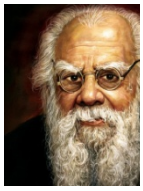
PERIYAR UNIVERSITY

Periyar Palkalai Nagar, Salem-636011

(Reaccredited with 'A' Grade by the NAAC)



School of Professional Studies

DEPARTMENT OF FOOD SCIENCE AND NUTRITION

M.Sc. DEGREE

FOOD SCIENCE, TECHNOLOGY AND NUTRITION

[Choice Based Credit System (CBCS)]

REGULATIONS AND SYLLABUS

(Effective from the academic year 2018-2019 and thereafter)

M. Sc. FOOD SCIENCE TECHNOLOGY AND NUTRITION

REGULATIONS AND SYLLABUS

(With effect from the academic year 2018-2019 onwards)

Preamble

The Department of Food Science and Nutrition was established in the year June 2005 to explore the youth and its application to the society in the discipline of Food Science and Nutrition. The Department fosters teaching, imparts job specific skills, society oriented research and extension activities in the major thrust areas like Food Science and Chemistry, Food Processing and Technology, Clinical and Public Health Nutrition. The purpose of the programme is to produce post graduate students who will become productive citizens excelling with

- Communication skills
- Analytical skill
- Teamwork skills
- Leadership skills
- Good interpersonal skills
- Scientific (problem-solving) skills
- Job specific qualification skills (NSDC QPs)

Vision

Inculcation of knowledge, productive learning, skills and employability among the youth related to Food Science, Technology and Nutrition

Programme Objectives

Hence to inculcate the importance in developing Food and Nutritional Science among the budding Food Scientists, Nutritionists and Food Processing Industrialists, the *M. Sc., Food Science Technology and Nutrition* programme is aimed with the following objectives.

- To engineer the students on theoretical and practical aspects of the entire food business and value chain management.
- To gain insight into the national nutritional problems and their management through diet.
- To generate evidence based nutrition knowledge through research and disseminate to the agrarian and general community.
- To promote interactions with food industries and other disciplines which relate to the study of Food Science Technology and Nutrition.

This programme is offered under Choice Based Credit system (CBCS). Students can earn more credits than the stipulated minimum of 90 credits, through Extra Credit Courses, Massive Open Online Courses (SWAYAM) and Interdisciplinary (Supportive) Courses.

Candidate's eligibility for admission

A degree in Nutrition and Dietetics/Food Science and Nutrition/Food Technology, B.Tech./B.Sc. (H) Food Technology, B.Voc. in Food Science and Nutrition related discipline, B.Sc./B.A. Home Science, B.Sc. Catering Science, B.Sc. Life Science

(Biotechnology/Microbiology/Biochemistry) and UG Degree in Allied Health Sciences (B.Sc. Nursing) approved by the Association of Indian Universities are eligible to seek admission.

The first order of preference for eligibility is

a. B.Sc. Nutrition and Dietetics
b. B.Sc. Food Science and Nutrition
c. B.Sc. and B.Sc. (H) Food Technology/Food Science and Technology
d. B.Sc. Clinical Nutrition and Dietetics
e. B.Sc. Nutrition and Health Education
f. B.Voc. Food Science and Nutrition
g. B.Voc. Food Process Engineering
h. B.Voc. Food Processing Technology
i. B.Voc. Food Processing and Quality Control
j. B.Tech. Food Technology

The second order of preference for eligibility is

a. B.Sc. Home Science
b. B.Sc. Catering Science
c. B.Sc. Biotechnology
d. B.Sc. Microbiology
e. B.Sc. Biochemistry

The third order of preference for eligibility is

a. B.Sc. Nursing

Duration of the programme - Two years

Programme Outcomes

The student can able to know, understand, apply, analyze, evaluate and create the relationship between food, technology, nutritional science and quality of life.

CBCS- STRUCTURE OF THE PROGRAMME

The programme structure comprises of two parts.

Course Component	No. of Courses	Hours of Learning	Marks	Credits
Part A (Credit Courses)				
Core Courses	18	1152	1800	56
Elective Courses (Optional)	04	288	400	16
Supportive Courses	02	108	200	04
Innovative Learning Courses (Research)	04	216	400	08
On-the-Job Training Courses	02	324	400	08
Online Courses	04	72 (3 days per semester)	-	08
Total	30	2088 (87 days per semester)	3200	100
Part B (Self-Learning Credit Courses)				
Elective Foundation Courses	01	18	100	02
Experiential Learning Courses	06	594	S/US	08
Total	30	684	100	10

Semester I

S.No.	Course Code	Course Title	Hours/ week	L	T	P	C
Core Courses (C)							
1.	18FSTNC01	Food Science and Chemistry	4	3	1	0	4
2.	18FSTNC02	Food Processing Technology	4	3	1	0	4
3.	18FSTNC03	Research Methodology	4	3	1	0	4
4.	18FSTNC04	Food Science and Chemistry Practical	3	-	1	2	2
5.	18FSTNC05	Biostatistics Practical	3	-	1	2	2
Elective Courses (One Course per semester) (E) (Optional)							
5.	18FSTNE01	Food Packaging Technology	4	3	1	0	4
5.	18FSTNE02	Instrumentation in Food Processing	4	3	1	0	4
Online Courses (O)							
1.	18FSTNO01	Courses in online portal of SWAYAM	1	-	1	-	-
Experiential Learning (EL) Courses							
1.	18FSTNEL01	Industrial Visit – minimum three industries (self visit)	2 (Extra)	-	-	2	1 (Extra)
Innovative Learning (IL) Courses							
1.	18FSTNIL01	Part 1 Research: Food Product Development and Quality Evaluation	3	-	1	2	2
On-the-Job Training (Skill Component) (SC) Courses							
1.	18FSTNSC01	Processed Food Entrepreneur (NSDC curriculum)	4	1	1	2	-
		Total	30	13	09	08	22+1 (Extra)

Note:- L- Lecture, T-Tutorial/Demonstration, P- Practical, C- Credit

Semester II

S.No.	Course Code	Course Title	Hours/ week	L	T	P	C
Core Courses (C)							
1.	18FSTNC06	Food Microbiology and Preservation	4	3	1	-	4
2.	18FSTNC07	Food Safety and Quality Control	4	3	1	-	4
3.	18FSTNC08	Food Safety and Quality Control Practical	3	-	1	2	2
4.	18FSTNC09	Food Composition Analysis Practical	3	-	1	2	2
Elective Courses (One Course per semester) (E) (Optional)							
5.	18FSTNE03	Food Industries Waste Management	4	3	1	0	4
5.	18FSTNE04	Food Biotechnology	4	3	1	0	4
Supportive Courses (S) for other Department Students							
1.	18FSTNS01	Food Safety Management Practical	3	-	1	2	2
Elective Foundation (EF) Courses							
1.	18FSTNEF01	Human Rights (Self Study)	-	-	-	-	2 (Extra)
Online Courses (O)							
1.	18FSTNO02	Courses in online portal of SWAYAM	1	-	1	-	4 (Extra)
Experiential Learning (EL) Courses							
1.	18FSTNEL02	Visit to three Units with ISO systems; HACCP certification; implemented GMP and GHP (self visit)	2 (Extra)	-	-	2	1 (Extra)
2.	18FSTNEL03	Six Weeks Internship in Reputed Food Processing Industries (Summer Vocation)	Extra hours	-	-	45 days	2 (Extra)
Innovative Learning (IL) Courses							
1.	18FSTNIL02	Part 2 Research – Business Model and Quality Assurance System for the New Venture	3	-	1	2	2
On-the-Job Training (Skill Component) (SC) Courses							
1.	18FSTNSC01	Processed Food Entrepreneur (NSDC curriculum)	5	1	2	2	4
		Total	30	10	10	10	24+9 (extra)

Note:- L- Lecture, T-Tutorial/Demonstration, P- Practical, C- Credit

Semester III

S.No.	Course Code	Course Title	Hours/ week	L	T	P	C
Core Courses (C)							
1.	18FSTNC10	Nutritional Biochemistry	4	3	1	0	4
2.	18FSTNC11	Nutrition in Life Cycle	4	3	1	0	4
3.	18FSTNC12	Public Health Nutrition	4	3	1	0	4
4.	18FSTNC13	Computer Aided Diet Planning Practical	3	-	1	2	2
Elective Courses (One Course per semester) (E) (Optional)							
5.	18FSTNE05	Specialized Nutrition	4	3	1	0	4
5.	18FSTNE06	Nutritional Policies and Programmes	4	3	1	0	4
Supportive Courses (S) for other Department Students							
1.	18FSTNS01	Nutrition for the Community Practical	3	-	1	2	2
Online Courses (O)							
1.	18FSTNO03	Courses in online portal of SWAYAM	1	-	1	-	4 (Extra)
Experiential Learning (EL) Courses							
1.	18FSTNEL04	Visits to three MSSRF Community Nutrition Camp/UNICEF Nutrition Camp/Mid-Day Meal Unit/ICDS Unit etc. (self visit)	2 (Extra)	-	-	2	1 (Extra)
Innovative Learning (IL) Courses							
1.	18FSTNIL03	Part 3 Research – Nutrition and Health Care Process of the Community	3	-	1	2	2
On-the-Job Training (Skill Component) SC							
1.	18FSTNSC02	Sports Nutritionist (NSDC curriculum)	4	1	1	2	-
		Total	30	13	09	08	22+5 (Extra)

Note:- L- Lecture, T-Tutorial/Demonstration, P- Practical, C- Credit

Semester IV

S.No.	Course Code	Course Title	Hours/ week	L	T	P	C
Core Courses (C)							
1.	18FSTNC14	Clinical Nutrition I	4	3	1	-	4
2.	18FSTNC15	Clinical Nutrition II	4	3	1	-	4
3.	18FSTNC16	Biochemical Analysis Practical	3	-	1	2	2
4.	18FSTNC17	Computer Aided Clinical Nutrition Practical	3	-	1	2	2
5.	18FSTNC18	Advanced Analytical Techniques Practical	3	-	1	2	2
Elective Courses (One Course per semester) (E) (Optional)							
5.	18FSTNE07	Physiological Aspects of Nutrition	4	3	1	0	4
5.	18FSTNE08	Nutritional Epidemiology	4	3	1	0	4
Online Courses (O)							
1.	18FSTNO04	Courses in online portal of SWAYAM	1	-	1	-	-
Experiential Learning (EL) Courses							
1.	18FSTNEL05	Visit to three Health and Fitness Centres/ Naturopathy Unit/Nutraceutical Manufacturing Unit	2 (Extra)	-	-	2	1 (Extra)
2.	18FSTNEL06	Four Weeks Internship in Reputed Multi-specialty Hospitals (Summer Vocation)	Extra hours	-	-	30 days	2 (Extra)
Innovative Learning (IL) Courses							
2.	18FSTNIL04	Part 4 Research – Personalised Nutrition Care Process of an Individual	3	-	1	2	2
On-the-Job Training (Skill Component) (SC) Courses							
2.	18FSTNSC02	Sports Nutritionist (NSDC curriculum)	5	1	2	2	4
		Total	30	10	10	10	24 + 3 (Extra)

Note:- L- Lecture, T-Tutorial/Demonstration, P- Practical, C- Credit

Credit Calculation

Online Courses

The students are required to complete four mandatory courses – one course in each semester by registering in the online education portal (SWAYAM).

Elective Foundation Courses

The students are required to complete one mandatory course – Human Rights in the second semester.

Experiential Learning Courses

The students are required to undertake four industrial visit oriented courses each in one semester and two internship courses (second and fourth semester break) in a reputed food industry/organization/hospital/health centres mandatorily. On completion of the course, the students are required to submit a report (Template 1 (Industrial visits) and 2 (Internship)). The departmental committee on the basis of certificate from host industry/organization, training report and viva voce will assess the student's performance and will be awarded Satisfactory/Unsatisfactory grade.

Innovative Learning Courses

The students have to do the research in the field of food product development and quality control in the first year and public health nutrition in the second year. The project will be done in the Department/National Laboratories/Relevant Industries. The template for the research report prescribed by the Department for each part of the research has to be followed.

Template 3 – Food Product Development and Quality Evaluation
Template 4 - Business Model and Quality Assurance System for the New Venture
Template 5 – Nutrition and Health Care Process of the Community
Template 6 – Personalised Nutrition Care Process of an Individual

On-the-Job Training Courses

The job specific qualification taught in every year as outcome based skill component is assessed by concerned Sector Skill Councils of NSDC or industrial partners by following the rules and regulations of NSDC and University. The separate certificate will be issued to the students in association with SSC and industry.

The templates 1-6 are depicted in Appendix I.

Co-Curricular Activities

1.Short –term Courses (Extra Credit Courses)

The students are required to undertake any two short term courses with minimum duration of 7 days (7x6 = 42hours) in the theme not covered in the syllabus.

S.No.	Short term course Code	Title of the course	Duration (Hours)	L	T	P	C
I year							
1.	18FSTNST01	Corel Draw and Adobe Photoshop – Nutritional Labeling	42	3	11	28	-
II Year							
2.	18FSTNST02	*In vitro* and *in vivo* techniques in Nutrition	42	8	19	15	-

The modules for the short term courses are given in Appendix II. The modules will be updated according to the suggestion proposed by the experts handling the courses.

2. *UGC – NET Coaching*

The students have to undergo minimum five days coaching class in each semester on strategy to prepare for UGC – NET Examination.

3. Bridge Course

The first year students are instructed on curriculum framework, SWOT analysis of the Department and the comprehensive contribution of the students for the growth and famine of the Department as bridge course.

Extra-curricular Activities

The students have to participate in the following activities of the University Departments or outside the University (minimum of 10 hours in a semester) and it is mandatory that the students have to submit two participation/winner certificate in any one of the activity every year to the Department.

1. NSS/NCC/YRC camps and its competitions
2. Inter-institutional/Inter-departmental competitions
3. Personality Development programmes
4. Student Seminar
5. Placement training
6. IAS coaching class
7. Typewriting class
8. Language coaching class

Remedial Coaching

In order to improve the knowledge, skills and linguistic proficiency of students who need special attention, remedial coaching classes on

a. Basic laboratory techniques
b. Oral presentation skills
c. Notes taking and exam preparation techniques

is conducted for one hour in a weak in rotation by all faculty in the Department as extra workload for teaching. The hour will be mentioned in the time table to motivate the students to attend the remedial classes.

Mentor-Mentee System

The students of Department of Food Science and Nutrition are supported by all faculties in the Department personally and professionally through mentor and mentee system. Faculties are allocated their wards to take care of their wards personal and professional problems. Mentor provide guidelines to mentee and upload their minutes (every week) through google link to the department on

1. Scholarship details
2. Carrier opportunities
3. Interview facing skills
4. Newspaper reading habits
5. Strategies to overcome the problems
6. Personal hygiene and sanitation
7. Roles and Responsibilities of students in the growth of the Department and University as a whole
8. Professional organizations and membership benefits
9. Preparation of CV etc.

CBCS – SCHEME OF EXAMINATIONS

Semester I

S.No.	Course Code	Course Title	Hours	I	E	T	C
Core Courses (C)							
1.	18FSTNC01	Food Science and Chemistry	3	25	75	100	4
2.	18FSTNC02	Food Processing Technology	3	25	75	100	4
3.	18FSTNC03	Research Methodology	3	25	75	100	4
4.	18FSTNC04	Food Science and Chemistry Practical	3	40	60	100	2
5.	18FSTNC05	Biostatistics Practical	3	40	60	100	2
Elective Courses (One Course per semester) (E) (Optional)							
5.	18FSTNE01	Food Packaging Technology	3	25	75	100	4
5.	18FSTNE02	Instrumentation in Food Processing	3	25	75	100	4
Online Courses (O)							
1.	18FSTNO01	Courses in online portal of SWAYAM	3	-	100	100	-
Experiential Learning (EL) Courses							
1.	18FSTNEL01	Industrial Visit – minimum three industries (self visit)	3	S/US	-	S	1 (Extra)
Innovative Learning (IL) Courses							
1.	18FSTNIL01	Part 1 Research: Food Product Development and Quality Evaluation	3	40	60	100	2
On-the-Job Training (Skill Component) (SC) Courses							
1.	18FSTNSC01	Processed Food Entrepreneur (NSDC curriculum)	-	-	-	-	-
		Total	27	220	480	700	22+1 (Extra)

Note:- I- Internal, E-External, T- Total, C- Credit, S-Satisfactory, US - Unsatisfactory

Semester II

S.No.	Course Code	Course Title	Hours	I	E	T	C
Core Courses (C)							
1.	18FSTNC06	Food Microbiology and Preservation	3	25	75	100	4
2.	18FSTNC07	Food Safety and Quality Control	3	25	75	100	4
3.	18FSTNC08	Food Safety and Quality Control Practical	3	40	60	100	2
4.	18FSTNC09	Food Composition Analysis Practical	3	40	60	100	2
Elective Courses (One Course per semester) (E) (Optional)							
5.	18FSTNE03	Food Industries Waste Management	3	25	75	100	4
5.	18FSTNE04	Food Biotechnology	3	25	75	100	4
Supportive Courses (S) for other Department Students							
1.	18FSTNS01	Food Safety Management Practical	3	40	60	100	2
Elective Foundation (EF) Courses							
1.	18FSTNEF01	Human Rights (Self Study)	3	25	75	100	2 (Extra)
Online Courses (O)							
1.	18FSTNO02	Courses in online portal of SWAYAM	3	-	100	100	4 (Extra)
Experiential Learning (EL) Courses							
1.	18FSTNEL02	Visit to three Units with ISO systems; HACCP certification; implemented GMP and GHP (self visit)	3	S/US	-	S	1 (Extra)
2.	18FSTNEL03	Six Weeks Internship in Reputed Food Processing Industries (Summer Vocation)	3	S/US	-	S	2 (Extra)
Innovative Learning (IL) Courses							
1.	18FSTNIL02	Part 2 Research – Business Model and Quality Assurance System for the New Venture	3	40	60	100	2
On-the-Job Training (Skill Component) (SC) Courses							
1.	18FSTNSC01	Processed Food Entrepreneur (NSDC curriculum)	6	50	150	200	4
		Total	39	285	615	900	24+9 (extra)

Note:- I- Internal, E-External, T- Total, C- Credit, S-Satisfactory, US - Unsatisfactory

Semester III

S.No.	Course Code	Course Title	Hours	I	E	T	C
Core Courses (C)							
1.	18FSTNC10	Nutritional Biochemistry	3	25	75	100	4
2.	18FSTNC11	Nutrition in Life Cycle	3	25	75	100	4
3.	18FSTNC12	Public Health Nutrition	3	25	75	100	4
4.	18FSTNC13	Computer Aided Diet Planning Practical	3	40	60	100	2
Elective Courses (One Course per semester) (E) (Optional)							
5.	18FSTNE05	Specialized Nutrition	3	25	75	100	4
5.	18FSTNE06	Nutritional Policies and Programmes	3	25	75	100	4
Supportive Courses (S) for other Department Students							
1.	18FSTNS01	Nutrition for the Community Practical	3	40	60	100	2
Online Courses (O)							
1.	18FSTNO03	Courses in online portal of SWAYAM	3	-	100	100	4 (Extra)
Experiential Learning (EL) Courses							
1.	18FSTNEL04	Visits to three MSSRF Community Nutrition Camp/UNICEF Nutrition Camp/Mid Day Meal Unit/ICDS Unit etc. (self visit)	3	S/US	-	S	1 (Extra)
Innovative Learning (IL) Courses							
1.	18FSTNIL03	Part 3 Research – Nutrition and Health Care Process of the Community	3	40	60	100	2
On-the-Job Training (Skill Component) SC							
1.	18FSTNSC02	Sports Nutritionist (NSDC curriculum)	-	-	-	-	-
		Total	27	220	480	700	22+5 (Extra)

Note:- I- Internal, E-External, T- Total, C- Credit, S-Satisfactory, US - Unsatisfactory

Semester IV

S.No.	Course Code	Course Title	Hours	I	E	T	C
Core Courses (C)							
1.	18FSTNC14	Clinical Nutrition I	3	25	75	100	4
2.	18FSTNC15	Clinical Nutrition II	3	25	75	100	4
3.	18FSTNC16	Biochemical Analysis Practical	3	40	60	100	2
4.	18FSTNC17	Computer Aided Clinical Nutrition Practical	3	40	60	100	2
5.	18FSTNC18	Advanced Analytical Techniques Practical	3	40	60	100	2
Elective Courses (One Course per semester) (E) (Optional)							
5.	18FSTNE07	Physiological Aspects of Nutrition	3	25	75	100	4
5.	18FSTNE08	Nutritional Epidemiology	3	25	75	100	4
Online Courses (O)							
1.	18FSTNO04	Courses in online portal of SWAYAM	3	-	100	100	-
Experiential Learning (EL) Courses							
1.	18FSTNEL05	Visit to three Health and Fitness Centres/ Naturopathy Unit/Nutraceutical Manufacturing Unit	3	S/US	-	S	1 (Extra)
2.	18FSTNEL06	Four Weeks Internship in Reputed Multi-specialty Hospitals (Summer Vocation)	3	S/US	-	S	2 (Extra)
Innovative Learning (IL) Courses							
2.	18FSTNIL04	Part 4 Research – Personalised Nutrition Care Process of an Individual	3	40	60	100	2
On-the-Job Training (Skill Component) (SC) Courses							
2.	18FSTNSC02	Sports Nutritionist (NSDC curriculum)	6	50	150	200	4
		Total	36	285	615	900	24 + 2 (Extra)

Note:- I- Internal, E-External, T- Total, C- Credit, S-Satisfactory, US - Unsatisfactory

Examinations

Examinations are conducted in semester pattern. The examination for the Semester I & III will be held in November/December and that for the Semester II and IV will be in the month of April/May.

Candidates failing in any subject (both theory, practical and skill) will be permitted to appear for such failed subjects in the same syllabus structure at subsequent examinations within next 5 years. Failing which, the candidate has to complete the course in the present existing syllabus structure.

Scheme for Evaluation

Evaluation will be done on a continuous basis and will be evaluated four times during the course work. The first evaluation will be in the 7th week, the second in the 11th week, third in the 16th week and the end – semester examination in the 19th week. Evaluation may be by objective type questions, short answers, essays or a combination of these, but the end semester examination is a University theory examination with prescribed question paper pattern.

Scheme for Internal Marks in Theory (Max. Marks-25)

Analytical Part Assignment	- 05 Marks
Seminar + ppt. upload	– 05 Marks
Internal Tests	- 10 (Best two out of three tests: Each 5 Marks)
Attendance	- 05 marks

Scheme for Internal Marks in Practical (Max. Marks-40)

Good Laboratory Practices	- 05 Marks
Standard Operating Procedure for one Exercise	- 10 Marks
Performance Evaluation	- 10 Marks
Internal Tests	– 10 (Best two out of three tests: Each 05 Marks)
Attendance	- 05 marks

Scheme of Valuation of Dissertation (Part 1, 2, 3 and 4)

Internal:

Innovative Ideas	- 05 Marks
Performance Evaluation	- 10 Marks
Report	- 20 Marks

External:

Presentation	- 40 Marks
Viva Voce	- 20 Marks

Pattern of Question paper (Theory)

Duration of the examination - 3 hours, Maximum marks – 75

Part A	
Answer All Questions (Like UGC Question Pattern)	20X1 = 20 (OMR Sheet based evaluation)
Part B	
Answer any Five Questions (Analytical questions)	5X3 = 15
Part C	
Answer All questions (Internal Choice questions)	5X8 =40
Total	**75 marks**

(All parts of question should have equal importance to all five units in the syllabus)

Grading System

Evaluation of performance of students is based on ten point scale grading system as given below.

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

Modules for the short term courses

Corel Draw and Adobe Photoshop – Nutritional Labeling (16FSNST01)

Objectives

1. To enable the students to design the nutrition label, pamphlets and advertisement pages using Corel Draw and Adobe Photoshop

Module	Sub Modules	L	T	P	Total hours
Corel Draw and Adobe Photoshop	Menus	1	2	3	6
	Tool boxes	1	2	3	6
	Keyboard shortcuts	1	1	1	3
	Designing visiting card	-	1	3	4
	Designing a certificate	-	1	3	4
	Designing an advertisement page	-	1	3	4
	Designing a food label	-	1	4	5
	Designing a nutrition label	-	1	4	5
	Designing a nutrition pamphlet	-	1	4	5
	Total	3	11	28	42

Outcome

1. Students can able to design a visiting card, invitation, certificate, advertisement pages – online and offline, food label, nutrition label and nutrition pamphlet.

In Vitro and *In Vivo* Techniques in Nutrition (16FSNST04)

Objectives

1. To update the practical knowledge of the students on *in vitro* and *in vivo* nutrient availability from any food item.

Module	Sub Modules	L	T	P	Total hours
In vitro techniques	*In vitro* starch digestibility	1	3	3	7
	In vitro protein digestibility	1	3	3	7
	In vitro iron bioavailability	1	3	3	7
In vivo techniques (Animal and Human Models)	Protein Efficiency Ratio	1	5	-	6
	Acute Toxicity Studies	1	5	-	6
	Glycemic Index and Load	1	-	3	4
	Role of animal and human ethical committee	2	-	3	5
	Total	8	19	15	42

Outcome

1. Students can able to execute the learned techniques during their research degree programmes