Programme outcome:

The programme outcome of M.Sc. (Home Science) is to instill professional, practical and entrepreneurship skills for improvement in the quality of life of family and community.

Course specific outcomes (Foods and Nutrition):

- To impart knowledge related to fundamentals of Biochemistry, Molecular Nutrition, Medical Nutrition Therapy, Food Science, Nutraceuticals, Community Nutrition and Food Quality Assurance through theoretical and practical skills.
- To familiarize the students with government programmes and schemes related to public health nutrition.
- To train the students to become registered dieticians as well as professionals of Food and Nutrition services/industries and nutriepreneurs.
- To train the students to take up jobs in nutrition related state, national and international health and welfare programmes.
- To acquire skills to undertake systematic and independent research in the area of Foods and Nutrition.

SARDAR PATEL UNIVERSITY
Programme – M.Sc.
(Under Choice Based Credit Scheme)
Semester – III

Structure with effect from: 2022-23
M. Sc H.Sc Foods and Nutrition

Sr. No.	C/E	Course No	Title	T/P	Credits Per Week	Contact hrs/ week	Exam Duration in hrs	Marks		
								Internal	External	Total
Core Course										
1	C	PH03C FDN51	Research Methodology and Scientific Writing	T	2	2	2	15/5	35/14	50/20
2	C	PH03C FDN52	Practical –Scientific Writing	P	1	2	-	25	-	25
3	C	PH03C FDN53	Molecular Nutrition - I	T	4	4	3	30/10	70/28	100/40
4	C	PH03C FDN54	Practical based on PH03C FDN53 (Molecular Nutrition - I)	P	2	4	4	15/5	35/14	50/20
5	C	PH03C FDN55	Medical Nutrition Therapy - I	T	4	4	3	30/10	70/28	100/40
6	C	PH03C FDN56	Practical based on PH03C FDN55 (Medical Nutrition Therapy - I)	P	2	4	4	15/5	35/14	50/20
7	C	PH03C FDN57	Dissertation*	-	4	4	-	100	-	100
Elective Course (8 &9 OR 10&11 OR 12& 13)										
8	E	PH03E FDN51	Community Nutrition	T	4	4	3	30/10	70/28	100/40
9	E	PH03E FDN52	Practical based on PH03E FDN51 (Community Nutrition)	P	2	4	4	15/5	35/14	50/20
10	E	PH03E FDN53	Food Product Development and Quality Assurance	T	4	4	3	30/10	70/28	100/40
11	E	PH03E FDN54	Practical based on PH03E FDN53 (Food Product Development and Quality Assurance)	P	2	4	4	15/5	35/14	50/20
12	E	PH03E FDN55	Nutrigenomics and Personalized Nutrition	T	4	4	3	30/10	70/28	100/40
13	E	PH03E FDN56	Practical based on PH03E FDN55 (Nutrigenomics and Personalized Nutrition)	P	2	4	4	15/5	35/14	50/20
			Total		**25**	**32**	**---**	**275**	**350**	**625**

Note: 1) C- Core course , E- Elective course
2) Student will select any one elective from theory and the related practical.
* One contact hour per week per student

(Master of Science-Home Science) (Foods and Nutrition)
(M.Sc.-H.Sc.) (Foods and Nutrition) Semester (III)

Course Code	PH03CFDN51	Title of the Course	Research Methodology and Scientific Writing
Total Credits of the Course	02	Hours per Week	02

Course Objectives:	1. To understand significance of research in Home Science 2. To understand sampling methods and techniques 3. To understand types of researches and develop the ability to construct data gathering tools appropriate to research design 4. To gain knowledge regarding scientific writing in research report presentations

Course Content		
Unit	Description	Weightage (%)
1.	Basic concepts of research: Introduction, Meaning, Objectives, Characteristics, Requirements for a Scientific Research, Types of Researches: Exploratory and Descriptive	15
2.	Research Problem: Introduction, Selecting the Problem, Defining the Problem, Sources of Problem, Criteria for Selection of the Problem, Delimiting a Problem, Process of Formation of a Research Problem	20
3.	Research design and Hypothesis Formulation: (a) Meaning of Research Design, Types of Research Designs (exploratory, descriptive, diagnostic, experimental) (b) Hypothesis, Sources of Hypothesis, Forms of Hypothesis	15
4.	Sampling methods and techniques: Meaning and Definition of Population and Sampling, Techniques of Sampling (probability and non-probability)	15
5.	Data collection and Measurement: (a) Types of data: Secondary and Primary (b) Methods of Primary data collection: Observation, Personal Interview, Questionnaire, Schedule, Case Study, Social Survey, Field study, Field experiment, Scaling measurement: types of measurement scales	20
6.	Organization of data and presentation:	15

	(a) Coding, Tabulation and Charts (b) Purpose of Report, Essentials of a Good Report, Types of Report Presentations (written, oral, poster), Format of a Report	

Teaching-Learning Methodology	Classroom lectures (Blackboard/Power Point Presentations), Discussion on recent updates with examples	

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Become better researchers.
2.	Know how to present research report in a systematic manner.

Suggested References:	
Sr. No.	References
1.	Kothari, C.K. (1990). *Research Methodology: Methods and Techniques*. New Delhi: Wiley Eastern Ltd.
2.	Sarangi, P.(2010). *Taxman's Research Methodology*. New Delhi: Taxman Publications (P) Ltd.
3	Oliver, P. (2008). *Writing your Thesis*. Delhi: Sage Publication.

4.	Hart, C. (2005). *Doing your Master's Dissertation*. New Delhi: Vistaar Publications.
5.	Chawla. D and Sondhi. N. (2011), *Research Methodology Concepts and Cases*. Noida: Vikas Publishing House.
6.	William, N. *Your Research Project*. New Delhi: Vistaar Publications.

On-line resources to be used if available as reference material
On-line Resources
https://www.open.edu/openlearn/money-management/understanding-different-research-perspectives/
www.guide2research.com
https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=827

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(Master of Science-Home Science) (Foods and Nutrition)
(M.Sc.-H.Sc.) (Foods and Nutrition) Semester (III)

Course Code	PH03CFDN52	Title of the Course	Practical- Scientific Writing
Total Credits of the Course	01	Hours per Week	02

Course Objective:	1. To understand the nuances of scientific writing and develop skills in presentation of scientific information

Course Content		
Unit	Description	Weightage (%)
1.	Scientific writing as a means of communication (grammar, punctuation and conventions of scientific writing)	15
2.	(a) Sections of a report: Research Paper, Thesis/Dissertation, Poster (b) Steps in writing a report	10
3.	Tables: Drafting titles, subtitles, construction details	15
4.	Graphs- Types, Title, Elements (scales, title, scale captions and key)	15
5.	Citing the references	15
6.	Appendices: Content, Need, Rules for Presentation	10
7.	Writing of proposal (for grants)	20

Teaching-Learning Methodology	Classroom lecture (Black board/ Power Point Presentation), Practice exercises in class, discussions

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Practical Examination (As per CBCS R.6.8.3)	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Demonstrate knowledge of scientific writing method and style.
2.	Develop research proposal on a topic relevant to their field of study.

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(Master of Science-Home Science) (Foods and Nutrition)
(M.Sc.-H.Sc.) (Foods and Nutrition) Semester (III)

Course Code	PH03CFDN53	Title of the Course	Molecular Nutrition – I
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	1. Gain knowledge about the physiological and metabolic role of carbohydrates, proteins and fats in the human body 2. Learn the requirements of carbohydrates, proteins and fats for various age groups and factors affecting the same 3. Understand the molecular action of carbohydrates, proteins and fats in health and disease

Course Content		
Unit	Description	Weightage (%)
1.	Introduction to Molecular Nutrition (a) Concept of molecular nutrition opposed to 'classic' concept of nutrition.Gene regulation and nutrient-gene interaction (b) Types of regulation by nutrient.Research methods in molecular nutrition (c) Application of genomic and post-genomic technologies	10
2.	Energy (a) Energetics of intermediate metabolism, measurement of energy intake and energy expenditure (b) Human energy requirement. Molecular action of hormones and biomolecules in energy regulation	20
3.	Carbohydrates (a) Functions, deficiency, RDA, Food sources, digestion, absorption and metabolism of carbohydrates (b) Role of carbohydrates in gene expression. (c) Molecular action of carbohydrates in health and disease	25
4.	Proteins and aminoacids (a) Functions, deficiency, RDA, Food sources, digestion, absorption and metabolism of proteins (b) Role of proteins and amino acids in gene expression (c) Molecular action of proteins and amino acids in health and disease	25
5	Lipids (a) Functions, deficiency, RDA, Food sources, digestion, absorption and metabolism of lipids (b) Role of lipids in gene expression. Molecular action of lipidsin health and disease	20

Teaching-Learning Methodology	Black Board, Power Point Presentation, Discussion

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Discuss about the functions and deficiency of carbohydrates, proteins and lipids.
2.	Describe about the molecular action of carbohydrates, proteins and lipids.
3.	Describe about the role of carbohydrates, proteins and lipids in health and disease.

Suggested References:	
Sr. No.	References
1.	Shils, M. E. (2005). *Modern Nutrition In Health And Disease* (10th ed.). Jones & Bartlett Learning.
2.	Cde, K. R. L., Csg, J. R. L., & Ldn, E. S. M. R. (2007). *Krause's Food & Nutrition Therapy* (12th ed.). Saunders
3	Brigelius-Flohé, R., & Joost, H. (2006). *Nutritional Genomics: Impact on Health and Disease* (1st ed.). Wiley-Blackwell.
4	Kaput, J., & Rodriguez, R. L. (2006). *Nutritional Genomics: Discovering the Path to Personalized Nutrition* (1st ed.). Wiley-Interscience.

On-line resources to be used if available as reference material

On-line Resources
www.annualreviews.org/journal/Nutrition
Nutrition Research, Elsevier
Nutrition Reviews, Oxford University Press
British journal of Nutrition, Cambridge University
The *American Journal of Clinical Nutrition,* American Society for Nutrition
Annual review of Nutrition, Annual Reviews
Foods and Function, Royal Society of Chemistry
Nutrition and reviews, Wiley Blackwell
Nutrition Research Reviews, Cambridge University Press
Nutrition and Metabolism, Springer

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(Master of Science-Home Science) (Foods and Nutrition)
(M.Sc.-H.Sc.) (Foods and Nutrition) Semester (III)

Course Code	PH03CFDN54	Title of the Course	Practical based on PH03CFDN53 (Molecular Nutrition - I)
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	1.Develop skills for estimating the antioxidant status of serum/blood using various parameters 2. Learn about the techniques for analyzing lipid peroxidation occurring in the body

Course Content		
Unite	Description	Weightage (%)
Serum/ Plasma Analysis for the following Nutrients/ Compounds		
1.	Total Antioxidant Capacity	20
2.	Glutathione	15
3.	Vitamin A, E and C	35
4.	Lipid Peroxidation	15
5.	AOPP	15

Teaching-Learning Methodology	Classroom lectures (use of blackboard), Demonstration and actual performance by the students

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Attendance (As per CBCS R.6.8.3)	15%

3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Describe importance of antioxidants in health & disease.
2.	Discuss about the various conditions in which the levels of various antioxidants are altered.

Suggested References:	
Sr. No.	References
1.	Varley, H. (2005). *Practical Clinical Biochemistry*. (4th Edition) CBS publication.
2.	Raghuramula, N., Nair, K. M., & Kalyansundaram, S. (2003). *A manual of Laboratory Techniques*. (2nd Edition) National Institute of Nutrition (ICMR).

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(Master of Science - Home Science) (Foods and Nutrition)
(M.Sc. - H.Sc.) (Foods and Nutrition) Semester (III)

Course Code	PH03CFDN55	Title of the Course	Medical Nutrition Therapy - I
Total Credits of the Course	04	Hours per Week	04

Course Objective:	1. To understand the etiology and metabolic variations in acute and chronic diseases such as obesity, diabetes mellitus, cardiovascular diseases and diseases of the adrenal cortex, thyroid gland and Para thyroid gland 2. To understand the effect of the above diseases on the nutritional status and on nutritional and dietary requirements 3. To be able to recommend and provide appropriate nutritional care for the prevention and treatment of diseases such as obesity, diabetes mellitus, cardiovascular diseases and diseases of the adrenal cortex, thyroid gland and para thyroid gland

Course Content		
Unit	Description	Weightage (%)
1.	Nutritional care for weight management: (a) Regulation of energy intake and balance of body weight in brief, control of appetite and food intake - neural control, hormonal control, etc (b) Types of obesity, health risks ,causes, psychology of obesity, diets in obesity - starvation, fasting, FAD diets, evaluation of some common diets, protein-sparing modified fast (PSMF). Foods to include, fibre, foods allowed as desired. Psychology of weight reduction, behavioural modification - psychotherapy, pharmacology, exercise & physical activity, surgery (c) Underweight - etiology and assessment, high calorie diets for weight gain, diet plan, Anorexia Nervosa and Bulimia	20
2.	Diet in diseases of the endocrine pancreas : Diabetes Mellitus and hypoglycemia- Classification, symptoms and disturbances, diagnosis, dietary care and nutritional therapy - diet plan, meal planning with and without insulin, carbohydrate counting, glycemic index of foods, exchange lists for diet plan, sweeteners and sugar substitutes, exercise for	32

	glycemic control. Hypoglycemia - classification, symptoms, fasting state hypoglycemia, postprandial or reactive hypoglycemia, early alimentary and late reactive hypoglycemia, idiopathic hypoglycemia, dietary treatment in reactive hypoglycemia	
3.	Diseases of the Circulatory System: Atherosclerosis - etiology, risk factors, diet. Hyperlipidemias - lipoproteins and their metabolism, clinical and nutritional aspects of hyperlipidemias, classification and dietary care of hyperlipidemias. Ischemic heart disease, pathogenesis of sodium and water retention in congestive heart disease, acute and chronic cardiac disease, acute - stimulants, food & consistency, chronic - compensated and decompensated states, sodium restriction in cardiac diseases. Diet in hypertension - etiology, prevalence, Renin-Angiotensin-Aldosterone mechanism, salt and blood pressure. Cerebrovascular diseases and diet in brief.	32
4.	Dietary care in diseases of the adrenal cortex, thyroid gland and parathyroid gland: Functions of the glands, hormones and their insufficiency, metabolic implications, clinical symptom, dietary treatment. Adrenal cortex insufficiency, hyper and hypothyroidism (goitre).	16

Teaching-Learning Methodology	Classroom lectures (Blackboard/Power Point Presentations), Discussion on recent updates with related examples.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcome: Having completed this course, the learner will be able to	
1.	Recommend and provide appropriate nutritional care for the prevention and treatment of conditions such as obesity, diabetes mellitus, cardiovascular diseases and diseases of the adrenal cortex, thyroid gland and para thyroid gland.

Suggested References:

Sr. No.	References
1.	Anderson L., Dibble M. V., Turkki P. R., Mitchell H. S. And Rynbergen H. J. (1982). *Nutrition in Health and Disease*. (17th edition). J. B. Lippincott Co., Philadelphia.
2.	Antia F. P. (1989). *Clinical Dietetics and Nutrition*. (3rd edition). Oxford University, Press, Delhi.
3.	Kraus, M. V. And Mann, L. K. (1984). *Food, Nutrition and Therapy*. W. B. Saunders Company, London.
4.	Passemore, R. And Eastwood , M.A. (1986). *Human Nutrition and Dietetics*. (8th editon). ELBS, Churchill Livingston.
5.	Robinson, C. H, Lawler M. R., Chenoweth W. L. And Garwick A. E. *Normal and Therapeutic Nutrition*. (17th edition).Macmillan.
6.	Suitor, C. W. And Crowley M. F. (1984). *Nutrition, Principles and Application in Health Promotion*. (2nd Edition). Lippincott Williams and Wilkins.
7.	Williams, S. R. (1986). *Essentials of Nutrition and Diet Therapy*. (4th edition). Mosby.

On-line resources to be used if available as reference material
https://epgp.inflibnet.ac.in/
http://idaindia.com/
https://www.eatrightpro.org/
Journal of American Dietetic Association, Science direct
Nutrition and dietetics, wiley Blackwell
Nutrition and Cancer, Taylor and Francis
British journal of Nutrition, Cambridge University
The *American Journal of Clinical Nutrition*, American Society for Nutrition
Kompass Nutrition and dietetics, Kargers

Case report and clinical Nutrition, Kargers
The American Journal of Clinical Nutrition, Oxford University
Obesity facts, Kargers
Journal of Human Nutrition and Dietetics - Wiley

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(M.Sc. - HomeScience) (Foods and Nutrition)
(M.Sc. - H.Sc.) (Foods and Nutrition) Semester (III)

Course Code	PH03CFDN56	Title of the Course	Practical based on PH03C FDN55 (Medical Nutrition Therapy - I)
Total Credits of the Course	02	Hours per Week	04

Course Objective:	The objective of the course is to acquaint the students with: 1. The practical aspects of planning of diets for various chronic disease conditions 2. The use of exchange lists for the diet planning of various chronic disease conditions

Course Content		
Unit	Description	Weightage (%)
1.	Planning of diets for various chronic diseases with modification of the appropriate nutrients with respect to the disease condition	50
2.	Use of exchange lists for diet planning in the various chronic disease conditions	50

Teaching-Learning Methodology	Classroom lectures (Blackboard), demonstration and then actual performance by students, discussion of results

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to:	
1.	Plan diets for various chronic disease conditions.

2.	Use the exchange list in the planning of diets for various chronic disease conditions.

Suggested References:	
Sr. No.	References
1.	Thomas, B. (1996). Manual of Dietetic Practice.
2.	IGNOU Dietetic Manual.

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(Master of Science –Home Science) (Foods and Nutrition)
(M.Sc.-H.Sc.) (Foods and Nutrition) Semester (III)

Course Code	PH03CFDN57	Title of the Course	Dissertation
Total Credits of the Course	04	Hours per Week	04

Course Objective:	To develop research skills in the student.

Course Content		
Unit	Description	Weightage (%)
	Identification of a research problem based on the latest developments in the field of foods and nutrition, review the related literature and plan the research work using appropriate research tools.	100

Teaching-Learning Methodology	Literature search, demonstration and then actual performance by students, discussion of results.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Continuous Assessment in the form of Practical, Attendance (As per CBCS R.6.8.3)	100%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Identify research areas of his or her own interest pertaining to the latest developments in the field of food biotechnology.
2.	Explore the research area in depth.
3.	Conduct the research project after identifying the appropriate research tool.

Suggested References:

Sr. No.	References
1.	Kothari, C.K. (1990). *Research Methodology: Methods and Techniques*. New Delhi: Wiley Eastern Ltd.
2.	Sarangi, P.(2010). *Taxman's Research Methodology*. New Delhi: Taxman Publications (P) Ltd.
3.	Hart, C. (2005). *Doing your Master's Dissertation*. New Delhi: Vistaar Publications.
On-line resources to be used if available as reference material	
On-line Resources	
International Journal of Food Science and Technology, CFTRI	
Nutrition and reviews, Wiley Blackwell	
Foods and Function, Royal Society of Chemistry	
Journal of Food Science and Technology (JFST), Springer	
Food Biotechnology, Springer	
Food Science and Biotechnology, Home - Springer	
Food Biotechnology, Taylor & Francis Online	

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(Master of Science-Home Science) (Foods and Nutrition)
(M.Sc.-H.Sc.) (Foods and Nutrition) Semester (III)

Course Code	PH03EFDN51	Title of the Course	Community Nutrition
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	1. To learn the causes, consequences and prevention of malnutrition 2. To gain in – depth knowledge on various government programmes and schemes for improving the health and nutritional status of community 3. To gain knowledge on various methods of nutritional assessment of the community

Course Content		
Unit	Description	Weightage (%)
1.	Assessment of nutritional status of the community: Anthropometric and Clinical examination	20
2.	Assessment of nutritional status of the community: Biochemical methods, Radiological examination, Biophysical methods and Dietary survey	20
3.	Malnutrition: Prevalence of malnutrition in India, factor affecting malnutrition, synergism between nutrition and infection, grades of malnutrition	20
4.	International, National and State level agencies & programmes for improving nutritional status of the community	15
5.	Vital statistics: Crude death rate, birth rate, infant mortality rate, toddler mortality, maternal and infant mortality rate in India and their causes	15
6.	Participatory Research Approach	10

Teaching-Learning Methodology	Black Board, Power Point Presentation, Discussion

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Describe about various methods to assess the nutritional status of the community.
2.	Describe about various national and international agencies working for improving the nutritional status of the community.
3.	Describe about the major deficiency diseases prevalent in the community and ways to combat them.

Suggested References	
Sr. No.	References
1.	Park, K. (2007). *Parks Text Book Of Preventive & Social Medicine*. Banarsidas Bhanot Publishers.
2.	Jelliffe, D. B. (1966). *The Assessment of the Nutritional Status of the Community*. World Health Organization.
3.	Bamji, S. M., Krishnaswamy, K., & Brahmam, G.N.V. (2019). *Textbook of Human Nutrition*: (4th ed.). Oxford & IBH publishing Co

On-line resources to be used if available as reference material
On-line Resources
1. Public health nutrition: Cambridge University press available at https://www.cambridge.org/core/journals/public-health-nutrition

2. Journal of public health nutrition: Allied academics available at https://www.alliedacademies.org/public-health-nutrition/
3. Nutrition and Public Health: MDPI available at https://www.mdpi.com/journal/nutrients/sections/Nutrition_Public_Health
4. http://icds-wcd.nic.in
5. https://wcd.nic.in
6. https://www.who.int
7. https://wcd.gujarat.gov.in
8. https://icar.org.in
9. https://www.nin.res.in
10. https://www.unicef.org
11. http://rchiips.org/nfhs

(Master of Science-Home Science) (Foods and Nutrition)
(M.Sc.-H.Sc.) (Foods and Nutrition) Semester (III)

Course Code	PH03EFDN52	Title of the Course	Practical based on PH03EFDN51 (Community Nutrition)
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	1. Gain knowledge on different methods to assess the nutritional status of the community. 2. Learn to plan & prepare nutritional recipes for Anganwadi children. 3. Understand the organizational chart of the employees of Anganwadi.

Course Content		
Unite	Description	Weightage (%)
1.	Anthropometric measurements of preschool children attending Anganwadi, Measuring height and weight using appropriate instruments., Measuring mid upperarm circumference	20
2.	Comparing the anthropometric measurements with the standard weight for age, height for age, weight for height and calculation of BMI	20
3.	To prepare nutritional recipe (calories, protein, vit-A, beta carotene, calcium, and iron rich) for preschool children attending Anganwadi for prevention of malnutrition	15
4.	Clinical assessment of preschool children attending Anganwadi with relation to vitamin A deficiency, PEM, anemia and rickets	15
5.	Carrying out dietary survey of adolescents using 24 h recall method and calculating the nutrient intake	10
6.	Preparation of chart and posters	10
7.	Visit to different anganwadi centres: Studying the organizational chart of the employees, Role and Responsibility of each employee	10

Teaching-Learning Methodology	Class room lectures, talks and demonstrations, group discussion, presentations

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Describe the prevalence of various nutritional deficiencies in the children attending different Anganwadi centers.
2.	Understand the duty of each employee of Anganwadi center.

Suggested References:	
Sr. No.	References
1.	Park, K. (2007). *Parks Text Book Of Preventive & Social Medicine*. Banarsidas Bhanot Publishers.
2.	Jelliffe, D. B. (1966). *The Assessment of the Nutritional Status of the Community*. World Health Organization.
3.	Bamji, S. M., Krishnaswamy, K., & Brahmam, G.N.V. (2019). *Textbook of Human Nutrition*: (4th ed.). Oxford &IBH publishing Co
4.	Longvah, T., Anantan, I., Bhaskarachary, K., Venkaiah, K., & Longvah, T. (2017). *Indian food composition tables*. Hyderabad: National Institute of Nutrition, Indian Council of Medical Research.

On-line resources to be used if available as reference material
On-line Resources
http://icds-wcd.nic.in

https://wcd.nic.in
https://wcd.gujarat.gov.in
https://icar.org.in
https://www.nin.res.in

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(Master of Science –Home Science) (Foods and Nutrition)
(M.Sc.- H.Sc.) (Foods and Nutrition) Semester (III)

Course Code	PH03EFDN53	Title of the Course	Food Product Development and Quality Assurance
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	1. To gain an understanding of the processes involved in the invention process, formulation, and development of new food products 2. To develop an appreciation of the food industry and how innovation is critical to the industry 3. To cultivate basic food science principles to problem solve during product development 4. To develop and enhance team cooperation and communication skills

Course Content		
Unit	Description	Weightage (%)
1.	(a) Concept of new food product development: Categories, reasons (b) Nutritional concept in food designing (c) Factors affecting food product development: External factors (macro-environment) and internal factors (micro-environment)	20
2.	(a) Food formulations for various health claims such as diabetes, heart diseases, hypertension, menopausal women etc. and for various age groups such as infant, children, geriatrics, (b) Speciality food: defense services, space foods, sports person, natural calamities, etc. (c)Convenience foods, modification of existing commercial/convenience food products (d) Analysis of food products: Sensory analysis, nutrient analysis, storage stability (e) Packaging, labelling and marketing (f) IPR and Patent	30
3.	(a) Concept of quality: Quality attributes- physical, chemical, nutritional, microbial, and sensory; types of hazards (physical, chemical, biological), exposure, estimation, toxicological requirements and risk assessment. (b) Quality assessment: Sampling procedure and plans, Sensory vis-à- vis instrumental methods for testing quality, Laboratory quality procedures and assessment of laboratory performance	25

	(c) Concepts of quality management: Objectives, importance and functions of quality control; quality assurance, total quality management; GMP/GHP; GLP, GAP; HACCP, Quality manuals, documentation and audits (d) Sanitary and hygienic practices in food business organization	
4.	Indian and International quality systems and standards: (a) ISO series, Codex, GFSI, Agmark, BIS, etc. (b) Food safety and standard act and regulations (c) Export import policy	25

Teaching-Learning Methodology	Classroom lectures (Blackboard/Power Point Presentations), Group discussion, Discussion with suitable examples.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Successfully produce food prototypes or food concepts.
2.	Develop formulations to meet cost targets, ingredient statement, nutrition profile and sensory attributes of desired product.
3.	Determine label and nutrition fact specifications according to regulations for nutrition, product naming, and claims.
4.	Design effective food safety plans (HACCP)

Suggested References:

Sr. No.	References
1.	Heijden, K.V., Younes, M., FIshbein, L. & Miller, S. (2017). International food safety handbook: Science, international regulation, and control. CRC Press
2.	Rao, E. (2013). Food quality evaluation. (1st ed.). Variety Books Publishers Distributors
3.	Watson, D. (Ed.). (2014). *Food chemical safety: Volume 2: Additives*. Elsevier.
4.	Watson, D. (Ed.). (2014). *Food chemical safety: Volume 1: Contaminants* (Vol. 1). Woodhead Publishing.
5.	Roday, S. (1998). *Food hygiene and sanitation*. Tata McGraw-Hill Education.
6.	Frazier, W. C. (2013). *Food microbiology*. Tata McGraw-Hill Education
7.	Hough, T. (2008). *Elements of hygiene and sanitation*. BiblioBazaar, LLC.
8.	Ganguli, P.(2008), Intellectual Property Rights: Unleashing Knowledge Economy, McGraw Hill, New Delhi
On-line resources to be used if available as reference material	
On-line Resources	
https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=444	
https://www.fssai.gov.in/	
https://old.fssai.gov.in/Codexindia/index.htm	
https://www.iso.org/home.html	
https://agmarknet.gov.in/	
https://dmi.gov.in/GradesStandard.aspx	

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(Master of Science –Home Science) (Foods and Nutrition)
(M.Sc.- H.Sc.) (Foods and Nutrition) Semester (III)

Course Code	PH03EFDN54	Title of the Course	Practical based on PH03EFDN53 (Food Product Development and Quality Assurance)
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	5. To detect common adulterants in foods 6. To enable students to plan, optimize and develop food products

Course Content		
Unit	Description	Weightage* (%)
1.	Detection of food adulteration	15
2.	Planning of food product	10
3.	Optimization of the formula (using RSM)	15
4.	Food product preparation	15
5.	Sensory evaluation and analysis of prepared food product for verification of various health claims	15
6.	Report writing	15

Teaching-Learning Methodology	Classroom explanation (Blackboard), actual performance by students, discussion

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Successfully produce food prototypes or food concepts.
2.	Analyse developed food product for nutrients, sensory attributes and storage stability.

Suggested References:	
Sr. No.	References
1.	Rao, E. (2013). Food quality evaluation. (1st ed.). Variety Books Publishers Distributors

On-line resources to be used if available as reference material
On-line Resources
Detect adulteration with rapid test available at https://fssai.gov.in/dart/
https://www.fssai.gov.in/

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(Master of Science –Home Science) (Foods and Nutrition)
(M.Sc-H.Sc) (Foods and Nutrition) Semester (III)

Course Code	PH03EFDN55	Title of the Course	Nutrigenomics and Personalized Nutrition
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	1. To familiarize students with the basic concepts in Nutritional Genomics 2. To develop an understanding of genomics and gene regulation with respect to diet 3. To comprehend the role and importance of nutrition in prevention of various diseases

Course Content		
Unit	Description	Weightage (%)
1.	Introduction to Nutrigenomics and Nutrigenetics: (a) Nutrigenomics: Scope and Importance to Human Health and Industry (b) Gene polymorphisms - interaction with effects of micronutrients in humans (c) Nutrigenomics approaches to unraveling physiological effects of complex foods (d) The intestinal microbiota - role in nutrigenomics	25
2.	Modifying disease risk through nutrigenomics: (a) Modulating the risk of cardiovascular disease diabetes inflammatory bowel diseases, obesity and cancer through nutrigenomics (b) Modulating the malnutrition through nutrigenomics	30
3.	Technologies used in nutrigenomics: (a) Genomics techniques: Different sequencing approaches, Microarray, Massarray, SNP genotyping, PCR and RT-PCR techniques (b) Proteomics techniques: 1-D, 2-D gel electrophoresis, DIGE, novel peptide identification, peptide sequencing methods (c) Metabolomics techniques: Chromatography and mass spectrometry techniques, Discovery and validation of biomarkers for important diseases and disorders (d) Computational approach: Introduction to different types of public domain databases, data mining strategies, primer designing	30
4.	Bringing nurigenomics to industries, health professional and the public:	15

	(a) Nutrigenomics and food industry (b) Nutrigenomics and public: consumer genetic testing, awerness on the future of nutritional genomics, (c) Public health significance of nutrigenomics and nutrigenetics	

Teaching-Learning Methodology	Classroom lectures (Blackboard/Power Point Presentations), Discussion on recent updates with related examples

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	gain knowledge to apply nutrigenomics and to design nutritional strategies for prevention of chronic diseases such as cardiovascular disease, obesity, type-2 diabetes and cancer.
2.	Basics principle and applications of various molecular techniques used in ntrigenomics.
3.	Apply molecular techniques to understand diet-gene interaction.

Suggested References:	
Sr. No.	References
1.	Kok, F., Bouwman, L., & Desiere, F. (Eds.). (2007). *Personalized nutrition: principles and applications*. CRC Press.
2.	Shils, M. E., & Shike, M. (Eds.). (2006). *Modern nutrition in health and disease*.

	Lippincott Williams & Wilkins.
3.	Kaput, J., & Rodriguez, R. L. (Eds.). (2006). *Nutritional genomics: discovering the path to personalized nutrition*. John Wiley & Sons.
4..	Lucock, M. (2014). *Molecular nutrition and genomics: nutrition and the ascent of humankind*. John Wiley & Sons.
5.	Kohlmeier, M. (2012). *Nutrigenetics: applying the science of personal nutrition*. Academic Press.

On-line resources to be used if available as reference material
On-line Resources
Annual Reviews of Human Genome and Genetics-Annual Reviews https://www.annualreviews.org/journal/genom
Annual Review of Nutrition: Annual Reviews https://www.annualreviews.org/journal/nutr
Journal of Nutrigentics and Nutrigenomics -Karger Publishers https://www.karger.com/Journal/Home/275177
Molecular Nutrition and Food Research-Wiley Publishers https://onlinelibrary.wiley.com/journal/16134133
http://www.ga-online.org/files/Antalya2011/WS2-Daniel.pdf
http://www.authorstream.com/Presentation/winingneeraj01-1272374-nutritional-genomics/

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(M.Sc-HomeScience) (Foods and Nutrition)
(M.Sc.-H.Sc.) (Foods and Nutrition) Semester (III)

Course Code	PH03EFDN56	Title of the Course	Practical based on PH03EFDN55 (Nutrigenomics and Personalized Nutrition)
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	1. The objective of the course is to acquaint the students with basic principle and applications of various molecular techniques

Course Content		
Unite	Description	Weightage (%)
1.	Isolation of RNA from different cells	20
2.	Preparation of complementary DNA	20
3.	Use of PCR and RT-PCR for gene expression	30
4.	Electrophoresis for nucleic acid and protein separation	20
5.	Visit to advance molecular biology laboratory in the state	10

Teaching-Learning Methodology	Classroom lectures (Blackboard), demonstration and than actual performance by students, discussion of results

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Isolation of RNA, preparation of complementary DNA, separation of proteins and study of gene expression.
2.	Know the principle and applications of gene sequencer and other instruments used in molecular biology

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