

**VELLALAR COLLEGE FOR WOMEN (AUTONOMOUS)**  
**ERODE – 12**



**Department of Foods and Nutrition**

**Course contents, Scheme of Examination, Credits and Syllabus**  
**(for students admitted during 2019-2020 and onwards)**

**Bloom's Taxonomy Based Assessment Pattern****Components of CIA Marks for Core/SBS**

Tests (I & II)	Assignment / Seminar / Subject Viva	Model Examination	Total
10	5	10	25

**Components of CIA Marks for Practical**

Tests (I & II)	Performance	Record	Model Examination	Total
10	15	5	10	40

**CIA**

Section	Choice	Marks	Total
A	Multiple Choice Questions	4x 1 = 4	30
B	Either / Or	2 x 5 = 10	
C	Either / Or	2 x 8 = 16	

**Model and End Semester Examination**

Section	Choice	Marks	Total
A	Multiple Choice Questions	10 x 1 = 10	75
B	Either / Or	5 x 5 = 25	
C	Either / Or	5 x 8 = 40	

**NON MAJOR ELECTIVE / SBS****CIA**

Section	Choice	Marks	Total
A	Open choice (2 out of 3)	2 x 15 = 30	30

**Model and End Semester Examination**

Section	Choice	Marks	Total
A	Open choice (5 out of 8)	5 x 15 = 75	75

**SELF LEARNING****End Semester Examination**

Section	Choice	Marks	Total
A	Open choice (5 out of 8)	5 x 15 = 75	75

Vellalar College for Women (Autonomous), Erode - 12.									
Master of Science in Foods and Nutrition									
Academic Year 2019-2020 Onwards									
Course Content and Scheme of Examinations (CBCS & OBE Pattern)									
Semester I									
Study Component	Sub Code	Title of the Paper	Inst. Hrs./ Week	Exam. Dur. Hrs.	Max. Marks			Credits	
					CIA	ESE	Total		
Core	18FNPC101	Advanced Food Science	6	3	25	75	100	4	
	18FNPC102	Physiological Aspects of Nutrition	6	3	25	75	100	4	
	18FNPC103	Nutritional Biochemistry	6	3	25	75	100	4	
	18FNPC104	Nutrition Through Life Cycle	6	3	25	75	100	4	
Practical I		Food Analysis	3	-	-	-	-	-	
Non Major Elective			3	3	25	75	100	5	
Semester II									
							<b>500</b>	<b>21</b>	
Core	18FNPC205	Research Methodology and Statistics	6	3	25	75	100	4	
	18FNPC206	Community Nutrition	6	3	25	75	100	4	
	18FNPC207	Nutrition in Disease-I	6	3	25	75	100	4	
	18FNPC208	Macronutrients	6	3	25	75	100	4	
Practical I	18FNPCP01	Food Analysis	3	3	40	60	100	4	
Skill Based Subject I	18FNPS201	Advanced Multi-Skill Development Paper	3	1 *	40	60	100	5	
							<b>600</b>	<b>25</b>	

\* Online examination

Semester III									
Study Component	Sub Code	Title of the Paper	Inst. Hrs./ Week	Exam. Dur. Hrs.	Max. Marks			Credits	
					CIA	ESE	Total		
Core	18FNPC309	Micronutrients	6	3	25	75	100	4	
	18FNPC310	Food Biotechnology	5	3	25	75	100	4	
	18FNPC311	Nutrition in Disease- II	5	3	25	75	100	4	
	18FNPC312	Food Quality Control and Product Development	5	3	25	75	100	4	
Practical II	18FNPCP02	Quality Control	3	3	40	60	100	4	
Skill Based Subject II			3	3	25	75	100	5	
Skill Based Subject III			3	3	25	75	100	5	
							<b>700</b>	<b>30</b>	
Semester IV									
	18FNPC413	Food Processing and Packaging	6	3	25	75	100	4	
Practical III	18FNPCP03	Clinical Nutrition Techniques	6	3	40	60	100	4	
Project	18FNPC4PV	Dissertation & Viva -voce	18	-	100	100	200	6	
							<b>Total</b>	<b>400</b>	<b>14</b>
								<b>2200</b>	<b>90</b>

\* MOOCs Non-ranking Compulsory Credit Course for PG will be introduced from the Academic Year 2019-20 and Onwards.

<b>NON MAJOR ELECTIVE (Cafeteria)</b>		
Paper - I	18FNPN101	Nutrition in Health and Disease
<b>ADVANCED MULTI-SKILL DEVELOPMENT PAPER</b>		
Paper - I	18FNPS201	Advanced Multi-Skill Development Paper
<b>SKILL BASED SUBJECTS</b>		
Paper - II	18FNPS302	Techniques of Fitness Assessment
Paper - III	18FNPS303	Nutritional Epidemiology

<b>SELF-LEARNING PAPER (OPTIONAL)</b>					
<b>S.No.</b>	<b>Sub Code</b>	<b>Title</b>	<b>Exam. Dur. Hrs.</b>	<b>Max. Marks</b>	<b>Credits</b>
1.	18FNPSL02	Nutraceuticals and Functional Foods	3	100	5

## SEMESTER - I

CODE	COURSE TITLE
18FNPC101	ADVANCED FOOD SCIENCE

Category	CIA	ESE	L	T	P	Credits
Core	25	75	86	4	-	4

### Course Outcomes

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

CO Number	CO Statement
CO1	Compare and apply the properties of colloidal dispersions, emulsifying agents in food industry
CO2	Determine the physico-chemical changes during processing of cereals and pulses
CO3	Assess the effect of heat, acid and alkali on pigments in fruits and vegetables and milk and milk products
CO4	Judge the quality of fleshy foods and egg and their role in cookery
CO5	Assess the role of sugars, fats and oils and spices and condiments in cookery and study their physico-chemical properties

### Syllabus

#### UNIT I

(17 hrs.)

**Colloidal system:** Types of colloidal dispersion- Sols, gels, foams, emulsions, true solutions and suspensions- Emulsifying agents, uses of emulsifiers in food industry. Physico-chemical changes in foods in relation to cookery - **Organic foods** – Meaning and advantages.

#### UNIT II

(18 hrs.)

**Carbohydrates : Starch** – Physico-chemical changes during cooking of starch, Sources and uses of starch- Effect of moist and dry heat on cereal starch- Factors affecting the viscosity of starch pastes. **Cereal** - gluten formation- Factors affecting gluten formation. **Pulse** - Effect of soaking- Decortication- Germination and fermentation on pulses- Effect of cooking and factors affecting cooking quality of pulses.

#### UNIT III

(18 hrs.)

**Vegetables & Fruits** : Physico-chemical changes during cooking, effect of prolonged cooking, effect of acid and alkali on pigments. Enzymatic changes in fruits and vegetables, Changes during ripening of fruits **Milk and milk products** : Properties of milk - Effect of heat, acids, enzymes, phenolic compounds and salts on milk - Pasteurization of milk – Non enzymatic reaction.

**UNIT IV****(20 hrs.)**

**Fleshy foods : Meat** – Structure, cuts of meat- Post mortem changes, rigor mortis- tenderness and factors affecting tenderness- Methods of cooking and changes in meat on cookery. **Poultry, Fish and Egg** : Selection and methods of cooking - Effect of heat-Factors affecting coagulation of protein- Cooking egg with and without shell- Egg white foams and factors affecting foam stability- Changes during storage.

**UNIT V****(17 hrs.)**

**Sugar** : Sources, uses and properties- Crystallization- Stages of sugar cookery- Preparation of crystalline and non-crystalline candies with special reference to Indian preparations. **Fats and oil**: Physico-chemical changes on heating - Physical and chemical properties- Rancidity-types - methods of prevention- Smoking point and changes in fat on cooking. **Spices and Condiments**- Major and Minor - Turmeric, chilli, pepper, cloves, cardamom - chemical constituents. **Beverages**- Tea, coffee, Cocoa-Chemical constituents- Processing outline.

**Text Books**

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Srilakshmi. B	Food Science	New Age International (P) Ltd., New Delhi,	2018 7 <sup>th</sup> edition
2	Shakuntala Manay, N. Shadaksharaswamy	Foods – Facts and Principles	New Age International (P) Ltd., New Delhi,	2008 Third Revised Edition

**Reference Books**

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Margaret McWilliams	Foods: Experimental Perspectives	Pearson Education LTD.,	2014 7 <sup>th</sup> Edition
2	Norman Potter & Joseph, H. Hotchkiss	Food Science	CBS publisher and Distributors, New Delhi,	2005 5 <sup>th</sup> Edition
3	Sunetra Roday	Food Science and Nutrition	Oxford University	2009 5 <sup>th</sup> Edition

**Journals**

1. Journal of Food Science & Technology, AFSTI, Mysore.



## 2. Indian Food Industry, CFTRI Mysore.

### **Web Resources**

- <https://www.slideshare.net/devadevi666/colloids-presentation-slides-67383606>
- <https://www.coursera.org/learn/.../10-3-factors-affecting-the-formation-of-gluten>
- <https://www.slideshare.net/jessabarrion/effects-of-cooking-vegetables>
- <http://phpt.uonbi.ac.ke/sites/default/files/cavs/vetmed/phpt/CONVERSION%20OF%20MUSCLE%20INTO%20MEAT.ppt>
- <https://genomediscovery.org/wp-content/.../07/STAGES-OF-SUGAR-COOKERY.ppt>

### **Pedagogy**

- Chalk and talk, PPT, Quiz, Assignment, Group Discussion, Seminar

## SEMESTER - I

CODE	COURSE TITLE
<b>18FNPC102</b>	<b>PHYSIOLOGICAL ASPECTS OF NUTRITION</b>

Category	CIA	ESE	L	T	P	Credit
Core	25	75	86	4	-	4

### Course Outcomes

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

CO Number	CO Statement
<b>CO1</b>	Analyze the changes in blood coagulation disorders, altered enzyme function and organ function
<b>CO2</b>	Evaluate the changes in immunity during malnutrition, infection and hypersensitivity
<b>CO3</b>	Evaluate the mechanism of Gastro Intestinal Hormones and explain the regulation of water and electrolyte balance
<b>CO4</b>	Study the relationship between nutrients and drug action and interpret the mechanism of drug action and factors modifying drug effects
<b>CO5</b>	Examine the factors influencing food intake and deduce the metabolic changes in obesity and starvation

### Syllabus

#### UNIT I

**(17 hrs.)**

**Blood** : Composition and functions- Cellular elements of Blood (RBC, WBC, Platelets) – Structure and function- Hemopoiesis- Metabolism and function- Haemoglobin – Structure and function- Plasma protein – Composition, Functions, Changes in various disorders, Blood coagulation - disorders.

#### UNIT II

**(20 hrs.)**

**Immunity** : Types of Immunity- Cells of immune system- Immunoglobins- Antigen – antibody reactions - Immune response – Humoral immunity, cell mediated immunity. Changes in Immunity in protein energy malnutrition, Vitamins, iron and zinc deficiency - Neuro–endocrinal control of stress and immunity- Immune mechanisms in infections - Autoimmunity and hyper- sensitivity.

#### UNIT III

**(18 hrs.)**

**Enzymes** : Definition, classification, action, factors influencing enzyme action- Role of Enzymes in medical diagnosis-Alkaline phosphatase, creatinine phosphokinase, SGOT, SGPT, Lactate dehydrogenase. **Function tests and their significance:** Gastric function test, liver function test, renal function test, endocrine function test and cardiac function test.

**UNIT IV****(17 hrs.)**

**Water and electrolyte balance** : Total body water, intake versus output of water-Body fluid compartment- Composition of body fluid- Measurement of body fluid volumes - Regulation of Water and Electrolyte balance. **Gastro Intestinal Hormones** – Gastrin, Secretin, Cholecystokinin and Gastric inhibitory peptide – mechanisms of action – neural control of gastric motility. **Hunger, Appetite and Satiety**: Obesity and starvation - Physiological and psychological factors affecting food intake - Circadian rhythm – Meaning.

**UNIT V****(18 hrs.)**

**Xenobiotics** - Definition, components, biotransformation – Phase I and Phase II reactions- Biodynamics- Mechanisms of drug action- Factors modifying drug effects- Receptor theories- **Drug and nutrient interactions** – Effect of drug on nutrient absorption and metabolism, Effect of nutrient on drug absorption and utilization.

**Text Books**

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Ambika Shanmugam	Fundamentals of Biochemistry for Medical students	Wolters Kluwer-LWW, New Delhi	2016 8th Edition
2.	Jain A.K.	Text Book of Physiology	Avichal Publishing company	2017 7 <sup>th</sup> edition
3.	Muruges, N	A Concise Text Book of Pharmacology	Sathya Publishers	2014 7 <sup>th</sup> Edition
4.	Guyton, I.E	Text Book of Medical Physiology	Elsevier	2016 Second South Asia Edition

**Reference Books**

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Sembulingam K., Prema Sembulingam	Essentials of Medical Physiology	Jaypee Brothers Medical Publishers	2016 7 <sup>th</sup> Edition
2.	Jain J.L., Sanjay Jain Nitin Jain	Fundamentals of Biochemistry	S.Chand Publishing company	2016 Revised Edition
3.	Dulsy Fatima and Arumugam	Immunology	Saras Publications	2014 Revised Edition
4.	Sathyanarayana.U and Chakrapani. U	Biochemistry	Elsevier publications	2013 4 <sup>th</sup> Edition

**Web Resources**

- <http://www.myvmc.com/anatomy/blood-function-and-composition/>
- <http://www.slideshare.net/pervezali5283/hypersensitivity-and-types-of-hypersensitivity-i-ii-iii-iv>
- <http://www4.uwsp.edu/chemistry/tzamis/365f00pdfs/enzymeclases02.pdf>
- <http://www.srmuniv.ac.in/sites/default/files/files/classification.pdf>
- <http://www.slideshare.net/gavinyap/kidney-function-test-12938395?related=2>
- <http://www.slideshare.net/baranwalordeepika/nutrient-drug-interaction>

### **Pedagogy**

- Chalk and talk, PPT, Quiz, Assignment, Group Discussion, Seminar

## SEMESTER - I

CODE	COURSE TITLE
<b>18FNPC103</b>	<b>NUTRITIONAL BIOCHEMISTRY</b>

Category	CIA	ESE	L	T	P	Credit
Core	25	75	86	4	-	4

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
<b>CO1</b>	Describe and distinguish various pathways of carbohydrate metabolism and energy production	K3 and K4
<b>CO2</b>	Identify the pathways of fat metabolism and examine the causes of fatty liver	K3 and K4
<b>CO3</b>	Classify the types of amino acids, explain the pathways of protein and hemoglobin synthesis and breakdown	K4 and K5
<b>CO4</b>	Explain the pathways of purine and pyrimidine metabolism	K5
<b>CO5</b>	Choose and apply appropriate techniques for the estimation of biochemical parameters.	K5

### Syllabus

#### UNIT I (18 hrs.)

**Metabolism of Carbohydrates** : Overview of Fate of glucose after absorption- Glycolysis- Oxidative decarboxylation – TCA Cycle- HMP Shunt and energy production – Gluconeogenesis, Glycogenesis, Glycogenolysis.

#### UNIT II (18 hrs.)

**Metabolism of Fatty acids** : Biosynthesis of fatty acids- Palmitic acid,  $\beta$  –Oxidation of fatty acids,  $\alpha$  and  $\omega$  Oxidations – Biosynthesis and degradation of phospholipids - Lecithin and Cephalin, Biosynthesis and breakdown of Cholesterol and Bile Salts.

#### UNIT III (18 hrs.)

**Metabolism of Proteins** : General pathway of protein and amino acid metabolism- Transamination- types – Deamination, Oxidative deamination- Transdeamination – Decarboxylation- Urea Cycle, Biosynthesis of protein- Synthesis and breakdown of haemoglobin and bile pigments.

**UNIT IV****(17 hrs.)**

**Nucleic Acids** : Structure, Functions and properties of DNA and RNA, Isolation of DNA and RNA, types of RNA. **Metabolism of nucleic acids**: Biosynthesis and break down of purine and pyrimidine nucleotides.

**UNIT V****(19 hrs.)**

**Techniques in Nutritional Biochemistry** : Separation of sugars and amino acids by paper chromatography – Electrophoretic separation of proteins. **Colorimetry and spectrophotometry**: Principle, procedure and applications. Microbiological assay of vitamins- Folic acid, Vitamin B<sub>2</sub> and B<sub>12</sub>. **Atomic absorption spectroscopy and Flame photometry** : Principle, procedure and applications.

**Text Book**

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Ambika Shanmugam	Fundamentals of Biochemistry for Medical students	Wolters Kluwer - LWW, New Delhi	2016 8 <sup>th</sup> Edition
2.	Sathyanarayana.U and Chakrapani. U	Text book of Biochemistry	Elsevier publications	2013 4 <sup>th</sup> Edition
3.	Deb,A.C.,	Fundamentals of Biochemistry	New central book agency(P) Ltd	2015 10 <sup>th</sup> Edition
4.	Chatterjee, M.N., and Rana Shinde	Text Book of Medical Biochemistry	Jaypee Brothers Medical Publishers (p) Ltd	2012 8 <sup>th</sup> Edition

**Reference Books**

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Vasudevan DM	Biochemistry for Medical students	Jaypee Brothers Medical Publishers (p) Ltd	2016 8 <sup>th</sup> Edition
2.	Robert K. Murray, Daryl K. Granner, Peter A. Mayes and Victor W.	Harper's Biochemistry	Appleton and Lange Publishers	2015 30 <sup>th</sup> Edition
3.	Rafi MD	Biochemistry for Medical students	Universities Press	2014 2 <sup>nd</sup> Edition
4.	Sheel Sharma	Experiments and Techniques in Biochemistry	Galgotia publications PVT, Ltd, New Delhi	2007 First Edition

## Web Resources

- [www.checkdiabetes.org/gluconeogenesis/](http://www.checkdiabetes.org/gluconeogenesis/)
- <https://www.slideshare.net/namarta28/cholesterol-synthesis-steps-and-regulation>
- <https://www.slideshare.net/angelsalaman/presentation-protein-synthesis>
- <https://www.slideshare.net/namarta28/dna-structure-and-properties>
- <https://www.slideshare.net/pankhilgandhi/microbial-assay-of-b2-and-b12>
- <https://www.slideshare.net/prachann/colorimeter-and-spectrophotometer-mass-spectrometer>

## Pedagogy

Chalk and talk, PPT, Quiz, Assignment, Group Discussion, Seminar

## SEMESTER - I

CODE	COURSE TITLE
<b>18FNPC104</b>	<b>NUTRITION THROUGH LIFE CYCLE</b>

Category	CIA	ESE	L	T	P	Credit
Core	25	75	86	4	-	4

### Course Outcomes

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

CO Number	CO Statement
CO1	Evaluate the nutritional needs of growth and development for different age groups
CO2	Determine the nutrient requirement on the basis of RDA for different age groups
CO3	Discuss the nutritional problems in different age groups and identify solutions to overcome them
CO4	Formulate supplementary foods to suit different age groups
CO5	Assess the physical fitness and evaluate the nutritional requirement during physical activity and exercise

### Syllabus

#### UNIT I (17 hrs.)

Basis for food and nutrient requirement and computation of RDA and ICMR requirements for Indians-2010. **Nutrition in Pregnancy** : Stages of gestation- Maternal physiological adjustments- Weight gain during pregnancy and nature of weight gain- Physical activity during pregnancy - Risk factors in pregnancy- Nutritional needs – Macronutrient and micro nutrient needs - RDA- energy cost of pregnancy- Dietary problems, complications of pregnancy and its dietary management.

#### UNIT II (19 hrs.)

**Nutrition in Lactation** : Physiological adjustments during lactation- Hormonal controls and reflex action- Lactation in relation to growth and health of infants – Physiology of milk production – Problems of breast feeding - Nutritional components of Colostrum and mature milk- Galactogogues during lactation- Nutritional requirements during lactation- Energy cost of lactation. **Nutrition for Infants**: Rate of growth- Growth and development- Weight as the indicator- Premature infants- Low birth weight- Feeding premature infants- Breast Vs bottle



feeding-RDA- Supplementary foods - Weaning foods- Amylase Rich Foods (ARF) - Problems of weaning.

**UNIT III (16 hrs.)**

**Nutrition for Preschool Children:** Growth and development – Social, cognitive, emotional, physical, motor and personality development- Food habits- Nutritional requirements- Supplemental foods. **Nutrition for School age:** Early and middle childhood- Physiological development- Food habits- Nutritional needs- RDA.

**UNIT IV (18 hrs.)**

**Nutrition during Adolescence:** Physical growth- Physiological and psychological problems associated with pubertal changes- Nutritional needs- Eating disorders – Anorexia Nervosa, Bulimia Nervosa, binge eating- Nutritional problems in adolescent pregnancy and complications.

**Nutrition during Adulthood:** Basis for requirements - RDA - Menopause - Physiology of menopause, health problems in menopause and dietary management. **Nutrition during Old age:** Physiological changes in old age- Socio-economic and psychological factors – Nutritional requirements-RDA- Factors affecting food intake.

**UNIT V (20 hrs.)**

**Nutrition for physical activity and exercise:** Body systems involved in physical activity (cardio-respiratory and musculo – skeletal systems)- Physical fitness assessment- Cardio respiratory fitness, assessment of body composition, muscular fitness assessment, flexibility assessment. Benefits of physical activity. **Sports Nutrition and Hydration:** Role of carbohydrate, fat and protein as a fuel for exercise, Fluid requirements, Hazards of dehydration - Fluid and electrolyte balance during prolonged sports- Nutritional requirements in sports- Dietary intake before, during and after game.

**Text Book**

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Srilakshmi,B.,	Dietetics	New age International (P) Ltd	2005 5 <sup>th</sup> edition
2.	L. Kathleen Mahan, Sylvia Escott-Stum	Krause’s Food, Nutrition, & Diet Therapy	Elsevier publications	2012 13 <sup>th</sup> Edition

**Reference Books**

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Sue Rodwell Williams	Nutrition and Diet Therapy	Mosby College Publishing	1993 5 <sup>th</sup> Edition

2.	Summer field L.M.,	Nutrition, Exercise and behavior; An integrated approach to weight management	Wadsworth / Cengage Learning	2012 2 <sup>nd</sup> Edition
3.	Maurice E. Shills and Vermo R. Young	Modern Nutrition Health and Disease	Lea and Febiger, Philadelphia	2012 11 <sup>th</sup> edition

### Web Resources

- [www.nlm.nih.gov/medlineplus/ency/article/002398.htm](http://www.nlm.nih.gov/medlineplus/ency/article/002398.htm)
- [www.nhs.uk/Conditions/pregnancy-and.../breastfeeding-problems.aspx](http://www.nhs.uk/Conditions/pregnancy-and.../breastfeeding-problems.aspx)
- <https://uwf.edu/smathews/.../physicaldevelopmentinmiddlechildhood.ppt>
- [www.slideshare.net/tina\\_santos14/eating-disorders-25086638](http://www.slideshare.net/tina_santos14/eating-disorders-25086638)
- <http://www.iumsp.ch/archives/web/Enseignement/colloques/docs/coll080311.pdf>

### Pedagogy

- Chalk and talk, PPT, Quiz, Assignment, Group Discussion, Seminar, Case study

## SEMESTER - I

CODE	COURSE TITLE
<b>18FNPN101</b>	<b>NUTRITION IN HEALTH AND DISEASE</b>

Category	CIA	ESE	L	T	P	Credit
Non major	25	75	42	3	-	5

**Objectives :** To enable the students understand the basic concepts of health and nutrition and to gain knowledge in dietary management of common diseases.

**UNIT I** **(9 hrs.)**

**Health :** Definition, dimension- Role of macro and micro nutrients. **Balanced diet:** Definition- Principles of planning diet- Food groups-Basic five - RDA for different age groups and physiological conditions. **Diet therapy:** Definition- Purpose of therapeutic diet- Principles.

**UNIT II** **(9 hrs.)**

**Nutritional deficiency diseases:** PEM- Vitamin- A deficiency, IDA and IDD, NTD, Fluorosis – Signs, symptoms, foods to be included and avoided.

**UNIT III** **(9 hrs.)**

**Disorders of GI tract:** Symptoms and foods to be included and avoided in diarrhoea, constipation, peptic ulcer and gastritis. **Disorders of liver:** Symptoms and foods to be included and avoided in Jaundice and Cirrhosis.

**UNIT IV** **(9 hrs.)**

**Obesity:** Assessment, types and diet therapy. **Underweight:** symptoms, dietary modifications. **Diabetes mellitus:** Types, symptoms, diagnosis, complications and lifestyle modifications.

**UNIT V** **(9 hrs.)**

**Cardiovascular disease:** Definition of Myocardial infarction, Congestive heart failure, Angina pectoris- Causes of CVD- Foods to be included and avoided. **Hypertension:** Causes, types, complications and dietary management.

**Kidney disorders:** Renal failure and Calculi – Causes, foods to be included and avoided.

**Cancer:** Causes and role of diet in cancer prevention.

### Text Book

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Srilakshmi, B.	Nutrition Science	The New Age International Publications, New Delhi	2016 7 <sup>th</sup> Edition
2.	Mudambi, S.R Rajagopal, M.V.	Fundamentals of Food, Nutrition and Diet therapy	New Age International Publications, New Delhi,	2009 5 <sup>th</sup> edition

3.	Shashi Goyal, Pooja Gupta	Food, Nutrition and Health	Chand Publishing company	2012 First Edition
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### SEMESTER - II

CODE	COURSE TITLE
18FNPC205	RESEARCH METHODOLOGY AND STATISTICS

Category	CIA	ESE	L	T	P	Credit
Core	25	75	86	4	-	4

### Course Outcomes

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

CO Number	CO Statement
CO1	Acquaint students with understanding of research process, problem identification for research and develop research design
CO2	Understand the theoretical basis of sampling and to enable data collection and analysis
CO3	Design effective research report
CO4	Select and apply suitable measures in problem solving
CO5	Select appropriate inferential statistics for interpretation of data

### Syllabus

#### UNIT I

(16 hrs.)

**Research** : Meaning, objectives and types of research - Selection and formulation of research problems- Meaning of hypothesis- Types of research design- Census and sample method.  
**Sampling**: Theoretical basis of sampling, random and non- random sampling methods – Sample size- Sampling and non-sampling errors.

#### UNIT II

(17 hrs.)

**Methods of collecting primary Data**: Questionnaire, preparation of schedules, interview methods, case study method, experimentation method – Sources of secondary data, precautions while using secondary data- Editing and coding the data. **Organization of Data**: Classification – Meaning, objectives and types, formation of discrete and continuous frequency distribution.  
**Tabulation**: Role, parts of a table, types of tables, general rules of tabulation.

#### UNIT III

( 17 hrs.)

**Representation of Data**: Diagrammatic and graphical representation – Significance of diagrams and graphs- General rules for constructing diagrams- Types of diagrams- Types of graphs.  
**Interpretation and report writing**: Meaning, technique and precautions of interpretation-

Format, types, steps and stages of research report, precautions and essentials of a good report- Footnotes and bibliographical citations.

**UNIT IV** **(20 hrs.)**

**Measures of Central Tendency:** Mean, median, mode, their relative advantages and disadvantages. **Measures of dispersion:** Mean deviation, standard deviation, quartile deviation- Percentile ranks- Co-efficient of variation - Association of attributes - Contingency tables- Correlation - Co-efficient of correlation and its interpretation - Rank correlation - Regression equations and predictions.

**UNIT V** **(20 hrs.)**

Probability–Rules of probability and its applications. Distributions: Normal, binomial, their properties and importance in statistical studies. Tests of significance – Large and small sample tests, ‘t’ test, ‘F’ test, chi-square test and their uses. Analysis of Variance – One-way and two-way classifications.

**Text Books**

Sl.No	Author Name	Title of the Book	Publisher	Year and Edition
1	Gupta,S.P	Statistical Methods	Sultan chand and son	2014 43 <sup>rd</sup> Edition
2	Kothari,C.R	Research Methodology – Methods and techniques	New Age International (P) Ltd., New Delhi.	2014 3 <sup>rd</sup> Edition

**Reference Books**

Sl.No	Author Name	Title of the Book	Publisher	Year and Edition
1	Pillai,R.S.N. and Bagavathi,V	Statistics Theory and Practice	S.Chand & Company	2016 Revised Edition
2	Kirti Gupta	Research Methodology	Nirali Prakashan	2013 First Edition
3	Gupta SC	Fundamentals of Statistics	Himalaya Publishing House	2016 7 <sup>th</sup> Edition

## Web Resources

- <https://bhanusigdel.wordpress.com/2011/11/17/census-and-sampling-method/>
- [www.slideshare.net/manukumarkm/source-of-data-in-research](http://www.slideshare.net/manukumarkm/source-of-data-in-research)
- [http://pages.csam.montclair.edu/~mcdougal/SCP/statistical\\_graphs1.htm](http://pages.csam.montclair.edu/~mcdougal/SCP/statistical_graphs1.htm)
- <http://www.biostathandbook.com/linearregression.html>
- <http://www.itl.nist.gov/div898/handbook/eda/section3/eda359.htm>
- <https://explorable.com/anova>

## Pedagogy

- Chalk and talk, PPT, Quiz, Assignment, Group Discussion, Seminar, Data analysis

## SEMESTER - II

CODE	COURSE TITLE
18FNPC206	COMMUNITY NUTRITION

Category	CIA	ESE	L	T	P	Credit
Core	25	75	86	4	-	4

### Course Outcomes

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

CO Number	CO Statement
CO1	Evaluate the causes of major nutritional deficiency disorders and apply control measures
CO2	Analyze the mode of transmission of communicable diseases and execute control measures to curtail its incidence
CO3	Acquire the knowledge on the objectives and function of the national and International organizations in collaboration with the member states and other agencies
CO4	Identify and create action plans through nutrition education to overcome various nutritional problems
CO5	Analyze nutritional Surveillance and recommend measures to achieve food security

### Syllabus

#### UNIT I

(18 hrs.)

Definition – Family, community, village and block. **Nutritional Deficiency Disorders in India:** Causes, Prevalence and Control programmes for malnutrition - PEM, Nutritional anaemia, Iodine deficiency disorders, Fluorosis, dental caries and vitamin A deficiency.

#### UNIT II

(16 hrs.)

**Epidemiology of Communicable Diseases:** Factors responsible for the spread of communicable diseases, mode of transmission of chicken pox, typhoid fever, malaria, leprosy, Polio, Tuberculosis and AIDS Control Programme- Emergency feeding during natural calamities and minimal survival ration. **Community Health :** National Health Policy - Primary Health Center (PHC) - Concept, organisation, current status in India- Delivery of services at PHC and Taluk level hospitals- Employees State Insurance (ESI)- Immunisation awareness and schedule.

**UNIT III****(20 hrs.)**

**Role of International Organizations :** Food and Agricultural Organization (FAO)- World Health Organization (WHO)- United Nations International Children’s Emergency Fund (UNICEF) - World Bank.**National Organizations:** National Institute of Nutrition (NIN)- National Nutrition Monitoring Bureau (NNMB)- Indian Council of Agriculture Research ( ICAR)- Indian Council of Medical Research ( ICMR)- Central Food Technological Research Institute (CFTRI) -Nutrition Foundation of India (NFI). Nutrition intervention programmes- ICDS, Noon Meal Programme.

**UNIT IV****(18 hrs.)**

**Assessment of Nutritional Status:** Direct methods- Anthropometric, clinical, Diet Survey, biochemical and functional indices, Indirect methods - Vital health statistics – Reference Standards – NCHS, NNMB and ICMR standards.**Nutrition Education:** Objectives, definitions, channels and importance of nutrition education to the community- Methods of nutrition education, nutrition education programmes - Planning, implementation and evaluation of nutrition and health education programmes.

**UNIT V****(18 hrs.)**

**Food Security, Nutrition security** – Meaning and significance, National Food Security Mission, Food Security Act . **The Public Distribution System (PDS):** As food security tool, recent development and links in PDS- National Nutrition policy and National plan of action for nutrition, Concept of Nutritional Surveillance - Millennium Development Goals(MDG)

**Text Book**

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Park and Park	Textbook of Preventive and Social Medicine	Banarsidas, Jabalpur	2017 24th Edition
2.	Srilakshmi, B.	Nutrition Science	The New Age International Publications, New Delhi,	2016 7 <sup>th</sup> Edition

**Reference Books**

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Mahtab S. Bamji. Kamala Krishnaswamy and GNV Brahmam	Human Nutrition	Oxford and PBH Publishing company, New Delhi	2017 4 <sup>th</sup> Edition



2.	Sunderlal Adarsh Pankaj	Community Medicine	CBS Publishing distributors	2005 4 <sup>th</sup> edition
3.	Suryakantha AH	Community Medicine with Recent Advances	Jaypee Brothers Medical Publishers (p) Ltd	2017 4 <sup>th</sup> Edition

### Journals

1. Journal of Community Guidance and Research
2. FoodSci: Indian Journal of Research in Food Science and Nutrition
3. The Indian Journal of Nutrition and Dietetics

### Web Resources

- [motherchildnutrition.org/.../pdf/mcn-vitamin-a-ifa-supplementation.pdf](http://motherchildnutrition.org/.../pdf/mcn-vitamin-a-ifa-supplementation.pdf)
- [www.aidstar-one.com/sites/default/files/.../national.../India\\_V3.pdf](http://www.aidstar-one.com/sites/default/files/.../national.../India_V3.pdf)
- <http://www.cftri.com/cftriglobal.pdf>
- [http://mospi.nic.in/mospi\\_new/upload/MDG\\_pamphlet29oct2013.pdf](http://mospi.nic.in/mospi_new/upload/MDG_pamphlet29oct2013.pdf)
- [https://www.uic.edu/depts/mcam/nutrition/pdf/nutrition\\_assessment.pdf](https://www.uic.edu/depts/mcam/nutrition/pdf/nutrition_assessment.pdf)
- [http://www.thehindu.com/multimedia/archive/01404/National\\_Food\\_Secu\\_1404268a.pdf](http://www.thehindu.com/multimedia/archive/01404/National_Food_Secu_1404268a.pdf)

### Pedagogy

Chalk and talk, PPT, Community survey, Assignment, Group Discussion, Seminar, Case study

## SEMESTER - II

CODE	COURSE TITLE
18FNPC207	NUTRITION IN DISEASE – I

Category	CIA	ESE	L	T	P	Credit
Core	25	75	86	4	-	4

### Course Outcomes

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

CO Number	CO Statement
CO1	Classify, compare and contrast the types of hospital diets and to identify the role of various types of dietitian
CO2	Perceive skills in diet counseling and patient care
CO3	Evaluate the role of diet in etiology and prevention of metabolic disorders
CO4	Develop and justify appropriate menu plan for treatment of diseases and differently abled individuals
CO5	Prioritize the role of nutrition in cancer therapy

### Syllabus

#### UNIT I

( 17 hrs.)

**Therapeutic Diets** : Principles and objectives of diet therapy- Types of hospital diets, Enteral and Parenteral Nutrition. Nutritional care of surgery patients - General, head and neck surgery, gastro intestinal and bariatric surgery. Types of dietitians- Role of dietitian in the hospital and community- Patient care- diet planning and use of exchange list in nutrient calculation- Diet counseling and patient education. History and activities of Indian Dietetic Association.

#### UNIT II

( 19 hrs.)

**Gastro Intestinal Disorders** : Disorders of Oesophagus - Achalasia, Esophagitis and Hiatal hernia. Disorders of Stomach -Indigestion, hypochlorhydria, acute and chronic gastritis and peptic ulcer. Disorders of Intestine – Flatulence - Atonic, spastic and obstructive constipation, Acute and chronic diarrhea, Steatorrhoea. Inflammatory Diseases - Diverticulosis, diverticulitis, ulcerative colitis, malabsorption syndrome – sprue and lactose intolerance.

#### UNIT III

( 18 hrs.)

**Diabetes Mellitus** : Epidemiology / incidence- Classification and symptoms- Metabolic changes – long term and short term complications- Clinical findings- diagnostic tests- Glycemic index of foods- Types of insulin- Dietary modifications in energy, carbohydrate, fat, protein, fibre and micronutrients.

**UNIT IV** ( 17 hrs.)

**Disease of the Heart and Circulatory system** : Acute and chronic cardiac disorders- Risk factors of cardiac diseases- Dietary management in hypertension, atherosclerosis, congestive heart failure, myocardial infarction, hyperlipoproteinemia and hypercholesterolemia. Nutritional considerations in feeding the differently abled – Cleft lip, Palate and Autism.

**UNIT V** ( 19 hrs.)

**Nutrition in Cancer** :Epidemiological studies- Reproduction of the normal cells- Classification of neoplasm- Principles of cancer pathogenesis,-Causes of cancer cell development- Metabolic and nutritional alterations in malignancy- Body’s defense system- Free radical formation and role of antioxidants in scavenging free radicals - Cancer therapy and nutrition – Definition and classification functional foods.

**Text Books**

Sl.N o.	Author Name	Title of the Book	Publisher	Year and Edition
1.	SriLakshmi . B	Dietetics	New Age International (P) Ltd., New Delhi	7 <sup>th</sup> Edition, 2014

**Reference Books**

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Kathleen, L.M., and Sylvia Escott Stamp	Krause’s Food and Nutrition	Elsevier	2008 12 <sup>th</sup> Edition
2.	Sue Rodwell Williams	Nutrition and Diet therapy	Times Mirror Mosby Publishing House, Toronto, Boston	1997 10 <sup>th</sup> Edition
3.	Maurice E. Shills and Vermon R. Young	Modern Nutrition in Health and Disease,	Lea and Febiger, Philadelphia	2012 11 <sup>th</sup> Edition
4.	Garrow J.S. and	Human Nutrition	Churchil	1996

	James W.P.T.	and Dietetics	Livingstone- Edinburgh London Madrid, Melborne	9 <sup>th</sup> Edition
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## Journals

1. Journal of Community Guidance and Research
2. FoodSci: Indian Journal of Research in Food Science and Nutrition
3. The Indian Journal of Nutrition and Dietetics

## Web Resources

- <http://www.idaindia.com/>
- [http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Diverticulosis\\_and\\_diverticulitis](http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Diverticulosis_and_diverticulitis)
- [http://care.diabetesjournals.org/content/33/Supplement\\_1/S62.full](http://care.diabetesjournals.org/content/33/Supplement_1/S62.full)
- <http://www.slideshare.net/pharmacologyseminars/antioxidants-9122878>
- <http://www.hindawi.com/journals/jnme/2012/569486/>
- <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3257668/>

## Pedagogy

Chalk and talk, PPT, Case study, Assignment, Group Discussion, Seminar

## SEMESTER - II

CODE	COURSE TITLE
<b>18FNPC208</b>	<b>MACRONUTRIENTS</b>

Category	CIA	ESE	L	T	P	Credit
Core	25	75	86	4	-	4

### Course Outcomes

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

CO Number	CO Statement
<b>CO1</b>	Determine the energy expenditure and predict the energy requirement based on expenditure
<b>CO2</b>	Classify and describe the types and functions of macronutrients
<b>CO3</b>	Discuss the digestion, absorption, utilization and assess the effect of deficiency of macronutrients
<b>CO4</b>	Compute the protein requirement and evaluate the protein quality
<b>CO5</b>	Analyze the relationship between nutrients and hormones in metabolism. To identify the effect of alcohol in nutrient metabolism

### Syllabus

#### UNIT I ( 19 hrs.)

**Energy** : Historical background- Energy content of food and its determination- Components and determination of energy expenditure - Basal metabolism, physical activity and regulatory thermogenesis- Energy calculation and ICMR requirements- factors influencing the energy requirements.

#### UNIT II ( 17 hrs.)

**Carbohydrates** : Classification, digestion, absorption and utilization of carbohydrates, nutritional importance of carbohydrate. **Dietary fiber** : Types, sources, composition, properties, role of dietary fiber in therapeutic nutrition- CVD, Diabetes, Obesity and Cancer. Effect of fiber in the absorption of different nutrients, Effect of over consumption of fiber.

#### UNIT III ( 19 hrs.)

**Fats and Lipids** : Classification of lipids and fatty acids - Role of lipids, essential fatty acids, phospholipids and cholesterol, digestion and absorption of fats, transport of lipid in blood, role of lipotropic factors, fat deposits - Essential fatty acids – functions and effect of deficiency.

#### UNIT IV ( 17 hrs.)

**Protein** : Classification, function, digestion, absorption, utilization and sources, computation of protein requirements through factorial method and balance study- ICMR requirements- Evaluation of protein quality –PER, NPU, BV and Chemical score - Role of animal proteins and novel proteins in combating malnutrition. **Amino acid** – Classification and Functions of Essential Amino Acids.

**UNIT V**

( 18 hrs.)

Inter relationship of carbohydrate, lipid and protein metabolism. **Hormonal control of nutrient metabolism** – Effect of Insulin, Glucagon, Epinephrine, Norepinephrine and growth hormone on Protein, carbohydrate and fat metabolism. **Nutrition and Alcoholism** : Effect of alcohol on digestion, absorption and metabolism of nutrients.

**Text Books**

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Srilakshmi, B.	Nutrition Science	The New Age International Publications, New Delhi,	2016 7 <sup>th</sup> Edition
2.	Shubhangini A. Joshi	Nutrition and Dietetics	Tata McGraw Hill Publishing Company, New Delhi	2017 4 <sup>th</sup> Edition

**Reference Books**

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	James L. Groff Sareen S. Gropper	Advanced Nutrition and Human Metabolism,	Wads Worth Thomson Learning, U.S.	2000 3 <sup>rd</sup> Edition
2.	Swaminathan, M.	Advanced text book on Food and Nutrition, Volume 1	BAPPCO, Bangalore	2000 2 <sup>nd</sup> Edition
3.	Sue Rodwell Williams	Nutrition and Diet Therapy	Times Mirror Mosby Publishing House, Boston	1997 10 <sup>th</sup> Edition

4.	Maurice E. Shills and Vernon R. Young	Modern Nutrition in Health and Disease	Lea and Febiger, Philadelphia	2012 11 <sup>th</sup> Edition
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### Journals

1. Food and Nutrition Bulletin
2. FoodSci: Indian Journal of Research in Food Science and Nutrition
3. The Indian Journal of Nutrition and Dietetics

### Web Resources

- [http://scielo.isciii.es/pdf/nh/v26n3/02\\_revision\\_02.pdf](http://scielo.isciii.es/pdf/nh/v26n3/02_revision_02.pdf)
- [www.education.ne.gov/HSE/documents/PowerPoints/123%20Fiber.ppt](http://www.education.ne.gov/HSE/documents/PowerPoints/123%20Fiber.ppt)
- [physrev.physiology.org/content/physrev/24/1/128.full.pdf](http://physrev.physiology.org/content/physrev/24/1/128.full.pdf)
- [www.powershow.com/.../PROTEIN\\_QUALITY\\_Methods\\_for\\_Evaluatin...](http://www.powershow.com/.../PROTEIN_QUALITY_Methods_for_Evaluatin...)
- [www.slideshare.net/dancingchef316/carbohydrates-fats-and-proteins](http://www.slideshare.net/dancingchef316/carbohydrates-fats-and-proteins)

### Pedagogy

Chalk and talk, PPT, Quiz, Assignment, Group Discussion, Seminar

## SEMESTER - II

CODE	COURSE TITLE
18FNPCP01	FOOD ANALYSIS

Category	CIA	ESE	L	T	P	Credit
Core Practical	40	60	-	-	45 + 45	4

### Course Outcomes

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

CO Number	CO Statement
CO1	Prepare the reagents needed for the estimation various nutrients
CO2	Acquire the techniques to evaluate the composition with analytical instruments
CO3	Apply the techniques for research in Food Science and processing

### Syllabus

1. Estimation of Energy value of foods in Bomb Calorimeter.
2. Estimation of Moisture content of foods.
3. Estimation of Fibre by Acid –Alkali method.
4. Estimation of Ash content in foods.
5. Estimation of Calcium by Titrimetric method.
6. Estimation of Iron by Wong's method.
7. Estimation of Phosphorus by Fiske and Subba Row method.
8. Estimation of Protein by Micro Kjeldhal method.
9. Estimation of Protein by Lowry's method.
10. Estimation of Fat by Soxhlet method.
11. Estimation of Carotene by Colorimetric method.
12. Estimation of Thiamine by Fluorimetric method.
13. Estimation of Riboflavin by Fluorimetric method.
14. Estimation of Vitamin-C by Dye method.
15. Determination of Saponification Number of Oil.
16. Determination of Iodine Number of Oil by Hanes method.
17. Determination of Acid Number of Oil.
18. Estimation of Lipid content in EggYolk.

### Pedagogy



Hands on training, Demonstration

### SEMESTER - II

CODE	COURSE TITLE
18FNPS201	ADVANCED MULTI-SKILL DEVELOPMENT PAPER

Category	CIA	ESE	L	T	P	Credit
Skill Based	40	60	42	3	-	5

### Course Outcomes

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

CO Number	CO Statement
CO1	Create general awareness on scientific, political, teaching and research aptitude
CO2	Develop skills on logical reasoning and communication
CO3	Build the capability of numerical reasoning and quantitative aptitude for competitive examinations
CO4	Improve the employability skills
CO5	Adapt and orient to online services and examinations

### Syllabus

#### UNIT I (9 hrs.)

**Communication:** Question tags - Gerund and Infinitives - Spotting the errors – Synonyms – Antonyms - One word substitution – Sentence completion –Prepositions – Articles.

**General Awareness and Scientific Aptitude:** Socio - Economic - Banking –Basic Sciences

**People and Environment**

**Politics and Current Affairs**

**Higher Education**

**Information and Communication Technology**

**Teaching Aptitude**

**Research Aptitude**

#### UNIT II (9 hrs.)

**Logical Reasoning :** Syllogism – Statement Conclusions – Statement Arguments – Statement Assumptions – Statement Courses of Action – Inference – Cause and Effect – Visual Reasoning – Direction Sense Test – Blood Relation – Coding and Decoding – Deductive Reasoning.

#### UNIT III (9 hrs.)

**Numerical Reasoning and Quantitative Aptitude:** Age – speed – Heights and Distance – Time and Distance - Ratio and Proportion – Percentage – Fraction – Profit and Loss – Interest – Average – Calendar – Clocks– Probability – Series – Venn Diagram - Data Interpretation.

**UNIT IV**

**( 9 hrs.)**

**Self Introduction** - Presentation Skills-Presentation through Power point - Soft Skills- Interpersonal Skills-Employability Skills Training-Resume Preparation - Preparation for interview. **Abstract writing** - presentation of case study - Data compilation - Skills in counseling - Diet counseling.

**UNIT V**

**( 9 hrs.)**

Group Discussion-Importance-Types of GD –GD Skills- GD Etiquette(do’s and don’ts)- Essential elements of a GD- Movements and gestures to be avoided in a GD-Online Services- Reservation-Banking-Purchases-Passport application.

**Reference Books**

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Agarwal.R.S.	Quantitative Aptitude	The New Age International Publications, New Delhi,	2016 7 <sup>th</sup> Edition
2.	Madaan KVS	CBSE UGC NET/JRF/SET Teaching and Research Aptitude	Pearson Publishers	2018 2 <sup>nd</sup> Edition
3.	Chopra.J.K	Bank Probationary Officers’ Examination	Unique Publishers	2014 3 <sup>rd</sup> Edition
4.	Tara Chand	General Studies for Civil Services Preliminary Examinations, Paper – I	Tata Mc Graw Hill Education Private Ltd	2016 Revised Edition
5.	Hari Mohan Prasad and Uma Rani Sinha	Objective English for Competitive Examinations	Tata McGraw Hill Education Private Ltd., New Delhi	2013 4 <sup>th</sup> Edition

**Pedagogy**

- Chalk and talk, Quiz, Assignment, Group Discussion

### SEMESTER - III

CODE	COURSE TITLE
18FNPC309	MICRONUTRIENTS

Category	CIA	ESE	L	T	P	Credits
Core	25	75	86	4	-	4

### Course Outcomes

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

CO Number	CO Statement
CO1	Understand the role of micronutrients in maintaining normal body metabolism and functions as well as in prevention and treatment of chronic diseases
CO2	Describe the fundamental functions of micronutrients
CO3	Discuss digestion, absorption, transport and metabolism of nutrients by human beings
CO4	Impart knowledge on deficiency and toxicity of micronutrients
CO5	Summarize the interrelationship between micronutrients

### Syllabus

#### UNIT I

18 Hrs.

**Fat soluble Vitamins** : A, D, E and K: structure, functions, absorption, transport, utilisation and storage, dietary sources, recommended intake, Assessment of vitamin nutriture - Conversion of carotene into vitamin A - Deficiency and diagnosis, hypervitaminosis.

#### UNIT II

18 Hrs.

**Water Soluble Vitamins** : thiamine, riboflavin, niacin, folic acid, pyridoxine, pantothenic acid, vitamin B<sub>12</sub>, biotin and ascorbic acid: structure, functions, absorption, transport, biochemical utilization, storage, dietary sources, recommended intake, deficiency and toxicity.

#### UNIT III

18 Hrs.

**Calcium**: absorption, distribution, utilization, blood calcium, calcium balance, dietary sources, requirements, deficiency and excess - Bone mass- measurement. **Phosphorus**: concentration in the body, calcium-phosphorus ratio, phosphorus absorption and utilization, deficiency and toxicity. **Sodium, Potassium, Magnesium and Sulphur**: distribution, absorption, utilization, role in human nutrition, dietary sources, deficiency and toxicity.

#### UNIT IV

20 Hrs.

**Trace Elements** : Concept, mode of action. **Iron** : Functions, absorption, transport, utilization, storage, sources, requirement- Deficiency and toxicity of iron- Methods of assessing nutritional status and availability of dietary iron. **Iodine and Fluorine**: Physiological functions, sources, requirement, deficiency and toxicity. Uses of Fluoride in prevention of dental caries. Physiological functions, sources, requirements, deficiency and toxicity of zinc, copper, selenium and chromium.

#### UNIT V

**16 Hrs.**

**Vitamin like molecules** : choline, carnitine, inositol, taurine – Structure, functions and dietary considerations and deficiency. Pseudo Vitamins : flavonoid, pangamate, laetrile- functions and sources.

Interdependence between micronutrients: Vitamin A and Zinc - Vitamin D with calcium and Phosphorus- Vitamin E with Vitamin K, Vitamin A and Selenium – Iron with Vitamin C.

#### Text Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	James L.Groff and Sareen S. Gropper	Advanced Nutrition and Human Metabolism	Thomson Wordsworth Learning	4 <sup>th</sup> Edition,2004
2.	Carolyn D. Berdanier	Advanced Nutrition – Micronutrients	CRC Publications	1 <sup>st</sup> Edition,1997
3.	Sue Rodwell Williams	William’s Essentials of Nutrition and Diet therapy	Elsevier Health Sciences Times Mirror Mosby Publishing House, Toronto, Boston	2013 10 <sup>th</sup> Edition

#### Reference Books

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Maurice E. Shills and Vernon R. Young	Modern Nutrition in Health and Disease	Lea and Febiger, Philadelphia	2012 11 <sup>th</sup> Edition
2.	Garrow J.S. and James W.P.T.	Human Nutrition and Dietetics	Churchil Livingstone-Edinburgh London Madrid, Melborne	1996 9 <sup>th</sup> Edition
3.	Michael J.Gibney, Hester,H.V and Frans,J.K.	Introduction to Human Nutrition	Blackwell Publishing,	1 <sup>st</sup> Edition,2003.

#### Journals

1. Journal of Community Guidance and Research
2. FoodSci: Indian Journal of Research in Food Science and Nutrition
3. The Indian Journal of Nutrition and Dietetics

#### Web Resources

- <https://www.slideshare.net/balakesavareddy/mineral-vitamin-interrelationship>
- <https://www.slideshare.net/ManojArockia/fat-soluble-vitamins-15503400>
- <https://www.slideshare.net/UDDent/water-soluble-vitamins-34632624>
- <https://www.slideshare.net/MohannadSoliman/final-m-metabolism-61016965>
- <https://www.slideshare.net/manjuprasad16/essential-trace-elements>

## **Pedagogy**

Chalk and talk, PPT, Case study, Assignment, Group Discussion, Seminar

### SEMESTER - III

CODE	COURSE TITLE
18FNPC310	FOOD BIOTECHNOLOGY

Category	CIA	ESE	L	T	P	Credits
Core	25	75	71	4	-	4

#### Course Outcomes

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

CO Number	CO Statement
CO1	Explain the stages of cell growth and application of tissue culture techniques on foods
CO2	Discuss the steps in gene cloning and its applications
CO3	Construct the fermenter design and apply the stages of fermentation in production of fermented various food products
CO4	Discover the microbial production of enzymes and its applications in food industry
CO5	Assess the role of biotechnology on environment and learn about the methods of biomass production

#### Syllabus

##### UNIT I

**13 Hrs.**

**Biology of Industrial Micro-organism:** Industrial Microorganism – Cell growth and metabolism, **Microbial products:** primary metabolites – Amino acid – Vitamins - B<sub>12</sub>, citric acid - secondary metabolites - Toxins and antibiotics - Penicillin. **Plant tissue culture:** Media and culture techniques, Basic requirements for tissue culture laboratory - applications of tissue culture.

##### UNIT II

**16 Hrs.**

**Recombinant DNA Technology:** Genetic Engineering and cloning – Definition, Tools – Plasmids, Cosmids, Bacteriophages and shuttle vectors. Enzymes - Restriction enzymes, Ligases, Reverse transcriptase and Polymerase. Steps in Gene Cloning, application of gene cloning – mechanism of gene transfer.

##### UNIT III

**13 Hrs.**

**Food Fermentation:** Culture of microorganism -Batch and continuous process - Fermenter design –Types of fermenter, stages of fermentation – Downstream processing – fermented foods - bread, soya based foods, cheese and vinegar.

**Genetically modified foods** – Flavr savr Tomato and Golden rice – pros and cons.

**Nutrigenomics:** Definition and Concept.

**Microbial biomass production:** Single Cell Protein - Algal and fungal SCP and their uses.

**UNIT IV**

**15 Hrs.**

**Enzyme Technology in Food Industry:** Microbial production and applications of enzymes- Amylase, protease, lipase and pectinase- New developments in the applications of lactic acid bacteria in the food industry.

**Immobilization of enzymes:** Methods of immobilization –uses of immobilized enzymes in food industry- Development of novel sweeteners.

**UNIT V**

**18 Hrs.**

**Environmental Biotechnology:** Food Waste treatment – Nature of impurities– Biodegradation-Types of treatment systems - Anaerobic waste treatment- Aerobic waste treatment - Biotechnology in agro – biomass utilization- Biofuels - Ethanol and biogas production.

**Text Books**

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Dubey, R.C	A textbook of bio-technology	S.Chand & Company	2005
2.	Frazier and West Hoff	Food Microbiology	Tata McGraw Hill Publishing Company	1995
3.	Gupta P.K	Elements of Biotechnology	Rostogi and Co	1996
4.	Ignacimuthu, S.J	Basic Biotechnology	Tata McGraw hill publishing Company	1995
5.	Kumaresan, V	Bio Technology	Saras Publications	2005.
6.	Sriram Sridhar	Enzyme Biotechnology	Dominant Publishers	2005
7.	Singh B.D	Biotechnology	Kalyani Publishers	2005
8.	Bhatia S.C	Handbook of Food Processing Technology Vol.3	Atlantic Publishers	2008

**Reference Books**

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1	Caside L.E	Industrial Microbiology	New Age International Publishers	1999

2.	Chatwal G.R	Textbook of Biotechnology	Anmol Publishers (P) Ltd	2003
3.	Dubey, R.C., and Maheswari, D.K.,	A textbook of Microbiology	S.Chand & Company Ltd	2000

### Journals

1. Journal of Community Guidance and Research
2. FoodSci: Indian Journal of Research in Food Science and Nutrition
3. The Indian Journal of Nutrition and Dietetics

### Web Resources

- [https://eandm.com/ExtraContent/Products/Content/Siemens/Training/.../ep\\_5.pdf](https://eandm.com/ExtraContent/Products/Content/Siemens/Training/.../ep_5.pdf)
- [www.ejpmr.com/admin/assets/article\\_issue/1525067643.pdf](http://www.ejpmr.com/admin/assets/article_issue/1525067643.pdf)
- <https://www.fermentools.com/blog/stages-of-fermentation/>

### Pedagogy

Chalk and talk, PPT, Case study, Assignment, Group Discussion, Seminar



### SEMESTER - III

CODE	COURSE TITLE
18FNPC311	NUTRITION IN DISEASE – II

Category	CIA	ESE	L	T	P	Credit
Core	25	75	71	4	-	4

#### Course Outcomes

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

CO Number	CO Statement
CO1	Identify the type of fever, allergy and dental diseases and plan the diet accordingly
CO2	Classify grades of obesity, underweight and psychiatric disorders
CO3	Distinguish the dietary management in liver diseases
CO4	Assess the symptoms of renal diseases and choose appropriate diet
CO5	Justify the diet plans for disorders of nervous and skeletal system and modify the diet for AIDS patients

#### Syllabus

##### UNIT I

(15 hrs.)

**Fevers and infection** - etiological factors, types and dietary modification - **Injury and Burns** - biochemical alterations and dietary management. **Allergy** - etiological factors, symptoms, types, diagnosis and dietary modification. **Dental diseases** – types, causes and dietary management – **Pre and post operative care**.

##### UNIT II

(15 hrs.)

**Nutrition Imbalances: Obesity** – Types, causes, assessment, grades, theories, complications, thermogenesis and dietary modifications. **Under weight**: Etiological factors and dietary modifications. **Psychiatric disorders**: Anorexia nervosa, bulimia – etiological factors and dietary modifications.

**UNIT III****(14 hrs.)**

**Diseases of Liver, Gall Bladder and Pancreas:** Types, Etiology, Symptoms and dietary modification in Fatty liver, Jaundice, Hepatitis, Cirrhosis, Hepatic coma, Cholecystitis, Cholelithiasis and Pancreatitis. Liver transplantation.

**UNIT IV****(14 hrs.)**

**Diseases of the kidney and urinary tract:** Types, Etiology, Symptoms, and dietary modification in Nephritis, Nephrosis, Acute and Chronic renal failure, renal stones, dialysis, kidney transplants – Etiology, symptoms and dietary modifications.

**UNIT V****(17 hrs.)**

**Disorders of the brain and nervous system:** Stroke, epilepsy, Parkinson's disease and multiple sclerosis – symptoms, causes and dietary modifications. **Disorders of the skeletal system:** Osteoporosis, Arthritis – Types, causes and dietary modifications.

**HIV Infection and AIDS :** Epidemiology, Stages of HIV infection, Transmission of HIV, Pathophysiology, Clinical Manifestations, Alteration of Immunity in AIDS, Dietary management and Prevention.

**Text Books**

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Srilakshmi. B	Dietetics	New Age International (P) Ltd., New Delhi	7 <sup>th</sup> Edition, 2014

**Reference Books**

Sl.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Kathleen, L.M., and Sylvia Escott Stamp	Krause's Food and Nutrition	Elsevier	2008 12 <sup>th</sup> Edition
2.	Sue Rodwell Williams	Nutrition and Diet therapy	Times Mirror Mosby Publishing House, Toronto, Boston	1997 10 <sup>th</sup> Edition
3.	Maurice E. Shills and Vermon R. Young	Modern Nutrition in Health and Disease	Lea and Febiger, Philadelphia	2012 11 <sup>th</sup> Edition
4.	Garrow J.S. and James W.P.T.	Human Nutrition and Dietetics	Churchil Livingstone-Edinburgh London Madrid, Melbourne	1996 9 <sup>th</sup> Edition
5.	Davidson S.S., Passmore P. and Branch J.F	Human Nutrition and Dietetics	F & S Lingstons Ltd Edinburgh and London	1993 9 <sup>th</sup> Edition
6.	Wilkes G.M	Cancer and HIV Clinical Nutrition	All India Publishers & Distributors, Chennai	2000 2 <sup>nd</sup> Edition

7.	Panda S, Chatterjee A, Abdul – Quader A.S	Living with the AIDS Virus, The epidemic and the response in India	SAGE Publications, New Delhi	2002
8.	Joshi S.A	Nutrition and Dietetics	Tata McGraw Hill Publishers Company Limited New Delhi	2010 3 <sup>rd</sup> Edition

### Journals

1. Journal of Community Guidance and Research
2. FoodSci: Indian Journal of Research in Food Science and Nutrition
3. The Indian Journal of Nutrition and Dietetics

### Web Resources

- <http://www.idaindia.com/>
- [http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Diverticulosis\\_and\\_diverticulitis](http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Diverticulosis_and_diverticulitis)
- [http://care.diabetesjournals.org/content/33/Supplement\\_1/S62.full](http://care.diabetesjournals.org/content/33/Supplement_1/S62.full)
- <http://www.slideshare.net/pharmacologyseminars/antioxidants-9122878>
- <http://www.hindawi.com/journals/jnme/2012/569486/>
- <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3257668/>

### Pedagogy

Chalk and talk, PPT, Case study, Assignment, Group Discussion, Seminar

### SEMESTER - III

CODE	COURSE TITLE
18FNPC312	FOOD QUALITY CONTROL & PRODUCT DEVELOPMENT

Category	CIA	ESE	L	T	P	Credit
Core	25	75	71	4	-	4

#### Course Outcomes

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

CO Number	CO Statement
CO1	Identify food hazards to ensure food safety
CO2	Classify different stages and interpret government regulations governing quality control.
CO3	Analyze the concept of patentability and various aspects of patent laws in India.
CO4	Develop ideas for creating different types of new foods and adapt various strategies for evaluation of newly developed foods
CO5	Describe food specifications of different food products

#### Syllabus

##### UNIT I

**15 Hrs.**

**Food safety:** Meaning of food safety. **Food hazards:** Physical, Chemical, Biological hazards associated with foods and prevention - Effect of processing and storage on microbial safety. **Types of food toxicants:** Endogenous, natural, synthetic toxicants - **Food additives:** Classification and uses – **Food Adulteration.**

##### UNIT II

**17 Hrs.**

**Quality control:** Objectives, importance, functions of quality control, stages of quality control in food industry. **Government regulations in quality control:** FAO/WHO Codex Alimentarius commission, PFA, AGMARK, BIS, FPO, fair average quality (FAQ) specification for food grains, ISO 9000 series and ISO 22000. **HACCP:** Background, current status, structured approach, principles, benefits and limitation- Consumer Protection Act (CPA), FSSAI – Principle and role, GMP.

##### UNIT III

**14 Hrs.**

**Role of Central and State Government in imparting quality control:** WHO assisted activities – Role of central and state food laboratories - Qualification and duties of public analyst and food inspector. **Patent** – definition, requirements, patent laws in India, administrator, need for patent system, advantages, and precautions to be taken by applicants, Procedures- Patent and Non-patent.

#### UNIT IV

**15Hrs.**

**Product development:** Meaning, stages of product development- idea, developmental and commercialization, Criteria for development of new food. **Types of new foods:** Fortified foods, enriched foods, designer foods and convenience foods. **Food Quality Evaluation** : Subjective and objective evaluation of food- Strategic consideration behind new food development.

#### UNIT V

**14 Hrs.**

**Food standards:** Cereals & its products - Bread, biscuits, cakes, pasta products.

**Fruit products** : Jam, juices, squashes, ketchup, sauce. **Oils & fats:** Coconut oil, groundnut oil, palm oil, sunflower oil, vanaspathi. **Milk & its products:** Skimmed milk powder, partly skimmed milk powder, condensed sweetened milk. **Other products:** Coffee, tea, sugar, honey and toffees.

#### Text Books

Sl. No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Khurana,A. D	Text book of food safety	Mohit Publications	2010 Edition 1,
2.	Dev Raj, Rakesh Sharma and Joshi,V.K	Quality control for value addition in Food Processing	New Delhi Publishing Agency	2011
3.	Sathe,A.Y	A first course in food analysis	New Age Publications	1999

#### Reference Books

S.No	Author Name	Title of the Book	Publisher	Year and Edition
1.		BIS standards		
2.	Swaminathan,M	Food Science Chemistry & Experimental foods	Bappco Publishers.	1995
3.	Singh,S.P., Julie Funk, Tripathi,S.C., Nanda Joshi	Safety quality Assurance and Global trade	International book distributors	2009 1 <sup>st</sup> Edition

#### JOURNALS

1. Indian food Industry. CFTRI, Mysore.

2. Processed food Industry, Compu type media, Viba press Pvt Ltd, New Delhi.
3. FSSAI Manual 2011

### **Web Resources**

[https://fssai.gov.in/dam/jcr.../Guidance\\_Document\\_Bakery\\_Sector\\_24\\_10\\_2017.pdf](https://fssai.gov.in/dam/jcr.../Guidance_Document_Bakery_Sector_24_10_2017.pdf)  
<https://www.slideshare.net/MdmSri/chapter-3-evaluation-of-food>  
[www.powershow.com/.../FOOD\\_QUALITY\\_CONTROL\\_powerpoint\\_ppt\\_presentatio...](http://www.powershow.com/.../FOOD_QUALITY_CONTROL_powerpoint_ppt_presentatio...)

### **Pedagogy**

Chalk and talk, PPT, Case study, Assignment, Group Discussion, Seminar

### SEMESTER - III

CODE	COURSE TITLE
18FNPCP02	QUALITY CONTROL

Category	CIA	ESE	L	T	P	Credit
Core Practical	40	60	-	-	45	4

#### Course Outcomes

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

CO Number	CO Statement
CO1	Detect adulteration and contamination in foods
CO2	Acquire the techniques to assess the quality of food
CO3	Apply the techniques for research in Food Science and processing

#### Syllabus

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 grains and extruded products – length, breadth, thickness and sphericity.
12. Preparation and inoculation of growth media – Inoculation and incubation – counting of microbes.

#### Pedagogy

Hands on training, Demonstration

#### Includes Internship in food industry for one week.

40 CIA marks given as

- 20 for practical : Average of two tests -10 marks  
Model practical exam -10 marks
- 20 for internship : Internship report -10 marks  
Viva-Voce -10 marks

### SEMESTER - III

CODE	COURSE TITLE
18FNPS302	TECHNIQUES OF FITNESS ASSESSMENT

Category	CIA	ESE	L	T	P	Credits
Core	25	75	37	4	4	5

**Objectives :** Develop the skills to assess each component of fitness and a thorough analysis of evaluating individuals' strength, muscular endurance, cardio respiratory fitness, flexibility, body composition, and nutritional status. The course serves as an introduction to the role of exercise in health promotion, fitness, and performance including the acute and chronic responses to exercise.

#### Syllabus

#### UNIT I (9hrs.)

**Physical Activity:** Types and benefits of physical activity – exercises for different conditions – exercises for strengthening different parts of the body. Body systems involved in physical activity.

#### UNIT II (9hrs.)

**Energy Production and Physical Activity:** Energy exchange, energy transfer, energy conversion, energy production and utilization – Anaerobic energy system (Phosphagen System)– Lactic acid system – Aerobic energy system.

#### UNIT III (9hrs.)

**Physical Fitness:** Definition, types and components, factors affecting physical fitness - Training principles and methods.

#### UNIT IV (9hrs.)

**Physical Fitness Assessment:** Assessment of Cardio respiratory endurance. Determination of cardio respiratory fitness – assessment of maximal oxygen uptake – Field test, sub maximal and maximal exercise test.

#### UNIT V (9hrs.)

**Assessment of Anaerobic Power:** Assessment of muscular strength – assessment of flexibility – assessment of speed – assessment of agility – assessment of co-ordination – assessment of balance – assessment of body composition.



**Text Books**

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Srilakshmi.B, Suganthi.V and Ashok.K.C	Exercise Physiology Fitness and Sport Nutrition	New Age International (P) Ltd., New Delhi,	2017
2.	Summer field L.M	Nutrition, Exercise and behaviour; An integrated approach to weight management	Wadsworth / Thomson Learning,	2001
3.	Kathleen, L.M., and Sylvia Escott Stamp	Krause's Food and Nutrition	Elsevier	2008, 12 <sup>th</sup> Edition
4.	Garrow J.S. and James W.P.T	Human Nutrition and Dietetics	Churchil Livingstone – London Madrid, Melborne	1996 9 <sup>th</sup> Edition,

**Web Resources**

- <https://www.choosemyplate.gov/physical-activity-what-is>
- <https://www.who.int/ncds/prevention/physical-activity/en/>
- <https://medlineplus.gov/exerciseandphysicalfitness.html>
- <https://study.com/academy/lesson/what-is-physical-fitness-definition-importance.html>

**Pedagogy**

- Chalk and talk, PPT, Quiz, Assignment, Group Discussion, Seminar

### SEMESTER - III

CODE	COURSE TITLE
18FNPS303	NUTRITIONAL EPIDEMIOLOGY

Category	CIA	ESE	L	T	P	Credits
SBS	25	75	16	4	25	5

**Objectives :** To enable students to get insight into nutritional problems in the community, to examine epidemiological status and to review the current state of knowledge regarding diet and other nutritional indicators as etiologic factors in disease.

#### Syllabus

##### UNIT I

**Overview of Nutritional epidemiology:** Definition, objectives of Nutritional epidemiological research, types of study designs used in nutritional epidemiological research.

##### UNIT II

**Nutritional anthropometry:** Growth chart plotting and interpretation, estimation of BMI and WHR of the community.

##### UNIT III

**Dietary assessment:** Monitor the food and nutrition intake of individual and groups, environment and individual factors affecting food intake, designing food frequency questionnaire, use of dietary analysis software, use of ready reckoners, surveillance and monitoring data collection and interpretation.

##### UNIT IV

**Clinical and biochemical Assessment:** Clinical assessment and biochemical assessment of nutritional deficiencies in the community, interpretation of data through case study examples in healthy members of the population and at risk groups, malnutrition screening versus assessment.

##### UNIT V

**Presenting findings in nutritional epidemiology:** Generation of hypothesis about diet and disease, presentation of data, data analysis, and application of statistics to measure association.

**Community Based Mini Project in any of the above mentioned fields.**

**Text Books**

<b>S.No.</b>	<b>Author Name</b>	<b>Title of the Book</b>	<b>Publisher</b>	<b>Year and Edition</b>
1.	Anil Mishra	Basics of Epidemiology- concepts made simple	Notion Press	2018 and , 1 <sup>st</sup> Edition
2.	Kenneth J. Rothman, Sander Greenland, Timothy L.Lash,	Mordern Epidemiology	Wolters Kluwer/ Lippincott Williams and Wilkins, 3 <sup>rd</sup> Edition	2008
3.	Walter Willett	Nutritional Epidemiology	Oxford Universit Press, 3 <sup>rd</sup> Edition	2012
4.	David D. Celentano	Gordis Epidemiology	Elsevier, 6 <sup>th</sup> Edition	2019

## SEMESTER - IV

CODE	COURSE TITLE
<b>18FNPC413</b>	<b>FOOD PROCESSING AND PACKAGING</b>

Category	CIA	ESE	L	T	P	Credit
<b>Core</b>	<b>25</b>	<b>75</b>	<b>86</b>	<b>4</b>	<b>-</b>	<b>4</b>

### Course Outcomes

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

CO Number	CO Statement
<b>CO1</b>	Explain the basic concepts of food processing and its impact on food product quality
<b>CO2</b>	Analyze various unit operations and principles on food processing
<b>CO3</b>	Develops ability to construct and interpret various processing methods in various types of foods
<b>CO4</b>	Discuss the role of packaging in different product preservation
<b>CO5</b>	Elaborates the role of labelling in food packaging and its regulations

### Syllabus

#### UNIT I

**17 Hrs.**

Basic principles of food processing, concepts of food processing- Puffing, popping, flaking, parching and extrusion - Basic Unit operations - Effect of food processing on nutritive value of foods. **Rice** : Production, milling of rice, parboiling methods- CFTRI hot soaking process, pressure parboiling, chromate soaking process, high temperature short time process - Advantages and disadvantages of parboiling - Byproducts of rice milling and their utilization. Packaging of byproducts.

#### UNIT II

**20 Hrs.**

**Wheat** : Structure, Milling - cleaning, conditioning and milling, manufacture of breakfast cereals and extruded products, pasta, noodle and macaroni products and packaging. **Millets**: Milling and packaging of major and minor millets - ragi, bajra, sorghum, maize, kodo, proso, Barnyard, and Italian millets, malting. **Pulses** : Structure, milling, processing and packaging of Soya bean and Bengal gram.

#### UNIT III

**17 Hrs.**

**Nuts and oil seeds** : Types of oil seeds and nuts, processing – Mechanical and solvent extraction – Manufacturing of soy concentrates and isolates - Hydrogenation of fats - Packaging of edible oils. **Milk and its products** : Manufacturing and packaging of cheese, cream, butter and khoa. Market

forms of milk - Pasteurized milk, standardized milk, Toned milk, Double toned milk and skimmed milk.

**UNIT IV**

**20 Hrs.**

**Meat** : Red meat processing - rigor mortis, Preservation and Storage- cold shortening, canning, curing, drying, fermentation, smoking and packaging of meat- different methods, packing of frozen meat- Cryogenic freezing of meat. **Poultry** : Preparing for consumption(processing)- Preservation, Storage and packaging. **Fish** : meal and oil - Effect of handling practices, freezing, storage and packaging. **Egg** : Storage, manufacturing and packaging of egg products.

**UNIT V**

**16 Hrs.**

**Packaging and Labelling**: Definition, Types of packaging and their applications- metals-glass-papers-plastics-retortable packages- films-laminates-edible films-wooden- shrink packaging and modified atmosphere packaging, advantages and disadvantages. **Labelling**: Definition, advantages, disadvantages, types- nutrition labelling and mandatory labeling, functions- Labelling regulations- health claims.

**Text Books**

S.No.	Author Name	Title of the Book	Publisher	Year and Edition
1.	Subbulakshmi,G., Shobha.A.L	Food Processing and Preservation	New age international publishing	2001
2.	Charls L	Cutting, Fish – Processing and Preservation	Agrobios (India)	2002
3.	Mahindru,S.N	Milk and milk products	A.R.H Publishing Corporation	2009
4.	Peter S. Murano	Understanding Food science and Technology	Thomson Wadsworth	2003

**Reference Books**

S.No	Author Name	Title of the Book	Publisher	Year and Edition
1.	Siva Shankar, B	Food Processing and preservation	Prentice hall of India	2002 2 <sup>nd</sup> edition
2.	Raghurent Chintamani	Advances in Agro Industry and Food processing	Dominant publishers and distributors	1999
3.	Shakuntala Manay, N., and Shadaksharaswamy	Foods; Facts and Principles,	New age International (P) Ltd	2010

	M			
4.	Sukumar D	Outlines of Dairy Technology	Oxford University press	2000
5.	Vijaya Khader	Text book of food science and Technology	ICMR	2001

### Journals

1. Journal of Food Science and Technology, AFSTI, Mysore.
2. Indian Food Industry, CFTRI, Mysore.
3. Kissan World, Sakthi Sugar Ltd. Chennai.
4. Food Digest, CFTRI, Mysore.

### Web Resources

- [agritech.tnau.ac.in/postharvest/pht\\_rice\\_valueaddtn.html](http://agritech.tnau.ac.in/postharvest/pht_rice_valueaddtn.html)
- [millets.res.in/m\\_recipes/Nutritional\\_health\\_benefits\\_millets.pdf](http://millets.res.in/m_recipes/Nutritional_health_benefits_millets.pdf)  
[https://www.researchgate.net/publication/271305921\\_Application\\_of\\_plastics\\_and\\_paper\\_as\\_food\\_packaging\\_materials](https://www.researchgate.net/publication/271305921_Application_of_plastics_and_paper_as_food_packaging_materials)
- <https://www.safefood.eu/SafeFood/~/SafeFoodLibrary/~/WhatsOn%20a%20label>

### Pedagogy

Chalk and talk, PPT, Case study, Assignment, Group Discussion, Seminar

## SEMESTER - IV

CODE	COURSE TITLE
18FNPCP02	CLINICAL NUTRITION TECHNIQUES

Category	CIA	ESE	L	T	P	Credit
Core Practical	40	60	-	-	90	4

### Course Outcomes

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

CO Number	CO Statement
CO1	Prepare the reagents needed for the estimation of various components in blood and urine
CO2	Estimate the parameters using appropriate techniques
CO3	Apply the techniques for research in biochemical assessment

### Syllabus

#### QUANTITATIVE ANALYSIS OF BLOOD

1. Estimation of blood glucose by Glucose oxidase method
2. Estimation of blood hemoglobin and Iron by Wong's method.
3. Estimation of blood Hemoglobin by Cynamethaemoglobin method .
4. Estimation of blood Cholesterol by Zake's method.
5. Estimation of Serum Albumin/ Globulin ratio by Salt precipitation method.
6. Estimation of Serum Phospholipids by Fiske and Subba Row method.
7. Estimation of Serum Protein by Lowry's method.

#### QUANTITATIVE ANALYSIS OF URINE

8. Estimation of Urinary Creatinine by Alkaline Picrate method.
9. Estimation of Urinary Urea by Diacetyl monoxime method.
10. Estimation of Urinary Calcium by Clark and Collip method.
11. Estimation of Urinary Phosphorus by Fiske and Subbarow.
12. Estimation of Urinary Ascorbic acid by Harris and Ray method.
13. Estimation of Urinary nitrogen by Micro Kjeldhal method.

#### DEMONSTRATION EXPERIMENTS

1. Estimation of Blood pyruvic acid
2. Estimation of Serum Alkaline Phosphatase
3. Isolation of nucleic acids
4. Animal study-Thiamine depletion- Repletion study

### Pedagogy

Hands on training, Demonstration

CODE	COURSE TITLE
18FNPSL02	NUTRACEUTICALS AND FUNCTIONAL FOODS

Category	CIA	ESE	L	T	P	Credit
Self learning Paper	-	-	-	-	-	5

**Objectives:** To enable the students understand the health benefits of functional foods and gain knowledge on classification and role of nutraceuticals.

## Syllabus

### UNIT I

**Functional foods and nutraceuticals** : Definition of functional foods and nutraceuticals– Review of the history of functional foods – interrelationship of various foods as nutraceuticals.

**Classification of nutraceuticals** – based on food source, mechanism of action and chemical nature.

### UNIT II

**Role and Health benefits of Isoprenoids** – carotenoids, tocopherols – **phenolic compounds** – Isoflavones and Flavonones – **Fatty acids** – Omega 3, Conjugated Linoleic acid (CLA) and MUFA – **Super Foods** – Green tea, Flax seed, olive oil, almond and walnut.

### UNIT III

**Probiotics** : concept- Important probiotic strains- Health benefits – Therapeutic applications. o

**Prebiotics** : Concept, sources – oligosaccharides, Fructo oligosaccharides, Galacto oligosaccharides, Raffinose, stachyose and soybean oligosaccharides and Xylo oligosaccharides and its health benefits.

### UNIT IV

**Phytosterols** – Sources, Health benefits and Mode of action.

**Dietary Fiber** - role of fiber in diabetes mellitus, heart disease, cancer and obesity.

### UNIT V

**Antioxidants** : Vitamin A,E,C and Selenium - Food sources, role of antioxidants in cancer and heart disease.

**Herbs and Spices as Functional foods:** garlic, ginseng, tulsi, turmeric, black pepper and chilli - active components and its role in health.

## Reference Books

S.No	Author Name	Title of the Book	Publishers	Year and Edition
1.	Mary, K.Schmidl and Theodore, P. Labuza	Essentials of functional foods	Culinary and hospitality	2000



2.	Paresh, C. Dutta	Phytosterol as functional food components and nutraceuticals	Marcel dekker inc	2004
3.	Robert E.C. Wildman	Hand Book of Nutraceuticals and Functional Foods	Taylor and Francis Publishers	2000 I Edition
4.	Johnson,I and Williams,G	Phytochemical functional foods	Wood house publishing	2003
5.	Arnoldi	Functional foods, cardiovascular disease and diabetes	Wood House Publishing	2004

### **Journals**

1. Indian food industry, CFTRI, Mysore.
2. Food Digest, CFTRI, Mysore.