RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Programme Structure and Course Specification of M.Sc. Food Nutrition and Dietetics

2023-2024

Programme Code: 106

Department of Food Technology
Faculty of Life and Allied Health Sciences
M. S. Ramaiah University of Applied Sciences
University House, New BEL Road, MSR Nagar, Bengaluru – 560 054
www.msruas.ac.in

Approved by the Academic Council at its 30th Meeting held on 11th December 2023

RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Programme Specifications
M.Sc. Food Nutrition and Dietetics

2023-2024

Programme Code: 106

Department of Food Technology
Faculty of Life and Allied Health Sciences

M.S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES Faculty of Life & Allied Health Sciences Bangalore 560 054

DEAN
Faculty of Life & Allied Health Sciences
M.S. RAMAIAH UNIVERSITY OF APPLIED SCIENCES
BANGALORE-560 054

Dean
M.S. Ramaiah University of Applied Sciences
Bangalore - 560 054

University's Vision, Mission and Objectives

The M. S. Ramaiah University of Applied Sciences (MSRUAS) will focus on student-centric professional education and motivates its staff and students to contribute significantly to the growth of technology, science, economy and society through their imaginative, creative and innovative pursuits. Hence, the University has articulated the following vision and objectives.

Vision

MSRUAS aspires to be the premier university of choice in Asia for student centric professional education and services with a strong focus on applied research whilst maintaining the highest academic and ethical standards in a creative and innovative environment.

Mission

Our purpose is the creation and dissemination of knowledge. We are committed to creativity, innovation and excellence in our teaching and research. We value integrity, quality and teamwork in all our endeavours. We inspire critical thinking, personal development and a passion for lifelong learning. We serve the technical, scientific and economic needs of our Society.

Objectives

1. To disseminate knowledge and skills through instructions, teaching, training, seminars, workshops and symposia in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to equip students and scholars to meet the needs of industries, business and society
2. To generate knowledge through research in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to meet the challenges that arise in industry, business and society
3. To promote health, human well-being and provide holistic healthcare
4. To provide technical and scientific solutions to real life problems posed by industry, business and society in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences
5. To instil the spirit of entrepreneurship in our youth to help create more career opportunities in the society by incubating and nurturing technology product ideas and supporting technology backed business
6. To identify and nurture leadership skills in students and help in the development of our future leaders to enrich the society we live in
7. To develop partnership with universities, industries, businesses, research establishments, NGOs, international organizations, governmental organizations in India and abroad to enrich the experiences of faculties and students through research and developmental programmes

Programme Specifications: M.Sc. Food Nutrition and Dietetics

Faculty	Life and Allied Health Sciences
Department	Food Technology
Programme Code	106
Programme Name	M.Sc. Food Nutrition and Dietetics
Dean of the Faculty	Dr. Krishnamurthy Jayanna
Head of the Department	Dr. Rajadurai M

1. **Title of the Award:** M.Sc. Food Nutrition and Dietetics
2. **Mode of Study:** Full Time
3. **Awarding Institution /Body:** M. S. Ramaiah University of Applied Sciences
4. **Joint Award:** Not Applicable
5. **Teaching Institution: Department of food technology:** Faculty of Life and Allied Health Sciences, M. S. Ramaiah University of Applied Sciences, Bengaluru
6. **Date of Programme Specifications:** June 2021
7. **Date of Programme Approval by the Academic Council of MSRUAS:** July 2021
8. **Next Review Date: June 2025**
9. **Programme Approving Regulating Body and Date of Approval:**
10. **Programme Accredited Body and Date of Accreditation:** Not Applicable
11. **Grade Awarded by the Accreditation Body:** Not Applicable
12. **Programme Accreditation Validity:** Not Applicable
13. **Programme Benchmark:** Not Applicable
14. **Rationale of the programme:**

The food sector in India has seen plethora of new advances, which have contributed to its significant growth. However, increased burden of urbanization has put pressure on food systems. In addition, due to a surge in various lifestyle diseases, health conscious consumers are directing the focus of food giants towards functional foods, nutraceuticals and other specialty foods to address health and nutrition challenges, as well.

Indian food and beverage market stands as the sixth largest in the world and expected to grow manifolds in the coming future. As per the experts, the challenge of Indian food industry would no longer be focused on just food availability, but on accessibility to safe, healthy food and diets. Experts are identifying this accelerating consumer shift towards healthy foods as well as natural and organic products and cite the category as a bright spot.

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Recent market trends estimated the worth of Indian health and wellness foods market as more than INR 10 crore and the one which is constantly registering a growth rate of around 10%. If we look at the global markets, health and wellness foods category is more than a trillion dollar industry, promising an upward pattern of growth in future. Even during the current pandemic situation, when other industries are booking losses, India's organic and functional food industry is in the pink of health with 25-100% spike in sale. This reflects the proactive mind-set of consumers and how they are actively taking charge of their health to make informed choices and understanding the science of nutrition and its role in reducing overall disease risk and mortality.

Recognizing the need of hour, many FMCG companies are also focussing on R&D opportunities to identify new nutritional product for Indian market and develop various competitive functional foods and dietary supplements. Hence, this proposal is intended to start a postgraduate course to meet the increasing demand of skilled and knowledgeable resource persons in nutrition and dietetics in the field of health and fitness sector.

15. Programme Mission

RUAS, a young and progressive University with excellent teaching, learning resources and faculty base would like to offer M.Sc. in Food Nutrition and Dietetics as a postgraduate programme. This programme aims to enable aspiring students on researching nutritional aspects of sustainable and quality food products. Pursuing a research based PG course in food nutrition and dietetics, will uniquely equip students to take on jobs focusing on quality, food product formulation, dietetics and even pursue their career as entrepreneur.

16. Graduate Attributes

GA-1. Ability to apply fundamental knowledge of nutrition, biochemistry, food chemistry, and food microbiology for developing food products and preservation

GA-2. Ability to develop diet plans for health management and fitness enthusiasts

GA-3. Ability to formulate sustainable functional food products

GA-4. Ability to test food for quality, safety and nutrition

GA-5. Ability to advice holistic nutrition for health management

GA-6. Ability to perform administrative duties in government, semi-government, private and public sector organizations

GA-7. Ability to teach in schools, colleges and universities with additional qualification and training

GA-8. Ability to understand and solve scientific problems by conducting experimental investigations

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GA-9. Ability to apply appropriate tools, techniques and understand utilization of resources appropriately in various laboratories

GA-10. Ability to understand the effect of scientific solutions on legal, cultural, social and public health and safety aspects

GA-11. Ability to develop sustainable solutions and understand their effect on society and environment

GA-12. Ability to apply ethical principles to scientific practices and professional responsibilities

GA-13. Ability to work as a member of a team, to plan and to integrate knowledge of various disciplines and to lead teams in multidisciplinary settings

GA-14. Ability to make effective oral presentations and communicate technical ideas to a broad audience using written and oral means

GA-15. Ability to adapt to the changes and advancements in science and engage in independent and life-long learning

17. Programme Outcome (POs)

PO 1. **Technical Knowledge:** Demonstrate in-depth knowledge of the scientific fundamentals and the modern technical knowledge needed to support food nutrition research activities

PO 2. **Design/ Development solution:** Identify, analyse and understand the problems related to life sciences and find valid conclusions with basic knowledge acquired in the field

PO 3. **Multidisciplinary approach:** Correlate how different sub-systems co-operate with each other into current research and development in the respective fields

PO 4. **Entrepreneurship skills:** Analyze manufacturing constituents and complete systems for relevant products and to enable enterprising skills for competing globally

PO 5. **Societal Responsibility:** Innovate and develop sustainable solutions and understand their effect on society and environment

PO 6. **Leadership and Ethics:** Apply professional Ethics, Leadership and consensus building skills relevant to the aspects of business enterprise in the respective field

PO 7. **Lifelong learning:** Adopt changes and advancements in science and engage in independent learning

PO 8. **Communication:** Communicate the information effectively in scientific writing and oral presentation

18. Programme Goal

Food Nutrition and Dietetics is a multidisciplinary subject involving human physiology, food Chemistry, microbiology, safety, quality and product formulation. This Programme enables students to develop new product, pursue research, serve in food, health, fitness sector and nurture entrepreneurship as well.

19. Programme Educational Objectives (PEO):

The objectives of the programme are to enable the students to:

PEO 1. Provide a common platform for students from varied disciplines, to nurture their zeal to enhance knowledge in food nutrition and dietetics through structured course curriculum and research opportunities

PEO 2. Enable the students to be proficient in new product development through application of cutting edge technologies in food processing, functional foods, and nutraceuticals

PEO 3. Facilitate students with contemporary knowledge of holistic nutrition, food quality and safety for development of healthy and safe foods

PEO 4. Stimulate interdisciplinary research or pursue doctoral programs and enable them for industry and or academia, thus enhancing skilled professionals in the field of nutrition and dietetics

20. Programme Specific Outcomes (PSO)

PSO 1. Impart knowledge and understanding of the basic and emerging concepts in the field of clinical and community nutrition, meal planning, food processing, food preservation, food chemistry, food microbiology, and product development

PSO 2. Enable students to solve complex problems and acquire analytical skills using the latest techniques and tools to find out the solution for food and nutrition-related issues

PSO 3. Apply theoretical concepts and scientific research to nutrition practices, clinical intervention, nutrition assessment, diet planning, documentation, and publication

PSO 4. Acquire focused perspective on economics, interpersonal and communication skills and ethics, relevant to professional practice and encourage entrepreneurship

21. Programme Structure

Semester I							
S. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	FNC501A	Principles of Food Science	3			3	100
2	FNC502A	Food Biochemistry	3		2	4	100
3	FNC503A	Advanced Nutrition	3		2	4	100
4	FNC504A	Nutrition During Lifecycle and Diet Management	3		2	4	100
5	FNC505A	Human Physiology and Anatomy	3			3	100
6	FNC506A	Medical Nutrition Therapy – I	3		2	4	100
Total			**18**		**8**	**22**	**600**
Total number of contact hours per Week			**26 hours**				

Semester II							
S. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	FNC507A	Medical Nutrition Therapy – II	3		2	4	100
2	FNC508A	Public Health Nutrition and Epidemiology	3		2	4	100
3	FNC510A	Applied Food Science and Functional Food Development	1		4	3	100
4	FNC511A	Applied Food Microbiology	3		2	4	100
5	FNC512A	Research Methodology and Biostatistics	3		2	4	100
6	FNE501A FNE502A FNE503A FNE505A	**Refer Elective table 1**	3			3	100
Total			**16**		**12**	**22**	**600**
Total number of contact hours per week			**28 hours**				

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Semester III							
S. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	FNC601A	Nutrition Counseling and Entrepreneurship	3		2	4	100
2	FNE601A FNE602A FNE603A FNE605A	Refer Elective Table 2	3			3	100
3	FNP601A	Group Project			20	10	100
Total			6		22	17	300
Total number of contact hours per week			28 hours				

Semester IV							
S. No.	Code	Course Title	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	FNP602A	Dissertation & Publication			32	25	300
Total						25	300
Total Number of Credits in M.Sc. Programme			86		Total Marks		1800

Elective course

Two Elective courses (E1 & E2) can be chosen from any one of the following streams–

Professional Core Electives (PCEs)			
Sl. No.	Course Code	Elective Courses -1	Credits
1	FNE501A	Nutrition In Sports and Exercise	3+0
2	FNE502A	Innovation and Entrepreneurship	3+0
3	FNE503A	Nutraceuticals and Functional Foods	3+0
4	FNE505A	Holistic Nutrition and Dietetics	3+0
5		MOOC	
Sl. No.	Course Code	Elective Courses -2	
1	FNE601A	Pediatric, Geriatric Diabetic Nutrition Care	3+0
2	FNE602A	Program Planning and Nutrition Education In Community	3+0
3	FNE603A	Maternal & Child Nutrition Care	3+0
4	FNE605A	Nutrigenomics	3+0

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Group Project - FNP601A

A group shall have up to 5 students. The purpose of group project is that the group should be able to develop a product/research problem in their area of specialization. The students are required to exhibit/ demonstrate the working of the product and generate a project report as well. The IPR rights of all such work lies with the University. The students are required to sign an agreement before the commencement of the project. Students can choose a project from the database of projects available with the concerned department and the same should be approved by a committee of examiners.

Dissertation and Publication - FNP602A

A student chooses a topic for the dissertation based on relevance and need.

The detail procedure of executing and assessing dissertation is available as a standard template.

MOOC:

Any online interactive course which has open access/providing choice of credit transfer and accumulation, in concurrence with the programme specifications and department approval can be chosen.

22. Course Delivery: As per the Timetable

23. Teaching and Learning Methods

Face to Face Lectures using Audio-Visuals

1. Workshops, Group Discussions, Debates, Presentations
2. Demonstrations
3. Guest Lectures
4. Laboratory work/Field work/Workshop
5. Industry Visit
6. Seminars
7. Group Exercises
8. Project Work
9. Project
10. Exhibitions
11. Technical Festivals

24. Assessment and Grading

24.1. Components of Grading

There shall be two components of grading:

Component 1, Continuous Evaluation (CE): This component involves multiple subcomponents (SC1, SC2, etc.) of learning assessment. The assessment of the subcomponents of CE is conducted during the semester at regular intervals. This

subcomponent represents the formative assessment of students' learning.

Component 2, Semester-end Examination (SEE): This component represents the summative assessment carried out in the form an examination conducted at the end of the semester. Component-1 (CE) carries a weightage of 50% and Component -2 (SEE) carries a weightage of 50%

The complete details of Grading are given in the Academic Regulations.

The template for weightage of CE and SEE in percentages for each type of course is indicated in Table a to c

24.2. Theory Courses

The following TWO options are available for each Faculty to perform the CE exercise.

Option 1 for a Theory Course: (Table a)

Option 1 for a Theory Course				
	Continuous evaluation			SEE
Component	SC1 (Midterm)	SC2 (Innovative assignment)	SC3 (Written assignment)	Semester End Examination
Weightage	25	12.5	12.5	50

In Option 1 (Table a), there shall be three subcomponents of CE (SC1, SC2, and SC3). SC1 subcomponent mandatorily has to be mid-term and is evaluated for 25% weightage, whereas SC2 and SC3 can be of any of the following types and will be individually evaluated for 12.5 % weightage each.

a) Online Test
b) Assignments/Problem Solving
c) Field Assignment
d) Open Book Test
e) Portfolio
f) Reports
g) Case Study
h) Group Task
i) Any other

After the three subcomponents are evaluated, the CE component marks are determined as:

CE Component Marks = Total of all the three subcomponents

An additional subcomponent (SC4) may be used at the discretion of the Faculty/Department. The department can conduct the 4th subcomponent SC4 if this subcomponent gives benefit to students. If the Department/Faculty conducts the SC4 subcomponent of evaluation, and the score obtained by the student in SC4 is greater than the lowest score of the previous three subcomponents SC1 to SC3, then it replaces the lowest of the three scores.

Option 2 for a Theory Course: (Table b)

Option 2 for a Theory Course				
Continuous evaluation				SEE
Component	SC1	SC2	SC3	Semester End Examination
Weightage	25	25		50

In Option 2 (Table b), there shall be three subcomponents. Out of these three, there shall be two assignments and one mid-term test. The assignments can be of any of the following types:

a) Online Test
b) Problem Solving
c) Field Assignment
d) Open Book Test
e) Portfolio
f) Reports
g) Case Study
h) Group Task
i) Any other

After the three subcomponents of CE are evaluated, the CE component Marks are determined as: CE Component Marks = (Best of SC2 and SC3) + (Midterm)

Each Faculty Dean, in consultation with the heads of all departments in the Faculty and the Faculty Academic Registrar, decides whether Option 1 or Option 2 is adopted for each programme offered by the Faculty. He/she notifies the students about the option at the beginning of the semester.

24.3 Theory + Laboratory course

There shall be three subcomponents of CE (SC1, SC2, and SC3) as represented in table c. SC1 and SC2 subcomponent mandatorily has to be mid-term and lab records respectively, Midterm will have 25% weightage whereas Lab record and SC3 will have 10% weightage. SC3 carries 15% weightage and can be of any of the following types:

a) Online Test

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b) Assignments/Problem Solving
c) Field Assignment
d) Open Book Test
e) Portfolio
f) Reports
g) Case Study
h) Group Task
i) Any other

After the three subcomponents are evaluated, the CE component marks are determined as:

CE Component Marks = Total of all the three subcomponents

SEE will have 2 components SEE written exam with 40% weightage and Laboratory Exam with 10% weightage

Table c: Typical evaluation template for Theory + Laboratory course

	CE (Weightage: 50 %)			SEE (Weightage: 50 %)	
Assessment Type	**SC1 (Mid-term exam)**	**SC2 (Lab records)**	**SC3 (Assignment)**	**SEE Written exam**	**Lab Exam**
Component Weightage	25	10	15	40	10

25. Student Support for Learning

1. Course Notes
2. Reference Books in the Library
3. Magazines and Journals
4. Internet Facility
5. Computing Facility
6. Laboratory Facility
7. Workshop Facility
8. Staff Support
9. Lounges for Discussions
10. Any other support that enhances their learning

26. Quality Control Measures

1. Review of Course Notes
2. Review of Question Papers and Assignment Questions
3. Student Feedback

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4. Moderation of Assessed Work
5. Opportunities for students to see their assessed work
6. Review by external examiners and external examiners reports
7. Staff Student Consultative Committee meetings
8. Student exit feedback
9. Subject Assessment Board (SAB)
10. Programme Assessment Board (PAB)

27. Curricular Map

Semester	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
I	Principles of Food Science	3				2		1		3	2	2	
I	Food Biochemistry	3	2					1		3	1	2	
I	Advanced Nutrition	3		2				1		3	2	2	
I	Nutrition During Lifecycle and Meal Management	3				1				3		3	
I	Human Physiology and Anatomy	2				2		1		3		3	
I	Medical Nutrition Therapy – I				3			1		3		3	
Semester	**Course Title**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
II	Medical Nutrition Therapy – II	3		3				2	1	3		3	
II	Public Health Nutrition and Epidemiology					3	2			3	3		
II	Applied Food Science and Functional Food Development		2		2		2			2	3	3	
II	Applied Food Microbiology	3						1		3	1	1	
II	Research Methodology and Biostatistics	3							1	3		3	
III	Nutrition Counselling and Entrepreneurship				3		2		1		1	2	3

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Elective 1													
II	Nutrition In Sports and Exercise	3	1	2	1	2		2	3	3	2	3	1
II	Innovation and Entrepreneurship				3								3
II	Nutraceuticals and Functional Foods	2			2			1		2	2		
II	Holistic Nutrition and Dietetics	3			2			1		3		3	
Elective 2													
III	Pediatric, Geriatric and Diabetic Nutrition Care	3		2				1		3	2	3	
III	Program Planning and Nutrition Education In Community		2			3				3		3	1
III	Maternal and Child Nutrition Care		2	2		1				2	2	3	
III	Nutrigenomics	3						2		3			

28. Co-curricular Activities

Students are encouraged to take part in co-curricular activities like seminars, conferences, symposia, paper writing, attending industry exhibitions, project competitions and related activities for enhancing their knowledge and networking.

29. Cultural and Literary Activities

Annual cultural festivals are held to showcase the creative talents in students. They are involved in planning and organizing the activities.

30. Sports and Athletics

Students are encouraged to take part in sports and athletic events regularly. Annual sports meet will be held to demonstrate sportsmanship and competitive spirit.

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Course Specification for the Program

M.Sc. Food Nutrition and Dietetics

Programme Code: 106

BATCH 2023-2024

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Semester-I

Course Specifications: Principles of Food Science

Course Title	Principles of Food Science
Course Code	FNC501A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

The aim of the course is to familiarize the students with the properties of foods components. Students will be able to understand the physicochemical changes occurring in various foodstuffs as a result of processing. It highlights the principles and processes involved in food preparation, product formulation, and processing and preservation techniques.

2. Course Size and Credits:

Number of Credits	03+0
Total Hours of Classroom Interaction	45
Number of laboratory Hours	0
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Describe the components and properties of food

CO-2. Discuss the nutritive value of different food groups

CO-3. Discover the changes in physiochemical and functional properties of food constituents due to processing

CO-4. Discuss the various processing and preservation method

CO-5. Compare processing and preservation techniques to develop safe and healthy food products with maximum retained nutrient value

4. Course Contents

Unit-1:

Food groups: Classification, Composition and nutritive value of cereals, millets and pulses, milk and animal products, vegetables and fruits, oils and fat nuts and sugar, spices and beverages

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Unit-II:

Food components: Polysaccharides and their application, simple sugars and their alternatives. Lipids- Classification, Functional properties of food lipids, deteriorative changes in fats and oils. Proteins- Classifications, Functional properties of food proteins. Protein Concentrates, Isolates and Hydrolysates and their applications. Water. Food enzymes, pigments and flavors

Unit-III:

Colloidal chemistry: Colloidal system and application of colloidal chemistry in food preparation. Properties of solution, sols, gels and suspension. Foams and antifoaming agents. Emulsion and emulsifying agent

Unit-IV:

Introduction to food processing and preservation: Historical developments in food preservation and processing, general principles of food preservation, processes for food preservation, introduction to basic concepts in unit operations

Unit-V:

Changes during cooking and processing: Chemical, physical and nutritional alterations occurring in foods during processing and storage. Dietary advanced glycation end products

Unit-VI:

Product development: Basic principles of new product development and overview of PRPs, GMP, HACCP, Food safety laws and standards

Unit-VII:

Properties of food: Sensory Properties of Food and evaluation methods. Rheology of food: Flow behaviour of fluid foods - Viscosity measurement- consistometers and viscometers

5. CO-PO PSO Mapping:

	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3		1						3	1		
CO-2	3	2							3	1		
CO-3		3	2						3	1		
CO-4	3	2							3	1		
CO-5	3	2	1						3	1		
3: High Influence, 2: Moderate Influence, 1: Low Influence												

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6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		34
Demonstrations		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		04
1. Case Study Presentation		
2. Guest Lecture	02	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	02	
6. Discussing Possible Innovations		
Term Test and Written Examination		05
Total Duration in Hours		45

7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed			
	CE (50% Weightage)		SEE (50% Weightage)
	SC1	SC2	SEE Theory
	50 Marks	50 Marks	100 Marks
CO-1	x	-	x
CO-2	x	-	x
CO-3	x	x	x
CO-4	-	x	x
CO-5	-	x	x

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The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	--
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources:

1. **References**

a. Desrosier, N.W. and James N. 2007. Technology of food preservation. 4th Ed. AVI Publishing Co., Inc., Westport, Connecticut, USA.

b. Geoffrey Campbell Platt. 2017.Food science and technology. 2nd Ed.Wiley-Blackwell. ISBN: 978-0-470-67342-3

c. Nakai, S. and Modler, H. W. 2000. Food proteins: processing applications, Wiley VCH.

d. Potter, N. and Hotch Kiss, J.H. 1996. Food Science. 5th Ed. CBS Publishers and Distributors, New Delhi. ISBN 978-1-4615-4985-7

e. Shakuntala Manay and M. Shadasharaswamy. 2008. Food: Facts and Principles 3rd Ed. New age international.

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f. Srilakshmi, B. 2005. Food Science. New Age International (P) Ltd., Publishers, New Delhi.

2. Magazines and Journals

a. Journal of Food Science
b. Scientific Journal of Food Science and Nutrition
c. Indian Journal of Research in Food Science and Nutrition

3. Websites

a. www.pubmedarticles.com
b. www.ncbi.com

4. Other Electronic Resources

a. (https://epgp.inflibnet.ac.in/Home)

10. Course Organization:

Course Code	FNC501A	
Course Title	Principles of Food Science	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

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Course Specifications: Food Biochemistry

Course Title	Food Biochemistry
Course Code	FNC502A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

The aim of this course is to introduce students to the basic biological and chemical processes of living cells and enzymes. Students will be taught the basics of biochemistry of macro and micro molecules and their classification, general reactions, digestion, absorption, metabolism and the integration of metabolic pathway. Students will also be carrying out experiments on quantitative analysis of carbohydrates, proteins, lipids, enzymes and vitamins.

2. Course Size and Credits:

Number of Credits	03+01
Total Hours of Classroom Interaction	45
Number of laboratory Hours	30
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After the successful completion of this course, the student will be able to:

CO-1. Explain the physico-chemical properties of water and functions of cellular organelles

CO-2. Outline the classification, chemical properties, general reactions, digestion, absorption and metabolism of carbohydrates, lipids and proteins

CO-3. Summarize biological functions of enzymes, vitamins, minerals and their application in food processing

CO-4. Illustrate various pathways involved in metabolism of carbohydrates, proteins and lipids

CO-5 Analyze and apply suitable method for quantitative analysis of carbohydrates, proteins, lipid and enzymes

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4. Course Contents:

Unit-I:

General overview: Importance of biochemistry in food science and technology. Metabolism of Biomolecules: An overview of metabolism, catabolism and anabolism.

Unit-II:

Water: Physical and chemical properties of water. Weak interactions in aqueous systems. Ionization of water and Buffers.

Unit-III:

Carbohydrates: Basic overview and classification: Monosaccharides, Oligosaccharides and Polysaccharides. Monosaccharides: Stereochemistry, Nomenclature, Cyclic Forms, General reactions. Digestion, Absorption and Metabolism of Carbohydrates. Glycolysis, TCA cycle, Electron Transport and Oxidative Phosphorylation, Pentose Phosphate Pathway.

Unit-IV:

Amino acids & Proteins & Enzymes: Basic overview of amino acids, proteins and enzymes. Amino acids: Chemical properties, Deamination, Transamination and Decarboxyaltion. Proteins: Importance of proteins in living system. Diverse roles of proteins. Classification, Properties of proteins, denaturation of proteins. Structural organization of proteins: Primary, secondary, tertiary and quaternary structures. Digestion, Absorption and Metabolism. Enzymes: Chemical nature, Classification and Nomenclature of Enzymes. Mechanism of action and Specificity of enzymes. Factors affecting enzymatic activities.

Unit-V:

Lipids: Basic overview and classification. Triglycerols, Fatty acids, Saturated and Unsaturated fatty acids. Chemical properties, Oxidation reactions, Rancidity. Digestion, absorption and lipid metabolism. β-Oxidation of fatty acids and energetic.

Unit-VI:

Vitamins & Minerals: Sources, RDA, & Functions of Water Soluble and Fat Soluble Vitamins. Functions of Macro & Micro Minerals.

Practicals:

1. Estimation of total carbohydrates by Phenol sulphuric acid method
2. Estimation of Starch by Anthrone method
3. Estimation of total Proteins by Lowry's method
4. Estimation of total lipids by Bligh and Dyer method
5. Determination of saponification number and acid value of an oil/fat
6. Determination of iodine number of an oil/fat
7. Estimation of Ascorbic acid by titrimetry
8. Determination of organic acid content by titrimetry
9. Separation of amino acids by Paper and Thin layer chromatography
10. Estimation of amylase enzymes in food

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3	2							3	2		
CO-2	3		2						3	2	1	
CO-3	3		2						3	2	1	
CO-4	3								3	2		
CO-5	2	3							3	2		
3: High Influence, 2: Moderate Influence, 1: Low Influence												

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		30
Demonstrations		03
1. Demonstration using Videos		
2. Demonstration using Physical Models		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		30
1. Course Laboratory	28	
2. Computer Laboratory	02	
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		04
1. Case Study Presentation	02	
2. Guest Lecture		
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	02	
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		08
Total Duration in Hours		**75**

Approved by the Academic Council at its 30th Meeting held on 11th December 2023

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7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.
The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed					
	CE (50% Weightage)			SEE (50% Weightage)	
	SC1	SC2	SC3	SEE Theory	SEE Lab
	50 Marks	25 Marks	25 Marks	100 Marks	50 Marks
CO-1	X	-	-	X	X
CO-2	X	-	-	X	X
CO-3	X	-	X	X	X
CO-4	-	X	X	X	X
CO-5	-	X	X	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
5.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	--
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources:

1. References

a. David L. Nelson and Michael M. Cox. 2017. Lehninger Principles of Biochemistry, 7th Ed. Macmillan Learning, NY, USA.

b. Donald Voet and Judith G. Voet. 2011. Biochemistry, 4th Ed. John Wiley and Sons, Inc., NY, USA.

c. Reginald H. Garrett and Charles M. Girsham, 2010, 4th Ed, Brooks/Cole Cengage Learning

6. Magazines and Journals

a. Journal of Food Biochemistry - Wiley Online Library

b. JNB | The Journal of Nutritional Biochemistry | ScienceDirect.com by Elsevier

7. Websites

a. eGyanKosh: MFN-002 Nutritional Biochemistry (https://www.egyankosh.ac.in/handle/123456789/32934)

8. Other Electronic Resources

b. (https://epgp.inflibnet.ac.in/Home

10. Course Organization:

Course Code	Food Biochemistry	
Course Title	FNC502A	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

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Course Specifications: Advanced Nutrition

Course Title	Advanced Nutrition
Course Code	FNC503A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

Aim of this course is to provide understanding of metabolic aspects of different nutrients. The course provides an insight to the physiological and metabolic role of nutrients and their relationship to human health and wellbeing. It also provides a better understanding of the health risks associated with nutrient deficiency and toxicity.

2. Course Size and Credits:

Number of Credits	03+01
Total Hours of Classroom Interaction	45
Number of laboratory Hours	30
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After the successful completion of this course, the student will be able to:

CO-1. Describe the physiological and metabolic role of macronutrient, micronutrient and other food components in human nutrition.

CO-2. Understand the basis of nutrient requirements and recommendations.

CO-3. Explore the sources, functions, deficiencies, and toxicity of various nutrients.

CO-4. Analyze macronutrient and micronutrients in food.

CO-5. Apply acquired knowledge and skills in developing dietary guidelines and program planning

4. Course Contents:

Unit-I:

Understanding Nutrition: Basic concept, history, body composition, methods of measuring body composition, Nutrition requirements, National and international nutrition recommendation

Unit-II:

Energy metabolism: Principles and definition, components and calculation of energy requirements. Methods of determining energy requirements, measurement of physical activity level (PAL), basal metabolic rate (BMR) and total energy expenditure (TEE). Energy cost of activities. Recommendations for physical activity for different age groups. Impact of altered energy metabolism.

Unit-III:

Macronutrients: Carbohydrates: Classification. Digestion, absorption and metabolism of carbohydrates, functions. Sources, RDA and nutrient requirement. Role of dietary fiber in various physiological disorders. Regulation of blood glucose concentration, glycemic response of carbohydrates, disorders of carbohydrate metabolism.

Proteins: Classification. Metabolism: Digestion, absorption and metabolism of proteins, functions. Sources, RDA and nutrient requirement, protein turn over and synthesis, methods of assessing protein quality and requirements. Protein deficiency and inborn errors.

Lipids: Classification. Metabolism: Digestion, absorption and metabolism of fatty acids function. Sources, RDA and nutrient requirement. Essential fatty acids, regulation of lipids. Disorders of lipid metabolism, visible and invisible fat in diet. Assessment of lipid profile.

Unit-IV:

Regulatory nutrients: Vitamins and minerals: Classification, Metabolism: Digestion, absorption and transport, mechanism of action, Functions, sources, bioavailability, RDA and nutrient requirement, deficiency, toxicity.

Unit-V:

Body fluid and electrolyte balance: Water distribution in body, maintenance of fluid and electrolyte balance, role of kidney, acid base balance.

Unit-VI:

Other food components: Phytonutrients, phytochemicals and plant sterols, functional food, phytochemicals and plant sterols and anti-nutritional factors

Practicals:

1. Assessment of Body composition
2. Basic concept of pH, buffers and solution
3. Calculation of energy requirements
4. Qualitative estimation of carbohydrates: reducing sugars, glucose, total sugars and dietary fiber
5. Properties of protein
6. Estimation of Nitrogen and Protein Content
7. Estimation of anti-nutrient factors

5. CO-PO PSO Mapping:

	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3	2							3	2		
CO-2	3	3					1		3	2	1	
CO-3	3	3							3	2		
CO-4		3							2	3		
CO-5			2		3						3	1
3: High Influence, 2: Moderate Influence, 1: Low Influence												

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		33
Demonstrations		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		30
1. Course Laboratory	30	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		02
1. Case Study Presentation		
2. Guest Lecture	02	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions		
6. Discussing Possible Innovations		
Term Test and Written Examination		08
Total Duration in Hours		**75**

Approved by the Academic Council at its 30th Meeting held on 11th December 2023

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7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed					
	CE (50% Weightage)			SEE (50% Weightage)	
	SC1	SC2	SC3	SEE Theory	SEE Lab
	50 Marks	25 Marks	25 Marks	100 Marks	50 Marks
CO-1	x	-	-	x	x
CO-2	x	x	-	x	x
CO-3	x	x	x	x	x
CO-4	-	-	x	x	x
CO-5	-	-	x	x	x

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	--
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources:

1. References

a. FAO, Food and Nutrition Technical Report Series. 2001. Human energy requirements: Report of a Joint FAO/WHO/UNU Expert Consultation.

b. Gropper, S. A. S., Smith, J. L., & Groff, J. L. 2009. Advanced nutrition and human metabolism. 5th edition. Australia; Belmont, CA: Wadsworth Cengage Learning.

c. ICMR Nutrient Requirements and Recommended Dietary Allowances for Indians.

d. Nix S. 2016. Williams' Basic Nutrition & Diet Therapy. 15th ED. Mosby-Elsevier.

e. Potter, N. and Hotch Kiss, J.H. 1996. Food Science. 5th Ed. CBS Publishers and Distributors, New Delhi.

f. Shils, M.E., Shike, M, Ross, A.C., Caballero B and Cousins RJ. 2005. Modern Nutrition in Health and Disease. 10th Ed. Lipincott, William and Wilkins.

g. Srilakshmi, B. 2005. Food Science, New Age International (P) Ltd., Publishers, New Delhi.

2. Magazines and Journals

a. Nutrition bulletin

b. Nutrition Review

c. Annual Review of Nutrition

3. Websites

a. https://www.nin.res.in/

b. https://www.who.int/

10. Course Organization:

Course Code	FNC503A	
Course Title	Advanced Nutrition	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

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Course Specifications: Nutrition During Lifecycle and Diet Management

Course Title	Nutrition During Lifecycle and Diet Management
Course Code	FNC504A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary

Aim of this course is to provide students an overview of the effect of nutrition on growth and development, the physiological basis of nutritional requirements throughout the life span. The course will address human body's nutritional requirements in various physiological states during their lifecycle: preconception, pregnancy and lactation, infant feeding, preschool years, school-age, adolescence, middle and late adulthood and old age. Learning will provide students with the opportunity to apply meal management principles to plan healthy and affordable balanced meal for all family members.

2. Course Size and Credits:

Number of Credits	03+01
Total Hours of Classroom Interaction	45
Number of laboratory Hours	30
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After the successful completion of this course, the student will be able to:

CO-1. Describe the concept of meal planning and balance diet.

CO-2. Identify physiological changes during various stages of life cycle.

CO-3. Understand the role of nutrition and major nutritional concerns during different life stages.

CO-4. Design meal plan to meet the nutrition requirement of human body during various stages of life cycle

4. Course Contents:

Unit I:

Basic concepts of meal planning: Concept of balance diet, energy balance, food exchange list, concept of dietary reference intake, food pyramid and dietary guidelines, factors affecting meal planning and food related behavior.

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Unit II:

Preconception nutrition. Overview of preconception period, nutrition related disruption in fertility, preconception nutrition concern, guidelines for preconception care, Genetic and environmental determinants of preconception health.

Unit III:

Nutrition in pregnancy and Lactation: Physiological changes in pregnancy: changes in body composition, developmental stages of the embryo, Food and nutrient requirements (RDA), impact of nutrition on fetal growth and consequences of nutrient deficiency, complications and physiological cost of pregnancy. Physiological adjustments during lactation, composition of breast milk, diet of lactating women and nutritional requirements, Impact of altered nutrition on growth and development: nutritional disorders during pregnancy and lactation.

Unit IV:

Nutrition during infancy and childhood: Characteristics of infancy and childhood: changes in body composition, Determinants of growth and development, Role of nutrition: physical and mental growth and rate of growth: weight as an indicator, growth monitoring, nutrient requirements (RDA), and Providing adequate diet: feeding of infants, breast milk and feeding, formula preparation, supplementary and complementary feeding. Impact of altered nutrition on growth and development, dietary considerations of Low birth weight babies (LBW) and premature infants, Immunization, deworming.

Unit V:

Nutrition during preschool age: Characteristics of preschool age: changes in body composition, growth and development during preschool years, physiological and psychological changes, RDA and nutrient requirements, Prevalence of malnutrition in preschool years and food habits, eating habits and behavior, specific feeding problems.

Unit VI:

Nutrition in school age and adolescence: Characteristics of school age and adolescence: changes in body composition, growth and development, changes in growth pattern, puberty, menarche, food habits and eating behavior: effect of media, peer group pressure on eating habits, factors influencing food intake, RDA and nutrient requirements, packed lunch Nutritional disorders in school age and adolescence.

Unit VII:

Nutrition in adulthood: Characteristics of adulthood: changes in body composition. Nutrition in the middle and late adult years, factors influencing food intake, lifestyle and health risk factors, Health Disparities. RDA and nutrient requirements, Impact of altered nutrition on health and development. Nutrition, supplementation and prevention.

Unit VIII:

Nutrition in old age: Characteristics of old age: physiological changes in body composition. Nutritional needs and requirements during old age, eating behavior, factors influencing food intake, lifestyle and health risk factors, physical activity and energy relationship, RDA and nutrient requirements. Nutritional Problems of old age, nutrients influencing aging process.

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Practicals:

1. Explain the concept of portion size and use of exchange list for menu preparation.
2. Instruction to general techniques of planning balanced diet
3. Menu planning for the following groups with variation:
   a) Age specific
   b) Activity
   c) Income and
   d) Physiological condition
4. Analyzing and assessing z-scores growth charts for children
5. Planning and preparation of nutrient dense recipes for preschooler (complimentary and supplementary foods), pregnant and lactating women and old age
6. Market survey of the functional food for pregnant woman, infants and elderly

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3	2							3	2	
CO-2	3	2							3	2	1
CO-3	3	2	1						2	3	
CO-4		3	1	2					2	3	2
3: High Influence, 2: Moderate Influence, 1: Low Influence											

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		33
Demonstrations		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		30
1. Course Laboratory	30	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		02
1. Case Study Presentation		
2. Guest Lecture	02	

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3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions		
6. Discussing Possible Innovations		
Term Test and Written Examination		08
Total Duration in Hours		75

7. Course Assessment

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed					
	CE (50% Weightage)			SEE (50% Weightage)	
	SC1	SC2	SC3	SEE Theory	SEE Lab
	50 Marks	25 Marks	25 Marks	100 Marks	50 Marks
CO-1	X	-	X	X	X
CO-2	X	-	X	X	X
CO-3	X	X	X	X	X
CO-4	-	X	X	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	--
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations

12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources:

1. References

a. Bamji M.S., Rao N.P., Reddy V. 2009. Textbook of Human Nutrition. 3rd Ed. Oxford and IBH Publishing Co. Pvt. Ltd.
b. Gibson R S.2005. Principles of Nutritional Assessment. 2nd Ed. Oxford University Press.
c. ICMR Nutrient Requirements and Recommended Dietary Allowances for Indians.
d. Judith E. Brown, *et al.* Nutrition through the life cycle. 7th Edition. Belmont, CA: Thomson, Wadsworth.
e. Mahan, L. K. and Escott Stump. S. 2008. Krause's Food & Nutrition Therapy 12th ed. Saunders-Elsevier
f. Raymond J. L. and Morrow K. 2020. Krause and Mahan's Food & the Nutrition Care Process. 15th Ed. Saunders.
g. Seth V and Singh K. 2006. Diet planning through life cycle: Part 1. Elite publishing house pvt ltd, New Delhi.
h. Swaminathan M. 1985. Advanced Textbook on Food and Nutrition. Vol.II. BAPPOO, No.88, Mysore Road, Bangalore.

2. Magazines and Journals

a. https://www.jandonline.org/
b. https://www.nature.com/ejcn/
c. https://jn.nutrition.org/

3. Websites

a. **https://www.nin.res.in/**
b. **https://www.mohfw.gov.in/**
c. **https://dhr.gov.in/**

4. Other Electronic Resources

https://wcd.nic.in/

10. Course Organization:

Course Code	FNC504A	
Course Title	Nutrition during lifecycle and diet management	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

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Course Specifications: Human Physiology and Anatomy

Course Title	Human Physiology and Anatomy
Course Code	FNC505A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

Aim of this course is to familiarize students with the major levels of organization in the human body from cellular levels to the tissues, organs and organ systems. Students will be able to understand the structure, functions and dysfunctions of various organs and organ systems. Students will learn the importance of diet, food and nutrition in regulation and healthy management of organs and organ systems, while also learning food & nutrition based regulation and management of dysfunction / diseases of organs and organ systems.

2. Course Size and Credits:

Number of Credits	03+0
Total Hours of Classroom Interaction	45
Number of laboratory Hours	00
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After the successful completion of this course, the student will be able to:

CO-1. Understand the structure and function of organs and organ systems of human body.

CO-2. Appreciate and understand the organ disorders and dysfunctions in human body.

CO-3. Understand and argue impact of Food & Nutrition on different organs and organ systems. Also understand the importance of managing organ dysfunctions via Food & Nutrition.

4. Course Contents:

Unit-I:

Cell Structure and function. Definition of anatomy and Physiology. Levels of structural organization and function – cell, tissue, organs and system levels. Eukaryotic cell structure.

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Unit-II:

Immune System: Cell mediated and humoral immunity, defensive properties of neutrophils and macrophages, phagocytosis and inflammation allergy.

Unit-III:

Gastrointestinal system: Secretary, digestive and absorptive functions of the organs of gastrointestinal tract. Role of esophagus, stomach, small and large intestine, liver, pancreas and gall bladder and their dysfunctions, peristaltic movement.

Unit-IV:

Endocrine and reproductive system: Endocrine glands – structure, function, role of hormones and hormone activity, regulation of hormonal secretion. The neuroendocrine axis – Hypothalamus, Pituitary Gland, thyroid, parathyroid, adrenals, fat cells, ovary, testis, and pancreatic islets. Disorders of endocrine glands. Physiology – hormones and diabetes, hypothyoidism, renal failure, stress response. Brief overview of male and female reproductive system. Female reproductive cycle. Embryonic period and Teratogens.

Unit-V:

Cardiovascular and respiratory system: Function and properties of blood. Formation of blood cells. Blood coagulation, blood groups. Structure and function of heart, valves and blood vessels. Cardiac cycle and cardiac output. Regulation of blood flow. Circulatory routes. Blood pressure and its significance. Overview of respiratory system anatomy: structure and role of lungs, pulmonary ventilation, Transport of Oxygen and Carbon Dioxide, Control of Respiration. Exercise, heart and respiratory system.

Unit-VI:

Nervous system: Structure and function of neuron, conduction of nerve impulse and role of neurotransmitters. Organization of central nervous system, brief structure and function of Brain and spinal cord, Afferent and efferent nerves, Blood Brain Barrier, CSF. Hypothalamus and its role in various body functions-obesity, sleep, memory.

Unit-VII:

Urinary System: Structure and function of kidney, nephrons. Overview of renal physiology – glomerular filtration, tubular reabsorption and secretion. Formation of urine, role of kidney in maintaining fluid, electrolytes, and acid base balance. Role of Diuretics.

Unit-VIII:

Skeletal system: Structure and functions of bone, histology of bone tissue, bone formation and remodeling of bone. Bone growth during infancy, childhood, and adolescence. Factors affecting bone growth and bone remodeling. Blood and nerve supply of bone. Bone's Role in Calcium Homeostasis.

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5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3		1						3			
CO-2	3		2						3	2		
CO-3	3		2						3	2	1	
3: High Influence, 2: Moderate Influence, 1: Low Influence												

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		30
Demonstrations		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		08
1. Case Study Presentation	04	
2. Guest Lecture		
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	02	
6. Discussing Possible Innovations	02	
Term Test and Written Examination		05
Total Duration in Hours		**45**

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7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed				
	CE (50% Weightage)			SEE (50% Weightage)
	SC1	SC2	SC3	SEE Theory
	50 Marks	25 Marks	25 Marks	100 Marks
CO-1	X	-	-	X
CO-2	X	-	X	X
CO-3	-	X	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skill	How imparted during the course
1.	Knowledge	Class room lectures, Assignments
2.	Understanding	Class room lectures, Assignments
3.	Critical Skills	Assignments, Seminar
4.	Analytical Skills	Assignments, Seminar
5.	Problem Solving Skills	--
6.	Practical Skills	Laboratory Exercises
7.	Group Work	--
8.	Self-Learning	Assignment
9.	Written Communication Skills	Assignment, Class Tests
10.	Verbal Communication Skills	--
11.	Presentation Skills	Assignment, Seminar
12.	Behavioral Skills	--
13.	Information Management	Seminar, Assignment
14.	Personal Management	Assessment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources:

1. References

a. Chaurasia, B.D., 2010. BD Chaurasia's Human Anatomy. CBS Publishers & Distributors PVt Ltd.
b. Hall, J.E. and Hall, M.E., 2020. Guyton and Hall textbook of medical physiology e-Book. Elsevier Health Sciences.
c. Rizzo, D.C., 2015. Fundamentals of anatomy and physiology. Cengage Learning.
d. Saladin, K.S. and Porth, C., 2010. Anatomy & physiology: the unity of form and function (Vol. 5). New York, NY, USA, McGraw-Hill.
e. Tortora, G.J. and Derrickson, B.H., 2018. Principles of anatomy and physiology. John Wiley & Sons.
f. Waugh, A. and Grant, A., 2014. Ross & Wilson Anatomy and physiology in health and illness E-book. Elsevier Health Sciences.

2. Magazines and Journals

a. Human Physiology (springer.com) (https://link.springer.com/journal/10747)

3. Websites

a. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=2rAs1Puvga4LW93zMe83aA==

4. Other Electronic Resources

a. https://egyankosh.ac.in/handle/123456789/81717

10. Course Organization:

Course Code	Human Physiology and Anatomy	
Course Title	FNC505A	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

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Course Specifications: Medical Nutrition Therapy- I

Course Title	Medical Nutrition Therapy – I
Course Code	FNC506A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

Aim of this course is to familiarize students to apply evidence-based medical nutrition therapy to screen, assess and assist in the medical treatment of various medical conditions which includes food allergy and intolerances, anemia, acute and chronic upper and lower gut disorders, pulmonary diseases, and genetic metabolic disorders.

Students will be trained to screen and design nutritional care and support for critically ill and trauma patients: sepsis, trauma and burn, pre-and post-surgery.

2. Course Size and Credits:

Number of Credits	03+01
Total Hours of Classroom Interaction	45
Number of laboratory Hours	30
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per University Regulations
Attendance Requirement	As per University Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After the successful completion of the course, the student will be able to:

CO-1. Understand the etiology, physiological and metabolic anomalies of acute and chronic diseases and patient needs in different disease conditions.

CO-2. Analyze the preventive and therapeutic role of diet and nutritional care.

CO-3. Recommend different nutritional support systems to nourish the patient based on pathophysiology and treatment of various diet-related disorders.

CO-4. Plan nutritional care, support and intervention process in hospice setting.

CO-5. Explain the various trends and advances in dietary management of diseased conditions, emerging modes of therapy and intervention and also ongoing research in the field.

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4. Course Contents:

Unit I:

Nutrition Diagnosis and Nutrient Delivery: Intervention and Nutrition Support. Nutrition care process. Factors affecting nutrition care. Documentation in nutrition care record. Nutrition interventions. Nutrition for terminally ill, burn and hospice patients. Criteria for Appropriate Nutrition support, enteral nutrition, Parenteral and total parenteral Nutrition (TPN). TPN – importance, site of TPN, composition and long term effect of use. Re-feeding syndrome, Transitional Feeding, Nutrition support in long term and home care. Counselling strategy and behavior change. Diet related ethical issues in the terminally ill.

Unit II:

Medical Nutrition Therapy for Adverse Reactions to Food: Food Allergies and Intolerances. Definitions, Etiology, Pathophysiology. IgE-Mediated Reactions. Non-IgE-Mediated or Mixed Antibody Reactions. Cell-Mediated Reactions. Food Intolerances. Assessment and Medical Nutrition Therapy. Preventing: Food Allergy.

Unit III:

Medical Nutrition Therapy for Upper and Lower Gastrointestinal Disorders: Biochemical, clinical assessment parameters. Diseases of the eosophagus and stomach – Acute and Chronic. Common Intestinal Problems. Diseases of the Small Intestine. Intestinal Brush-Border Enzyme Deficiencies. Inflammatory Bowel Diseases. Medical nutrition therapy.

Unit IV:

Medical Nutrition Therapy for Hepatobiliary and Pancreatic Disorders: Overview of Physiology and Functions of the Liver, Gallbladder and Exocrine Pancreas. Diseases of the Liver-Acute and Chronic. Treatment of Cirrhosis and Its Complications. Diseases of the Gallbladder. Diseases of the Exocrine Pancreas. Medical nutrition therapy.

Unit V:

Medical Nutrition Therapy for Anemia: Iron-Related Blood Disorders. Iron Overload. Megaloblastic anemia. Other nutritional and non-nutritional anemia.

Unit VI:

Medical Nutrition Therapy for Metabolic Stress: Sepsis, Trauma, Burns, and Surgery. Metabolic Response to Stress, Starvation versus Stress. Systemic Inflammatory Response Syndrome and Multiple Organ Dysfunction Syndrome. Trauma, major burns. Pre- and post-Surgery nutritional care, bariatric surgery and nutritional care.

Unit VII:

Medical Nutrition Therapy for Pulmonary Disease: Chronic Lung Disease of Prematurity and

Bronchopulmonary Dysplasia. Chronic Obstructive Pulmonary Disease. Cystic Fibrosis Lung Cancer. Pneumonia, Respiratory Failure, Tuberculosis. Lifestyle and nutrition recommendations for pulmonary diseases.

Unit VIII:

Medical Nutrition Therapy for Common Genetic Metabolic Disorders and Developmental disabilities: Principles of genetic disease management: Disorders of Amino acid Metabolism: Disorders of Organic acid Metabolism, Disorders of Urea Cycle Metabolism. Disorders of Carbohydrate Metabolism. Disorders of Fatty Acid Oxidation. Chromosomal Aberrations. Role of Nutritionist in Genetic Metabolic Disorders.

Nutritional causes and management for Neurological and Psychiatric Disease disorders: Alzheimer's and Parkinson's disease, Epilepsy, Cerebral Palsy Neurologic Disorder.

Practicals:

1. Market survey of enteral, parenteral nutritional supplements.
2. Calculation and formulation of enteral, parenteral, and other nutrition transition feeds.
3. Nutrition screening/assessment– patient assessment form and data collection
4. Interpreting lab diagnostic reports for various diseases.
5. Principle of diet care and nutrition management of stomach and intestinal dysfunction
6. Principle of diet care and nutrition management of acute and chronic liver diseases
7. Screening/assessment of anemia, dietary care and nutrition management
8. Principle of dietary care and nutrition management of burn and surgery patient
9. Principle of dietary care and nutrition management of tuberculosis
10. Principle of diet care and nutrition management of PKU and gout

5. CO-PO PSO Mapping:

	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2	PSO 3	PSO4
CO-1	3		2						3	2		
CO-2	3		2				2		3	2		
CO-3		3		2	2					3	2	1
CO-4		3	2		2					2	3	1
CO-5			2				3				3	
3: High Influence, 2: Moderate Influence, 1: Low Influence												

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		33
Demonstrations		01
1. Demonstration using Videos	01	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		30
1. Course Laboratory	30	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		03
1. Case Study Presentation	01	
2. Guest Lecture	02	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions		
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		08
Total Duration in Hours		**75**

7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

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Focus of Course Learning Outcomes in each component assessed					
	CE (50% Weightage)			SEE(50% Weightage)	
	SC1	SC2	SC3	SEE Theory	SEE Lab
	50 Marks	25 Marks	25 Marks	100 Marks	50 Marks
CO-1	X	X	-	X	X
CO-2	X	X	-	X	X
CO-3	X	X	X	X	X
CO-4	-	-	X	X	X
CO-5	-	-	X	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	Assignments, Examination
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment, Class Presentations
8.	Self-Learning	Assignment, Self-study
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

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9. Course Resources:

1. References

a. Gibney MJ, Elia M, Ljungqvist & Dowsett J. 2005. Clinical Nutrition. The Nutrition Society Textbook Series. Blackwell Publishing Company.

b. ICMR Nutrient Requirements and Recommended Dietary Allowances for Indians.

c. Kane K. and Prelack K. 2018. Advanced Medical Nutrition Therapy.1st Ed. Jones & Bartlett Learning.

d. Mahan, L. K., Escott Stump. S. and Raymond J.L. 2012. Krause's Food and the Nutrition Care Process. 13th Ed. Saunders-Elsevier.

e. Raymond J. L. and Morrow K. 2020. Krause and Mahan's Food & the Nutrition Care Process. 15th edition. Saunders.

f. Schlenker, E.D. and Roth, S.L. 2013. Williams' Essentials of Nutrition and Diet Therapy. 10th Edition. Mosby.

g. Shils, M.E., Shike, M, Ross, A.C., Caballero B and Cousins RJ. 2005. Modern Nutrition in Health and Disease. 10th Ed. Lipincott, William and Wilkins.

h. Sylvia Escott-Stump. 2021. Nutrition and Diagnosis-Related Care, 9th Ed. Academy of Nutrition and Dietetics.

2. Magazines and Journals

a. https://www.nature.com/articles

b. https://clinical-nutrition.imedpub.com/articles

c. https://www.acquaintpublications.com/journal/nutrition-and-diet-care

3. Websites

a. https://pubmed.ncbi.nlm.nih.gov/

b. https://nin.res.in/

c. https://www.who.int/

4. Other Electronic Resources

a. https://vinu.libguides.com/nutrition/onlineresources

b. https://www.dietitiansathome.com/medical-nutrition-therapy-mnt

10. Course Organization:

Course Code	FNC506A	
Course Title	Medical Nutrition Therapy - I	
Course Leader/s Name		Allotted as per time table
Course Leader Contact Details		**Phone:** 080-49066666
		E-mail: hod.ft.ls@msruas.ac.in
Course Specifications Approval Date		Dec 2023
Next Course Specifications Review Date		June 2025

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Semester- II

Course Specifications: Medical Nutrition Therapy - II

Course Title	Medical Nutrition Therapy – II
Course Code	FNC507A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

Aim of this course is to train students in evidence-based medical approach to screen, assess and assist in the medical treatment of certain medical conditions: Morbid Obesity-Weight management, eating disorders, diabetes mellitus, renal diseases, PCOS, thyroid disorders, CVDs, cancer, HIV and AIDS. Students will learn to evaluate the etiology, pathophysiology and recommend medical nutrition therapy and lifestyle management for various chronic, non-communicable diseases.

2. Course Size and Credits:

Number of Credits	03+01
Total Hours of Classroom Interaction	45
Number of laboratory Hours	30
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per University Regulations
Attendance Requirement	As per University Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After undergoing this course students will be able to:

CO-1. Understand the preventive and therapeutic role of diet and nutritional care in chronic degenerative diseases.

CO-2. Analyze the etiology, diagnosis, pathophysiology, nutritional and lifestyle management of non-communicable diseases based on patient's needs.

CO-3. Recommend and provide appropriate nutritional care based on pathophysiology, prevention and/or treatment of the various diet-related disorders/ diseases.

CO-4. Understand trends and advances in dietary management of non-communicable and lifestyle diseases, emerging modes of therapy and intervention and ongoing research in the field.

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4. Course Contents:

Unit I:

Medical Nutrition Therapy for Obesity and Weight management: Causes and assessment of obesity and underweight, co- morbidities of obesity. Physiology of obesity – role and regional distribution of adipose tissues: understanding body weight regulation, weight regain and maintenance of reduced weight. Causes of obesity – Hormonal, neural and psychological. Management of obesity and underweight – Dietary and behavioral modification, Physical activity. Surgical treatment and effect on satiety.

Unit II:

Medical Nutrition Therapy for Cardiovascular Diseases: Atherosclerosis and Coronary Heart disease. Hypertension. Heart Failure. Screening and Diagnostic Criteria, lipid profile and heart rhythms. Medical nutrition therapy. Various inflammatory markers.

Unit III:

Medical Nutrition Therapy for Diabetes Mellitus and Hypoglycemia of Non-diabetic Origin: Categories of Glucose Intolerance. Screening and Diagnostic Criteria. Current theories of diabetes prognosis: thin fat phenotype, thrifty gene hypothesis, carbohydrate-insulin model. Management of Pre-diabetes. Management of Diabetes Mellitus I and II. Acute Complications. Long-term Complications. Hypoglycemia of Non-diabetic Origin. Dietary guidelines – lifestyle management, drugs and insulin management, Carbohydrate counting

Unit IV:

Medical Nutrition Therapy for Renal Disorders: Physiology and Function of the Kidneys. Renal Diseases. Acute Kidney Injury (Acute Renal Failure). Chronic Kidney Disease. Glomerular Diseases, nephrotic syndrome. End-Stage Renal Disease. Screening and Diagnostic Criteria. Types of dialysis. Medical nutrition therapy

Unit V:

Medical Nutrition Therapy for Thyroid and Related Disorders: Thyroid Physiology. Assessment in Thyroid Disorders. Hypothyroidism. Polycystic Ovary Syndrome. Hyperthyroidism. Imbalances of the Hypothalamus-Pituitary-Thyroid (HPT) Axis and Ovarian-Adrenal-Thyroid (OAT) and its relationship with hormones. Screening and Diagnostic Criteria. Other Endocrine System Disorders. Medical nutrition therapy.

Unit VI:

Medical Nutrition Therapy for Cancer Prevention, Treatment, and Recovery: Carcinogenesis and Mutagenesis, Carcinogens in Food. Clinical manifestations of cancer, types of cancer. Nutrition and Carcinogenesis. Nutrients for Cancer Prevention. Impact of Cancer Treatments on nutrition. Nutrition Monitoring and Evaluation. Lifestyle and Nutrition Recommendations

for cancer patients and cancer Survivors. Overview of Complementary and Integrative Oncology.

Unit VII:

Medical Nutrition Therapy for HIV and AIDS: Pathophysiology and Classification. Medical, nutritional and lifestyle management. Medical Nutrition Therapy. Special Considerations – HIV in Women, Children, Complementary and Alternative Therapies.

Practicals:

1. Interpretation of diagnostic biomarkers.
2. Assessment, dietary modification and management of underweight and obesity
3. Sodium and potassium exchange list, development of low sodium and potassium recipes
4. Nutritional management and diet planning for cardiovascular diseases – DASH approach
5. Carbohydrate counting and development of low carbohydrate recipes
6. Nutritional management and diet planning for type 2 diabetes mellitus
7. Nutritional management for prevention and nutritional care of long-term complications in diabetes
8. Nutritional management and diet planning of acute and chronic renal diseases
9. Nutritional management and diet planning for hypothyroidism and PCOS.
10. Dietary management of an underweight cancer/AIDS patient

5. CO-PO PSO Mapping:

	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3		2				1		3	2		
CO-2	3		2	1			2		3	2		
CO-3		3		2	1					3	2	1
CO-4			3				2			3	2	
3: High Influence, 2: Moderate Influence, 1: Low Influence												

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6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		32
Demonstrations		01
1. Demonstration using Videos	01	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		30
1. Course Laboratory	30	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		04
1. Case Study Presentation	01	
2. Guest Lecture	02	
3. Industry / Field Visit	01	
4. Brain Storming Sessions		
5. Group Discussions		
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		08
Total Duration in Hours		**75**

7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed					
	CE (50% Weightage)			SEE (50% Weightage)	
	SC1	SC2	SC3	SEE Theory	SEE Lab
	50 Marks	25 Marks	25 Marks	100 Marks	50 Marks
CO-1	X	-	-	X	X
CO-2	X	X	-	X	X
CO-3	-	X	X	X	X
CO-4	-	-	X	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	Assignments, Examination
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment, Class Presentations
8.	Self-Learning	Assignment, Self-study
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources:

1. References

a. Garrow, J.S., James, W.P.T. and Ralph, A. 2000. Human Nutrition and Dietetics, 10th Ed. Churchill Livingstone.

b. Gibney MJ, Elia M, Ljungqvist & Dowsett J. 2005. Clinical Nutrition. The Nutrition Society Textbook Series. Blackwell Publishing Company.

c. ICMR Nutrient Requirements and Recommended Dietary Allowances for Indians.

d. Kane K. and Prelack K. 2018. Advanced Medical Nutrition Therapy. 1st Ed. Jones & Bartlett Learning.

e. Mahan, L. K., Escott Stump. S. and Raymond J.L. 2012. Krause's Food and the Nutrition Care Process. 13th Ed. Saunders-Elsevier.

f. Raymond J. L. and Morrow K. 2020. Krause and Mahan's Food & the Nutrition Care Process, 15th Ed. Saunders.

g. Schlenker, E.D. and Roth, S.L. 2013. Williams' Essentials of Nutrition and Diet Therapy. 10th Ed. Mosby.

h. Shils, M.E., Shike, M, Ross, A.C., Caballero B and Cousins RJ. 2005. Modern Nutrition in Health and Disease. 10th Ed. Lipincott, William and Wilkins.

i. Sylvia Escott-Stump. 2021. Nutrition and Diagnosis-Related Care, 9th Ed. Academy of Nutrition and Dietetics.

2. Magazines and Journals

a. https://www.nature.com/articles

b. https://clinical-nutrition.imedpub.com/articles

c. https://www.acquaintpublications.com/journal/nutrition-and-diet-care

3. Websites

a. https://pubmed.ncbi.nlm.nih.gov/

b. https://nin.res.in/

c. https://www.who.int/

4. Other Electronic Resources

a. https://vinu.libguides.com/nutrition/onlineresources

b. https://www.dietitiansathome.com/medical-nutrition-therapy-mnt

c. https://drtc.isibang.ac.in/ldl/bitstream/handle

10. Course Organization:

Course Code	FNC507A	
Course Title	Medical Nutrition Therapy - II	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

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Course Specifications: Public Health nutrition and epidemiology

Course Title	Public health nutrition and Epidemiology
Course Code	FNC508A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

Aim of this course is to elucidate the relationship between dietary intakes, nutritional status and health outcomes using the concept and principles of epidemiology. The course will train students to plan, implement, monitor and evaluate existing and new nutrition programs to effectively strengthen nutrition information, research and eventually aid nutrition advocacy and policy.

2. Course Size and Credits:

Number of Credits	03+01
Total Hours of Classroom Interaction	45
Number of laboratory Hours	30
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After the successful completion of this course, the student will be able to:

CO-1. Understand the concept and current concerns in public health nutrition.

CO-2. Learn about the national health care delivery system, government policies and programmes aimed at improving health and nutritional status of the population.

CO-3. Analyze the importance of inter-sectoral and intra-sectoral linkages in improving nutrition.

CO-4. Evaluate the role of epidemiological research in improving health systems and nutritional status of populations.

CO-5. Develop skills in design and measurement of nutritional parameters in population-based studies of health and disease

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4. Course Contents:

Unit-I:

Aim and scope of public health nutrition: Current concerns in public health nutrition. Concept of food and nutrition security. Role and scope of public health nutrition in national development. Definition, determinants and indicators of health of individual and populations. Gender differences: vulnerable groups in the life cycle, wealth quintiles.

Unit-II:

Direct and Indirect parameters of nutritional/health assessment used in community surveys: Nutritional status of individual and population, indicators of nutritional status, direct and indirect assessment of nutritional status of individuals of different ages. Anthropometric assessment and classification of individuals using various indices for stunting, wasting and under nutrition: MUAC, Wt for age, Ht for age, Wt for ht, etc. Indices for assessing overweight and obesity.

Unit-III:

Concepts of epidemiology: Aims and concepts. Data sources – Census, vital statistics, nutrition and health indicators, health surveys and surveillance programs. Type of epidemiological studies. Experimental: Randomized control trials, quasi experimental trials. Non-experimental studies: Descriptive, Analytical cohort, Case control studies and cross-sectional studies. Population and sampling – sample size estimation. Use of epidemiological data. Use of indicators and standards for measuring risk frequencies (prevalence, incidence, Relative risk, rates and ratios, ODDS Ratio) in assessing risk profile of community, Interpretation of epidemiological studies, assessing nutritional status of individual and population.

Unit-IV:

Nutrition Program Management: Definitions, Principles, components – Planning, Implementation and Evaluation. Principle, major steps of study planning and identification of indicators for monitoring, data collection and analysis system (e.g. MIS). Interpretation and report writing.

Unit-V:

Nutrition Policy and advocacy: National policies linking nutrition with WASH, education, agriculture and health components. Nutrition mission of various states – Poshan Abhiyan. Role of FAO, WHO, NGO's & United Nations in Global/National advocacy & program implementation support to Government.

Unit-VI:

Overview of international, national and community level programs and health care delivery systems: Programs for control of under nutrition, stunting, wasting, vitamin A and Iron deficiency. Other programs for controlling and preventing non communicable diseases. Nutrition in emergency.

Practicals:

1. Conduct dietary survey and nutrition status assessment of individuals / population
2. Conduct anthropometric measurements and assess nutrition status of individuals / population
3. Development of IEC materials and techniques for health and nutrition program
4. To conduct situational analysis of a selected community level program from the management, epidemiological and IEC perspective
5. To conduct critique on an existing health nutrition program with a focus on studying the inter-and intra-sectoral linkages in planning and implementation
6. To conduct formative research using quantitative and participatory research tools to assess the nutrition health perceptions (KAP) of health services providers, subjects and the community
7. To plan, implement and evaluate a focused intervention covering the above components
8. To analyze the data using appropriate software

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3				2					3		
CO-2	3				2					3	2	
CO-3	3		1		2					2		3
CO-4		3	2		2						3	2
CO-5	2	3	1								3	2
3: High Influence, 2: Moderate Influence, 1: Low Influence												

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		33
Demonstrations		01
1. Demonstration using Videos	01	
2. Demonstration using Physical Models		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		30
1. Course Laboratory	25	
2. Computer Laboratory	05	
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		03
1. Case Study Presentation		
2. Guest Lecture	01	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	02	
6. Discussing Possible Innovations		
Term Test and Written Examination		08
Total Duration in Hours		**75**

7. Course Assessment

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

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Focus of Course Learning Outcomes in each component assessed					
	CE (50% Weightage)			SEE (50% Weightage)	
	SC1	SC2	SC3	SEE Theory	SEE Lab
	50 Marks	25 Marks	25 Marks	100 Marks	50 Marks
CO-1	X	X	X	X	X
CO-2	X	X	X	X	X
CO-3	X	X	X	X	X
CO-4	-	-	X	X	X
CO-5	-	-	X	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	--
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

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9. Course Resources

1. References

a. Beaton, G. H and Bengoa, J. M. (eds.). 1996. Nutrition in Preventive Medicine, WHO.

b. Burr, M. L. 1983. Epidemiology for nutritionist, some general principles, Human nutrition, Applied nutrition. 37(A), 259-264.

c. Celentano DD and Szklo M. 2019. Gordis Epidemiology. 6th edition. Elsevier.

d. Edelstein S. 2006. Nutrition in Public Health. A handbook for developing programmes and services. Second Edition. Jones and Bartlett Publishers.

e. FAO. 1983. Selecting Interventions for Nutrition Improvement. A Manual Nutrition in Agriculture. No. 3.

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

g. Gopalan, C. (ed.). 1987. Combating Under nutrition- Basic Issues and Practical Approaches, Nutrition Foundation of India.

h. Kaufman M. 2007. Nutrition in promoting the public health strategies, principles and practices. Jones and Barlett Publishers.

i. Park, K. 2009. Park's Textbook of Preventive and Social Medicine, 20th ed. Jabalpur M/s. Banarsidas Bhanot.

j. Rothman KJ, Lash TL and Greenland S. 2012. Modern Epidemiology. 3rd edition. Lippincott Williams and Wilkins.

k. Visweswara, R. K. 1996. Biostatistics- A manual of statistical methods for use in health and nutrition. New Delhi: Jaypee brothers Medical Publishers.

l. WFP/ UNHCR (1998) WEP/ UNHCR Guidelines for Selective Feeding Programmes in Emergency Situations. Rome and Geneva: WEP & UNHCR.

m. Willett, W. 1983. Nutritional epidemiology. New York: Oxford University Press.

2. Magazines and Journals

a. **https://www.jepublichealth.com/index.php/jepublichealth**

b. **https://www.cambridge.org/core/journals/public-health-nutrition**

3. Websites

a. https://www.unscn.org/en/topics/un-decade-of-action-on-nutrition

b. **https://www.nin.res.in/**

4. Other Electronic Resources

a. **https://main.icmr.nic.in/**

b. **https://www.mohfw.gov.in/**

10. Course Organization:

Course Code	FNC508A	
Course Title	Public health nutrition and Epidemiology	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

Approved by the Academic Council at its 30th Meeting held on 11th December 2023

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Course Specifications: Applied Food Science and Functional Food Development

Course Title	Applied Food Science and Functional Food Development
Course Code	FNC510A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

The course aims at preparing students to work efficiently in functional food and nutraceutical-oriented food industry. The course familiarizes the students with functional constituents of food, concepts underlying its processes to enhance existing product and create new one with maximum nutrient retention using latest technology. Students will be able to understand the theory and science of quality product development encompassing basics of market research, IPR management, licensing, processing and preservation, packaging and distribution.

2. Course Size and Credits:

Number of Credits	01+02
Total Hours of Classroom Interaction	15
Number of laboratory Hours	60
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	As per University Regulations
Attendance Requirement	As per University Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After undergoing this course students will be able to:

CO-1. Understand the effect of processing treatment on functional ingredients.

CO-2. Critically discuss steps involved in developing or improving functional food product.

CO-3. Define and rationalize development of new or improved functional food products and influence of future trends.

CO-4. Design concept, prototype and pilot scale up of a product.

CO-5. Integrate the concept of IPR, food licensing and regulations with product development.

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4. Course Contents:

Unit I:

Unit operations: Raw material preparation, size reduction, separation and concentration of food components.

Unit II:

Effect of processing on functional ingredients: Application of heat: Theory, processing, equipment, effect on food texture, colour, flavour and nutritional value of functional ingredients. Effect of low temperature processing: Theory, processing, equipment, effect on food texture, colour, flavour and nutritional value of functional ingredients.

Unit III:

New Technologies for functional food manufacture: – microencapsulation, nano-encapsulation, emulsion delivery system, sub and supercritical fluid-based products.

Unit IV:

Basic concepts of new product development: Market research, consumer dynamics, social and health concerns. Steps in product development and standardization. Sensory evaluation, shelf life stability, packaging and labeling. Marketing of new food products. Food safety, FSSAI licensing and regulations.

Unit V:

Food product design: Statistical approach. Basic Concepts of Food Process Design. Selection of Suitable Models. Black box modeling. Food process modeling and optimization. Response surface methodology.

Unit VI:

Intellectual property rights (IPR): Procedure for filing patent, procedure for technology transfer. Trademark registration, copyright infringement, trade secret and design rights.

Practicals:

Covers the following aspects of product development.

1. Hands on training – statistical software, RSM
2. Market survey and techno-economic Feasibility
3. Prototype of product
4. Pilot plant scale-up
5. Process Design
6. Analysis and self-life study
7. Cost calculation, detailed project report (DPR) preparation

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5. CO-PO PSO Mapping:

	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3	1							3	2		
CO-2		3	2							3		
CO-3		3	2						2	3		
CO-4		2		3						3		2
CO-5			2					3			2	2
	3: High Influence, 2: Moderate Influence, 1: Low Influence											

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		15
Demonstrations		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		49
1. Course Laboratory	49	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		01
1. Case Study Presentation	01	
2. Guest Lecture		
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions		
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		08
Total Duration in Hours		**75**

Approved by the Academic Council at its 30th Meeting held on 11th December 2023

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7. Course Assessment

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed					
	CE (50% Weightage)			SEE (50% Weightage)	
	SC1	SC2	SC3	SEE Theory	SEE Lab
	50 Marks	25 Marks	25 Marks	100 Marks	50 Marks
CO-1	x	-	x	x	x
CO-2	x	-	x	x	x
CO-3	-	x	x	x	x
CO-4	-	x	x	x	x
CO-5	-	x	x	x	x

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	--
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources:

1. **References**

a. Fuller, G.W. 1994. New Food Product Development: From Concept to Market place CRC Press, New York.
b. Lyon, D.H.; Francombe, M.A.; Hasdell, T.A.; Lawson, K. (eds). 1992. Guidelines for Sensory Analysis in Food Product Development and Quality Control. Chapman and Hall, London.
c. Moskowitz, H.R. 1985. New Directions for Product Testing and Sensory Analysis of Foods. Food and Nutrition Press, Connecticut.
d. Ruguo Hu. 1999. Food Product Design: A Computer-Aided Statistical Approach. CRC Press.
e. Smith, J. and Charter, E. 2011. Functional Food Product Development. Germany, Wiley

2. **Magazines and Journals**

a. Journal of food Science
b. Journal of Food Science and Technology

3. **Websites**

a. www.fssai.gov.in
b. www.pubmed.com

4. **Electronic media**

a. www.pgpaathsala.com

10. Course Organization:

Course Code	FNC510A	
Course Title	Applied Food Science and Functional Food Development	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

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Course Specifications: Applied Food Microbiology

Course Title	Applied Food Microbiology
Course Code	FNC511A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

Aim of this course is to comprehend various microbiological examinations and study of different food born infections and diseases. The students will be able to understand the factors affecting the microbial growth in foods and microbiological examinations. They will also learn the food preservation and application. The course will also educate students regarding Quality Control/Quality Assurance Legislation for food safety and knowledge of media preparation, staining and isolation techniques.

2. Course Size and Credits:

Number of Credits	03+01
Total Hours of Classroom Interaction	45
Number of laboratory Hours	30
Number of Semester Weeks	16
Department Responsible	Food Technology
Course Marks	As described in the program specification
Pass Requirement	As per University Regulations
Attendance Requirement	As per University Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After undergoing this course students will be able to:

CO-1. Explain the techniques of microbiological examination.
CO-2. Describe the microflora of fresh food and food preservation technologies.
CO-3. Discuss quality control/quality assurance Legislation for food safety.
CO-4. Prepare various media for cultivation of microorganisms.
CO-5. Demonstrate staining, isolation and bacteriological analysis.

4. Course Contents

Unit I:

Microorganisms in food. Overview: History, scope and importance of food microbiology. Primary sources of microorganisms in foods: Airborne bacteria and fungi, microorganisms in water. Normal flora of skin, nose, throat and GI tract.

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Unit II:

Factors affecting the survival and growth of microorganisms in food: Intrinsic factors for growth: moisture, pH & acidity, nutrient content, redox potential. **Microflora of Fresh Food:** Meat, Poultry, Eggs, Fruits and vegetable, Shellfish and Finish, Milk. Microbial Spoilage of: Food, Flesh Foods, Fresh Milk, Canned Foods.

Unit III:

Naturally occurring and added antimicrobials: Competitive micro flora, extrinsic factors for growth: effect of time/temperature conditions on microbial growth, storage/holding conditions and processing steps.

Unit IV:

Microbiological examination: Methods of isolation and detection of microorganisms or their products in food. Conventional methods, Rapid methods: Emerging techniques, immunological methods, fluorescent, antibody, radio immunoassay, ELISA etc. Chemical methods: PCR (Polymers chain reactions), RT PCR, Microchip based techniques.

Unit V:

Food Preservation and application to different types of preservation: Physical methods: drying, freeze, drying cold storage, heat treatments (pasteurization), TDT, TDP, Irradiation (UV, microwave, ionization), high pressure processing. Chemical preservatives and Natural antimicrobial compounds. Biologically based preservation systems.

Unit VI:

Food borne infections and diseases: Significance to public health. Food hazards and risk factors. Bacterial and viral food-borne disorders. Food borne important animal parasites. Mycotoxins, *Bacillus, Campylobacter, Brucella, Staphylococcus, Clostridium, E.coli, Aeromonas, Vibrio cholerae, Listeria, Mycobacterium, Salmonella, Shigella.*

Unit 7:

Quality Control/Quality Assurance Legislation for food safety: National and international criteria, sampling schemes, records, risk analysis QC- microbial source, code Indicators of food safety and quality: Microbiological criteria of foods and their significance. **Food Safety.** The HACCP system and food safety used in controlling microbiological hazards.

Practicals:

1. Preparation of common laboratory media and special media for cultivation of bacteria, yeast & molds.
2. Staining of Bacteria: Gram's staining, acid -fast, spore, capsule, Motility of bacteria, staining of yeast and molds.

3. Isolation of microorganisms: Different methods and maintenance of cultures of microorganisms.
4. Bacteriological analysis of Foods using conventional methods
5. Coli forms analysis of milk and water samples
6. To perform various biochemical tests used in identification of commonly found bacteria in foods: IMVIC urease, H 2S, Catalase, coagulase, gelatin and fermentation (Acid/gas)
7. Determination of thermal death characteristics of bacteria
8. Demonstration of available rapid methods and diagnostic kits used in identification of microorganisms or their products
9. Visits to food processing unit or any other organization dealing with methods in food microbiology.

5. CO-PO PSO Mapping:

	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3	2							3			
CO-2	2	3							3	2		
CO-3	3		1						3	2		
CO-4	3	2							3	2		
CO-5	3	2								3		
3: High Influence, 2: Moderate Influence, 1: Low Influence												

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		32
Demonstrations		01
1. Demonstration using Videos	01	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		30
1. Course Laboratory	30	
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop /		

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Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		04
1. Case Study Presentation	01	
2. Guest Lecture	01	
3. Industry / Field Visit	01	
4. Brain Storming Sessions		
5. Group Discussions	01	
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		08
Total Duration in Hours		**75**

7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.
The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed					
	CE (50% Weightage)			**SEE (50% Weightage)**	
	SC1	**SC2**	**SC3**	**SEE Theory**	**SEE Lab**
	50 Marks	25 Marks	25 Marks	100 Marks	50 Marks
CO-1	X	-	-	X	X
CO-2	X	X	-	X	X
CO-3	X	X	X	X	X
CO-4	-	-	X	X	X
CO-5	-	-	X	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	Assignment
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources:

1. References

a. Atlas, M. Ronald. 1995. Principles of Microbiology. 1st Ed. Mosby Yearbook, Inc, Missouri, U.S.A.

b. Pelczar, MJ, Chan, E C S and Noel RK. 1993. Microbiology: concepts and applications. 6th Ed. McGraw Hill Book Company, New York.

c. Topley WWC, Wilson GS, Parker MT, Collier LH. 1990. Topley and Wilson's principles of bacteriology, virology, and immunity. 6th Ed. London, Arnold.

d. William C Frazier, Dennis C Westoff, K N Vanitha. 2001. Food Microbiology. 5th Ed. McGraw Hill Inc.

2. Magazines and Journals

a. https://www.icmsf.org/

b. https://link.springer.com/journal/13197

c. Journal of food science and technology

3. Websites

a. https://www.microbes.info/resources/4/food-microbiology

4. Other Electronic Resources

a. https://fssai.gov.in/upload/uploadfiles/files/Manual%20on%20Microbiological%20Examination%20of%20Food%20and%20Water_compressed.pdf

10. Course Organization:

Course Code	FNC511A	
Course Title	Applied Food Microbiology	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

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Course Specifications: Research Methodology and Biostatistics

Course Title	Research Methodology and Biostatistics
Course Code	FNC512A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

The course aims at providing students with an insight into the research methodology and the associated responsibilities of a researcher. This course deals with the principles of research, research methodology, significant phases of research, role of systematic literature Review. The course will also cover essential aspects of technical communication to develop effective scientific writing skills and presentation skills to communicate research findings effectively with the public.

2. Course Size and Credits:

Number of Credits	03+01
Total Hours of Classroom Interaction	45
Number of laboratory Hours	30
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After the successful completion of this course, the student will be able to:

CO-1. Identify methods of research in nutrition and their design strategies.

CO-2. Discuss statistical tools and their application in analysis and interpretation of result.

CO-3. Describe the scope, relevance and mandatory steps of research.

CO-4. Demonstrate strict adherence to ethical norms and standards in research.

CO-5. Develop well-structured research proposal and technically communicate the research findings.

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4. Course Contents:

Unit I:

General Research Methodology. Research – Meaning, objectives and importance, Types of Research, quantitative and qualitative research in nutrition and dietetics. Research design: Types of research designs. Sampling methods and sample size.

Unit II:

Biostatistics. Definition, application, descriptive statistics, probability and random variation, sampling, hypothesis testing, proportions, measures of frequency, t-tests, chi-square tests, analysis of variance, correlation and regression analysis, nonparametric statistical tests. Types of error and their implication on research. Confidence interval, significance of p value.

Unit III:

Design strategies in research. Descriptive studies, Analytical studies, epidemiological research design. Bias in research, confounding effect.

Unit IV:

Research tool and data collection. Primary and secondary methods of data collection, Different types of questionnaires, Attitude scales, rating scales, check lists, schedules, inventories, standardized tests, interviews, observation. Tools: development of tools, reliability and validity of tools, administration of tools for data collection, procedure of data collection.

Unit V:

Tabulation, organization, and analysis of data. Representation, cleaning and coding, baseline correction of data, data processing, and analysis of both qualitative and quantitative data.

Unit VI:

Research Proposal. Identification of research gap, research proposal, problem statement, identification of variables and their types. Structure of good research proposal: writing a grant, Tips for compilation, budgeting, ethical approval, ethical principles and decision making in research, guidelines for authorship, plagiarism.

Unit VII:

Technical Communication. Research Paper for Publication- Significance of Problem Statement and its scope, Formulation of Hypothesis, Adequacy of Methodology, Significance of Presentation and Discussion of Results, Relevance and Importance of references, Introduction to metanalysis and systematic review.

Unit VIII:

Tools and languages in Statistics. Basics of SAS, SPSS, OriginPro.

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Practical Experiments

1. Writing a Research Paper: Structure and Requirements
2. Writing a Research Grant
3. Referencing: Citations & Bibliography using Mendley
4. Conducting a Survey / Data Collection via Online Tools
5. Construction of Graphs for Linear Data (Line & Bar diagrams, Histograms, Pie diagrams)
6. Construction of Graphs for Larger Data (Scatter Plot, Dot Plot, Heat Map)
7. Construction of Graphs using OriginPro
8. Correlation and Regression using MS Excel
9. Mean, Median, Mode, Standard Deviation, Skewness and Kurtosis
10. Performing T-Test using MS Excel

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3		2						2			3
CO-2		3	2							2		3
CO-3	3										3	2
CO-4		2				1					1	3
CO-5	2							3			3	2
3: High Influence, 2: Moderate Influence, 1: Low Influence												

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		33
Demonstrations		
1. Demonstration using Videos		
2. Demonstration using Physical Models		
3. Demonstration on a Computer		

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Numeracy		
1. Solving Numerical Problems		
Practical Work		30
1. Course Laboratory	26	
2. Computer Laboratory	04	
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		04
1. Case Study Presentation	02	
2. Guest Lecture		
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	02	
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		08
Total Duration in Hours		**75**

7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed					
	CE (50% Weightage)			**SEE (50% Weightage)**	
	SC1	**SC2**	**SC3**	**SEE Theory**	**SEE Lab**
	50 Marks	25 Marks	25 Marks	100 Marks	50 Marks
CO-1	X	-	-	X	X
CO-2	X	-	-	X	X
CO-3	-	X	X	X	X
CO-4	-	X	X	X	X
CO-5	-	-	X	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures, Assignments
2.	Understanding	Class room lectures, Assignments
3.	Critical Skills	Assignments, Seminar
4.	Analytical Skills	Assignments, Seminar
5.	Problem Solving Skills	--
6.	Practical Skills	Laboratory Exercises
7.	Group Work	--
8.	Self-Learning	Assignment
9.	Written Communication Skills	Assignment, Class Tests
10.	Verbal Communication Skills	--
11.	Presentation Skills	Assignment, Seminar
12.	Behavioral Skills	--
13.	Information Management	Seminar, Assignment
14.	Personal Management	--
15.	Leadership Skills	--

9. Course Resources:

1. References

a. Kothari, CR. 2004. Research Methodology, Methods & Techniques, 2nd ed. New Age International Publishers.

b. Rao, K. V. 2007. Biostatistics - A Manual of Statistical Methods for use in Health Nutrition and Anthropology. Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.

c. Dawson-Saunders, B and Trapp, RG. 1990. Basic and clinical biostatistics. Appleton and Lange, Connecticut.

d. Rohatgi, V.K. & Saleh, A.K. 2001. An Introduction to Probability and Statistics, John Wiley & Sons.

e. Rugg G. and Petre M. 2004. The Unwritten Rules of Ph.D research, Open University. McGraw-Hill Education, England.

f. https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm
g. World Health Organization. 2011. Standards and operational guidance for ethics review of health-related research with human participants.
h. World Medical Association (WMA). 2008. Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects.

10. Course Organization:

Course Code	Research Methodology and Biostatistics		
Course Title	FNC512A		
Course Leader/s Name		Allotted as per time table	
Course Leader Contact Details		**Phone:**	080-49066666
		E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date		Dec 2023	
Next Course Specifications Review Date		June 2025	

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Semester-III

Course Specifications: Nutrition Counselling and Entrepreneurship

Course Title	Nutrition Counselling and Entrepreneurship
Course Code	FNC601A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

Aim of this course is to introduce students to understand the concept and practice of entrepreneurship in integration with food and nutrition. This course aims to promote entrepreneurial thinking and skill set, basic financial management, art and science of communicating and counseling to modify behavioral eating pattern and rapport building with individuals. Students will be encouraged to practice counseling individuals, participate in nutrition awareness campaigns via social media, adopting mass media technology to enhance the idea of healthy lifestyle guidance.

2. Course Size and Credits:

Number of Credits	03+01
Total Hours of Classroom Interaction	45
Number of laboratory Hours	30
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per University Regulations
Attendance Requirement	As per University Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After undergoing this course students will be able to:

CO-1. Understand the principles and procedures of nutrition counseling and the role of counselor.

CO-2. Learn various counseling techniques.

CO-3. Develop an understanding how acute and chronic disease affects the short term and long term emotional and psychological state and behavior of the individuals.

CO-4. Use various types and techniques of counseling to motivate patients to achieve well-being.

CO-5. Develop entrepreneurial skills to create business plan and become successful nutripreneurs.

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4. Course Content:

Unit I:

Overview of Counselling: Definition, Expectations, goals, scope and limits. Counsellor – Characteristics of an effective counselor. The Client – Characteristics, expectations. Behaviour modification therapies – Cognitive behavioural therapy (CBT), Rational-Emotive Therapy, PRECEDE-PROCEED Model. The Counselling Process: Techniques for obtaining relevant information – Clinical Information, Medical History and General Profile, Dietary Diagnosis, Assessing food and nutrient intakes, Lifestyles, physical activity, stress, Nutritional Status. Correlating relevant information and identifying areas of need – Stage I: Problem exploration and clarification, Stage II: Developing new perspectives and setting goals, Stage III: Implementation follow up and evaluation.

Unit II:

Counselling Theories and Approaches: Systems approach to nutrition counseling, Key Concepts and Techniques, Counselling techniques, strategies and communication skills. Rapport building and opening techniques, Questioning, listening, reflecting, acceptance, silence, leading reassurance, non-verbal behavior, terminating skills, counseling spectrum. Group Counselling.

Unit III:

Conducting counselling sessions for given condition Working with Hospitalized patients: (adults, pediatric, elderly, and handicapped), adjusting and adopting to individual needs. Outpatients' (adults, pediatric, elderly, and handicapped) and patients' education, techniques and modes. Follow up, monitoring and evaluation of outcome: home visits. Art of motivational counseling.

Unit IV:

Nutrition entrepreneurship: Definition and qualities of entrepreneur. Designing persuasive, health promotion programs. Introduction to graphic and web designing, tools involved. Creating persuasive online content. Art of Online and telephonic counseling: Concept and Tools: Funding, financial and accounts management, client appointment, legal structure, management skills needed to run an entrepreneur venture.

Practicals:

1. Develop website
2. Weekly short blog writing assignment
3. Make a script depicting conversation between counselor and client to develop interviewing and counseling skills
4. Counseling in the management of obesity and overweight
5. Nutrition counseling in prevention and treatment of coronary heart disease
6. Nutrition counseling in treatment of diabetes
7. Nutrition counseling in treatment of hypertension
8. Nutrition counseling for cancer risk prevention
9. Innovative business idea pitching

5. CO-PO PSO Mapping:

	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO 2	PSO 3	PSO4
CO-1	3								3	1		
CO-2		3		2						3	2	
CO-3			1	2						3	2	
CO-4		3	2			1					3	
CO-5				3							2	3
	3: High Influence, 2: Moderate Influence, 1: Low Influence											

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		30
Demonstrations		01
1. Demonstration using Videos	01	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		30
1. Course Laboratory	25	
2. Computer Laboratory	05	
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		06
1. Case Study Presentation	02	
2. Guest Lecture	01	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	03	
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		08
Total Duration in Hours		**75**

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7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed					
	CE (50% Weightage)			SEE(50% Weightage)	
	SC1	SC2	SC3	SEE Theory	SEE Lab
	50 Marks	25 Marks	25 Marks	100 Marks	50 Marks
CO-1	X	-	-	X	X
CO-2	X	X	-	X	X
CO-3	X	X	X	X	X
CO-4	-	-	X	X	X
CO-5	-	-	X	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	Assignments, Examination
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment, Class Presentations
8.	Self-Learning	Assignment, Self-study
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	Class Presentations
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

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9. Course Resources:

1. References

a. American Dietetic Association. 2008. International Dietetics and Nutrition Terminology (IDNT) Reference Manual Standardized Language for the Nutrition Care Process. Chicago: ADA.
b. Curry, R.K. and Jaffe, A. (1998): Nutrition Counselling and Communication Skills, W.B. Saunders Co. London.
c. Davis JS and Cohen M. 2011. The 24-Hour Turnaround. How Amazing Entrepreneurs Succeed in Tough Times. Happy About Publishing.
d. Derby J. 2019. Writing the Winning Business Plan for Entrepreneurs.
e. Gable, J. 1997. Counselling Skills for Dietitians, Blackwell Science.
f. Holli, B.B. and Beto, J.A. (2020): Communication and Education Skills for Dietetics Professionals. 7th edition. Lippin Cott Williams & Wilkins, New York.
g. Hosking, G. and Powell, R. (1985): Chronic Childhood Disorders; Wright, Bristol.
h. O'Deughterty, M.M. (1983): Counselling the chronically ill child; The Lewis Publishing Co. Verment.
i. Ries E. 2011. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business.
j. Snetselaar, Linda G. 2009. Nutrition counseling skills for the nutrition care process. 4th edition, Jones and Bartlett Publishers.
k. Sturt J et al. 2015. Effective interventions for reducing diabetes distress: systematic review and meta-analysis. *Int Diabetes Nurs*. 12:40-55.
l. Mark Dodgson, David Gann and Ammon Salter. 2008. The Management of Technological Innovation Strategy and Practice. 1st Edition. UK, Oxford University Press.
m. Narayanan V K. 2003. Managing Technology and innovation for Competitive Advantage. 2nd edition. USA, Pearson Education.

2. Magazines and Journals

a. https://journals.sagepub.com/home/fnb
b. https://www.eatrightstore.org/cpe-opportunities/food-and-nutrition-magazine
c. https://www.todaysdietitian.com/2021archive.shtml

3. Websites

a. https://nin.res.in/
b. https://www.who.int/
c. https://www.nutrition.gov/

10. Course Organization:

Course Code	FNC601A	
Course Title	Nutrition Counseling and Entrepreneurship	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

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Course Specifications: Group Project

Course Title	**Group Project**
Course Code	FNP601A
Department	Food Technology
Faculty	Life and Allied Health Sciences

1. Course Summary:

This Course is intended to contemplate an insight to the students on application of principles of research methodology, preparation of research project proposal, research project management, execution of research project and effective technical communication and presentation. It also emphasizes the need and the relevance of a structured approach to identify a research topic and undertake research.

This course provides an opportunity for students to apply theories and techniques learnt during programme work. It involves in-depth work in the chosen area of study.

2. Course Size and Credits:

Number of Credits	10
Total Hours of Classroom Interaction	-
Number of Laboratory Hours	240 hours
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per University Regulations
Attendance Requirement	As per University Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After the successful completion of this course, the student will be able to:

CO-1. Critically review scholarly literature collected from various sources for the project purpose and formulate a research problem.

CO-2. Prepare and present a research proposal.

CO-3. Conduct research to achieve research objectives.

CO-4. Propose new ideas/methodologies or procedures for further improvement of the research undertaken.

CO-5. Create research document and write research papers for publications.

CO-6. Defend the research findings in front of scholarly audience

4. Course Contents:

1. Scientific research proposal: Need and rationale for undertaking a project, problem identification, development of project, evaluation and presentation.
2. Effective Project Management
3. Costing, Finance Management, Raw material Procurement, Product Development, Testing, Project Evaluation, Exhibition, Presentation
4. Team building, Teamwork, Leadership skills

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	1	1								2	3	
CO-2		2						3		2	3	
CO-3	2		2								3	
CO-4			2								3	
CO-5								3			3	
CO-6								3			3	
	3: High Influence, 2: Moderate Influence, 1: Low Influence											

6. Course Teaching and Learning Methods:

Topics	Teaching methods	Hours
Critical Review, Problem Formulation and stating Objectives	Reading Journal papers, books and Other relevant materials and problem formulation	80
	Presentation to Reviewers	04
Design	Group work with supervisor's guidance	25
Analysis	Group work with supervisor's guidance	25
Testing and Evaluation	Group work with supervisor's guidance	20
Verification/Validation	Group work with supervisor's guidance	25
Drawing Conclusions	Group work with supervisor's guidance	05
Presentation , Thesis/Report Writing and Viva Voce	Presentation and Viva voce-Group	01
	Thesis/Report writing - Group	50
Tests/Examinations/Presentations		05
Total		240

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7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed			
	Interim Presentation (50% Weightage)	Final Presentation (50% Weightage)	
	Presentation	Presentation	Project Report Writing
	50 Marks	25 Marks	25 Marks
CO-1	X	-	X
CO-2	X	-	X
CO-3	X	-	X
CO-4	-	X	X
CO-5	-	X	X
CO-6	-	X	X

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Group Project work
2.	Understanding	Group Project work
3.	Critical Skills	Group Project work
4.	Analytical Skills	Group Project work
5.	Problem Solving Skills	Group Project work
6.	Practical Skills	Group Project work
7.	Group Work	Group Project work
8.	Self-Learning	Group Project work
9.	Written Communication Skills	Report writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Group Project work
13.	Information Management	Group Project work
14.	Personal Management	Group Project work
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources:

Essential Reading

Assigned reading relevant to the group project.

10. Course Organization:

Course Code	FNP601A	
Course Title	Group Project	
Course Leader/s Name		Allotted as per time table
Course Leader Contact Details		**Phone:** 080-49066666
		E-mail: hod.ft.ls@msruas.ac.in
Course Specifications Approval Date		Dec 2023
Next Course Specifications Review Date		June 2025

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Semester- IV

Course Specifications: Dissertation and Publication

Course Title	Dissertation and Publication
Course Code	FNP602A
Department	Food Technology
Faculty	Life and Allied Health Sciences

1. Course Summary:

This course is intended to give students hands on experience of working in various institutions related to the area of food science, nutrition and dietetics. Course will also help students to develop professional acumen in various settings.

2. Course Size and Credits:

Number of Credits	25
Total Hours of Classroom Interaction	-
Number of Laboratory Hours	640 hrs
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per University Regulations
Attendance Requirement	As per University Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1 Integrate theory and practice at workplace in assigned job functions.

CO-2 Assess career options, interests and abilities in their field of study to achieve professional and educational advancement.

CO-3 Exhibit critical thinking and problem solving skills by analyzing underlying issue/s to challenges.

CO-4 Develop right work attitude, inter-personal skills and ability to work as a team by engaging harmoniously with different stakeholders.

CO-5 Prepare and present case study/report.

4. Course Contents

The Dissertation will cover the following:

1. Students will be promoted, based on their interests, to take up internship or

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dissertation.

2. Dissertation will cover - defining / identification of the research problem, literature review/ retrieval and review, framing research methodology, problem solving - evaluation, interpretations and drawing conclusions, proposing ideas or methods for further work, thesis writing, oral presentation/viva voce.
3. Internship will comprise of – Hands on training in any organization of interest. At the end of internship, students are required to make a presentation and submit a hard-bound report.

Publishing will cover the following:

1. Journal / Conference Identification
2. Writing journal paper based on research findings
3. Submission to Journal / Conference

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1		3	2								3	
CO-2							1					3
CO-3		2	2							3	2	
CO-4						2		3				3
CO-5								3			3	
	3: High Influence, 2: Moderate Influence, 1: Low Influence											

6. Course Teaching and Learning Methods:

Topics	Teaching methods	Hours
Information search, retrieval and review, Project definition and project planning	Reading Journal papers, books and other relevant materials and problem formulation	100
	Presentation to Reviewers	40
Use of methodology and execution of experiments	Individual work with supervisors guidance	160
Problem solving and Evaluation	Individual work with supervisors guidance	110
Interpretations and drawing conclusions	Individual work with supervisors guidance	50
Proposing ideas or methods for further work	Individual work with supervisors guidance	20

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Presentation, Thesis/Report Writing and Viva Voce, Authoring Research paper	Thesis/Report writing, Authoring research paper	100
	Presentation and Viva voce	10
	Paper Publication	50
	Total	640

7. Course Assessment 2:

There are two components for assessment in this Course:

Component-1: 50% weightage

Presentations (Pre, Interim and Final with Viva-Voce and submission of research paper).

Component-2: 50% weightage

Project Thesis (will be moderated by a second examiner) and Paper publication presentation to peer-team.

The assessment questions are set to test the learning outcomes. In each component a certain learning outcomes are assessed. The following table illustrates the focus of learning outcome in each component assessed:

Focus of Course Learning Outcomes in each component assessed		
	CE (50% weightage)	SEE (50% weightage)
	Presentations (150 Marks)	Presentation, Report and Publication (150 Marks)
CO-1	X	X
CO-2	X	X
CO-3	X	X
CO-4	X	X
CO-5	-	X
CO-6	-	X

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8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Dissertation work
2.	Understanding	Dissertation work
3.	Critical Skills	Dissertation work
4.	Analytical Skills	Dissertation work
5.	Problem Solving Skills	Dissertation work
6.	Practical Skills	Dissertation work
7.	Group Work	Dissertation work
8.	Self-Learning	Dissertation work
9.	Written Communication Skills	Report writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Dissertation work
13.	Information Management	Dissertation work
14.	Personal Management	Dissertation work, Report writing, Presentation
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources:

1. Essential Reading

a. Lecture Sessions on Dissertation, Thesis Preparation delivered by the concerned Head of Department
b. Regulatory guidelines

2. Websites

a. www.pubmed.com
b. www.ncbi.com

10. Course Organization:

Course Code	FNP602A	
Course Title	Dissertation and Publication	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

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ELECTIVE – I

Course Specifications: *Nutrition in Sports and Exercise*

Course Title	Nutrition in Sports and Exercise
Course Code	FNE501A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

Aim of this course is to let students help people of all ages, optimize their movement and performance, prevent future risk of diseases and contribute in greater well-being. Students will be understanding the importance of nutrition in sports and optimal use of nutrients to improve exercise/athletic performance. Course will also demonstrate behavioral strategies for improving dietary habits, safe use of supplements and ergonomic aids.

2. Course Size and Credits:

Number of Credits	03+0
Total Hours of Classroom Interaction	45
Number of laboratory Hours	0
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per University Regulations
Attendance Requirement	As per University Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After undergoing this course, students will be able to:

CO-1. Understand the integrated functions of musculoskeletal systems in controlling movement.

CO-2. Discuss the concept of fitness and exercise in prevention and management of chronic degenerative diseases.

CO-3. Explain the special nutritional requirements for physical activities related to sports and exercise.

CO-4. Apply the knowledge of nutrition and hydration to improve the health and performance of sportspersons.

4. Course Contents:

Unit I:

Introduction to skeletomuscular system: Define kinesiology. Physiology of skeletal system – bone cells, bone formation and remodeling, types of joints. Physiology of muscle tissue – structure and function. Muscle fibre types – Fast twitch and slow twitch fibers. Mechanism of

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muscle action and relaxation. Training muscles to become stronger – resistance training, aerobic training, strength training. Muscle soreness and stiffness.

Unit II:

Neuromuscular Basis of Human Motion: Fundamentals of biomechanics. Endocrine response to exercise training.

Unit III:

Role of exercise and nutrition in fitness of sports persons: Classification of sports activities, Body Composition of Sports Persons. Types of exercises – aerobic and anaerobic; Endurance and resistance exercise. Energy systems, exercise and thermal stress. Effect and markers of aerobic and aerobic exercise training and intensity on pulmonary and cardiovascular fitness. Role of exercise in the prevention and management of chronic degenerative diseases-Obesity, Diabetes, CVD, Cancer, Bone health etc. Guidelines for physical activity – sedentary adults, elderly and cardiac patients. Effect of malnutrition on body composition and exercise performance.

Unit IV:

Role of nutrition in sports fitness and performance during training (before competition): Exercise and energy demands. Utilization of Carbohydrates - Type & Timing of carbohydrate ingestion, Glycogen loading techniques; Protein – requirements for sports person and role in endurance, strength and aerobic exercises; fat – fat loading, strategies to enhance fat utilization during training. Micronutrients, Hydration strategies and electrolyte needs for optimum sports performance – symptoms and results of dehydration, fluid replacement guidelines. Nutritional problems of athletes.

Unit V:

Nutrition needs for competition: Preparation for competition. Diet and hydration during competition. Post event recovery. Competitive and training stress in sports – physiological loading, spinal loading, physical loading, psychological loading. Supplements and sports foods, Ergogenic Aids – use and concerns. Doping issues. Recent guidelines of WADA.

Unit VI:

Definition and domains of fitness: Physical, Mental, Social & Spiritual domains of fitness. Health oriented components – cardiovascular endurance, muscular strength, muscular endurance, flexibility, and body composition. Skill oriented components-agility, balance, coordination, power, reaction time, and speed. Factors influencing Physical fitness – Role of exercise and nutrition in Physical fitness. Psychological Fitness, stress- Causes, consequences & strategies of management.

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5. CO-PO PSO Mapping:

	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3		1						3	2		
CO-2	2	3	1		1				3	2		
CO-3		3	2				1			3	2	
CO-4		3		1							3	1
3: High Influence, 2: Moderate Influence, 1: Low Influence												

6. Course Teaching and Learning outcome:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		32
Demonstrations		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		06
1. Case Study Presentation	02	
2. Guest Lecture	02	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	02	
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		05
Total Duration in Hours		45

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7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed				
	CE (50% Weightage)			SEE (50% Weightage)
	SC1	SC2	SC3	SEE Theory
	50 Marks	25 Marks	25 Marks	100 Marks
CO-1	X	X	X	X
CO-2	X	X	X	X
CO-3	X	X	X	X
CO-4	-	-	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	Assignment
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

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9. Course Resources:

1. References

a. Burke LM, A Loucks, N Broad. 2006. Macronutrients and energy for training and recovery. Journal of sports science. 24:7, 675-685.

b. Davies, A, Blakeley, G. H. and Kidd, C. 2001. Human Physiology, Harcourt Pub., 1st ed. Edinburgh: Churchill Livingstone.

c. Maughan, R.J. and Burke, LM. 2002. Handbook of sports medicine and science: Sports nutrition. Blackwell Science Ltd.

d. Mc Ardle WD, Katch FI, Katch VL. 1996. Exercise physiology- Nutrition and Human performance. 4th edition.

e. Meeusen R, P Watson, J Dvorak. The brain and fatigue: new opportunities for nutrition interventions.

f. Waugh, A. and Grant, A. 2006. Anatomy and Physiology in Health and illness. 10th Ed. Churchill Livingstone.

2. Magazines and Journals

a. https://journals.humankinetics.com/view/journals/ijsnem

b. https://www.allsportsjournal.com/

c. https://www.journalofsports.com/

3. Websites

a. https://mtsac.libguides.com/SportsNutrition

b. https://www.nutrition.gov/topics/basic-nutrition/eating-exercise-and-sports

c. https://pubmed.ncbi.nlm.nih.gov/

d. https://nin.res.in/

4. Other Electronic Resources

https://www.acsm.org/education-resources/trending-topics-resources/nutrition

10. Course Organization:

Course Code	FNE501A	
Course Title	Nutrition in Sports and Exercise	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

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Course Specifications: Innovation and Entrepreneurship

Course Title	Innovation and Entrepreneurship
Course Code	FNE502A
Department	Food Technology
Faculty	Life and Allied Health Sciences

1. Course Summary:

This course aims to enable students with product innovation management and entrepreneurial development. The students are taught the concepts of product life cycle management, technological innovation, business opportunity identification, enterprise establishment and development.

2. Course Size and Credits:

Number of Credits	03+0
Total Hours of Classroom Interaction	45
Number of Tutorial Hours	0
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per University Regulations
Attendance Requirement	As per University Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After the successful completion of this course, the student will be able to:

CO-1. Describe the phases of product life cycle and role of innovation in product management.

CO-2. Discuss the entrepreneurial traits and characteristics of an enterprises / businesses.

CO-3. Identify opportunities for new product development.

CO-4. Apply product and innovation management concepts for product development process.

CO-5. Assess innovative ideas and strategies for nurturing an enterprise.

4. Course Contents:

Unit I:

Product Life Cycle and Strategy: Phases of Product lifecycle, Product development processes and methodologies, Core functions, Functional applications, Product lifecycle management (PLM), Introduction to Product Data Management (PDM), PDM objectives,

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PDM benefits, PDM systems, PDM implementation.

Unit II:

Technological Innovation: Types and extent of innovation, Incremental and radical innovation, sources of innovation, measuring innovation & outcomes of innovation

Unit III:

Innovation Strategy; Types of Innovation Strategy, Formulating Innovation Strategy, Building Innovation Capabilities & Returns from Innovation Strategies, Frugal Engineering

Unit IV:

Entrepreneurial traits: Entrepreneurial types and characteristics of different entrepreneurial types and their positioning, Qualities and actions of entrepreneur, which influence the success and sustenance of business

Unit V:

Strategies for nurturing an enterprise: Sources of ideas and its recognition, Idea processing and institutions / NGOs supporting innovation, Search for business idea and commercialization

Unit VI:

Understanding the role and importance of entrepreneurial growth: Case studies of successful business houses. Fixed and working capital assessment for project report generation.

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3			2					3	2		
CO-2				3		2			1			3
CO-3		3	2	1					3			1
CO-4		3	2	1							3	2
CO-5			2	3								3

3: High Influence, 2: Moderate Influence, 1: Low Influence

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		32
Demonstrations		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop/ Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		06
1. Case Study Presentation	02	
2. Guest Lecture	02	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	02	
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		05
Total Duration in Hours		**45**

7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

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Focus of Course Learning Outcomes in each component assessed				
	CE (50% Weightage)			SEE(50% Weightage)
	SC1	SC2	SC3	SEE Theory
	50 Marks	25 Marks	25 Marks	100 Marks
CO-1	X	X	X	X
CO-2	X	X	X	X
CO-3	X	X	X	X
CO-4			X	X
CO-5			X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Assignments, Seminar
4.	Analytical Skills	Assignments, Seminar
5.	Problem Solving Skills	--
6.	Practical Skills	--
7.	Group Work	Presentation
8.	Self-Learning	Assignment
9.	Written Communication Skills	Assignment, Class Tests
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Assignment, Seminar
12.	Behavioral Skills	--
13.	Information Management	Seminar, Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

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9. Course Resources:

1. References

a. Kuratko, DF and Rao, TV. 2012. Entrepreneurship: A South Asian Perspective. 3rd edition. New Delhi, Cengage Learning India Pvt. Ltd

b. Mark Dodgson, David Gann and Ammon Salter. 2008. The Management of Technological Innovation Strategy and Practice. 1st Edition. UK, Oxford University Press.

c. Narayanan V K. 2003. Managing Technology and innovation for Competitive Advantage. 2nd edition. USA, Pearson Education.

10. Course Organization:

Course Code	FNE502A	
Course Title	Innovation and Entrepreneurship	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

Course Specifications: Nutraceuticals and Functional Foods

Course Title	Nutraceuticals and Functional Foods
Course Code	FNE503A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

The aim of this course is to familiarize students with the role of nutraceuticals and functional foods in health, disease and their importance in food processing industry. Students will be enabled to understand the concept of nutraceuticals, functional foods and their classifications. After undergoing this course students will be able to integrate the acquired knowledge in formulating functional foods for different disease conditions. Students will be educated regarding safety, adverse effects, toxicity, labeling and marketing issues associated with nutraceuticals and functional foods.

2. Course Size and Credits:

Number of Credits	03+0
Total Hours of Classroom Interaction	45
Number of laboratory Hours	0
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After the successful completion of this course, the student will be able to:

CO-1. Discover different nutraceutical and function food

CO-2. Describe the role of nutraceuticals and functional foods in health and disease

CO-3. Explain the role of nutraceuticals in angiogenesis

CO-4. Integrate the acquired knowledge in formulating functional foods

4. Course Contents

Unit-I:

Introduction to nutraceuticals and functional foods: Definitions, synonymous terms, basis of claims for a compound as a nutraceutical, classification of functional food and nutraceuticals, regulatory issues for nutraceuticals.

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Unit-II:

Nutraceuticals and functional foods for health and disease prevention: Sources, types and bioavailability of probiotics, prebiotics, bioactive peptides, bioactive lipids, phytochemicals, bioactive vitamins and minerals. Functional foods for immune, intestinal, bone and brain health. Functional foods for cancer, diabetes, cardiovascular disorders, osteo-arthritis, rheumatoid arthritis, osteoporosis, other inflammatory conditions, and obesity. Concept of angiogenesis and the role of nutraceuticals and functional foods.

Unit-III:

Antioxidants: Oxidative stress and free radicals - concept, causes and mechanisms of free radical formation, general biological effects of free radicals, biological defense systems, classification of food antioxidants.

Unit-IV:

Principles of designing functional foods: Lycopene, isoflavonoids, glucosamine, phytosterols, etc. Clinical testing of nutraceuticals and health foods, adverse effects and toxicity of nutraceuticals. Stability, analytical, labelling and marketing issues.

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3								3	2		
CO-2	3		2						3	2	1	
CO-3	3		1							3	2	
CO-4		3	1				1			3	1	
3: High Influence, 2: Moderate Influence, 1: Low Influence												

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		33
Demonstrations		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		

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1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		
1. Case Study Presentation	02	
2. Guest Lecture	02	
3. Industry / Field Visit		04
4. Brain Storming Sessions		
5. Group Discussions		
6. Discussing Possible Innovations		
Term Test and Written Examination		06
Total Duration in Hours		**45**

7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed				
	CE (50% Weightage)			**SEE (50% Weightage)**
	SC1	**SC2**	**SC3**	**SEE Theory**
	50 Marks	25 Marks	25 Marks	100 Marks
CO-1	X	-	-	X
CO-2	X	-	X	X
CO-3	-	X	X	X
CO-4	-	X	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

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8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures, Assignments
2.	Understanding	Class room lectures, Assignments
3.	Critical Skills	Assignments, Seminar
4.	Analytical Skills	Assignments, Seminar
5.	Problem Solving Skills	--
6.	Practical Skills	Laboratory Exercises
7.	Group Work	--
8.	Self-Learning	Assignment
9.	Written Communication Skills	Assignment, Class Tests
10.	Verbal Communication Skills	--
11.	Presentation Skills	Assignment, Seminar
12.	Behavioral Skills	--
13.	Information Management	Seminar, Assignment
14.	Personal Management	--
15.	Leadership Skills	--

9. Course Resources:

1. References

a. Robert E.C. 2006. Handbook of Nutraceuticals and Functional Foods. 2nd Ed. CRC Press. New York and London.

b. Sahidi F, Neeser JR and German BJ. 2004. Bioprocesses and Biotechnology for Functional Food and Nutraceuticals. 1st Ed. CRC Press. https://doi.org/10.1201/9780203026380

c. Shi J. 2016. Functional Food Ingredients and Nutraceuticals: Processing Technologies. 2nd Ed. CRC Press. ISBN 9780367267728

d. Tomar, S.K. 2011. Functional Dairy Foods Concepts and Applications. Satish Serial Publishing House, Delhi.

e. Webb, GP. 2011. Dietary Supplements and Functional Foods. 2nd Ed. Wiley Blackwell Publication. ISBN: 978-1-444-33240-7

2. Magazines and Journals

b. Trends & Prospects in Processing of Horticultural Crops: Nutraceuticals and Functional Foods

10. Course Organization:

Course Code	Nutraceuticals and Functional Foods	
Course Title	FNE503A	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:** 080-49066666	
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

Approved by the Academic Council at its 30th Meeting held on 11th December 2023

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Course Specifications: Holistic Nutrition and Dietetics

Course Title	Holistic Nutrition and Dietetics
Course Code	FNE505A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

Aim of this course is to provide students a holistic approach to wellness that integrate mind, body and soul. Course will help students to inculcate the age old practices of Yoga and Ayurveda principles in day to day life for prevention of chronic degenerative diseases and healing.

This course will also provide in-depth study of science and practice of integrative health in promoting wellbeing through lifestyle modifications and interventions.

2. Course Size and Credits:

Number of Credits	03+0
Total Hours of Classroom Interaction	45
Number of laboratory Hours	0
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After the successful completion of this course, the student will be able to:

CO-1. Describe the dimensions of holistic health.

CO-2. Identify the ayurvedic principles for diet and healthy living.

CO-3. Evaluate and discuss the emerging trends in the field of integrative well-being.

CO-4. Design practical dietary guidelines and holistic lifestyle recommendations to promote well-being

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4. Course Contents:

Unit-I:

Holistic health: Health, wellbeing and quality of life. Concept and dimensions of holistic health, body, mind and soul relationship, traditional and alternative health system like Ayurveda, *Unani, Siddha*, naturopathy. Circadian rhythms, biological clock and healthy sleep. Concept of happiness.

Unit-II:

Ayurvedic Nutrition: History and principle of Ayurveda, concept of *Ojas, agni and ama, prakriti, Vikriti* and *dosha*. Concept of *Dinacharya, ahara and poshana. Rasa, Rashi* (quantity of food), combining food and flavor correctly, *virudhha ahara:* incompatible food and diet. Effect of geographical location (*desha*), *kala* (time of day/Season/Chronological age) on methods of food preparation and *prakriti*. Role of spices and herbs, influence of food over mind and emotions. Principles of Ayurvedic diet and recommendations, in present era. Ayurvedic guidelines for lifestyle disorders.

Unit-III:

Yoga: *Koshas*, Yoga for optimum health and holistic development: *Chitta Vritti Nirodh*, yoga alignment with Ayurveda, *Samadhi, Yama, Niyama, Asana, Pranayama, Prathyahara, Dharana, Dhyana.* Yoga based on body constitution. *Yoga Asana* and Pranayama: Philosophy and benefits.

Unit-IV:

Lifestyle intervention and challenges: Importance of yoga and meditation for mind, body and soul – theory and science, preventive holistic nutrition for lifestyle disorder, stress management, *Upayoga Samstha* – rules for partaking food for optimizing nutrition (mindful eating), tridosha and sleep. *Abhyanaga,* Aromatherapy, sound therapy.

Unit-V:

Current and emerging health and wellness trends: Nutritionism, vegetarianism, veganism detoxification, fasting and elimination and juice therapies, acid-alkaline balance: concept, rationale, associated myths and issues.

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3		1						3	1		
CO-2	3	2							2	3		
CO-3		3	2							3	1	
CO-4		3	2	1						2	3	
	3: High Influence, 2: Moderate Influence, 1: Low Influence											

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		33
Demonstrations		02
1. Demonstration using Videos		
2. Demonstration using Physical Models	02	
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		05
1. Case Study Presentation	01	
2. Guest Lecture	02	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	02	
6. Discussing Possible Innovations		
Term Test and Written Examination		05
Total Duration in Hours		**45**

7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed			
	CE (50% Weightage)		SEE (50% Weightage)
	SC1	SC2	SEE Theory
	50 Marks	50 Marks	100 Marks
CO-1	x	-	x
CO-2	x	-	x
CO-3	x	x	x
CO-4	-	x	x

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The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	--
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources:

1. **References**

a. Frawley, D. 2011. Ayurveda and the Mind: The Healing of Consciousness. Motilal Banarsidass Publishers.
b. Gamble KL et al. 2014. Circadian Clock Control of Endocrine Factors. Nat Rev Endocrinol. 10(8): 466–475.
c. Govindaraj, P et al. 2015. Genome-wide analysis correlates Ayurveda Prakriti. Sci Rep. 5.
d. Jayanna, K. 2020. Science and practice of integrative health and wellbeing lifestyle. White Falcon Publishing.
e. Kshemakutuhala by Kshemasharma, An English translation, FRLHT Publication.

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f. Lad VD. 2002. Book of ayurveda: Fundamental Principles of Ayurveda.
g. Raghunatha Suri. Bhojanakutuhalam, An english translation. MA Alwar (editor) FRLHT Publication.
h. Sabnis, M. 2012. Viruddha Ahara: A critical view. 33(3): 332–336
i. Sharma J. Guha A. 2005. Sankhya: The philosophy that shaped the tenets of Ayurveda. J Elements: Ayurveda & Health. 3 (3): 4-5.
j. Svoboda RE. 1992. Ayurveda: Life, health and longevity. Penguin Books, New Delhi, India.
k. Svoboda RE. 2002. Prakriti, Your Ayurveda Constitution. Lotus press.
l. The Legacy of Charaka. MS Valiathan
m. The Legacy of Susruta. MS Valiathan
n. The Legacy of Vagbhata. MS Valiathan
o. Tiwari P et al. 2017. Recapitulation of Ayurveda constitution types by machine learning of phenotypic traits. PLoS One. 12(10): e0185380.
p. Tripathi, B. Ashtanga Hridayam. Chaukhambha

2. **Magazines and Journals**

a. https://www.researchgate.net/topic/Diet-Therapy~Holistic-Health/publications
b. https://rfppl.co.in/about_journal.php?jid=31

3. **Websites**

a. https://igmpi.ac.in/Prospectus-Certified-Natural-Health-Nutritionist.html

10. Course Organization:

Course Code	FNE505A		
Course Title	Holistic Nutrition and Dietetics		
Course Leader/s Name		Allotted as per time table	
Course Leader Contact Details		**Phone:**	080-49066666
		E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date		Dec 2023	
Next Course Specifications Review Date		June 2025	

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ELECTIVE – II

Course Specifications: Pediatric, Geriatric and Diabetic Nutrition Care

Course Title	**Pediatric, Geriatric and Diabetic Nutrition Care**
Course Code	FNE601A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

The course aims to enable students understand the physiology, metabolic changes and nutritional implications of the diseased state in childhood and old age. Course will also give insight in the updated practical dietary management and nutrition care of acute and chronic illnesses in pediatric and geriatric years.

2. Course Size and Credits:

Number of Credits	03+0
Total Hours of Classroom Interaction	45
Number of laboratory Hours	0
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per University Regulations
Attendance Requirement	As per University Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After undergoing this course students will be able to:

CO-1. Describe the multifaceted aspects and specific needs of childhood and old age years.

CO-2. Understand the effects of various diseases on nutritional status and importance of nutritional care and nourishment of children and elderly with various ailments.

CO-3. Recommend appropriate nutritional care based on pathophysiology, prevention and/or treatment of the various diet-related disorders/ diseases.

CO-4. Describe Diabetes, its various types, broad management plan and role of diabetes educators.

CO-5. Demonstrate the ability to understand clinical and technical skills essential in providing education to the diabetic or pre diabetic patients.

4. Course Contents:

Unit I:

Pediatric nutritional considerations in acute and chronic illness: Screening and assessment of nutritional status. Nutritional Management of Inborn Errors of Metabolism. Nutritional challenges in developmental disabilities and nutritional therapy – autism spectrum disorders, cerebral palsy, and Attention-deficit hyperactivity disorder. Epilepsy and dietary approaches – ketogenic diet, Atkins and recent advances.

Type 1 Diabetes (juvenile diabetes) – Complications, impact on growth and nutritional therapy. Pediatric over nutrition and metabolic disorders - etiology, consequences, and nutritional management. Dental caries and oral health. Food Allergies.

Unit II:

Diabetes: Basics of diabetes-diabetes, types of diabetes. Monitoring of diabetes. Management of diabetes, Dietary considerations. Insulin therapy and administration, injecting sites and techniques. Psychosocial and behavioral approaches. Diabetes and lifestyle intervention. Diabetes self-management – Basics of emergency care and life support skills, hypo-low sugar attack, sick day management, disaster preparedness and management. Exercise and diabetes. Roles and Responsibilities of Diabetes educator.

Unit III:

Geriatric nutrition: Global and Indian scenario. Life Expectancy vs Life Span, Usual vs Successful Ageing. Differentiate between primary, secondary, and tertiary aging. Cellular aspects of ageing. Factors influencing ageing – endogenous and exogenous. Assessment of nutritional status – mini nutrition index, assessment of frailty. Nutrition support – Parenteral, enteral and oral. Palliative care. Changes in body composition.

Unit IV:

Brief physiological changes and impact on health: Sensory organs, Gastrointestinal, Cardiac, Respiratory, Renal, skeletal (Bone and muscle related abnormalities, osteoporosis), neural (including brain and spinal cord) and Endocrine. Mental complications – depression, dementia, Parkinson's, Alzheimer's.

Unit V:

Functional manifestations of ageing: Constipation, feeding problems, impaired fluid and electrolyte balance, altered thermoregulation, sleep disturbances. Preventing malnutrition in old age. Recognize components of health history and lab reports as they relate to nutrition problems of the older adult.

5. CO-PO PSO Mapping:

		Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3										1	
CO-2	2	3	1						2		2	
CO-3		3		1						2	3	
CO-4	3							2		2	3	
CO-5	3							3		2	3	1
	3: High Influence, 2: Moderate Influence, 1: Low Influence											

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		30
Demonstrations		01
1. Demonstration using Videos	01	
2. Demonstration using Physical Models / Systems		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		09
1. Case Study Presentation	03	
2. Guest Lecture	02	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	02	
6. Discussing Possible Innovations	02	
Term Tests, Laboratory Examination/Written Examination, Presentations		05
Total Duration in Hours		**45**

7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed			
	CE (50% Weightage)		SEE (50% Weightage)
	SC1	SC2	SEE Theory
	50 Marks	50 Marks	100 Marks
CO-1	x	-	x
CO-2	x	-	x
CO-3	x	x	x
CO-4	-	x	x
CO-5	-	x	x

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	--
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources:

1. References

a. Aiken, L.R. 1978. The Psychology of Later Life. Philadelphia WB Saunders Company.

b. Bagchi, K. and Puri, S. (Ed). 1999. Diet and Aging – Exploring Some Facets. Society for Gerontological Research, New Delhi and Help Age India, New Delhi.

c. Bergmann, Klaus. 1972. Aged: Their Understanding and Care. London Wolfe Pub.

d. Binstock, R.H. and E. Shanes (eds). 1986. Handbook of Aging and Social Sciences V.N. Reinhold Co, New York.

e. Kleinman, Ronald E. and Greer, Frank R. 2019. Pediatric Nutrition. 8th edition. American Academy of Pediatrics

f. Kumar, V. 1996. Aging – Indian Perspective and Global Scenario. Proceedings of International Symposium of Gerontology and Seventh Conference of the Association of Gerontology (India).

g. Ray A and Threlkeld RJ. 2019. Nutritional Recommendations for Individuals with Diabetes. Feingold KR, Anawalt B, Boyce A, et al., (editors).

h. Sharma, O.P. (Ed.). 1999. Geriatric Care in India – Geriatrics and Gerontology: A Textbook, M/s. ANB Publishers.

2. Magazines and Journals

a. https://www.mdpi.com/journal/nutrients/special_issues/pediatricdiabetes_nutrition

b. https://www.clinicalnutritionjournal.com/

c. https://clinmedjournals.org/Journal-of-Nutritional-Medicine-and-Diet-Care.php

3. Websites

a. https://www.nutritioncaremanual.org/pediatric-nutrition-care

b. https://www.ncbi.nlm.nih.gov/books/NBK597439/

c. https://www.nin.res.in/

d. https://www.who.int/

4. Other Electronic resources

https://www.ihs.gov/diabetes/education-materials-and-resources/

10. Course Organization:

Course Code	FNE601A	
Course Title	Paediatric, Geriatric and Diabetic Nutrition Care	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

Course Specifications: Program Planning and Nutrition Education in Community

Course Title	Program Planning and Nutrition Education in Community
Course Code	FNE602A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

The course aims to provide students with the tools for developing community nutrition interventions. Developing audio-visual aids. Students will learn about utilizing behavioral theory, conducting needs assessments, writing program objectives, developing intervention strategies, evaluating program implementation and effectiveness, budget planning, and writing grant proposals.

2. Course Size and Credits:

Number of Credits	03+0
Total Hours of Classroom Interaction	45
Number of laboratory Hours	0
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After the successful completion of this course, the student will be able to:

CO - 1. Discuss importance of nutrition education in health promotion.

CO - 2. Indicate factors effecting behavioural change.

CO - 3. Discover crucial steps in program planning.

CO - 4. Design means of effective communication.

CO - 5. Develop effective grant proposal to acquire funding for intervention program.

4. Course Contents:

Unit-I:

Nutrition and health program planning: Basic principles and models of program planning. Evaluation of existing program management models. Planning at national, state, district, block and community level. Program planning approach: Top down vs. bottom up, need

assessment, community participation. Planning Strategies: Vertical vs. integrated, planning for short term and long term objectives, implementation & evaluation. Identifying the partners for building a nutrition health team: role of partnerships in management of nutrition program. Involvement of corporate sectors. Attitudes & skills required to be a successful program manager with a focus on building or leading a team.

Unit-II:

Implementation, monitoring and evaluation: Recruiting, training, supervision and coordination of personnel. Managing space, money, time, personnel, transport, and other miscellaneous components. Cost benefits, cost effectiveness and cost efficiency. Operations research and its contribution to nutrition program management, Management Information Systems (MIS) at various levels and its applications in nutrition and health program management. Evaluation of results, impact, reporting of results, reconsideration and dissemination of program findings.

Unit-III:

Nutrition and health intervention programs: Current health and nutrition intervention programs. Critique of the existing nutrition health programs: Merits, demerits, Best practices.

Unit-IV:

Concept and practice of nutrition and health education (NHE): Aim, theories, importance and recent trends in NHE. Components and processes in NHE for health modification and promotion. Modes of communication: Purpose and techniques, Social media, folk media, Dashboards, AV aids and other interpersonal channels. Designing effective nutrition and health messages – tools, know your audience, knowledge attitude practice (KAP), pre-testing. Designing training strategies for effective NHE and capacity building, ethics in nutrition and health communication, Effective Community participation, theory for behavior changes, behavioral change for effective intervention.

Unit-V:

Funding community nutrition interventions: Preparing a grant proposal- problem to be addressed – Rationale and importance of the intervention program – Empirical and theoretical framework – Presenting pilot study / data or background information - Research proposal and time frame – Specificity of methodology – Organization of different phases of study – Expected outcome of study and its implications – Budgeting - Available infra-structure and resources - Executive summary.

5. CO-PO PSO Mapping:

	Programme Outcomes (POs)								Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3								3	2		
CO-2	3		1						2	2	1	
CO-3		3								3	1	
CO-4		3						2			1	3
CO-5						1	1	3			2	3
	3: High Influence, 2: Moderate Influence, 1: Low Influence											

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		33
Demonstrations		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
2. Course Laboratory		
3. Computer Laboratory		
4. Engineering Workshop / Course/Workshop / 5. Kitchen		
6. Clinical Laboratory		
7. Hospital		
8. Model Studio		
Others		05
1. Case Study Presentation	01	
2. Guest Lecture	01	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	03	
6. Discussing Possible Innovations		
Term Test and Written Examination		05
Total Duration in Hours		45

Approved by the Academic Council at its 30th Meeting held on 11th December 2023

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7. Course Assessment:

The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.

The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed			
	CE (50% Weightage)		SEE (50% Weightage)
	SC1	SC2	SEE Theory
	50 Marks	25 Marks	100 Marks
CO-1	X	-	X
CO-2	X	X	X
CO-3	X	X	X
CO-4	-	X	X
CO-5	-	X	X

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	Classroom lectures, Assignments
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	Assignment
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

1. References

a. Barth, MM, Bell, RA and Grimmer, K. 2020. Public Health Nutrition Rural, Urban, and Global Community-Based Practice DOI: 10.1891/9780826146854

b. Edelstein S. 2006. Nutrition in Public Health. A handbook for developing programmes and services. 2nd edition. Jones and Bartlett Publishers.

c. FAO. 1983. Selecting Interventions for Nutrition Improvement. A Manual Nutrition in Agriculture. No. 3.

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

e. Sallis JF, Owen N, Fisher EB. 2008. Ecological models of health behavior. In: Glanz K, Rimer BK, Viswanath K (eds). Health Behavior and Health Education: Theory, Research, and Practice. 4th edition. San Francisco, CA: Jossey-Bass.

2. Magazines and Journals

a. https://www.researchgate.net/publication/325849783_Nutrition_Education_as_a_Community_Perspective_Approach

b. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6650826/

3. Websites

a. https://www.nin.res.in/

b. https://main.icmr.nic.in/

4. Other Electronic Resources

a. https://epgp.inflibnet.ac.in/

10. Course Organization:

Course Code	Program Planning and Nutrition Education in Community	
Course Title	FNE602A	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

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Approved by the Academic Council at its 30th Meeting held on 11th December 2023

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Dean - Academics Faculty of Allied Sciences M.S. Ramaiah University of Applied Sciences Bangalore - 560 054

Course Specifications: Maternal and Child Nutrition Care

Course Title	**Maternal and Child Nutrition Care**
Course Code	FNE603A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

Aim of this course is to let students understand the health issues concerning women, infants, and children. The course will cover determinants of maternal, infant and child health and evaluate the available maternal and child health care services to prevent maternal and child morbidity and mortality.

2. Course Size and Credits:

Number of Credits	03+00
Total Hours of Classroom Interaction	45
Number of laboratory Hours	0
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After the successful completion of this course, the student will be able to:

CO-1. Understand the inter-relationship between nutrition and growth and development

CO-2. Explain altered growth and developmental changes from conception

CO-3. Evaluate government policies, community and public nutrition/health programs aimed at improving health and nutritional status of pregnant, lactating women and children under 5 years of age

CO-4. Assess health nutritional parameters in population based studies of health and disease

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4. Course Contents:

Unit-I:

Women's Health and Nutrition: Influence of cultural factors and program implications. Cultural influence on intra-household distribution of food. Female Headed Households: Impact on family nutrition. Cultural and societal view of pregnancy and lactation: influence on women's nutrition Adolescent girls: Cultural influences and impact on her Nutrition-Health.

Unit-II:

Low birth weight infants: Infant Mortality and Statistics. Physiologic Development. Nutrition Requirements: Enteral Feeding. Feeding Methods. Selection of Enteral Feeding. Nutrition Assessment and Growth. Discharge Care. Neurodevelopmental Outcome. Incubator care

Unit-III:

Infant and Young Child Nutrition: Influence of Cultural factors and Program Implications. Neonatal feeding and breastfeeding practices: traditional vs. modern. Young child feeding and health care practices (focus on complementary feeding): traditional vs. modern. Formula feeding for low birth weight and preterm infants. Towards improving child nutrition – Importance of Family Support, government and non-government programs (NHM, ICDS, etc.). Nutritional Anthropometry-Various parameters and Growth monitoring. Normal pattern of growth and development, norms/standards for growth, Growth monitoring and promotion, growth faltering, Failure to thrive – Comparison with norms, standards, Z-scores.

Preterm and LBW infants: Implications for feeding and management. SAM, MAM babies – assessment, principle of care, initial management and feeding guidelines, rehabilitation, monitoring, follow up and problem solving, involving mothers in their care.

Unit-IV:

Hidden hunger: Micronutrient deficiencies in adolescent girls and effect on child health indicators. Anemia prevalence in women. Iron folic acid interventions in women of reproductive age. Vicious cycle of malnutrition. Deworming for Schistosomiasis, soil transmitted Helminthes. Food fortification, Bio-fortification of staple foods and Vitamin A supplementation for children – Intervention and Efficacy. Promotion of food safety and hygiene, WASH. Counselling – premarital, birth control, before and during pregnancy, during lactation

5. CO-PO PSO Mapping:

		Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO-1	3								3	2		
CO-2	3	2							3	2		
CO-3		2	3		1					2		
CO-4	3		2							2		
	3: High Influence, 2: Moderate Influence, 1: Low Influence											

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		35
Demonstrations		02
1. Demonstration using Videos	02	
2. Demonstration using Physical Models		
3. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop / Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		03
1. Case Study Presentation	01	
2. Guest Lecture	01	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	01	
6. Discussing Possible Innovations		
Term Test and Written Examination		05
Total Duration in Hours		**45**

7. Course Assessment:

Approved by the Academic Council at its 30th Meeting held on 11th December 2023

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The components and subcomponents of course assessment are presented in the Academic Regulations documents pertaining to the Programme. The procedure to determine the final course marks is also provided in the Academic Regulations document as well.
The assessment questions are set to test the course learning outcomes. In each component or subcomponent, certain Course Outcomes are assessed as illustrated in the following table.

Focus of Course Learning Outcomes in each component assessed			
	CE (50% Weightage)		SEE (50% Weightage)
	SC1	SC2	SEE Theory
	50 Marks	50 Marks	100 Marks
CO-1	x	-	x
CO-2	x	x	x
CO-3	-	x	x
CO-4	-	-	x

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures, Assignments
2.	Understanding	Classroom lectures, Assignments
3.	Critical Skills	Classroom lectures, Assignments
4.	Analytical Skills	Classroom lectures, Assignments
5.	Problem Solving Skills	--
6.	Practical Skills	Laboratory exercises
7.	Group Work	Assignment/ Class Presentations
8.	Self-Learning	Assignment, Examination
9.	Written Communication Skills	Assignment
10.	Verbal Communication Skills	Class Presentations
11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources:

1. **References**

a. Allen L and Casterline-sabel J. 2000. Prevalence and causes of nutritional anemias. In: Ramakrishnan U, editor. Nutritional anaemias. Boca Raton: CRC Press.

b. Bhutta ZA, Ahmed T, Black RE, *et al.* 2008. Maternal and Child Under-nutrition Study Group. What works? Interventions for maternal and child under-nutrition and survival. Lancet 371:417–40.

c. Black RE, Allen LH, Bhutta ZA, *et al.* 2008. Maternal and Child Under nutrition Study Group. Maternal and child under nutrition: global and regional exposures and health consequences. Lancet. 371:243–60.

d. de Benoist B. 2008. Conclusions of a WHO technical consultation on folate and vitamin B12 deficiencies. Food Nutr Bull. 29 (Suppl 2): S238–44.

e. Dickinson, N *et al.* 2009. A framework to explore micronutrient deficiency in maternal and child health in Malawi, Southern Africa. Environmental Health. 8 (Suppl 1): S13.

f. Jelliffe, D.B. 1966. *The Assessment of the Nutritional Status of the community*, WHO Geneva.

g. Kovacs CS. 2008. Vitamin D in pregnancy and lactation: maternal, fetal, and neonatal outcomes from human and animal studies. Am J Clin Nutr. 88: 520S–8S.

h. Lee, R.D. and Nieman, D.C. 2003. *Nutritional Assessment* 3rd Ed. McGraw – Hill Higher education. New York.

i. Mohammed K, Hyten F. 1989. Iron and folate supplementation in pregnancy. In: Chalmers H, Enkin MJ, editors. Effective care in pregnancy and childbirth. Oxford: Oxford University Press.

j. Mudaliar AL, Menon MK. 2005. Clinical obstetrics. Hyderabad: Orient Longman. p 147.

2. **Magazines and Journals**

a. Maternal and Paediatric Nutrition

b. Nutrition Bulletin

c. Annual Review of Nutrition

3. **Websites**

a. https://www.nin.res.in/

b. https://www.who.int/

4. Other Resourses

a. www.pgpaathsala.com

10. Course Organization:

Course Code	FNE603A		
Course Title	**Maternal and child nutrition care**		
Course Leader/s Name		Allotted as per time table	
Course Leader Contact Details		**Phone:**	080-49066666
		E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date		Dec 2023	
Next Course Specifications Review Date		June 2025	

Course Title	Nutrigenomics
Course Code	FNE605A
Department	Food Technology
Faculty	Faculty of Life and Allied Health Sciences

1. Course Summary:

This course aims to introduce students with the influence of genetics on metabolism, and its implications on human diseases including inherited inborn disease, metabolic disease, cancer, neurodevelopment, and neurodegenerative diseases. The students will be familiarized with the gene and diet interaction, modulating the risk of various diseases through nutrigenomics, application of various technologies used in nutrigenomics. Students will also able to evaluate nutrient and drug interaction and the fate of a compound when ingested.

2. Course Size and Credits:

Number of Credits	03+0
Total Hours of Classroom Interaction	45
Number of laboratory Hours	0
Number of Semester Weeks	16
Department Responsible	Food Technology
Pass Requirement	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

Teaching, Learning and Assessment

3. Course Outcomes (COs):

After the successful completion of this course, the student will be able to:

CO-1. Explain the interactions of micronutrients with human disease states.

CO-2. Describe the influence of genetic variation on nutritional requirement and the regulation of genetics on cellular and molecular metabolism.

CO-3. Distinguish between the various technologies used in nutrigenomics.

CO-4. Explain the significance of nutrigenomics for public health, industries and health professionals.

4. Course Contents:

Unit-I:

Introduction to gene-diet interactions: Nutrigenomics: Scope and Importance to Human Health and Industry. Transporter gene polymorphisms -interaction with effects of micronutrients in humans. Polymorphisms in genes affecting the uptake and transport of omega-6 and omega-3 polyunsaturated fatty acids: interactions with dietary lipids and chronic disease risk. Nutrigenomics approaches to unraveling physiological effects of complex foods. Intestinal microbiota – Integrating Nutrigenetics, Nutrigenomics, and Microbiomics.

Unit-II:

Modifying disease risk through nutrigenomics: Modulating the risk of cardiovascular disease, diabetes, inflammatory bowel diseases, obesity, cancer and malnutrition through nutrigenomics.

Unit-III:

Technologies in nutrigenomics- genomics techniques: Different sequencing approaches, Microarray, SNP genotyping, PCR and RT-PCR techniques. Proteomics techniques: 1-D, 2-D gel electrophoresis, DIGE, novel peptide identification, peptide sequencing methods. Metabolomics techniques: Chromatography and mass spectrometry techniques, Discovery and validation of biomarkers for important diseases and disorders. Computational approaches: Introduction to different types of public domain databases, data mining strategies, primer designing.

Unit-IV:

Bringing nutrigenomics to industry, health professionals, and the public: Bringing nutrigenomics to the food industry. Industry-Academia partnerships as an important challenge; Bringing nutrigenomics to the public: Is direct-to-consumer testing the future of nutritional genomics? Interaction with health professionals in bringing nutrigenomics to the public; Is contemporary society ready for nutrigenomic science? Public health significance of nutrigenomics and nutrigenetics.

Unit-V:

Nutrient – drug interaction: Absorption, metabolism, action, retention and / or excretion of nutrient as well as drug – influence of one on other. Pharmacodynamics, pharmacokinetics, bioavailability of drug – influence of nutrients. Biotransformation, stability of the drug, gastric emptying – influence of nutrients.

5. CO-PO PSO Mapping:

Course Outcomes	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO-1	3	2						3	2		
CO-2		3	1						3		
CO-3		2	2						3		
CO-4			3		1				2	3	
3: High Influence, 2: Moderate Influence, 1: Low Influence											

6. Course Teaching and Learning Methods:

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
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1. Demonstration using Physical Models		
2. Demonstration on a Computer		
Numeracy		
1. Solving Numerical Problems		
Practical Work		
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2. Computer Laboratory		
3. Engineering Workshop / Course/Workshop /Kitchen		
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		03
1. Case Study Presentation		
2. Guest Lecture	01	
3. Industry / Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	01	
6. Discussing Possible Innovations	01	
Term Test and Written Examination		05
Total Duration in Hours		**45**

7. Course Assessment:

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CO-2	x	x	x
CO-3	-	x	x
CO-4	-	-	x

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The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of the course outcomes in each component assessed in the above template beginning of the semester.

8. Achieving Course Learning Outcomes:

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11.	Presentation Skills	Class Presentations
12.	Behavioral Skills	Assignment
13.	Information Management	Assignment
14.	Personal Management	Assignment, Examination
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

1. References

a. Afman L, Müller M. 2006. Nutrigenomics: from molecular nutrition to prevention of disease. J Am Diet Assoc. 106(4):569-76. doi: 10.1016/j.jada.2006.01.001. PMID: 16567153.

b. Fenech, M., El-Sohemy, A., Cahill, L., Ferguson, L. R., French, T. A., Tai, E. S., Milner, J., Koh, W. P., Xie, L., Zucker, M., Buckley, M., Cosgrove, L., Lockett, T., Fung, K. Y., & Head, R. 2011. Nutrigenetics and nutrigenomics: viewpoints on the current status and applications in nutrition research and practice. Journal of nutrigenetics and nutrigenomics, 4(2), 69–89.

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c. Ferguson, Lynnette R. 2014. Nutrigenomics and Nutrigenetics in Functional Foods and Personalized Nutrition. USA: CRC Press, Taylor and Francis Group.
d. Gerald, R., Jurgen, F. & Lester P. (2005). Nutrigenomics (1st ed.). Unites States of America: CRC press.
e. Kussmann, M., and Affolter, M. (2009). Proteomics at the center of nutrigenomics: comprehensive molecular understanding of dietary health effects. Nutrition (Burbank, Los Angeles County, Calif.), 25(11-12), 1085–1093.
f. Norheim, F., Gjelstad, I. M., Hjorth, M., Vinknes, K. J., Langleite, T. M., Holen, T., Jensen, J., Dalen, K. T., Karlsen, A. S., Kielland, A., Rustan, A. C., & Drevon, C. A. (2012). Molecular nutrition research: the modern way of performing nutritional science. Nutrients, 4(12), 1898–1944.
g. Phillips C. M. (2013). Nutrigenetics and metabolic disease: current status and implications for personalised nutrition. Nutrients, 5(1), 32–57.

2. **Magazines and Journals**

a. https://karger.com/jnn
b. https://www.nature.com/subjects/nutrigenomics

3. **Websites**

a. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2137135/
b. https://www.nutrigenomicmedicine.co.uk/

4. Other Resources

a. www.pgpaathsala.com

10. Course Organization:

Course Code	Nutrigenomics	
Course Title	FNE605A	
Course Leader/s Name	Allotted as per time table	
Course Leader Contact Details	**Phone:**	080-49066666
	E-mail:	hod.ft.ls@msruas.ac.in
Course Specifications Approval Date	Dec 2023	
Next Course Specifications Review Date	June 2025	

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