paper 4 Research Methodology
Core Paper 5 Food Science-II
Core Paper 6 Medical Nutritional Therapy-I
Core Paper 7 Macronutrients
Core Pract-2 Food Analysis practical(continued from 1st semester)
EDC Extra disciplinary Course (EDC)
HR Human Rights(common all PG)

SEMESTER III

Core Paper 8	Micronutrients
Core Paper 9	Medical Nutritional Therapy-I
Core Paper 10	Community Nutrition
Elective 2	Food Biotechnology
Core Pract-3	Medical Nutritional Therapy Practical
Core Pract-4	Biochemical Techniques Practical
Internship Report	

SEMESTER IV

Elective 3	Food Preservation
Elective 4	Neutraceutical
Core Pract-4	Biochemical Techniques Practical
Dissertation	

4. EXAMINATIONS

The examination shall be three hours duration to each paper at the end of each semester. The candidate failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examination.

Extra Disciplinary Course (EDC) is introduced in the second semester. The Students should select any one EDC paper offered by other departments. Practical examinations for PG course should be conducted at the end of the odd/ even semester.

At the end of third and fourth semester viva-voce will be conducted on the basis of the internship report/dissertation / project report submitted by the student. The Viva – voce will be conducted by one internal and one external examiner jointly

Requirement to appear for the examination

A candidate shall be permitted to appear for the university examinations for any Semester (practical/theory) if He / She secures not less than 75% of attendance in the number of working days during the semester.

5. PASSING MINIMUM

A candidate who secures not less than 50% in the university (external) Examination and 50% marks in the external examination and continuous internal assessment put together in any course of Major/elective/NMEC shall be declared to have passed the examination in the subject (theory or Practical). For practical, the minimum for a pass includes the record notebook marks also. There is no passing minimum for the record notebook. However submission of a record notebook is a must.

6. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in First Class.

All other successful candidates shall be declared to have passed in the Second Class. Candidates who obtain 75% of the marks in the aggregate shall be declared to have passed the examination in First Class with Distinction provided they pass all the examinations prescribed for the course at the first appearance.

Grading:

Conversion of marks to Grade points and letter grade (Performance in a course/paper)

Range of marks	Grade Points	Grade Points	Description
90-100	9.0-10.0	O	Outstanding
80-89	8.0-8.9	D+	Excellent
75-79	7.5-7.9	D	Distinction
70-74	7.0-7.4	A+	Very Good
60-69	6.0-6.9	A	Good
50-59	5.0-5.9	B	Average
00-49	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

C_i = Credits earned for course i in any semester

G_i = Grade point obtained for course i in any semester

n = refers to the semester in which such course were credited

Grade point average (for a Semester):

Calculation of grade point average semester-wise and part-wise is as follows:

$$\text{GRADE POINT AVERAGE [GPA]} = \frac{\sum_i C_i G_i}{\sum_i C_i}$$

Sum of the multiplication of grade points by the credits of the courses

$$\text{GPA} = \frac{\text{Sum of the multiplication of grade points by the credits of the courses}}{\text{Sum of the credits of the courses under each part in a semester}}$$

Sum of the credits of the courses under each part in a semester

Calculation of grade point average (CGPA) (for the entire programme):

A candidate who has passed all the examinations under different parts is eligible for the following part wise computed final grades based on the range of CGPA.

$$\text{CUMULATIVE GRADE POINT AVERAGE [CGPA]} = \frac{\sum_n \sum_i C_{ni} G_{ni}}{\sum_n \sum_i C_{ni}}$$

Sum of the multiplication of grade points by the credits of the entire programme

$$\text{CGPA} = \frac{\text{Sum of the multiplication of grade points by the credits of the entire programme}}{\text{Sum of the credits of the courses of the entire programme}}$$

Sum of the credits of the courses of the entire programme

CGPA	GRADE	Classification of Final Result
9.5-10.0	O+	First Class - Exemplary*
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	First Class with Distinction*
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	First Class
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
0.0 and above but below 5.0	U	Re-appear

* The candidates who passed in the first appearance and within a prescribed semester of the PG Programme.

7. RANKING

Candidates who pass all the examinations prescribed for the course in the first appearance and within a period of two academic years from the year of admission to the course only are eligible for University Ranking.

8. MAXIMUM DURATION FOR THE COMPLETION OF THE PG PROGRAMME

The maximum duration for completion of the PG Programme shall not exceed eight semesters.

9. COMMENCEMENT OF THIS REGULATION

These regulations shall take effect from the academic year 2017-18, i.e., for students who are to be admitted to the first year of the course during the academic year 2017-2018 and thereafter.

10. TRANSITORY PROVISION

Candidates who were admitted to the PG course of study before 2017 shall be permitted to appear for the examinations under these regulations for a period of three years i.e., upto and inclusive of the examinations of May 2020. Thereafter, they will be permitted to appear for the examination only under the regulation then in force.

COURSE OF STUDY AND SCHEME OF EXAMINATION

SEM	CODE	COURSE	Hrs	Cre-dits	Marks			EXAMI-NATION (Hrs)
					IA*	EA**	TOTAL	
I	Core I	Food Science - 1	5	5	25	75	100	3
	Core II	Nutrition Through Life Cycle	5	5	25	75	100	3
	Core III	Physiological Aspects of Nutrition	5	5	25	75	100	3
	Elective I	Food processing	5	5	25	75	100	3
	Core Pract-I	Food Quality Control Practical	5	3	40	60	100	3
	Core Pract-II	Food Analysis Practical	5	-	-	-	-	-
II	Core IV	Research Methodology	5	5	25	75	100	3
	Core V	Food Science - II	5	5	25	75	100	3
	Core VI	Medical Nutritional Therapy-I	5	5	25	75	100	3
	Core VII	Macro nutrients	5	5	25	75	100	3
	Core Pract-III	Food Analysis Practical	4	4	25	75	100	3
	EDC	Extra disciplinary Course (EDC)	4	4	25	75	100	3
		Human Rights	2	2	-	100	100	3
III	Core VIII	Micro nutrients	5	5	25	75	100	3
	Core IX	Medical Nutritional Therapy - II	5	5	25	75	100	3
	Core X	Community Nutrition	5	5	25	75	100	3
	Elective II	Food Biotechnology	5	4	25	75	100	3
	Core Pract-IV	Medical Nutritional Therapy	5	3	40	60	100	3
	Core Pract-V	Biochemical Techniques Practical	5	-	-	-	-	-
	Viva Voice	Internship Report	-	2	40	60	100	-
IV	Elective -III	Food Preservation	5	4	25	75	100	3
	Elective -IV	Nutraceuticals	5	4	25	75	100	3
	Core Pract -VI	Biochemical Techniques Practical	5	4	40	60	100	6
	Viva Voice	Dissertation	15	4	40	60	100	-
TOTAL			120	92			2200	

* IA - Internal Assessment ** EA - External Assessment

ELIGIBILITY : B.Sc Nutrition and Dietetics, B.Sc Food Science and Nutrition, B.Sc Clinical Nutrition and Dietetics, B.Sc Home Science, B.Sc Home Science related subjects.

PATTERN OF QUESTION PAPER

M.Sc FOOD & NUTRITION

THEORY (EXTERNAL EXAM)

Time: 3 Hours

Maximum Marks: 75

PART A (5 X 5 = 25 MARKS)

Answer ALL Questions (Internal Choice)

PART B (5 X 10 = 50)

Answer ALL Questions (Internal Choice)

INTERNAL ASSESSMENT (THEORY)

MARKS DISTRIBUTION

Test : 10marks
Assignment : 5 marks
Seminar : 5 marks
Attendance : 5 marks

25 marks

Passing minimum (Internal Assessment) – 50% - 12 marks

Passing minimum (External Assessment) – 50% - 38 marks

50 marks

DISSERTATION: EVALUATION PATTERN

Internal	:	40 marks (Awarded by respective guides)
External	:	60marks
Report valuation	:	40 marks
Viva Voce	:	20 marks

PRACTICAL MARKS DISTRIBUTION

External	:	60 marks
Internal	:	40 marks

Practical external marks

Practical	:	50 marks
Record	:	10 marks

Practical Internal marks

Record	:	10 marks
Practical	:	30 marks

Passing minimum (Internal Assessment) – 50% - 20 marks

Passing minimum (External Assessment) – 50% - 30 marks

50 marks

M.Sc. FOOD AND NUTRITION
SEMESTER - I
CORE I - FOOD SCIENCE - I

OBJECTIVES

Study of this paper will enable the students to

1. Understand the composition and nutritive value of cereals, pulses, milk and milk products.
2. Understand the changes that are taking place in cereals, pulses and milk during cooking.

UNIT-I

Food: Properties of food – Physical properties, Acids and bases in foods; Colloids – Types and Properties; Sols – Properties; Gels – Properties and factors influencing gel formation; Emulsion – Types, formation, properties and stability of emulsions; Foams – formation, Stability and anti foaming agents.

UNIT-II

Cereals: General structure, composition, Nutritive value of rice, wheat, maize, oats and jowar.

Millets: Composition, Nutritive value and uses of pearl millet, finger millet, proso millet. Breakfast cereal – Uncooked breakfast cereals and ready to eat cereals.

UNIT-III

Cereal cookery: Cereal protein- Gluten formation and factors affecting; Cereal starch, effect of moist heat – Gelatinisation, factors affecting gelatinisation Changes in cooked starches- Gel formation, Retrogradation and syneresis; Effect of dry heat- Dextrinisation; Effect of cooking on nutritive value, Points to remember in cereal cookery, Role of cereal in cookery.

Unit – IV

Pulses: Composition and nutritive value, Digestibility of pulses and factors affecting the digestibility of pulse proteins, Toxic constituents in pulses and their elimination; commonly used pulses.

Pulse cookery: Effect of cooking, Factors affecting cooking quality, Utilization of pulses, Role of pulses in cookery and pulses in human nutrition.

Unit – V

Milk and Milk products: Composition of milk, Nutritive value of milk and milk products, Physical and chemical properties of milk, Types of milk available in the market (whole milk, skim milk, homogenised milk, flavoured milk, evaporated milk, sweetened condensed milk, powdered milk, UHT milk, lactose reduced milk, standardized milk, toned milk, double toned milk).

REFERENCES

1. Srilakshmi. B; Food Science, 6th edition, New Age International (P) Limited Publishers, 2015.
2. Shakunthala Manay. N; Shadakshara Swamy.M; Foods Facts and Principles, 3rd edition, New Age International (P) Limited Publishers, 2014.
3. Lillian Hoagland Meyer, Food chemistry, CBS Publishers and Distributors, 2004.
4. Arindam Ramaswamy, Elements of Food Science, Oxford Book Company, 2010.
5. Norman. N Potter, Joseph H. Hotchkiss, Food Science, 5th edition, CBS Publishers and Distributors, 1996.
6. Sivasankar. B; Food Processing and Preservation, PHI Learning Private Limited, 2011.

M.Sc. FOOD AND NUTRITION

SEMESTER - I

CORE II - NUTRITION THROUGH LIFE CYCLE

OBJECTIVES

Study of this paper will enable the students to

1. Understand the Computation of allowances.
2. Understand the importance of nutrition during life span.

UNIT-I

Nutrition during Pregnancy: Prenatal growth and development, Nutritional requirements, RDA, Weight gain during pregnancy, Relationship between maternal and foetal nutrition, Teenage pregnancy and diet, General gastro intestinal problems, complications of pregnancy.

UNIT-II

Nutrition during Lactation: Physiological process of lactation, Nutritional requirements, RDA, Breast feeding- Colostrum and mature milk. Advantages of breast feeding- Nutritional benefit, hormones and growth, immunological benefits, psychological and economic, environmental benefits, infant and child morbidity. Barriers to breast feeding, Low milk production.

UNIT-III

Nutrition during Infancy: Infant growth and Physiological development, Nutritional requirements for growth, RDA, Artificial feeding. Low birth weight and Preterm baby- Nutritional requirements, feeding the preterm baby, feeding problems. Weaning- Need for weaning, types of supplementary foods, problems in weaning. Nutrition in Preschool children: Growth and development, nutritional requirements, RDA, feeding dental problems and decay. Nutrition related problems of preschool children – Protein energy malnutrition- Types, symptoms, nutritional requirements and treatment.

Unit –IV

Nutrition in School children: Nutritional requirements, RDA, Feeding problems, Packed lunches, Supplementary foods. Nutrition in Adolescents; Growth and development, Nutritional requirements, RDA, Nutritional problems- Obesity, eating disorders, predisposition to osteoporosis, anaemia, under nutrition, pre menstrual syndrome, mal nutrition due to early marriage.

Unit –V

Nutrition in Adults: Growth and development, Nutritional requirements, RDA. Nutrition in Old age: General physiological changes, Theories on the causes of aging, Nutritional requirements, Nutrition related problems of old age, Degenerative diseases. Alzheimer's disease- Cause, physical effects and nutrition consideration. Guidelines for promoting healthful eating in old age, Exercise in old age.

REFERENCE :

1. Gordon. M. Wardlaw et.al; Contemporary Nutrition, 2nd edition, Publishing by Mosby, 2004.
2. Srilakshmi. B; Dietetics, 7th edition, New Age International (P) Limited Publishers, 2014.
3. William's; Nix; Basic Nutrition and Diet therapy, 14th edition, Publishing by Mosby, 2013.
4. Mahtab S.Bamji, Prasad Rao, N.Vinodini Reddy; Textbook of Human Nutrition, Second Edition Oxford and IBH Publishing Co. Pvt .Ltd, 2003.
5. Nutrient Requirement and Recommend Dietary Allowances for Indians by Indian council of Medical research, National Institute of nutrition, Hyderabad.
6. Judith E. Brown., Nutrition New, 2nd edition, West / Wadsworth west / Wadsworth, An International Thomson publishing company, 1998.

M.Sc. FOOD AND NUTRITION
SEMESTER - I
CORE I -PHYSIOLOGICAL ASPECTS OF NUTRITION

Objectives

Study of this paper will enable the students to

1. Advance their understanding of some of the relevant issues and topics of human physiology.
2. Understand the integrated functions of all systems and the grounding of nutritional science in Physiology.

UNIT-I

Structure and functions of animal cell and its organelles with special reference to structure and function of cell membranes (their role in the control of the transport of solutes across the membrane) and nucleus.

Adipose tissue – Structure, composition, types, deposition of triglycerides in adipose tissue, formation of fat stores from non lipid and dietary lipids, role of brown adipose tissues in thermogenesis.

Immunity – Human immunoglobulins, cell mediated and humoral immunity; innate immunity – activation of WBC and production of antibodies. Introduction to T cells and B cells. Role of thymus.

UNIT-II

Digestive system – Structure and functions of gastro intestinal tract, gastro intestinal motility, salivary gland function, nature and control of stomach and pancreatic secretions, biliary system, digestion and absorption in small and large intestines, regulation of food intake –hunger, appetite and satiety.

Respiratory system – Structure of lungs and gaseous exchange (transport of oxygen and carbon-di-oxide).

Unit –III

Cardio vascular system – Blood composition and functions, structure and function of heart and blood vessels, regulation of cardiac output and blood pressure, heart failure and hypertension.

Excretory system – Structure and functions of kidney, structure of nephron, physiology of urine formation, micturition; structure and function of skin.

Unit –IV

Nervous system – Structure and functions of brain (briefly) and spinal cord; structure and functions of neuron; conduction of nerve impulse, role of neurotransmitters; blood brain barriers, CSF, hypothalamus and its role in various body functions.

Musculo skeletal system – Structure and functions of bone; physiology of muscle contraction.

Unit –V

Reproductive system – Structure and functions of gonads, menstrual cycle, fertilization, physiological changes in pregnancy, parturition, lactation and menopause.

Endocrine system – Structure , function, role of hormones, regulation of hormone secretion and disorders – pituitary, thyroid, adrenal, pancreas and parathyroid glands.

REFERENCE :

1. Ganongs. W.F; Review of medical physiology, 1985.
2. Campbell. E.J et al; Clinical and applied physiology, 1984.
3. Guyton AC and Hall JB; Textbook of medical physiology, 1996.
4. Guyton AC; Functions of human body, 1985.
5. Wilson KJW and Waugh A; Ross and Wilson. Anatomy and Physiology in health and illness, 8th edition, 2003.
6. Judith E. Brown., Nutrition New, 2nd edition, West / Wadsworth west / Wadsworth, An International Thomson publishing company, 1998.

M.Sc. FOOD AND NUTRITION
SEMESTER - I
ELECTIVE I - FOOD PROCESSING

Objectives

Study of this paper will enable the students

1. To impart systematic knowledge of basic and applied aspects in food processing and technology.
2. To optimise process parameter for consistent quality processed

UNIT-I

Basic principle of food processing, Need for food processing ,Basic unit operations in food processing- cleaning separating, heat exchanging , evaporation, drying, forming, packaging and controlling. Processing techniques: Using high temperatures, low temperatures, ionising radiation, microwave and ohmic processing of foods. Effect of various processing techniques on nutritive value of foods. Manufacturing of sugar and its types.

UNIT-II

Cereal technology: Rice- Milling, parboiling: Methods, advantages and disadvantages, byproducts of rice milling and their utilization. Wheat: Milling process, byproducts of wheat milling. Millets: Milling of major and minor millets. Malting and fermentation. Manufacturing of break fast cereals: Extruded products, puffing, flaking.

UNIT-III

Pulse technology: Milling of soya bean and Bengal gram and their byproducts, germination, fermentation, parching, popping, processed soya products. Nuts and oil seeds: Milling, techniques in extraction of oil, byproducts- Meal concentrates, isolate. Speciality fats, hydrogenation, production of MCT. Fat replacers and their uses.

Unit -IV

Dairy technology: Milk processing: Separation, standardization, pasteurization, homogenization, sterilization, evaporation, drying, membrane fractionation. Manufacturing of cheese, butter, khoa, yoghurt, srikhand, ice cream, condensed milk and dry milk. Milk substitutes- Lactone, infant formula. Byproducts: Skimmed milk, lassi, butter milk, whey, ghee residue.

Unit –V

Fruits and vegetable technology: Dehydration, juice concentrate, canning of fruits and vegetables. Potato processing and its products (wafers and French fries). Fleshy food technology: Processing of fish for smoking, canning and freezing. Curing of meat, Poultry processing, Pasteurization of egg, manufacture of egg powder and frozen egg products.

REFERENCE :

1. Srilakshmi. B; Food Science, 6th edition, New Age International (P) Limited Publishers, 2015.
2. Shakunthala Manay. N; Shadakshara Swamy.M; Foods Facts and Principles, 3rd edition, New Age International (P) Limited Publishers, 2014.
3. Lillian Hoagland Meyer, Food chemistry, CBS Publishers and Distributors, 2004.
4. Subbulakshmi. G and Shobha. A.U; Food processing and preservation, New Age International (P) Limited Publishers, 2014.
5. Norman. N Potter, Joseph H. Hotchkiss, Food Science, 5th edition, CBS Publishers and Distributors, 1996.
6. Sivasankar. B; Food Processing and Preservation, PHI Learning Private Limited, 2011.

**M.Sc. FOOD AND NUTRITION
SEMESTER - I**

CORE PRACTICAL :1 FOOD QUALITY CONTROL PRACTICAL

1. Estimation of titrable acidity.
2. Estimation of total solids.
3. Estimation of specific gravity in foods.
4. Analysis of pectin in foods.
5. Estimation of lactose in milk.
6. Estimation of tannins in tea.
7. Test for rancidity in oils – Kries test.
8. Food adulteration- Tests to detect adulteration.
9. Determination of gluten content of flour.
10. Determination of bulk density, true density and porosity.
11. Determination of physical dimensions of grain- length, breadth, thickness and sphericity.
12. Preparation and inoculation of growth media- Inoculation and incubation counting of microbes.

M.Sc. FOOD AND NUTRITION
SEMESTER - I AND II
CORE PRACTICAL II - FOOD ANALYSIS PRACTICAL

- I. Quantitative Analysis
 1. Protein by Lowry's method
 2. Nitrogen by Kjeldahl method
 3. Iodine Number of oil
 4. Saponification number of oil
 5. Acid Number of oil
 6. Ash content
 7. Iron
 8. Phosphorus
 9. Calcium
 10. Vitamin -C
 11. Thiamine
 12. Riboflavin
 13. Sodium
 14. Potassium
 15. Vitamin A / β carotene
 16. Crude fibre
 17. Moisture by hot air oven method
 18. Energy value by Bomb calorimeter
 19. Fat by Soxhlet method

M.Sc. FOOD AND NUTRITION
SEMESTER - II
CORE IV - RESEARCH METHODOLOGY

Objectives

Study of this paper will enable the students to

1. Understand the methods of researches that can be applied in the field of food and nutrition.
2. Understand the application of statistical calculations in the interpretation of results of research problems.

UNIT-I

Research methodology: An introduction- Meaning, Objectives, Motivation, Types and Significance of research, Research methods versus methodology, Research and scientific method, Research process. Defining the research problem- Selecting, Necessity, Technique and An Illustration in defining the problem. Research design- Meaning, Need, Features, Important concepts and different research designs. Sampling design- Census, Sample survey, Steps, Characteristics and Types of sampling design.

UNIT-II

Methods of collecting primary data- Questionnaire, preparation of schedules, Interview method, case- study method, Experimentation method, Data Collection – Primary and secondary data, Sources of secondary data, precautions while using secondary data. Editing and coding the data, Organization of data- Classification – meaning and objectives, types of classification, formation of discrete and continuous frequency distribution, Tabulation – Role, parts of a table, general rules of tabulation, Types of tables.

UNIT-III

Representation of data – Diagrammatic and graphical representation , Significance of diagrams and graphs, General rules for constructing diagrams, Types of diagrams, graphs of Time series, graphs of frequency distribution. Interpretation and Report writing- Meaning of interpretation technique, precautions, Format of research report, types, steps and stages, mechanism and style, precautions and essential for good report, footnotes and bibliographical citations.

Unit –IV

Dairy technology: Milk processing: Separation, standardization, pasteurization, homogenization, sterilization, evaporation, drying, membrane fractionation. Manufacturing of cheese, butter, khoa, yoghurt, srikhand, ice cream, condensed milk and dry milk. Milk substitutes- Lactone, infant formula. Byproducts: Skimmed milk, lassi, butter milk, whey, ghee residue.

Unit –V

Fruits and vegetable technology: Dehydration, juice concentrate, canning of fruits and vegetables. Potato processing and its products (wafers and French fries). Fleshy food technology: Processing of fish for smoking, canning and freezing. Curing of meat, Poultry processing, Pasteurization of egg, manufacture of egg powder and frozen egg products.

REFERENCE :

1. Srilakshmi. B; Food Science, 6th edition, New Age International (P) Limited Publishers, 2015.
2. Shakunthala Manay. N; Shadakshara Swamy.M; Foods Facts and Principles, 3rd edition, New Age International (P) Limited Publishers, 2014.
3. Lillian Hoagland Meyer, Food chemistry, CBS Publishers and Distributors, 2004.
4. Subbulakshmi. G and Shobha. A.U; Food processing and preservation, New Age International (P) Limited Publishers, 2014.
5. Norman. N Potter, Joseph H. Hotchkiss, Food Science, 5th edition, CBS Publishers and Distributors, 1996.
6. Sivasankar. B; Food Processing and Preservation, PHI Learning Private Limited, 2011.

M.Sc. FOOD AND NUTRITION
SEMESTER - II
CORE V - FOOD SCIENCE II

Objectives

Study of this paper will enable the students to

1. Understand the composition and nutritive value of animal products, vegetables, fruits, fats, oils, nuts and spices.
2. Understand the changes that are taking place during cooking of animal products, fruits, vegetables, fats and oils.

UNIT-I

Egg: Structure, composition and nutritive value, quality of egg – factors determining and evaluation.

Egg cookery: Effect of cooking on nutritive value, effect of heat on egg protein, factors affecting coagulation of egg proteins, effect of other ingredients on egg proteins; egg white foam – factors affecting; role of egg in cookery, designer eggs.

Poultry: Classification, composition and nutritive value, processing and cooking.

UNIT-II

Meat: Classes of meat, structure, composition and nutritive value; post-mortem changes in meat, ageing, tenderising, curing; cuts and grades of meat.

Meat cookery: Factors affecting cooking quality, changes in meat on cooking, tenderness and juiciness of meat.

Fish: Classification, composition and nutritive value, selection.

Fish cookery: Principles and methods.

UNIT-III

Vegetables: Classification, composition and nutritive value, pigments, organic acids, enzymes, flavour compounds, bitter compounds, selection of vegetables.

Vegetables cookery: Changes during cooking, loss of nutrients during cooking, effect of cooking on pigments, role of vegetables in cookery and points to be remembered while cooking vegetables.

Fruits: Classification, composition and nutritive value, pigments, cellulose and pectic substances changes during cooking, flavour constituents, polyphenols, bitterness, post harvest changes and ripening.

Browning: Types and prevention, points to be considered while serving fruits.

Unit -IV

Nuts and Oilseeds: Classification, composition and nutritive value, toxins present in nuts, role in cookery.

Fats and oils: Nutritional importance of fats and oils, functions of oils and fats in foods, flavour changes – Rancidity – types and prevention, reversion.

Sugar: Sources, properties, types, forms, liquid sweetners, reactions of sugar
Crystallisation: Factors affecting, role of sugar in cookery, stages of sugar cookery, crystalline and non crystalline candies

Unit -V

Spices: Classification, general functions, commonly used spices and herbs.

Aromatics – Composition and uses, role of spices in cookery.

Beverages: Classification and points to be considered while preparing beverages.

REFERENCE :

1. Srilakshmi. B; Food Science, 6th edition New Age International (p) Limited Publishers 2015.
2. Shakunthala manay N; Shadakshara swamy. M; Foods Facts and Principles, Third edition, New Age International (p) Limited Publishers, 2014.
3. Lillian Hoagland meyer, Food chemistry, CBS Publishers and distributors, 2004.
4. Arindam Ramaswamy, Elements of Food Science, Oxford book company, 2010.
5. Norman N. Potter, Joseph H. Hotchkiss, and food science, fifth edition, CBS publishers and distributors, 1996.
6. B. Sivasankar, Food Processing and Preservation, PHI Learning Private Limited, 2011.

**M.Sc. FOOD AND NUTRITION
SEMESTER - II**

CORE VI - MEDICAL NUTRITIONAL THERAPY - I

Objectives

1. To understand the etiology, physiological and metabolic anomalies of acute and chronic disorders / diseases
2. To understand the effect of various disorders / diseases on nutritional status, nutritional and dietary requirements

UNIT-I

Principles of clinical nutrition – Introduction, the spectrum of nutritional problems and management pathways. Perspectives on the future. Drug and Diet Interaction, Diet therapy and types of therapeutic diets, Role of dietitian and Indian Dietetic Association. The influence of drugs on the nutritional status of patients. Special Feeding Method: Intravenous feeding, tube feeding, gastrostomy, jejunostomy – Meaning, objectives, Technique, Nutrients and Diet.

UNIT-II

Nutritional therapy during energy Imbalance: Over nutrition and under nutrition - Introduction, etiology, clinical assessment, treatment approaches – general principles, lifestyle changes and nutritional management.

Eating disorders: Anorexia nervosa, bulimia nervosa, binge eating disorder – History, etiology, clinical features, epidemiology and nutritional management.

UNIT-III

Adverse reaction to foods; Introduction, food intolerance, food allergy, types of food allergy, patterns of food allergic responses, diagnostic criteria for food allergy, specific food allergies, multiple food allergy, scientific background: The basic mechanisms of immune response to dietary antigen.

Infection and fevers – defense mechanisms in the body, Role of Nutrition in Infections, effects of infection on body mechanisms , effects of infection on nutrition, definition of fever, nutritional modification in infection and fever.

Unit -IV

Metabolic disorder: Diabetes Mellitus – Introduction, types, pathophysiology of insulin resistance, symptoms, biochemical tests, complications, hypoglycemic drugs, dietary management, patient education, the diabetic association of India.

Unit -V

Gastro intestinal tract disorders: Dyspepsia, peptic ulcer, diarrhoea, constipation, inflammatory bowel disease – definition, epidemiology, pathogenesis, clinical features and diagnosis, dietary management. Diseases of Liver;-Hepatitis, (A, B, and C), Cirrhosis - Causes, symptoms, dietary management and Prevention.

REFERENCE :

1. Michael. J. Gibney etal; Clinical Nutrition Black well Science, 2005.
2. Shubhangini. A. Joshi; Nutrition and Dietetics, 3rd edition, McGraw Hill Education (India) Private Limited.
3. Srilakshmi . B; Nutrition Science, 15th edition, New Age International (p) Limited, publishers, 2016.
4. Swaminathan. M; Advanced Text-Book on Food and Nutrition, Volume I and 11 2nd Edition, The Bangalore printing and publishing co., LTD, Reprint 2015.
5. Sunetra Roday; Food Science and Nutrition, 2nd edition, Oxford University press, 2013.
6. Carol Byrd – Bredbenner; Wardlaw's perspectives in Nutrition, 9th edition McGraw – Hill International Edition, 2013.

M.Sc. FOOD AND NUTRITION
SEMESTER - III
CORE VII - MACRONUTRIENTS

OBJECTIVES

1. To understand the structure and functions of macro nutrients in human body.
2. To understand the effects of deficiency and excess of macro nutrients in human body

UNIT I

Carbohydrates – Introduction, Classification - Basis of degree of polymerization, based on digestive fate of carbohydrates. Functions, Food sources, Requirements Digestion, absorption and metabolic utilization of carbohydrates, Regulation of blood glucose concentration. Glycemic index-Factors affecting GI of foods. Dietary fibre- Introduction,Types,Properties, RDA and Components of dietary fibre. Role of fibre in human nutrition.

UNIT II

Lipid-Introduction, Classification, Function, Food sources, Requirements, RDA, digestion, absorption, transport and storage. Lipids and gene expression. Dietary fat and coronary heart disease. Fatty acid- Types, Functions, Requirements, food sources and deficiency.

Omega fatty acids – Role in good health, daily values, food sources, fortification and cauhm and omega fatty acids.

UNIT III

Proteins- Introduction,Classification,Functions, Requirements and RDA, Food sources, Digestion, absorption and metabolic utilization of protein, Quality of proteins.

Amino acid: Types, functions, food sources, requirements, deficiency. Therapeutic applications of specific amino acids. Peptides of physiological significance. Proteins, amino acids and gene expression.

UNIT IV

Energy – Introduction, Units, determination of energy value of food, physiological fuel

value, Benedict's Oxy-calorimeter, relation between oxygen required and calorimeter value. Basal Metabolic rate – Introduction, measurement of basal metabolism determination of basal metabolic rate by calculation energy requirement, during work, Thermic effect of food, Total energy requirement – Meaning, Measuring total energy requirement.. Factors affecting physical activity, basal metabolic rate and thermic effect of food, Dietary source, RDA.

UNIT IV

Water and electrolytes – Introduction, water, electrolytes and body composition, body water distribution, body electrolyte content : Distribution and exchangeable fractions, Intracellular water and the body cell mass concept, regulation of body water compartments, metabolic links: glucose, water and sodium. Body water compartments in chronic starvation, Impact to acute pathological conditions on the ICW, Body water in acute illness, water and electrolyte metabolism during refeeding, Implications of water and sodium metabolism in nutrition therapy for specific clinical condition .

REFERENCES

1. Michael. J. Gibney etal; clinical nutrition Blackwell science , 2005.
2. Shubhangini. A. Joshi; Nutrition and Dietetics III edition, McGraw Hill Education (India) private limited
3. Srilakshmi.B; Nutrition Science, 15th edition, New Age International (P) Limited, Publishers, 2016.
4. Swaminathan. M; Advanced Text-Book on Food and Nutrition, Volume I 2nd edition. The Bangalore Printing and Publishing Co., LTD, Reprint 2015.
5. Sunetra Roday; Food Science and Nutrition, 2nd edition, Oxfore University Prerss, 2013
6. Carol Byrd – Bredbenner; Wardlaw's perspeccctives in Nutrition, 9th edition MCGraw – Hill International Edition 2013

M.Sc. FOOD AND NUTRITION
SEMESTER - III
CORE VIII - MICRONUTRIENTS

Objectives

1. To understand the structure and functions of micro nutrients in human body
2. To understand the effects of deficiency and excess of micro nutrients in human body.

UNIT-I

Fat soluble vitamins: Vitamin A, D, E and K – Food sources, RDA, Functions, Absorption, Transport, Storage, Deficiency and toxicity.

UNIT-II

Water soluble vitamins: Thiamine, Riboflavin, Niacin, Pantothenic acid, Biotin, B6, Folate, Vitamin B12, Vitamin C – Food sources, RDA, Function, Absorption, transport, storage, excretion and deficiency.

UNIT-III

Major minerals: Sodium, Potassium, Calcium, Phosphorus, Magnesium and Chloride – Food sources, RDA, Functions, Absorption, Transport, Storage, excretion and deficiency.

UNIT-IV

Trace Minerals: Iron, Zinc, Copper, Iodine, Selenium, Manganese, Fluoride – Food sources, RDA, Functions, Absorption, Transport, Storage, excretion and deficiency.

UNIT-V

Interrelationship Between nutrients: Protein – energy interrelationship, Effect of carbohydrates, fats and proteins on vitamin requirements, vitamin – vitamin interrelationship, vitamin - mineral interrelationship, mineral – mineral interrelationship.

REFERENCE :

1. Michael. J. Gibney et al; Clinical Nutrition Black well Science, 2005.
2. Shubhangini. A. Joshi; Nutrition and Dietetics, 3rd edition, McGraw Hill Education (India) Private Limited.
3. Srilakshmi . B; Nutrition Science, 15th edition, New Age International (p) Limited, publishers, 2016.
4. Swaminathan. M; Advanced Text-Book on Food and Nutrition, Volume I and 11 2nd Edition, The Bangalore printing and publishing co., LTD, Reprint 2015.
5. Sunetra Roday; Food Science and Nutrition, 2nd edition, Oxford University press, 2013.
6. Carol Byrd – Bredbenner; Wardlaw's perspectives in Nutrition, 9th edition McGraw – Hill International Edition, 2013

**M.Sc. FOOD AND NUTRITION
SEMESTER - III**

CORE IX - MEDICAL NUTRITIONAL THERAPY II

Objectives

Study of this paper will enable the students to

1. Remain updated on recent advances in Medical Nutrition Therapy (MNT) for various diseases.
2. Develop skill in nutritional diagnosis, planning and providing suitable preventive/therapeutic diets for various diseases / disorders .

UNIT-I

Nutrition and the pancreas: Pancreatitis- Pathogenesis of acute and chronic pancreatitis, severity scores, artificial nutrition, future directions.

Nutrition for kidney diseases: Introduction, kidney function tests. Glomerulonephritis, Nephrotic Syndrome, Acute and chronic renal failure- Clinical symptoms, nutritional management and drug. Dialysis, Renal transplantation.

UNIT-II

Nutritional management in pulmonary diseases: Chronic obstructive Pulmonary disease, cysticfibrosis, pneumonia, tuberculosis; causes, pathology, effect of malnutrition, nutritional management. Rheumatic disorders: Arthritis- osteo and rheumatoid arthritis, Gout: Symptoms, causes, treatment, prevention.

UNIT-III

Medical Nutritional management for cardio-vascular diseases: Atherosclerosis, coronary heart disease, hypertension, stroke, cardiac arrest- Risk factors, definition, epidemiology, pathogenesis, clinical features, diagnosis, dietary management and drugs.

UNIT-IV

Nutrition and Cancer: Carcinogenesis and Mutagenesis, Development of cancer, Types of cancer and effect on metabolism and nutritional status. Nutrients and their relationship with cancer. Recent development in nutrition and cancer. HIV/AIDS: Stages of HIV infection, medical and nutritional therapy, complications with the nutrition impact.

UNIT-V

Approaches to the management of fitness and health: Nutrition, exercise, physical fitness and health- their inter relationship. Significance of physical fitness and nutrition in prevention and management of weight control regimes. Nutrition guidelines for maintenance of health and fitness. Nutrition in sports: Sports specific requirements-Importance of carbohydrate loading, pre game and post game meals, Diets for persons with high energy requirements, stress, fracture and injury.

REFERENCE :

1. Michael. J. Gibney et al; Clinical Nutrition Black well Science, 2005.
2. Shubhangini. A. Joshi; Nutrition and Dietetics, 3rd edition, McGraw Hill Education (India) Private Limited.
3. Srilakshmi . B; Nutrition Science, 15th edition, New Age International (p) Limited, publishers, 2016.
4. Swaminathan. M; Advanced Text-Book on Food and Nutrition, Volume I and II 2nd Edition, The Bangalore printing and publishing co., LTD, Reprint 2015.
5. Sunetra Roday; Food Science and Nutrition, 2nd edition, Oxford University press, 2013.
6. Carol Byrd – Bredbenner; Wardlaw's perspectives in Nutrition, 9th edition McGraw – Hill International Edition, 2013

M.Sc. FOOD AND NUTRITION
SEMESTER - III
CORE X - COMMUNITY NUTRITION

Objectives

Study of this paper will enable the students to

1. Remain updated on recent advances in policies, nutrition monitoring and education methods.
2. Develop an understanding about various programs and agencies involved for the improvement of nutritional status of the community.

UNIT-I

Nutrition and national development: National Nutrition Policy – aims and objectives; Demographic Profile: Population trends in India, density of population, age structure, sex ratio, family size, literacy and education, life expectancy. Nutrition and Infection: Vicious cycle of malnutrition and infection, effect of malnutrition on immunity.

UNIT-II

Assessment of nutritional status: Methods of nutritional assessment, nutritional anthropometry, growth standards, dietary and clinical assessment, biochemical and radiological assessment.

Problems in human nutrition: Obesity, underweight, anemia, vitamin A deficiency, iodine deficiency disorders, rickets, osteomalacia, osteoporosis and flurosis.

UNIT-III

Nutrition monitoring: Objectives, agencies engaged in nutrition monitoring; vital statistics – IMR, Crude Birth Rate, fertility rate, MMR, under five mortality rate.

Strategies to combat nutritional deficiencies: Food fortification, food enrichment, nutrition and health education, vitamin A prophylaxis program, prophylaxis against nutritional anemia, control of IDD.

UNIT-IV

Nutrition education: Scope of nutrition education, steps in planning, conducting and evaluating nutrition and health education programmes; methods of imparting nutrition education; monitoring and evaluation of effectiveness of nutrition and health education programmes.

UNIT-V

Food security: Definition, factors affecting food security systems, food security programmes – PDS, AAY, Annapurna scheme, Food for work programme

Nutrition intervention programmes: ICDS, Supplementary feeding programme, special Nutrition Programme, PMAY, Composite Nutrition Programme, Applied Nutrition Programme.

National and International Organisations: engaged in food and nutrition activities – ICMR, NIN, NNMB, ICAR, CFTRI, FAO, WHO, UNICEF, UNESCO.

REFERENCE :

1. Park K., Preventive and social medicine, Bamarasidas Bahnot Publishers, Jabalpur.
2. Jellilfe D. B., Infant nutrition in tropics and subtropics, WHO, 1965.
3. Bamji M. S., Prahalad Raov, Reddy V, Text book on human nutrition, Oxford and IBM publishing co. Pvt. Ltd.
4. Proceeding of Nutrition Society of India, NIN.
5. Technical reports of ICMR .
6. P.K. Shukla, Nutritional problems of India, Prentice Hall, India.
7. Sabarwal B., Applied Nutrition and Health education, common wealth publishers, New Delhi.

M.Sc. FOOD AND NUTRITION
SEMESTER - III
ELECTIVE II - FOOD BIOTECHNOLOGY

Objectives

Study of this paper will enable the students to

1. Remain updated on recent advances in the application of genetic engineering in food.
2. Develop an understanding about nano biotechnology in food industries.

UNIT-I

Biotechnology – Introduction – biotechnological applications of animals, plants and microbes; concepts of genetic engineering and molecular cloning and their application in food production, transgenic plants, application of genetic engineering in food science and technology. Genomics, proteomics and bio informatics.

UNIT-II

Classical strain improvement: Natural selections and mutation, recombination. Concepts and tools for recombinant DNA technology; genetically modified foods: concept, types and applications; safety assessment of genetically modified foods: International and National guidelines of regulations and safety, issues related to production, consumption, export / import and labelling of GM foods. Ethical issues concerning GM foods, Testing for GMOs, IPR, GMO Act 2004.

UNIT-III

Application of biotechnology to food products: Yeast based processes and products – alcoholic beverages, industrial alcohols, bread and related products; Bacteria based processes and products – dairy products, fermented meat and fish products, fermented vegetable products, vinegar and other organic products, bacterial bio mass.

UNIT-IV

Application of enzymes in food and beverages industries. Enzyme immobilization and its application in food industry: History, carrier materials, enzyme immobilization techniques, use of immobilized enzyme in food industries. Micro organism based products – sweeteners, flavours and amino acids, vitamins and pigments, mushrooms, SCP.

UNIT-V

Application of Nano biotechnology in food industry: Nano biotechnology in food packaging, nano biotechnology for delivery of bioactives and nutraceuticals, nanobiosensors – safety and regulatory aspects of Nanobiotechnology applications.

Micro encapsulation in food biotechnology: concepts, agents and techniques; application of micro encapsulation – probiotics, flavours, lipids, antioxidants, vitamins and enzymes.

REFERENCE :

1. Byong H. Lee, fundamentals of food biotechnology, II editions, wiley – Blackwell, 2014.
2. Ravishankar Rai, V. Advances in food biotechnology, wiley – Blackwell, 2015.
3. Bains W. biotechnology from A to Z, Oxford , University Press, 2009.
4. Lopez, G.F.G., Canovas, G.V.B., Food science and Food Biotechnology , CRC Press, 2003.
5. Knorr. D., Food Biotechnology, marcel Deller, Newyork, 1982.
6. Crueger, W. Crueber A, Biotechnology; A text book of Industial microbiology, science Ttech. Madison, USA, 1984.

**M.Sc. FOOD AND NUTRITION
SEMESTER - III**

CORE PRACTICAL III - MEDICAL NUTRITIONAL THERAPY

- I. Standardization of common food preparations.**
- II. Planning, preparation and calculation of nutritive value for the following diets (SOAP Format)**
 1. Normal diet.
 2. Liquid diet
 3. Soft diet
 4. High fibre and low caloric diet
 5. Diet for Energy imbalance
 6. Diet for Diabetes Mellitus
 7. Diet for Cardio-vascular diseases
 8. Diet for Kidney Diseases
 9. Diet for Gastrointestinal diseases
 10. Diet for Liver diseases
 11. Diet for Infections and fevers.

M.Sc. FOOD AND NUTRITION
SEMESTER - III AND IV
CORE PRACTICAL IV
BIOCHEMICAL TECHNIQUES PRACTICAL

I. Analysis of Blood / Serum

1. Blood glucose
2. Serum iron
3. Serum cholesterol
4. Serum protein
5. Serum vitamin – A
6. Blood Haemoglobin

II. Analysis of urine

1. Creatinine
2. Urea
3. Total nitrogen
4. Calcium
5. Phosphorus
6. Vitamin – C

III. Qualitative Analysis

1. Qualitative analysis of sugars

1. Reactions of Monosaccharide (Glucose, fructose, galactose, mannose and ribose)
2. Reactions of disaccharides (Maltose and lactose)
3. Reactions of polysaccharides (Starch and dextrin)
4. Analysis of unknown sugar

2. Qualitative analysis of amino acids

1. Reactions of individual amino acids (Tyrosine, tryptophan, arginine, histidine, cystine and methionine)
2. Analysis of unknown amino acids

**M.Sc. FOOD AND NUTRITION
SEMESTER - III
INTERNSHIP REPORT**

INTERNSHIP REPORT : EVALUATION PATTERN

Compulsory Internship Programme for 30 days in any one of the following discipline.

1. Food Industry
2. Hospital
3. Health Centers

Report on internship will be evaluated as stated below.

External marks	-	60
Internal marks	-	40

Total marks	-	100

Internal mark components

Marks awarded by the training institution	-	20 marks
Marks awarded by the guide	-	20 marks

External mark components

Report preparation	-	20 marks
Report presentation	-	20 marks
Viva voce	-	20 marks

**M.Sc. FOOD AND NUTRITION
SEMESTER - IV**

ELECTIVE III - FOOD PRESERVATION

Objectives

Study of this paper will enable the students to

1. Understand and apply the preservation techniques to increase the shelf life of food materials.
2. Develop an understanding about the latest developments in preservation methods.

UNIT-I

Principles and methods of food preservation. Preservation by use of High temperatures- Factors affecting heat resistance, heat resistance of microorganism and their spores, determination of heat resistance, thermal-death-time curves, 12D concept, heat penetration, determination of thermal processes, heat treatments employed in processing foods.

UNIT-II

Preservation by use of low temperatures- Low-temperature methods- Refrigeration, cool storage and freezing. Low- temperature-Microbial activity, characteristics, factors affecting the quality of foods and packaging requirements for foods. Preservation by drying and dehydration- Methods, advantages and disadvantages. Factors in the control of drying, treatments of food before drying, procedures after drying, microbiology of dried foods.

UNIT-III

Food irradiation- Introduction, electromagnetic energy, ionizing radiation, kinds of ionizing radiation and their applicability on food processing, mode of action, potentialities for radiation processing of foods, effects of food irradiation, safety of irradiated foods. Fermentation of foods - advantages and disadvantages, types, factors controlling fermentation, commonly fermented foods- sauerkraut, wine, vinegar, beer, temph, Soya sauce.

UNIT-IV

Food additives- Introduction, classification of food additives – Preservatives, antioxidants, emulsifiers, stabilizers and thickeners, sequestering and buffering agents, bleaching and maturing agents, food colours, flavouring agents and flavor boosters, nutrient supplements, non-nutritive and special dietary sweeteners, anti-caking agents, foaming and anti-foaming agents, leavening agents, firming agents humectants and texturisers and clarifying agents. Nature, characteristics and use of additives in foods.

UNIT-V

Packaging technology- Introduction, packaging materials, retort pouch materials, types of packaging, effects of packaging on the nutritive value of foods. HACCP- Concepts. Quality systems- BS5750 AND ISO 9000 Series.

REFERENCE :

1. Srilakshmi. B; Food Science, 6th edition, New Age International (P) Limited Publishers, 2015.
2. Shakunthala Manay. N; Shadakshara Swamy.M; Foods Facts and Principles, 3rd edition, New Age International (P) Limited Publishers, 2014.
3. Lillian Hoagland Meyer, Food chemistry, CBS Publishers and Distributors, 2004.
4. Subbulakshmi. G and Shobha. A.U; Food processing and preservation, New Age International (P) Limited Publishers, 2014.
5. Norman. N Potter, Joseph H. Hotchkiss, Food Science, 5th edition, CBS Publishers and Distributors, 1996.
6. Sivasankar. B; Food Processing and Preservation, PHI Learning Private Limited, 2011.

M.Sc. FOOD AND NUTRITION
SEMESTER - IV
ELECTIVE IV - NUTRACEUTICALS

Objectives

Study of this paper will enable the students to

1. Understand nutraceutical properties of foods.
2. Develop an understanding about the application of nutraceutical in diet therapy.

UNIT-I

Nutraceuticals or functional foods – History, definitions, functional food versus pharmaceuticals, classification. Nutraceutical properties of nutrient components of foods: Pro active carbohydrates – Trehalose, poly saccharides, soluble fibers (pectin, guar gum and β – glucons), insoluble fiber, resistant starches (their role in blood lipids, mineral absorption, control of blood glucose, risk of developing colon cancer), slowly digestible starches; Prebiotics – definition, inulin, oligo saccharides and lactulose as prebiotic compounds and polyphenols as prebiotics.

UNIT-II

Nutraceutical properties of bioactive lipids – Butyric acid, medium chain fatty acids, long chain fatty acids (MUFA, PUFA, omega-3 and omega-6 fatty acids) and conjugated linoleic acid as nutraceuticals.

Nutraceutical properties of bioactive peptides – Antihypertensive peptides, antilipidemic and antidiabetic peptides, opioid peptides, caseinophospho peptides, calmodulin – binding peptides, antioxidant peptides, anticancer and immune – modulating peptides, antithrombotic peptides; co-enzyme – Q10.

UNIT-III

Nutraceutical properties of bioactive polyphenols and carotenoids: Polyphenolic products – Grape and red wine polyphenol extracts, resveratrol, apple polyphenols, lychee fruit polyphenols, curcumin, phytosterols, proanthocyanidins, plant anthocyanins, Pomace olive oil Triterpenoids; carotenoids – Lycopene.

Nutraceutical properties of specific functional foods: food from plant sources – soybean: bioactive components and their role in CVD, renal diseases, cancer, bone health, menopause, cognitive function; cereal grains: Amaranth, Barley and Wheat.

UNIT-IV

Nutraceutical properties of vegetables, fruits, nuts and oil seeds: Bio active components of tropical fruits and citrus fruits and berries and their functional properties; bio active compounds of cruciferous vegetables and their biological activities. Health benefits of olive oil and flax seeds.

Nutraceutical properties of spices and herbs: Cinnamon, turmeric, ginger, garlic, onion, pepper fruit.

UNIT-V

Nutraceutical properties of foods from animal sources: milk and milk products – whey protein, lactoferrin, colostrums, immunoglobulins, milk glycoproteins and sugar; Probiotics and their health benefits; role of milk fatty acids in CVD.

Fish: Proactive components and their role in CVD, brain function, cancer, immune system, diabetes, obesity, kidney disease, digestive tracts.

Nutraceutical properties of miscellaneous foods: Seaweeds, tea and honey.

REFERENCE :

1. Dhiraj A. Vатtem and Vatsala maitin, Funtional foods, Nutraceutical and Natural products – concepts and applications, DES tech publications, 2016.
2. Aluko and Rotimi E , Funtional foods and Nutraceuticals, springer publications, 2012.
3. Robert E.C . Wildman, Handbook of Nutraceutical and Funtional foods, II edition, CRc press, 2006.
4. Brian Lockwood, Nutraceutical, II editions,
5. Gibson GR and William CM. Funtional foods – concept to product, 2000.

M.Sc. FOOD AND NUTRITION
SEMESTER - II
EXTRA DICCIPLINARY PAPER (EDC)
NUTRITION

Objectives

1. To understand the structure and functions of nutrients in human body.
2. To understand the effects of deficiency and excess of nutrients in human body

UNIT-I

Carbohydrates: Classification, functions, digestion, absorption, recommended dietary allowances sources.

Lipids: Classification, functions, digestion, absorption, recommended dietary allowances, sources, deficiency, dietary fat and coronary heart disease.

UNIT-II

Proteins: Nutritional classification of proteins, Nutritional classification of Amino Acids, function, digestion and absorption, complementary value of proteins, recommended dietary allowances, sources.

Energy: Units, components of energy requirement, measurement of energy, basal metabolic rate, energy requirements during work, thermic effect of food, factorial method of measuring total energy expenditure, factors affecting basal metabolic rate, recommended dietary allowances, sources.

UNIT-III

Minerals: Calcium, magnesium, phosphorus, iron, iodine, zinc, copper, sodium-food sources, requirement , functions and deficiency

UNIT V

Balanced Diets: Definitions, five food group system, food exchange lists, the food guide pyramid, planning diets, dietary guidelines for different age groups, Indian nursing mothers.

REFERENCES

1. B. Srilakshmi; Human Nutrition, New Age International (P) Limited, Publishers, 2014