ST. TERESA'S COLLEGE, ERNAKULAM (AUTONOMOUS)

Affiliated to Mahatma Gandhi University, Kottayam.

CURRICULUM FOR

M.Sc. HOME SCIENCE

(BRANCH C) FOOD SCIENCE AND NUTRITION

Under Credit & Semester System
(2020 Admissions Onwards)

ST.TERESA'S COLLEGE (AUTONOMOUS), ERNAKULAM
DEPARTMENT OF HOME SCIENCE & CENTRE FOR RESEARCH
BOARD OF STUDIES IN HOME SCIENCE

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4. **Dr. A. Thirumani Devi,** Associate Professor and Head, Dept. of Food Science and Nutrition, Avnashilingam Deemed to be University, Coimbatore -43(subject Expert)**.**
5. **Dr. Dharani Krishna,** Chief Dietician, Wellness Clinic, Teynampet, Chennai, (Expert from industry).
6. **Dr. Lizmitha Godwin,** Assistant Professor & Head, Department of Home Science, Morning Star Home Science College, Angamaly (Alumnus).
7. **Dr. Betty Rani Isaac,** Associate Professor, Department of Home Science, St. Teresa's College, Ernakulam (Member).
8. **Smt. Teresa Kuncheria,** Associate Professor, Department of Home Science, St. Teresa's College, Ernakulam (Member).
9. **Dr. Susan Cherian**, Associate Professor, Department of Home Science, St. Teresa's College, Ernakulam (Member).
10. **Dr. Anu Joseph**, Associate Professor, Department of Home Science, St. Teresa's College, Ernakulam (Member).
11. **Smt. Rose Mary Francis**, Assistant Professor, Department of Home Science, St. Teresa's College, Ernakulam (Member).
12. **Dr. Shilpa Jose**, Assistant Professor, Department of Home Science, St. Teresa's College, Ernakulam (Member).
13. **Dr. Dhanya N.**, Assistant Professor, Department of Home Science, St. Teresa's College, Ernakulam (Member).
14. **Dr. Leena Leon**, Assistant Professor, Department of Home Science, St. Teresa's College, Ernakulam (Member).
15. **Dr. Nisha Vikraman**, Assistant Professor, Department of Home Science, St. Teresa's College, Ernakulam (Member).
16. **Dr. Rashmi H. Poojara**, Assistant Professor, Department of Home Science, St. Teresa's College, Ernakulam (Member).
17. **Smt. Nimmi Jacob**, Assistant Professor, Department of Home Science, St. Teresa's College, Ernakulam (Member).

MINUTES OF THE BOARD OF STUDIES MEETING OF THE DEPARTMENT OF HOME SCIENCE & CENTRE FOR RESEARCH HELD ON 19/03/2020

This is to certify that the revised syllabus of the M.Sc. Home Science (Branch A- Child Development, Branch B -Resource Management and Interior Designing and Branch C- Food Science and Nutrition) for 2020 admissions onwards has been scrutinized and approved at the Board of Studies Meeting which was held on 19th March 2020.

The following members attended the meeting:

1. Dr. Thara Sebastian (Chairperson)
2. Dr. Lizmitha Godwin (BOS Member – Alumna)
3. Dr. Betty Rani Isaac (BOS Member)
4. Smt. Teresa Kuncheria (BOS Member)
5. Dr. Susan Cherian (BOS Member)
6. Dr. Anu Joseph (BOS Member)
7. Smt. Rose Mary Francis (BOS Member)
8. Dr. Shilpa Jose
9. Dr. Dhanya. N. (BOS Member)
10. Dr. Leena Leon (BOS Member)
11. Dr. Rashmi H. Poojara (BOS Member)
12. Dr. Nisha Vikraman (BOS Member)
13. Smt. Nimmi Jacob (BOS Member)

Dr. Thara Sebastian
Chairman, Board of Studies in Home Science

FACULTY OF THE DEPARTMENT WHO HAVE CONTRIBUTED TOWARDS CURRICULUM AND SYLLABUS IN M.Sc. HOME SCIENCE

1. Dr. Thara Sebastian, Head and Assistant Professor (Child Development)
2. Dr. Betty Rani Isaac, Associate Professor (Food Science and Nutrition)
3. Smt. Teresa Kuncheria, Associate Professor (Textiles and Clothing)
4. Dr. Susan Cherian, Associate Professor (Family Resource Management)
5. Dr. Anu Joseph, Associate Professor (Food Service Management & Dietetics)
6. Smt. Rose Mary Francis, Associate Professor (Family Resource Management)
7. Dr. Shilpa Jose, Assistant Professor (Food Science and Nutrition)
8. Dr. Dhanya.N, Assistant Professor (Human Development)
9. Dr. Leena Leon, Assistant Professor (Family Resource Management)
10. Dr. Nisha Vikraman, Assistant Professor (Extension Education)
11. Dr. Rashmi H. Poojara, Assistant Professor (Foods and Nutrition)
12. Smt. Nimmi Jacob, Assistant Professor (Food and Nutrition)
13. Smt. Leena George, Assistant Professor-Guest (Human Development)
14. Smt. Jumana Haseen. A .,Assistant Professor-Guest (Child Development)
15. Smt. Betty Joseph, Associate Professor (Statistics)
16. Smt. Shanty. B. P., Associate Professor (Statistics)

ACKNOWLEDGEMENT

I would like to extend my sincere thanks to Rev. Dr. Sr. Vinitha for her valuable support. I also acknowledge with gratitude, the guidance extended by our Principal Dr. Sajimol Augustine. M during the course of the restructuring of the syllabus of MSc Programme in Home Science (Branch A) Child Development, (Branch B) Resource Management and Interior Designing and (Branch C) Food Science and Nutrition.

I thank all the esteemed experts of the BOS for their valuable suggestions. I wish to individually thank all the members of the BOS who have provided valuable inputs on course structure and content. I gratefully acknowledge the unstinted support and guidance extended by the faculty members of the Home Science Department during the course of restructuring of the syllabus. I am also grateful to all the members of the Curriculum Committee of the college for their guidelines and generous support. I extend my immense sense of gratitude and respect to all those who extended help and guidance. Above all, I bow my head before God Almighty for all the help given to us in all our endeavours.

Dr. Thara Sebastian
Head, Department of Home Science & Centre for Research
Chairman, Board of Studies in Home Science

PREFACE

As an autonomous college under Mahatma Gandhi University, St. Teresa's College has taken conscientious efforts to strengthen the curriculum by retaining all the fundamental stipulations of the University/Higher Education Council, to ensure a well-balanced curriculum. Within the constraints of prescribed syllabi, we have resolved to take a collective effort to create an inspiring academic culture in the institution, essential for teachers and students to access deeper knowledge and participate in its expansion and transmission. It is also to re-articulate almost lost or forgotten fact that production and transmission of Quality Knowledge, essential for the development of students in particular and society in general, are the primary functions of any educational institution.

The restructured syllabi of the programmes aim to provide students many opportunities to engage with authentic, real world learning which will foster their reasoning, imagination, intelligence and problem solving skills, thereby enabling them to acquire true knowledge of universal validity and relevance which will lead to individual development, civil efficiency, economic competency and welfare of the whole of humanity.

I acknowledge the efforts taken by the teachers in restructuring the syllabi and course outcomes of the programmes that focus on the cognitive and intellectual skills of the learners, confidence to carry out independent and scholarly research in the area of professional interest to them and to position themselves as globally effective cross- cultural educators

I congratulate the efforts taken by the Principal Dr. Sajimol Augustine M. and Convenor, PG syllabus restructuring 2020, Smt. Shanty B.P who coordinated the syllabus restructuring of all the programmes in an effective manner. Transformation is what makes St. Teresa's distinctive; transforming lives in order to make a real impact on the local and international stage through the creation, sharing and application of knowledge. We look forward to sharing with you the outcomes of our curriculum restructuring and I hope that these resources will enable you to reflect on the learning gain in our institution.

Dr. S. R. VINITHA (CELINE E)
DIRECTOR, ST. TERESA'S COLLEGE, ERNAKULAM

FOREWORD

Autonomy in the field of higher education implies responsibility and accountability and this in turn leads to excellence in academics and proactive governance. St Teresa's College was given autonomous status in the year 2014 and we have made a concerted attempt to maintain a high level of quality in the standard of education that we impart. In 2019 the college has been re-accredited with A++ grade (CGPA 3.57)

Academic autonomy has granted us the freedom to fine tune the syllabus keeping in mind the changing needs of the new generation of students. Education in the current scenario throws up a multitude of challenges and the curricula and syllabi ought to reflect the paradigm shift that has occurred in the various disciplines. Structured feedback was taken from the Students, Alumni and the experts from the industry and the changes suggested by them were duly incorporated in the restructured syllabi.

The Board of Studies constituted for each department meet regularly in the stipulated time frame and in depth discussions are conducted about the different dimensions of the curricula and syllabi. The IQAC team has felicitated the conduct of a number of workshops and conferences to equip the faculty with the necessary skill set to restructure the syllabi, set question papers for internal tests that evaluate whether the learning outcomes enlisted in the syllabus have been achieved and to ensure the fair and transparent conduct of examinations.

The responsibility that autonomy has placed on us is indeed onerous but we have strived together to meet all the challenges that were placed in our way. We have worked towards moulding young women as responsible citizens who will carry forward the task of nation building in an exemplary manner. All effort has been made to nurture their academic ambitions as well as their skills in co-curricular activities. To keep in pace with the need of the new generation students, we have decided to restructure post graduate programmes in the next academic year.

With sincere gratitude I acknowledge the instinct support and constant guidance extended by Rev. Sr. Dr.Vinitha, the Director of the College.

I specially thank the team headed by Smt. Shanty B. P. for coordinating the syllabus restructuring of the programmes, the Heads of the Departments and all the faculty members for their diligence, commitment and exceptional contribution towards this endeavour.

Dr. SAJIMOL AUGUSTINE M.
PRINCIPAL

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PREAMBLE

The Master's program of Food Science and Nutrition provides professional education for those who wish to develop a career in Dietetics, Community Nutrition, Food industry or Nutrition research. It focuses on the interface between human nutrition and food science, an area of increasing importance to educators, health departments, consumers, government and the food industry. It builds on major concepts of human biochemistry and physiology, nutrition and food science to discuss the roles of all nutrients, nutritional contents of food and diet in health and disease. The program includes all the units of study pertaining to food and nutrition to ensure that the students reach competence in the field of public health, medical nutrition therapy, food service management, communication, management, research and evaluation.

The main objective of the programme is to equip the students with skills and knowledge on the scientific study of nutrition and to help students to become professionals who can effectively play a role in academics, research, food industry, training and extension and community services. The programme also enable the students to develop capacities and abilities to pursue higher education and research in Food Science and Nutrition. This programme offers an integration of theory, practicals, internship, field placement and hands on training as instructional methods aims at equipping the students with necessary proficiencies for a wide variety of career options. This Master's programme in Food Science and Nutrition is designed to enhance the persona of students and to empower them to make positive changes in the society.

The Board of Studies acknowledges and appreciates the good effort put in by the faculty members of Department of Home Science to frame the syllabus for M.Sc. in Home Science (Branch C) Food Science and Nutrition in the institution which will be implemented for the admissions from 2020 onwards.

PROGRAMME OUTCOME

The Department of Home Science and Centre for Research is committed to provide an enriched educational experience to develop the knowledge, skills and attributes of students to equip them for life in a complex and rapidly changing world. On completion of M.Sc Home Science (Branch C) Food Science and Nutrition our students should be able to demonstrate the programme outcomes listed below:

PO1. ***Disciplinary knowledge***

- Demonstrate a mastery of the fundamental knowledge and skills required in the discipline to function effectively as an entry-level professional in the field.

PO2. ***Scientific Temper***

- Experiment with new approaches, challenge existing knowledge boundaries and take informed action to solve problems related to society.
- Identify, define, and deal with problems through logical, analytical and critical Thinking acquired from different domains of knowledge

PO3. ***Research and Digital Competence***

- Develop a research culture for lifelong learning and demonstrate competency in creating new knowledge**.**
- Analyze and choose from available data and information sources to communicate, collaborate and network through a range of digital media.

PO4. ***Communication Skills***

- Develop language proficiency through interactions embedded in meaningful contexts.
- Demonstrate communicative competence particularly using technology in social and global environments.

PO5. ***Leadership, Teamwork and Interpersonal Skills***

- Function effectively both as leader and/or member of a team**.**
- Collaborate and interact effectively with others.

PO6. ***Moral & Ethical Awareness and Social Responsibility***

- Demonstrate social and national responsibility.
- Engage in activities that contribute to the betterment of society, with a preferential option for the economically challenged and the marginalized.

PROGRAMME SPECIFIC OUTCOME

The syllabus is framed in such a way that it provides a more complete and logic framework in almost all areas of Home Science (Branch C) Food Science and Nutrition

At the end of the programme, the students should able to

PSO1: Develop competence in public health nutrition & nutrient analysis of foods and new product development.

PSO2: Acquire skills to practice as a dietician or nutritionist in a national or international government programmes / clinical setting /health club/community setting/sports organization.

PSO3: Demonstrate the ability as an entrepreneur and skills to establish a food service outlet

PSO4: Apply the theoretical knowledge acquired for a job in the food industry

PSO5: Acquire skills to design epidemiological study methods suitable for nutrition programmes and promote healthy life style in the community.

PSO6: Enhance academic competence to pursue teaching as a profession and undertake research in the area of food and nutrition.

Job Opportunities

The programme M.Sc. Home Science (Branch C) Food Science and Nutrition would enable students to work as teaching faculty in colleges and universities. They can work as research assistants/ associates in institutes and as project staff in research programmes in nutrition and health. Students can work as clinical or therapeutic dieticians in hospitals, sports nutritionists, diet consultants in health and fitness centers and food service establishments. They are also eligible to work as nutritionist in government nutrition programmes in state and national centers like FAO. WHO, UNICEF NHM and ICDS. The students can also work as food quality controllers in food processing establishments, nutrition consultants and communicators.

Eligibility for admission

Admission in order of preference is given below

For admission for the PG Programme in Food Science & Nutrition, the applicant must have passed.

1) BSc./B.Voc programme with specialization in Food and Nutrition/ Food Science & Quality Control/ Clinical Nutrition & Dietetics/ Food Technology / Food Processing Technology/ Home Science/ Family & Community Science.

2) Graduates in Biochemistry / Chemistry/ Zoology/ Nursing with PG. Diploma in Nutrition & Dietetics of any statutory university recognized by M.G University are also eligible.

3) Graduates in Biochemistry/ Chemistry/ Zoology/ Nursing with any three of the following nutrition related courses are also eligible.

4) Basic nutrition ii) Biochemistry iii) Human Physiology iv) Diet Therapy v) Clinical Nutrition vi) Diet in Diseases.

Candidates who have passed qualifying examination in CBCSS (2009) pattern should possess CGPA of not less than 2.00 out of 4.00 in the Core Group (core plus open and complementary courses).

Candidates who have passed qualifying examination in CBCSS (2013) pattern should possess CGPA of not less than 5.00 out of 10.00 in the Core Group (core plus open and complementary courses).

Candidates who have passed qualifying examination in other patterns should possess not less than 50% marks in main & subsidiary subjects under Part III.

Duration of the Course: Four Semesters

Examination: Credit and Semester System (CSS)

Direct Grading System with 7 point scale

Medium of instruction and assessment: English

Faculty under which the Degree is awarded: Science

STRUCTURE OF M.Sc. HOME SCIENCE

(Branch C) FOOD SCIENCE AND NUTRITION

The programme shall include two types of courses, Core courses and Elective courses. There shall also be a project and comprehensive viva voce as core courses. The programme also includes assignment/seminar/practical/ internship/field placement etc. The total credit for the programme is fixed at 80.

Theory Courses

There are **fifteen** theory courses spread in all the four semesters of the M.Sc. Programme. Distribution of theory courses are as follows. There are twelve core courses common to all students. Semester I, II and III will have **four** core courses each and semester IV will have **three** elective courses. Any **three** elective courses can be chosen as per the interest of the students, availability of faculty and academic infrastructure.

Practical

All four semesters will have a course on laboratory practical. The practical examinations will be conducted by external and internal examiner appointed by the controller of examinations at the end of even semesters only. The first and second semester examinations of laboratory practical courses will be conducted at the end of Semester II while the third and fourth semester practical examinations will be conducted at the end of Semester IV.

Project

The project of the PG programme should be relevant and innovative in nature. The type of project can be decided by the student and the guide (a faculty of the department or other department/college/university/institution). The project work should be taken up seriously by the student and the guide. The project should be aimed to motivate the inquisitiveness and research aptitude of the students. The students may be encouraged to present the results of the project in seminars/symposia. The conduct of the project may be started at the beginning of Semester III, with its evaluation scheduled at the end of Semester IV. The project is evaluated by external and internal examiners.

Viva Voce

A viva voce examination will be conducted by internal and external examiners at the time of evaluation of the project. The components of viva consists of subject of project related topics, thrust areas of research in Food Science and Nutrition, topics covering all semesters and awareness on current topics and advanced topics.

Course Code

The courses in the programme are coded according to the following criteria. The first two letters of the code indicates the name of programme, ie. FN stands for Food Science and

Nutrition. Next digit is to indicate the semester. i.e., FN1 (Food Science and Nutrition, 1st semester) followed by the letter C or E indicating whether the course is a core course or elective course as the case may be. Next digits indicate course number. The letter/letters T/P/ PR/V follows it and is used to indicate theory/practical/project/viva. The next letter will be M which indicates that programme is for masters. The last two digit is 20 representing the year in which restructuring is done.

DISTRIBUTION OF COURSES AND CREDITS

Semester	Course Code	Course Title	Teaching hours per week	Credit	Total credit
I	FN1C01TM20	Human Physiology	4	4	
	FN1C02TM20	Advanced Nutrition I	4	4	
	FN1C03TM20	Principles of Nutrition	4	4	**19**
	FN1C04TM20	Research Methods and Statistics I	3	3	
	FN1C01PM20	Advanced Nutrition and Food Analysis Practicals	10	4	
II	FN2C05TM20	Advanced Nutrition II	4	4	
	FN2C06TM20	Clinical Nutrition and Dietetics	4	4	
	FN2C07TM20	Research Methods and Statistics II	4	4	**19**
	FN2C08TM20	Public Health Nutrition	3	3	
	FN2C02PM20	Public Health Nutrition and Dietetics Practicals	10	4	
III	FN3C09TM20	Advanced Food Science	4	4	
	FN3C10TM20	Nutritional Biochemistry	4	4	
	FN3C11TM20	Food Technology	4	4	**19**
	FN3C12TM20	Food Service Management	3	3	
	FN3C03PM20	Food Science and Food Service Management Practicals	10	4	
IV	FN4E01TM20	Food Biotechnology	5	4	
	FN4E02TM20	Food Microbiology	5	4	
	FN4E03TM20	Biophysical Techniques	5	3	**23**
	FN4C04PM20	Food Microbiology Practicals	10	4	
	FN4PRM20	Project		5	
	FN4VM20	Viva voce		3	
	Total				**80**

ELECTIVE COURSES

Course code	Course Title	Teaching hours per week	Credit
ELECTIVE COURSES BUNCH A			
FN4E01TM20	Food Biotechnology	5	4
FN4E02TM20	Food Microbiology	5	4
FN4E03TM20	Biophysical Techniques	5	3
ELECTIVE COURSES BUNCH B			
FN4E04TM20	Sports Nutrition	5	4
FN4E05TM20	Food Safety and Quality Control	5	4
FN4E06TM20	Food product Development and Marketing	5	3
ELECTIVE COURSES BUNCH C			
FN4E07TM20	Entrepreneurship Management	5	4
FN4E08TM20	Nutrition Education and Dietetic counselling	5	4
FN4E09TM20	Bakery and Confectionery Technology	5	3

DISTRIBUTION OF CREDITS

The total credit for the programme is fixed at 80.The distribution of credit points in each semester and allocation of the number of credit for theory courses, practical, project and viva are as follows:

Semester	Courses	Credit	Total Credit	
I	3Theory Core Courses 1 Theory Core Course 1 Practical Core Course	4 3 4	3 X 4 = 12 1 X 3 = 3 1 X 4 = 4	19
II	3Theory Core Courses 1 Theory Core Course 1 Practical Core Course	4 3 4	3 X 4 = 12 1 X 3 = 3 1 X 4 = 4	19
III	3Theory Core Courses 1 Theory Core Course 1 Practical Core Course	4 3 4	3 X 4 = 12 1 X 3 = 3 1 X 4 = 4	19
IV	2 Theory Elective Courses 1 Theory Elective Course 1 Practical Core Course	4 3 4	2 X 4 = 8 1X 3 = 3 1 X 4 = 4	23
	1 Project	5	1 X 5 = 5	
	1 Viva- Voce	3	1 X 3 = 3	
	GRAND TOTAL			**80**

EVALUATION AND GRADING

The evaluation for each course shall contain two parts such as In-Semester Assessment (ISA) and End Semester Assessment (ESA). The ratio between ISA and ESA shall be 1:3 and 25% weightage shall be given to ISA and 75% weightage to ESA. Both ISA and ESA shall be carried out using direct grading system.

Evaluation (Both ISA and ESA) to be done by the teacher is based on a six point scale shown in the table below:

GRADE	GRADE POINT	RANGE
A^+	5	4.50 to 5.00
A	4	4.00 to 4.49
B	3	3.00 to 3.99
C	2	2.00 to 2.99
D	1	0.01 to 1.99
E	0	0.00

Direct Grading System based on a 7 – point scale is used to evaluate the performance of students in both ISA and ESA.

For all courses (theory & practical) / semester/overall program, the letter grades for GPA/SGPA/CGPA and its indicators are given in the following table:

RANGE	GRADE	INDICATOR
4.50 to 5.00	A^+	Outstanding
4.00 to 4.49	A	Excellent
3.50 to 3.99	B^+	Very good
3.00 to 3.49	B	Good(Average)
2.50 to 2.99	C^+	Fair
2.00 to 2.49	C	Marginal
0.00 to 1.99	D	Deficient(Fail)

IN-SEMESTER ASSESSMENT (ISA)

The pass minimum for ISA for each course is C grade. The In-Semester Assessment is to be done by continuous assessments of the components given below.

The components of the In-Semester assessment for theory and practical and their weightage are as in the following table:

THEORY		**PRACTICAL**	
COMPONENTS	**WEIGHTAGE**	**COMPONENTS**	**WEIGHTAGE**
Assignment	1	Written / Lab test	3
Seminar	2	Lab involvement and record	1
Test Papers (Average of 2)	2	Viva	1
TOTAL	**5**	**TOTAL**	**5**

The two test papers should be in the same model as the End Semester examination question paper. For test papers questions shall be set in such a way that the answers can be awarded $A^{+,}$ A, B, C, D, E grade.

The performance of students in the seminar and assignment should also be documented in terms of grades. The components for assignments and seminars are as in the following table:

ASSIGNMENT COMPONENTS	**SEMINAR COMPONENETS**
Punctuality	Content
Content	Presentation

- The components of the In-Semester Assessment for project and their weightage are as in the following table:

COMPONENTS	**WEIGHTAGE**
Relevance of the topic and Analysis	2
Project content and presentation	2
Project viva	1
TOTAL	**5**

The In-Semester Assessment of the project is done by the supervising guide of the department or the member of the faculty decided by the head of the department.

The project work may be started at the beginning of the Semester III. The supervising guide should keenly and sincerely observe the performance of the student during the course of project work. The

Supervising guide is expected to inculcate in student(s), the research aptitude and aspiration to learn and aim high in the realm of research and development. Only one student may be allowed to perform one project work. Project evaluation begins with (I) the selection of problem (ii) literature survey (iii) work plan, (iv) experimental / theoretical setup/data collection (v) characterization techniques/computation/analysis (vi) use of modern software for data analysis/experiments (**SPSS, R software)** and (vi) preparation of project report. The project internal grades are to be submitted at the end of Semester IV.

- The components of the In-Semester Assessment for comprehensive viva voce and their weightage are as in the following table.

COMPONENTS	WEIGHTAGE
Fundamental Concepts	3
Awareness of current /advanced topics	2
TOTAL	**5**

General Instructions for In-Semester Assessment

- The In-Semester Assessment should be fair and transparent. The responsibility of evaluating the In-semester Assessment is vested on the teacher (s) who teach the course. The evaluation of the components should be published and acknowledged by students. All documents of In-semester Assessment are to be kept in the institution for 2 years.
- The assignments/ seminars / test papers are to be conducted at regular intervals. These should be marked and promptly returned to the students.
- One teacher appointed by the Head of the Department will act as a coordinator for consolidating grade sheet for In-Semester Assessment in the

department, in the format supplied by the Controller of the Examinations. The consolidated grade sheets are to be published in the department notice board one week before the closing of the classes for End Semester Assessment. The grade sheet should be signed by the coordinator and counter signed by the Head of the Department and the college Principal.

- The consolidated grades in specific format are to be kept in the college for future references. The consolidated grades in each course should be uploaded to the Institution Portal at the end of each semester as directed by the Controller of the Examinations.
- There shall not be any chance for the improvement of ISA grade points.
- Grievance Redressal Mechanism for In-semester Assessment

There will be provision for grievance redressal at three levels, viz,

1) At the level of teacher concerned
2) At the level of departmental committee consisting of Head of the Department, Coordinator and teacher concerned.
3) At the level of college committee consisting of the Principal, Controller of Examinations and Head of the Department.

College level complaints should be filed within one week of the publication of results and decisions taken within the next two weeks.

END SEMESTER ASSESSMENT (ESA)

The End Semester Assessment of all semesters shall be conducted by the institution on the close of each semester. The End semester assessment will be of 3 hours duration for each lecture based and practical courses. A minimum C grade is required for a pass in both ISA and ESA. Also a minimum C grade is required for a pass in a course.

Students with attendance less than 75% aggregate attendance during a semester are not eligible to attend ESA of any course.

If a student represents her Institution/ University /State / Nation in sports/ NCC/NSS or Cultural programme or any other officially sponsored activities such

as college union/university union etc, she shall be eligible to claim the attendance for the actual number of days participated subject to a maximum of 15 days in a semester based on the specific recommendations of the Head of the Department or teacher concerned.

For reappearance/ improvement, students may appear along with the next batch.

Question Paper Pattern for Theory Courses

All the theory question papers are of three hour duration. All question papers will have three parts. The question shall be prepared in such a way that the answers can be awarded the grades A+, A, B, C, D,E.

Part A: Questions from this part are very short answer type. Eight questions have to be answered from among ten questions. Each question will have weightage one and the Part A will have a total weightage of eight. A minimum of two questions must be asked from each unit of the course.

Part B: Part B consists of problem solving and short essay type questions from the course concerned. Six questions out of eight given have to be answered. Each question has a weightage of two making the Part B to have total weightage of twelve.

Part C: Part C will have four questions. One question from each module must be asked. Two questions have to be answered out of four questions. Each question will have a weightage of five making the total weightage ten in Part C.

Maximum weightage for End-Semester Assessment is 30. Therefore Maximum Weighted Grade Point (WGP) is 150.

Directions for Question Setters

1) Questions shall be set to assess knowledge acquired, standard and application of knowledge in new situations, critical evaluation of knowledge and the ability to synthesize knowledge.

2) Due weightage shall be given to each module on content/teaching hours allotted to each module.

3) The question setter shall ensure that questions are set as per the course outcomes.

4) A question paper shall be a judicious mix of short answer type, short essay type/problem solving type and long essay type questions.

5) The questions shall be set in such a way that the answers can be awarded $A^{+,}$ A, B, C, D, E grade.

6) Different types of questions shall be given different weightage to quantify their range as shown below:

	Type of Questions	**Weight**	**Number of questions to be answered**
Part A	Short answer type questions	1	8 out of 10
Part B	Short essay/ problem solving type questions	2	6 out of 8
Part C	Long essay type questions	5	2 out of 4

Practical, Project and Viva Voce Examinations

Practical Examination

First and second semester practical examinations are conducted at the end of Semester II and third and fourth semester practical examinations are conducted at the end of Semester IV. The practical examinations are conducted immediately after the second and fourth semester theory examinations respectively. There will be two practical examination boards every year to conduct these practical exams. All practical examinations will be of six hours duration.

One external examiner will be selected from the panel of examiners and one internal examiner will be selected by the department.

Evaluation of Practical Examinations

The Scheme of Evaluation of the practical examination will be decided by the Board of Examiners. The different weightage for assessment of different components is shown in the following table:

COMPONENTS	**WEIGHTAGE**
Written/Lab test	10
Lab involvement and Record	3
Viva	2
TOTAL	15

Project Evaluation

The project is evaluated by internal and external examiners deputed from the board of examination. The project is examined along with the oral presentation of the project. The examiners should ascertain that the project and report are genuine. Innovative projects or the results/findings of the project presented in national seminars may be given maximum advantage. The supervising guide or the faculty appointed by the head of the department may be allowed to be present at the time of project evaluation. This is only to facilitate proper evaluation of the project. The different weightage for assessment of different components are shown in the following table:

COMPONENTS	WEIGHTAGE
Relevance of the topic and analysis	2
Project content and presentation	10
Project viva	3
TOTAL	**15**

Comprehensive Viva Voce Examination

Viva voce examination is conducted only by the internal and external examiners of the board of examinations

The components of the End Semester Assessment for comprehensive viva-voce and their weightage are as in the following table:

COMPONENTS	WEIGHTAGE
Fundamental Concepts	9
Awareness of current topic/ advanced topic	6
TOTAL	**15**

Both project evaluation and viva voce examination are to be conducted in batches of students formed for the practical examinations.

Reappearance/ Improvement

- A student who fails to secure a minimum grade (Grade C) for a pass in a course will be permitted to write the examination along with the next batch.
- The candidate who wish to improve the grade /grade point of the End-Semester Assessment of a course /courses she has passed can do the same by appearing in the End-Semester Assessment of the semester concerned along with the immediate junior batch. This facility is restricted to first and second semesters of the programme.
- **One Time Betterment Programme:** A candidate will be permitted to improve the CGPA of the programme within a continuous period of four semesters immediately following the completion of the programme allowing only once for a particular semester. The CGPA for the betterment appearance will be computed based on the SGPA secured in the original or betterment appearance of each semester whichever is higher.
- If a candidate opts for the betterment of CGPA of a programme , she has to appear for the external examination of the entire semesters excluding practicals/project/comprehensive viva voce. One time betterment programme is restricted to students who have passed in all courses of the programme at the regular (first) appearance.

Promotion

- A student who registers for a particular semester examination shall be promoted to the next semester.
- A student having 75% attendance and fails to register for examination of a particular semester will be allowed to register notionally and is promoted to the next semester, provided application for notional registration shall be submitted within15days of the commencement of the next semester.

COMPUTATION OF GPA/SGPA/CGPA

Grade Point Average (GPA): ISA and ESA are separately graded using a six point scale and the combined grade point with weightage 1 for ISA and 3 for ESA shall be applied to calculate the grade point average (GPA) of each course.

The Semester Grade Point Average (SGPA): After the successful completion of a semester, SGPA of a student in that semester is calculated using the formula given below:

Semester Grade Point Average (SGPA) = $\frac{\sum(C_i \ X \ GPA_i)}{\sum C_i}$ where C_i and GPA_i are the credit point and GPA of each course respectively.

Cumulative Grade Point Average (CGPA)for the programme is calculated as follows:

CGPA = $\frac{\sum(C_i \ X \ SGPA_i)}{\sum C_i}$ where C_i and $SGPA_i$ are the total credit point and SGPA of each semester respectively.

Note: GPA/SGPA/CGPA is graded on a 7 – point scale. A separate minimum of **C** Grade each for ISA and ESA (for both theory and practical) is required for pass for a course. For a pass in a programme, a separate minimum of Grade **C** is required for all the individual courses. If a candidate secures **D** Grade for any one of the courses offered in a Semester/Programme, only **D** grade will be awarded for that Semester/Programme until he/she improves this to **C** grade or above within the permitted period.

Note on compliance with the UGC minimum standards for the conduct and award of postgraduate degrees:

Credit and semester system is followed in this program. The program has 4 semesters with eighteen weeks in each semester. In each week there are 15 lecture hours and 10 laboratory hours (may change).In each semester there are 270 lecture hours and 180 practical hours; thus a total of 450 calendar hours in each semester which is in compliance with the minimum 390 hours stipulated by the UGC.

All rules and regulations are subject to change as and when modified by MG University to which St Teresa's College (Autonomous) is affiliated.

SYLLABUS

MSc. HOME SCIENCE

(Branch C) Food Science and Nutrition

SEMESTER I

CORE COURSES

SEMESTER I

FN1C01TM20- HUMAN PHYSIOLOGY

Total Credit: 4

Total Lecture Hours: 72

Course Outcome:

CO1: Advance knowledge on structure and function of the human body.

CO2: Comprehend alterations of organ systems in disease conditions.

CO3: Elucidate the integrated functions of all systems in the human body

CO4: Relate the principles of nutritional sciences and physiology.

CO5: Elaborate on interlinked mechanisms in the maintenance of normal functioning of human body.

Course Content:

Module 1: Blood and Circulatory System (15 hours)

Composition and functions of Blood, Blood volume, plasma proteins, Erythropoiesis, Hemoglobin, Coagulation of blood and coagulation factors. Blood vessels, Blood pressure-Regulation of blood pressure. Blood Grouping-ABO and Rh system and Hemostasis. Structure and functions of heart, Cardiac cycle, Properties of cardiac muscles, heart sounds, heart rate, Cardiac output and its regulation.

Module 2: Digestive and Renal system (15 hours)

Structure of upper and lower gastrointestinal tract and accessory organs-Salivary glands, liver and pancreas, Functions of the digestive system, the process of digestion-secretions and enzymes required for nutrient digestion, interrelationship between the digestive and absorptive processes in the Small Intestine. Enterohepatic circulation. Overview of common disorders of the digestive system-Vomiting, Constipation, Diarrhea.

Structure and Functions of Renal System. Urine -Formation of urine, Composition of normal and abnormal urine. Water, electrolyte and Acid Base balance, Renal Function Tests and pathophysiology of renal disorders. Endocrine function of kidneys.

Module 3: Respiratory system and Immunology (15 hours)

Organs, Structure and Functions, Mechanism of internal and external Respiration, Pulmonary Volumes, Interchange of gases within the lungs.

Nervous and Chemical Control of respiration Respiratory disorders-Anoxia, Dyspnea, Cyanosis, Asphyxia, Hyperpnoea, Orthopnea.

Human immunoglobulins, Cell mediated and humoral immunity-impact of malnourishment, innate immunity, acquired immunity and Autoimmune disorders.

Module 4: Nervous system and Endocrine glands (15 hours)

Nervous System - Nerve Cell morphology, communication between neurons, synaptic transmission, Classification of Nervous System, Central Nervous System – Brain and Spinal Cord - structure and functions, Peripheral Nervous System Somatosensory and Autonomic nervous system.

Hormones - The structure and function of pituitary gland, thyroid and parathyroid glands, pancreas, adrenal cortex and medulla, pineal body and thymus gland.

Module 5: Reproductive System (12 hours)

Anatomy of male and female reproductive system, Menstrual Cycle, Menopause, Spermatogenesis, Oogenesis, Embryo formation and development. Physiological changes during pregnancy and lactation, Placental transfer of Nutrients, Role of hormones in reproduction. Disorders of the reproductive system.

Learning Resources:

References

- Samson and Wright (1989) Applied Physiology, Tandon Publications
- Best, H. and Taylor, B (1991) The physiological basis of Medical Practice, 8th Edition, The Williams and Wilkins Company.
- Guyton J E and Hall A B (1996) Textbook of Medical Physiology, WB Saunders Publications, Philadelphia
- Sembulingam and Prema Sembulingam (2000), Essentials of Medical Physiology, Second Edition, Jaypee Brothers Medical Publishers (P) Ltd.
- Chatterjee, C.C (2001)., Human Physiology- Volume I and II, Medical Allied Agency, Calcutta.

- Tortora GJ, Derickson B, Grabowski SR (2007). Principles of Anatomy and Physiology (11th Ed.).
- Bijlani RL and Manjunatha S (2011) Understanding Medical Physiology,4th Edition,Jaypee Brothers Medical Publishers(P) Ltd.
- Stuart Fox (2012), Human Physiology, 13th edition, McGraw-Hill Education publishers.
- Anne Waugh and Allison Grant (2014), Ross and Wilson Anatomy and Physiology in Health and Illness, 12th Edition, Churchill Livingstone Elsevier, New York.
- Elaine N. Marieb, Katja N. Hoehn (2016); Human Anatomy & Physiology, Global Edition, Pearson Education Ltd.
- John E. Hall (2016), Guyton & Hall Textbook of Medical Physiology, 13th edition, Saunders Elsevier, United States of America.
- Jain AK (2017) Textbook of Physiology, 7th Edition Volume 1 &2, Avichal Publishing Company.

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FN1C01TM20 -HUMAN PHYSIOLOGY

Module	Hours	Part A 8/10 1 weight	Part B 6/8 2 weight	Part C 2/4 5 weight
1	15	2	1	1
2	15	2	1	1
3	15	2	2	1
4	15	2	2	1
5	12	2	2	

MODEL QUESTION PAPER

M.SC. DEGREE (C.S.S) EXAMINATION

First Semester

Faculty of Science-Home Science (Branch C) Food Science and Nutrition

FN1C01TM20 -HUMAN PHYSIOLOGY

(2020 admission onwards)

Time: 3 hours **Max. Weightage: 30**

Part A

(Answer any eight questions. Each question carries a weightage of 1)

1. List the functions of plasma proteins.
2. Comment on the properties of cardiac muscles.
3. List the functions of bile.
4. Discuss the normal and abnormal constituents of urine.
5. Comment on the chemical control of respiration.
6. Differentiate cell mediated and humoral immunity.
7. Discuss the role of the sympathetic nervous system in the human body.
8. What is the role of the pineal body?
9. Discuss the functions of placenta.
10. Write a note on the menstrual cycle.

(8 x 1=8 weightage)

Part B

(Answer any six questions. Each question carries a weightage of 2)

11. Discuss the structure of the heart with the aid of a neat figure.
12. Elaborate on the structural aspects of the human digestive system.
13. Comment on the impact of malnutrition on immune function.
14. Discuss the nervous control of respiration.
15. Explain the structure of the spinal cord with the aid of a neat figure.
16. Discuss the structural and functional aspects of the thyroid gland.
17. Elaborate on the structure of the male reproductive system.
18. Discuss the physiological changes in pregnancy.

(6x2=12 weightage)

Part C

(Answer any two questions. Each question carries a weightage of 5).

19. Write an essay on the composition and functions of blood.
20. Explain the formation of urine in the kidneys.
21. Detail the process of internal and external respiration in the human body.
22. Elaborate the role of the pituitary as the master gland of the endocrine system.

(2x5=10 weightage)

SEMESTER I

FN1CO2TM20-ADVANCED NUTRITION I

Total Credit - 4

Total Lecture Hours: 72

Course Outcomes:

CO1: Differentiate levels of body composition and elucidate the significance in human nutrition

CO2: Cite physiological and biochemical functions of macronutrients

CO3: Develop knowledge in the digestion and assimilation of nutrients and consequences of malnutrition

CO4: Relate human nutrition to the maintenance of health and the prevention of disease.

CO5: Develop competence in the scientific foundation of nutrition and dietetics practice and research.

Course Content:

Module 1: **Body Composition (10 hours)**

Body composition, significance, levels of body composition, assessment - Direct indirect and doubly indirect methods

Module 2: **Energy balance (12 hours)**

Energy content of foods, measurement, physiological fuel value

Total energy expenditure- measurements, components, basal metabolism, thermic effect of activity, thermic effect of food, adaptive thermogenesis, states of energy balance, current methodology for determining energy requirements, RDA Regulation of energy intake, chemical mediators of energy homeostasis CED and Obesity

Module 3: **Carbohydrates (20 hours)**

Nutritional importance, functions, sources, classification , digestion, absorption and transport and metabolism of carbohydrates

Glycemic index, glycemic load and satiety index, factors affecting glycemic index of foods. Hormonal control of carbohydrate homeostasis

Non glycemic carbohydrates - Fibre, classification, components and sources, properties, role of fibre in human nutrition, requirements.

Resistant starch, factors influencing resistant starch content in foods and potential health benefits Fructo-oligosaccharides

Carbohydrates and exercise performance, role of multiple transportable carbohydrates

Module 4: **Proteins (15 hours)**

Proteins- Classification, digestion, absorption and transport

Classification and therapeutic applications of specific amino acids: branched chain, glutamine, arginine, homocysteine, cysteine and taurine

Role of proteins and other nitrogen containing compounds

Protein turnover, nitrogen balance, obligatory nitrogen losses, current methodology for determining protein and essential amino acid requirements, RDA

Evaluation of Protein Quality- BV, DC, PER, NPR, NPU, chemical score, NDP Cal%, PDCAAS, Supplementary value of Proteins, Novel Protein Foods, improvement of nutritional quality of vegetarian diet

Module 5: **Lipids (15 hours)**

Classification, chemistry and structure of lipids, fatty acids and its sources, functions, digestion, absorption and metabolism

Lipid transport and transformation in liver

Role of essential fatty acids and eicosanoids

Lipotropic factors, visible and invisible fats, plant sterols in human nutrition, Requirement of fat and fatty acids

Recent Trends in Lipid Nutrition - saturated, poly unsaturated, mono unsaturated and Trans fat, fat burners and replacers

Learning Resources:

References:

- Gibney, M.J., MacDonald, I.A. and Roche, H.M. (2003). Nutrition and Metabolism, First Edition, The Nutrition Society Textbook Series, Blackwell Publishing.

- Gibney, M.J., Lanham- New, S.A., Cassidey, A. and Vorster H.H. (2009). Introduction to Human Nutrition, Second Edition, The Nutrition Society Textbook Series, Blackwell Publishing.
- Groff, J.L. and Gropper, S.S.(2016). Advanced Nutrition and Human Metabolism, Seventh Edition, Wadsworth Publishing Company.
- ICMR, (2010). Nutrient Requirements And Recommended Dietary Allowances For Indians A Report of the Expert Group of the Indian Council Of Medical Research.
- Kohlmeir, M. (2015) . Nutrient metabolism, Second Edition, Elsevier Ltd.
- Medeiros, D.M. and Wildman, E.C. (2019). Advanced Human Nutrition, Fourth Edition, Jones and Bartlett learning.
- Shils, M.E., Shike, M., Ross, A. C., Cabellero B., Cousins, R.J. (2012). Modern Nutrition in Health And Disease, Eleventh Edition, Wolters Kluwer Health Adis (ESP). \

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FN1C02TM20-ADVANCED NUTRITION 1

UNIT	Hours	Section A 8/10marks 1 weight	Section B 6/8 2 weight	Section C 2/4 5 weight
1	10	2	1	1
2	12	2	1	
3	20	2	2	1
4	15	2	2	1
5	15	2	2	1

MODEL QUESTION PAPER

ST.TERESA'S COLLEGE (AUTONOMOUS), ERNAKULAM

M. SC Degree(C.S.S) EXAMINATION

First Semester

Faculty of Science-Home Science (Branch C) Food Science and Nutrition

FN1C02TM20-ADVANCED NUTRITION 1

(2020 admission onwards)

Time: Three Hours **Maximum weightage: 30**

Section A

(Answer any **eight** questions, not exceeding one page. Each question carries a weightage of 1)

1. Give the advantages of IVNAA for body composition assessment
2. Give the methodology for body composition measurement by body impedance analysis
3. Differentiate gross calorific value from physiological fuel value
4. What are NPY and galanin ?
5. List out the types and illustrate the structure of a glucose transporter.
6. What are resistant starches?
7. What is meant by supplementary value of proteins?
8. What is the Protein Digestibility Corrected Amino Acid Score refer to?
9. What is the role of coenzyme A in the initiation of fatty acid oxidation?
10. With a suitable example elucidate facilitated diffusion

(8x1= 8 weightage)

Section B

(Answer any **six** questions, not exceeding one page. Each question carries a weight of 2)

11. Describe the significance of body composition assessment
12. What is mean by thermic effect of food? What are the factors affecting it?
13. Elucidate the functions of carbohydrate.
14. What are the key carbohydrate digestion enzymes and where are they produced?
15. Discuss any five important methods to evaluate protein quality

16. Describe urea cycle
17. Characterise each of the four lipoproteins in terms of chemical composition and functions
18. Differentiate cis and *trans* fatty acids.

(6x2=12weightage)

Section C

(Answer any **two** questions, not exceeding one page. Each question carries a weight of 5)

19. Describe different levels of body composition. Explain the indirect methods of assessment
20. Discuss fiber under the following heads; a) Types b) The importance in human nutrition c) Requirement for adults
21. Elaborate on the protein digestion and transport
22. What are eicosanoids? Explain its functions

(2x5= 10 weightage)

SEMSTER I

FN1C03TM20 - PRINCIPLES OF NUTRITION

Total Credit: 4

Total Lecture Hours: 72

Course Outcomes:

CO1: Comprehend physiological changes in life cycle and appropriate nutritional requirements

CO2: Summarise the nutritional concerns and issues during different stages of life cycle.

CO3: Evaluate the relation between fitness and sports

CO4: Develop the application of nutrition for optimal performance in fitness and sports

CO5: Integrate the principles of nutrition during space travel and high altitudes.

Course Content:

Module 1: Maternal and Infant Nutrition (20 hours)

- Importance of nutrition prior to pregnancy, Pre-requisites for successful pregnancy outcome, Effect of under nutrition on mother-child dyad-Short term and long term. Physiological changes in Pregnancy. Pregnancy Weight gain. Principles of estimating RDA in Pregnancy. Nutritional and Dietary requirements during pregnancy.
- Foetal programming, Barker's hypothesis, Effect of under nutrition on mother and child Health, Adolescent pregnancy, Pregnancy and AIDS, Foetal alcohol syndrome, Gestational Diabetes Mellitus. Supplementation in pregnancy.
- Physiology and Endocrinology of Lactation –Synthesis of Milk and regulation of milk production, Human Milk Composition, Breast feeding benefits- nutritional, physiological and psychological. Value of colostrum. Factors affecting Breast Feeding, Common problems during breast feeding, Principles of estimating RDA in lactation, Nutritional Requirements of lactating mothers.
- Developmental milestones in infants- Review

- Feeding of LBW and preterm babies, Growth and development during infancy Growth monitoring, Nutritional requirements in Infancy, significance of the first 1000 days of life, IYCF guidelines, Exclusive breastfeeding and Baby Friendly Hospital Initiative- Steps and Policies, Adverse effects of artificial feeding, Infant Milk Substitute Act, Key issues in infant feeding, Complementary feeding practices , Weaning, Amylase Rich Foods

Module 2: Nutrition in Childhood to Adolescence (15 hours)

- Normal Pattern of Growth and Development, Nutritional requirements of children, RDA.
- Malnutrition and Mental Development, Common nutritional problems in pre-schoolers- PEM, Obesity in children, Ill effects of fast and junk foods.
- Factors influencing of Growth and Development during adolescence, Puberty and growth related changes, Nutritional requirements of adolescents, RDA, Food habits and eating behaviours, Common nutritional problems of adolescents - Weight management, Anemia and Eating Disorders.

Module 3: Nutrition in Adulthood to Old age (12 hours)

- Eat well plate, Food Guide Pyramid, Dietary guidelines for Indians- Review
- Nutrition and work efficiency, Special health concerns of adult woman
- Geriatric nutrition- Demography, Socio economic problems and psychological factors of elderly, Physiological changes in old age, Nutritional requirements and food modifications in old age.

Module 4: Fitness and sports nutrition (13 hours)

- Introduction to Fitness, Types and components of fitness, Physiologic testing for fitness and performance capacity.
- Sports physiology, Energy expenditure during physical activity, Role of Carbohydrates, fats, proteins, vitamins and minerals in sports performance .Water and electrolyte balance, electrolyte loss and replacement in exercise. Nutritional requirements in Sports events-Team, Power and Endurance events, Pre-game and Post game regime .Nutritional Ergogenics- Ergogenic aids and Supplements-Types, Potential and Concerns, practical issues in nutrition for athletes.

Module 5: Nutrition in Special Events (12 hours)

- Space nutrition- nutritional requirements and dietary modifications, space foods.
- High altitude nutrition, Nutrition in Cold/Polar environments –physiological changes, nutritional requirements, adaptive mechanisms, effects of environmental extremes.

Learning Resources:

References

- Michael J. Gibney, Ian A Macdonald and Helen M. Roche (2003). Nutrition and Metabolism, The Nutrition Society Textbook Series, Blackwell Publishing, First Edition
- Maurice B. Shils, Moshe Shike A., Catherine Ross, Benjamin Cabellero, Robert J Cousins, (2006). Modern Nutrition in Health and Disease, Lippincott Williams and Wilkins.
- Garrow J.S., James WPT and Ralph A, (2000). Human Nutrition and Dietetics, 10th edition. London: Churchill Livingstone,
- Krause MV and Mahan. (2008). Food, Nutrition and Diet Therapy, 12th edition. WS Saunders Co.,
- Bamji S.M.,Rao N. P. and Reddy V.(2017).Text book of Human Nutrition, 4th Edition. Oxford and IBH Publishing C.
- Nutrient Requirements and Recommended Dietary Allowances for Indians-A report of the expert group of the ICMR.2010.
- Fred and Brouns (2002). Essentials of Sports Nutrition, 2nd edition. John Wiley & Sons pub.
- Mc Ardle, W.D. & Katch (2005). Sports and Exercise Nutrition, 4th edition.Williams & Wilkins, A Waverly Company.

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FN1C03TM20-PRINCIPLES OF NUTRITION

Module	Hours	Section A 8/10 1 weight	Section B 6/8 2 weight	Section C 2/4 5 weight
1	20	2	2	1
2	15	2	2	1
3	12	2	1	1
4	13	2	2	
5	12	2	1	1

MODEL QUESTION PAPER

M.Sc DEGREE (C.S.S) EXAMINATION

First Semester

Faculty of Science-Home Science (Branch C) Food Science and Nutrition

FN1C03TM20 - PRINCIPLES OF NUTRITION

(2020 admission onwards)

Time: 3 hours **Max. Weightage: 30**

Section A

(Answer any eight questions. Each question carries a weightage of 1)

1. What is meant by foetal programming?
2. What are Amylase rich foods? Give examples.
3. Enlist the psychological factors of elderly
4. Define Anorexia Nervosa.
5. Recall the RDA for adolescents?
6. What is eat well plate?
7. What are the components of physical fitness?
8. Enlist the pregame regimes.
9. State the adaptive mechanisms in environmental extremes?
10. Mention the types of space foods.

(8x1=8 weightage)

Section B

(Answer any six questions. Each question carries a weightage of 2)

11. Analyse the factors necessary for a successful pregnancy outcome.
12. Critically judge the effect of nutrition in mental development of children.
13. Discuss the factors influencing growth and development during adolescence.
14. Evaluate the factors influencing nutritional requirements during old age.
15. Comment on the role of macronutrients in sports performances
16. Give an account of the importance of fluids and electrolytes in sports.
17. Elaborate on the nutritional requirements in space travel.
18. Comment on the importance of nutrition in High altitude.

(6x2=12 weightage)

Part C

(Answer any two questions. Each question carries a weightage of 5).

19. Explain the physiology and endocrinology of lactation
20. Detail the common nutritional problems of pre-schoolers.
21. Relate nutrition and work efficiency in adults and evaluate the dietary guidelines for Indian adults
22. Elaborate on the measures of performance and methods to test physical fitness.

(2x5=10 weightage)

SEMESTER 1

FN1C04TM20- RESEARCH METHODS AND STATISTICS I

Total Credit: 3

Total Lecture Hours: 54

Course Outcomes:

CO1: Examine the different types of research and ways to determine a research problem of interest.

CO2: Identify the variables of a research problem and formulation of hypothesis

CO3: List the practical issues arising in data collection tool development methods and prepare tool using the scales learnt.

CO4: Organize, manage and present data for descriptive statistics.

CO5: Calculate measures of central tendency, dispersion, regression and coefficient of variance.

Course Content:

Module 1: Introduction to Research (3 hours)

Definition, Objectives and Characteristics of research, Types of Research – Basic, Applied and Action research, Exploratory and Descriptive, Ex-post facto research.

Module 2: **Identification of Research Problem (10 hours)**

Sources of research problem, Criteria for the selection of research problem. Research design, Setting objectives operational definition, variables: Types– independent and dependent, control and intervening variables, limitations and delimitation. Hypothesis – Meaning and importance, types of hypotheses.

Module 3: **Methods and Tools for data Collection (5 hours)**

Methods – Survey, observation, interview, experimental, clinical methods.

Tools – Questionnaire, Schedule (for interview and observation), Scales - Rating Scales, Attitude Scales; Reliability and validity.

Module 4: **Descriptive Statistics (18 hours)**

Measures of Central Tendency – Mean, Median, Mode; Partition Values – Quartiles, Deciles and Percentiles, Measures of Dispersion – Range, Quartile deviation, Standard deviation. Absolute and Relative measures of dispersion, Coefficient of variation.

Module 5: **Correlation and Regression (18 hours)**

Correlation: Scatter diagram, Coefficient of Correlation – Karl Pearson and Rank Correlation Coefficients. Interpretation of Calculated co- efficient. Concept of Regression: Regression Lines and their estimation.

Related Experience

- Prepare a research design with a research topic of your choice, spelling out objectives, formulating hypothesis.
- Prepare a tool for the topic chosen for research design.
- Compute measures of central tendency and dispersion on MS excel and SPSS.

Learning Resources:

References:

- Gupta, S. (2001). Research Methodology and statistical techniques. Deep and Deep. New Delhi.
- Marcello Pagano. (2008). Principles of Biostatistics. Second edition. Brooks/Cole.
- Sarma, K.V.S. (2001). Statistical made simple: Do it yourself on PC. Prentice-hall, New Delhi.
- Best.J.W &, Kahn.J.V.(2017).Research in Education,(8th Edition), Ally and Bacon Publications, Boston.
- Walliman.N.(2011).Research Methods-The basics,Routledge,Taylor and Francis Publications, New York
- Research Methodology(2014).Copyright @www.explorable.com

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FN1C04TM20-RESEARCH METHODS AND STATISTICS I

Module	Hours	Part A 8/10 1 weightage	Part B 6/8 2 weightage	Part C 2/4 5 weightage
1	3	1	-	
2	10	2	1	1
3	5	1	1	1
4	18	3	3	1
5	18	3	3	1

MODEL QUESTION PAPER

M. Sc. DEGREE (C.S.S) EXAMINATION

First Semester

Faculty of Science-Home Science (Branch A) Child Development

FN1C04TM20- Research Methods and Statistics I

(2020 admission onwards)

Time: 3 hours **Max. Weightage: 30**

Part A

(Answer any eight questions. Each question carries a weightage of 1)

1. Define research.
2. State the objectives of research.
3. Recall measures of central tendency.
4. Differentiate between questionnaire and schedule.
5. Construct a flowchart of a research design.
6. Categorize the sources of research problem.
7. Illustrate a scatter diagram.
8. Explain descriptive research with an illustration.
9. Mention the importance of coefficient correlation.
10. Calculate the range of the following scores: 50, 40, 39, 35, 29, 28, 24, 19, 18.

(8x1=8 weightage)

Part B

(Answer any six questions. Each question carries a weightage of 2)

11. Outline the characteristics of different types of research.
12. Critically analyze the different types of variables in a chosen research problem.
13. Differentiate between i) Multiple and partial correlation ii) Negative and non-linear correlation.
14. Summarize the components of a good questionnaire.
15. Describe the various scales in framing a questionnaire.
16. Calculate Karl Pearsons coefficient of correlation from the following data

X	40	42	46	48	50	56
Y	10	12	15	23	27	30

17. Explore the Measures of Dispersion.
18. Compute rank correlation coefficient from the following data.

X	48	33	40	9	16	16	65	24	46	57
Y	13	13	24	6	15	4	20	9	6	19

(6x2=12 weightage)

Part C

(Answer any two questions. Each question carries a weight of 5)

19. Calculate the variance and standard deviation from the data grouped in the following frequency distribution

Class Interval	71-75	66-70	61-65	56-60	51-55	46-50	41-45
Frequency	3	4	9	15	8	6	5

20. Exemplify on the various methods of data collection in research .

21.

X	1	6	3	4	2
Y	2	8	5	6	4

i) Find the two regression lines.
ii) Calculate the value of Y when x=4.
iii) Find correlation coefficient from the regression lines.

22. Define hypothesis. Analyse and interpret the different types of hypothesis using suitable example.

(2x5=10 weightage)

SEMESTER 1

FN1C01PM20-ADVANCED NUTRITION AND FOOD ANALYSIS PRACTICALS

Total Credit: 4

Total Lecture Hours: 180

Course Outcomes

CO1: Acquire skills in body composition assessment.

CO2: Evaluate protein quality of foods and plan suitable dishes for feeding programmes for vulnerable groups in a community.

CO3: Undertake balance studies of energy, nitrogen and calcium.

CO4: Analyse nutrient content of food samples.

CO5: Comprehend protocols employed in a modern food analysis laboratory and Develop skills to undertake research in food analysis.

Course Content:

A. Advanced Nutrition

1. Body composition measurements

a. Measurement of BMI, skinfold thickness, waist circumference, hip circumference, MUAC and WHR
b. Assessment of body composition
c. Measurement of fat mass
d. Measurement of fat free mass

2. Energy

a. BMR(Kymographic method)
b. BMR(Predictive equations)
c. Energy intake
d. Energy expenditure
e. Energy balance
f. Comparison of energy balance of individuals based on activity/age

3. Carbohydrates

a. Percent energy of CHO
b. Survey of high fibre products in the market.

4. Protein

a. Chemical score computation of food items
b. Calculating chemical score and NDP cal % of a recipe
c. Planning suitable dishes for supplementary feeding programmes based on protein quality.

5. Balance Studies

a. Calcium balance study
b. Nitrogen balance study

B. Food Analysis

Nutrient Estimation of the following in various food samples:

1. Total Ash
2. Moisture
3. Fat
4. Crude Fibre
5. Protein (Kjeldahl method)
6. Iron
7. Phosphorous
8. Vitamin C (2,6 dichlorophenol indophenol method)
9. Total Carotene(Spectrophotometry)
10. Sodium (Flame Photometry)
11. Potassium (Flame Photometry)
12. Calcium(Macro method)

C. Project/Industrial Internship:

Project Report on:-

An experimental study based on any topic within the syllabus

OR

A one week Industrial internship in major Food Industries or ISO certified laboratories to have a hands on experience and training at a modern laboratory/Food industry.

Learning Resources:

Reference:

- A Manual of laboratory techniques (2003). NIN, Hydrabad , ICMR.
- Biochemical Analysis of Sea Food, CIFT, Kochi
- Advanced Nutrition practical manual, GNOU self-learning material, e Gyankosh.

SEMESTER II

SEMESTER II

FN2C05TM20-ADVANCED NUTRITION II

Total Credit: 4

Teaching hours: 72

Course Outcomes

CO1: Elucidate the physiological and metabolic role of various micronutrients and water

CO2: Acquire knowledge in the digestion and assimilation of micronutrients

CO3: Demonstrate the nutritional requirements through life cycle

CO4: Differentiate problems of macronutrient nutrient deficiencies and toxicities and specify methods of assessment

CO 5: Develop competence in the scientific foundation of nutrition and dietetics practice and research

Course Content:

Module 1: **Water (6 hours)**

Distribution of water, functions, requirements, sources, water balance and its regulation

Importance of euhydration; assessment of hydration Status- common indices hazards of hypo and hyper hydration with suitable examples

Module 2: Macro minerals (12 hours)

Calcium, Phosphorus, Magnesium, Sulphur, Chorine, Sodium and Potassium

Distribution, absorption and utilization, sources, requirement, deficiency and toxicity, calcium - phosphorus ratio, absorption and utilization, Phosphates in blood, therapeutic uses of phosphates, calcium balance, Hypocalcemia and hypercalcemia,

Module 3: Micro minerals (18 hours)

Iron

Distribution, absorption, metabolism, transport and utilization, sources, requirement, deficiency, assessment of iron nutritional status, methods of assessing iron availability, effect of excess iron retention and deficiency

Iodine, Fluorine and Zinc

Metabolism, functions, sources, requirements, deficiency, assessment of nutritional status and toxicity.

Trace elements

Physiology, function,sources, deficiency and toxicity of cobalt,copper, molybdenum, manganese, selenium, nickel, chromium, cadmium

Module 4: Fat Soluble Vitamins (18 hours)

Vitamins

Introduction

Fat soluble vitamins

Free radicals and antioxidants

Vitamin A, D, E and K - History, structure, nomenclature, chemistry, physiological functions, absorption, transport, utilization, storage, excretion and methods of assay, Dietary sources and losses in preparation and handling ,conversion of carotenes into vitamin A in human beings, recommended intakes, human deficiency and diagnosis, hyper vitaminosis, antivitamins

Module 5: Water Soluble Vitamins (18 hours)

Ascorbic Acid- Sources, absorption, transport, functions, interaction with other nutrients, deficiency and requirements

Thiamine, Riboflavin, Niacin, Pyridoxine, Folic acid, Cyanocobalamine

- History, structure, chemistry, physiological action, sources, absorption, functions, deficiency, requirements

Pantothenic acid and biotin- Sources, functions, deficiency

Learning Resources:

References

- Bamji M.S., Krishnaswamy K. and Brahman G.N.V.(2017) . Textbook of Human Nutrition, 4th Edition, Oxford & Ibh Publishing.
- Chander S.and Woodhead V.(2011). Public Health Nutrition in Developing Countries , Part I & II , Woodhead Publishing India.

- Gibney M.J., MacDonald I.A. and Roche H.M. (2003). Nutrition and Metabolism, First Edition, The Nutrition Society Textbook Series, Blackwell Publishing .
- Gibney, M.J., Lanham- New, S.A.,Cassidey,A. and Vorster H.H.(2009). Introduction to Human Nutrition ,Second Edition, The Nutrition Society Textbook Series, Blackwell Publishing.
- Groff, J.L. and Gropper, S.S.(2016). Advanced Nutrition and Human Metabolism, Seventh Edition, Wadsworth Publishing Company.
- ICMR, (2010). Nutrient Requirements And Recommended Dietary Allowances For Indians A Report of the Expert Group of the Indian Council Of Medical Research.
- Kohlmeir, M. (2015) . Nutrient metabolism, Second Edition, Elsevier Ltd.
- Medeiros, D.M. and Wildman, E.C. (2019). Advanced Human Nutrition, Fourth Edition, Jones and Bartlett learning.
- Shils, M.E., Shike, M., Ross, A. C., Cabellero B., Cousins, R.J. (2012). Modern Nutrition in Health And Disease, Eleventh Edition , Wolters Kluwer Health Adis (ESP).

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FN2C05TM20-ADVANCED NUTRITION II

UNIT	Hours	Section A 8/10marks 1 weight	Section B 6/8 2 weight	Section C 2/4 5 weight
1	6	2	1	1
2	12	2	1	
3	18	2	2	1
4	18	2	2	1
5	18	2	2	1

SEMESTER II

FN2C06TM20-CLINICAL NUTRITION AND DIETETICS

Total credit: 4

Teaching hours: 72 hours

Course Outcome

CO1: Comprehend the importance and principles of dietetics as a distinct therapy for diseases.

CO2: Acquire advanced knowledge in the field of clinical nutrition and dietetics.

CO3: Concept enhancement regarding the classification, pathogenesis, diagnosis, etiology, symptoms and dietetic management in various disease conditions.

CO4: Identify nutrition related problems and evaluate nutrition interventions

CO5: Enlist the processes involved in delivering diet and nutrition services

Course Content:

Module 1: Medical Nutrition Therapy-Concepts and Advances (15 hours)

The Nutrition Care process (NCP)-Nutrition Assessment, Diagnosis, Intervention, Monitoring, Evaluation and Documentation. Diet prescription and the psychology of feeding the patient. Types of dietary adaptations for therapeutic needs, routine hospital diets-normal, soft and full liquid, clear liquid diets.

Recent advances in feeding techniques-Modes of feeding, Oral, Enteral and Parenteral Nutrition- Parenteral Nutrition - Types, mode, and composition of feeds, Tube feeding, Enteral Nutrition - Routes, modes, composition, care to be taken during feeding, Dual transition feeding .Nutritional management of the critically ill and nutrition during stress.

Module 2: Diseases of the Gastro Intestinal system (15 hours)

Pathophysiology, risk factors and dietary modification in Ulcers, Gastritis, Constipation, Colitis, Malabsorption syndromes-Celiac disease, Tropical sprue, Steatorrhea, Lactose intolerance, Inflammatory Bowel Disease, Ulcerative colitis and Short Bowel Syndrome.

Nutritional care in Liver Disease- Hepatitis, Cirrhosis, Hepatic Encephalopathy and Cholelithiasis

Nutritional care in Pancreatitis-Acute and Chronic.

Module 3: Diet in Non-Communicable Diseases (17 hours)

Diabetes Mellitus-Classification and etiology of diabetes, metabolic aberrations and symptoms, Diagnosis-Fasting Blood Glucose, Oral Glucose Tolerance Test, Glycosylated Hemoglobin and Urine testing., chronic and acute complications in diabetes, Oral Hypoglycemic agents and insulin therapy. Dietary management-Macronutrient distribution, Exchange lists, carbohydrate counting, Insulin to Carbohydrate ratio, glycemic index and glycemic load. Nonnutritive sweeteners.

Cardiovascular disease and hypertension-Coronary Heart Diseases (CHD)-Prevalence, etiology and pathophysiology. Common disorders of CHD and their management-Dyslipidemia, Atherosclerosis, Hypertension, Angina pectoris, Myocardial infarction and Congestive Cardiac Failure (CCF).Role of diet in the prevention of Coronary Heart Diseases

Nutritional therapy for neoplastic diseases

Types, symptoms, detection, etiology, metabolic alterations during cancer, Oncological treatment modalities and malnutrition, Cancer Cachexia, Goals of care and guidelines for oral feeding, Role of potential dietary protectors in cancer.

Module 4: Nutrition therapy for renal diseases and AIDS (15 hours)

Common renal diseases and general principles of dietary management

Etiology, Clinical and metabolic manifestations and dietary management for-. Nephritic syndrome, Nephrotic syndrome, Acute Renal Failure (ARF),Chronic Renal Failure (CRF) , End Stage Renal Disease (ESRD),Hemodialysis, Peritoneal Dialysis and Renal Calculi

Stages and Signs of HIV, AIDS, Stages of infection, Goals of Nutrition care and support for people living with HIV, AIDS.

Module 5: Nutrition for weight management (10hours)

Components of body weight, adipocytes, regulation of body weight, weight imbalances, Underweight-etiology, metabolic aberrations and clinical manifestations.
Dietary management Obesity-risk assessment, etiology, metabolic aberrations and clinical manifestations. Management of obesity-Medical Nutrition Therapy and

lifestyle considerations, Dietary strategies for weight loss, Bariatric surgical and medical management. Preventive aspects of obesity.

Learning Resources

References

- Garrow JS, James WPT and Ralph AC, (1993) Nutrition and Dietetics, Churchill Livingstone
- Michael J Gibney, Ian A Macdonald and Helen M Roche (2003) Nutrition and Metabolism, The Nutrition Society Textbook Series, Blackwell Publishing, First Edition
- Maurice B Shils, Moshe Shike A, Catherine Ross, Benjamin Cabellero, Robert J Cousins, (2006), Modern Nutrition in Health and Disease, Lippincott Williams and Wilkins.
- Mahan L.K, and Stump S.E, (2012), Krause's Food, Nutrition and Diet Therapy, Elsevier Limited.13th Edition
- Mahan K L and Raymond J L(2017),Krause's Food and The Nutrition Care Process,14th Edition, Elsevier Publishers
- Indian Dietetic Association (2018), Clinical Dietetics Manual, Elite Publishing House, New Delhi.

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FN2C06TM20-CLINICALNUTRITIONAND DIETETICS

Modules	Hours	Section A 8/10 1 weight	Section B 6/8 2 weight	Section C 2/4 5 weight
1	15	2	1	1
2	15	2	1	1
3	17	2	3	1
4	15	2	2	1
5	10	2	1	

SEMESTER II

FN2C07TM20- RESEARCH METHODS AND STATISTICS-II

Total Credits: 4

Total Lecture Hours: 72

Course Outcome:

CO1: Compare and contrast the different sampling techniques in research methods.

CO2: Identify the best possible method to represent the data graphically.

CO3: Outline the different parts of dissertation.

CO4: Use normal distribution curve and central limit theorem in analysis of data.

CO5: Examine and compute the concept of Type I and Type II error.

Course Content:

Module 1: **Sampling (12 hours)**

Sampling - Population and Sample, Sampling techniques, Determination of size of sample, Merits and Limitations of sampling, Errors in sampling

Module 2: **Organization of Data, Classification and Tabulation (12 hours)**

Primary and Secondary Data, Classification-Objectives of Classification, Tabulation-General rules of tabulation, Tables, Parts of a table, Types of tables, Representation of data-significance of diagrams and graphs, Types of diagrams and graphs-advantages and limitations.

Module 3: **Parts of dissertation, Grants & Ethics in research (12 hours)**

Report writing- dissertation and article, Plagiarism, IPR, Writing for grants, ethics in research

Module 4: **Concept of Probability and Random Variable (18 hours)**

Concept of Probability and Random Variable. Normal distribution and its properties. Standard normal distribution and calculation of probability of events. Importance and use of distribution in research.

Module 5: **Sampling distributions and Analysis of Data (18 hours)**

Sampling distributions,'t', F and χ^2 distributions. Central Limit theorem, Standard error and its importance and applications. Testing of Hypothesis – Hypothesis, Null and Alternative hypothesis, Type I and Type II errors, Significance Level and size of

test, Critical Region, Testing Procedure concept of P Value in testing. Large and small sample tests (Z, t, F and χ^2statistics). Analysis of Variance (concept only).

Related Experience

Application of computers in research

- Working with MS Word (formatting document and text, designing tables and graphs for research purpose)
- MS Excel – application/usage of electronic spread sheet, manipulation of cells, providing formulas for computation of various statistical functions - average, mean, median, mode, standard deviation, correlation.
- MS Power Point
- Introduction to SPSS or 'R' Features of SPSS for Windows, Operating Windows in SPSS, Basic steps in data analysis, data analysis (relationship between variables).

Learning resources

References

- Gupta, S. (2001). Research Methodology and statistical techniques. Deep and Deep. New Delhi.
- Marcello Pagano. (2008). Principles of Biostatistics. Second edition. Brooks/Cole.
- Sarma, K.V.S. (2001). Statistical made simple: Do it yourself on PC. Prentice-hall, New Delhi.
- Best.J.W &, Kahn.J.V. (2017).Research in Education,(8th Edition), Ally and Bacon Publications, Boston.
- Walliman.N.(2011).Research Methods-The basics,Routledge,Taylor and Francis Publications, New York
- Research Methodology(2014).Copyright @www.explorable.co

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FN2C07TM20- RESEARCH METHODS AND STATISTICS II

Module	Hours	Part A 8/10 1 weightage	Part B 6/8 2 weightage	Part C 2/4 5 weightage
1	12	2	1	1
2	12	2	1	
3	12	2	2	1
4	18	2	2	1
5	18	2	2	1

SEMESTER II

FN2C08TM20- PUBLIC HEALTH NUTRITION

Total Credit: 3

Total Lecture Hours: 54

Course Outcomes

CO1: Design epidemiological study methods suitable for Nutrition Research

CO2: Acquire skills to assess nutritional status of community

CO3: Design nutrition education methods suitable to each community setting and food based intervention strategies including food fortification

CO4: Understand types of nutritional deficiency disorders and prevention strategies

CO5: Create public health preventive strategies against Lifestyle diseases

Course Content:

Module 1: Food Security in India and Epidemiological study methods (10 hours)

Sustainable Development Goals. Food and Nutrition security, Production and availability of foods in India, Trends in dietary intake and nutritional status of Indian population, India State Hunger Index, Global Hunger Index.

Introduction to Epidemiology, Epidemiological study methods, Nutrition Epidemiology.

Module 2: Assessment of nutritional status in community setting (10 hours)

Nutritional assessment, Importance and Objectives. Direct assessment of nutritional status –Techniques, interpretation and applications of Anthropometry, Z scores, Clinical assessment, Biochemical assessment, Dietary assessment methods.

Indirect assessment of Nutritional status – Age specific mortality rates, cause specific mortality rates, nutritionally relevant morbidity rates, ecological factors.

Module 3: Nutritional deficiency disorders(12 hours)

Magnitude of malnutrition in India, Consequences of malnutrition ,Synergism between malnutrition and infection.

Nutritional problems in India

Prevalence, Aetiology, Prevention and Control of–

a) Protein Energy Malnutrition
b) Vitamin A Deficiency
c) Anaemia
d) Iodine Deficiency Disorders
e) Zinc Deficiency
f) Fluorosis

Nutrition Intervention programmes - Nutritious Noon Meal programme. ICDS initiatives, Prophylaxis programmes – Vitamin A deficiency, Iron deficiency anaemia, Iodine deficiency.

Module 4: Community Nutrition (12 hours)

a) Nutrition Education

Definition, Significance, Process of Nutrition and Health Education Programme –Conceptualisation Phase. Formulation phase-Designing Messages, Choosing media and multimedia combinations, Implementation Phase, Evaluation of program- Designing the evaluation ,Purpose and Types.

b) Food Fortification

Technical Considerations, Technology for Food Fortification, Fortificants, Planning Food Fortification Intervention, Fortification of Selected Food Items.

Module 5: Epidemiology of diet related NCDs and Role of organizations in mitigating malnutrition (10 hours)

a) Prevalence and risk factors for diet related NCDs -Cardiovascular Diseases, Obesity, Diabetes mellitus, Metabolic Syndrome and Cancer – Review.

Changing trends in lifestyle and Nutrition transition. Eat Right Initiative.

Recent initiatives to mitigate double burden of malnutrition.

b) Role of organisations in combating malnutrition

Vision, Mission, Objectives, Strategies and Outcomes of the following:

International: WHO, FAO, UNICEF, CARE

National: ICAR, NIN, FSSAI, NNMB, ICDS, NHM,ICMR.

Learning Resources:

References

- Sheila Chander Vir.2011. Public Health Nutrition in Developing Countries .Woodhead Publishing India,Part I & II.
- Maurice B Shils, Moshe Shike.A,Catherine Ross, Benjamin Cabellero, Robert J Cousins. 2006. Modern Nutrition in Health and Disesase edited by, Lippincott Williams and Wilkins .
- Nutrient Requirements and Recomended Dietary allowances for Indians. A report of the expert group of the Indian Council of Medical Research ICMR 2010.

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FN2C08TM20-PUBLIC HEALTH NUTRITION

Module	Hours	Section A 8/10 1 weightage	Section B 6/8 2 weightage	Section C 2/4 5 weightage
1	10	2	1	1
2	10	2	1	1
3	12	2	2	1
4	12	2	2	1
5	10	2	2	

SEMESTER II

FN2C02PM20- PUBLIC HEALTH NUTRITION AND DIETETICS PRACTICALS

Total Credit: 4

Total Lecture Hours: 180

Course Outcome

CO1: Acquire skills in techniques of nutritional status assessment of various age groups and its interpretation

CO2: Develop, standardise and evaluate suitable dishes for combating dietary deficiencies or non communicable diseases

CO3: Undertake surveys on nutritional problems of the community and formulate comprehensive nutrition education programme to be used in Public Nutrition Initiatives and evaluate its impact.

CO4: Develop skills in planning and preparation of therapeutic diets.

CO5: Learn techniques in diet counselling and feeding of patients.

CO6: Plan and prepare appropriate diets for therapeutic conditions.

Course Content:

A. PUBLIC HEALTH NUTRITION

Module 1: Techniques for Nutritional Status Assessment in various age groups

- Anthropometry-Growth Monitoring of preschool children; Adults - BMI, WHR, Skin fold thickness.
- Biochemical assessment
- Clinical assessment
- Dietary assessment-Family diet survey by three day weighment /24 hour Recall in Community

Module 2: Standardisation of Nutritive recipes suitable for Community Nutrition Programmes

Low cost recipes /Cyclic menu /One dish meal targeting any of the following groups: Preschoolers, school children, adolescents, pregnant /lactating mothers, Elderly

or Nutritive recipes for PEM, VAD and IDA

or Nutritive recipes to combat Non Communicable Diseases

Module 3. Field study

- Assessment of nutritional status of a specific demographic group using direct parameters.
- Analysis of Data, Tabulation And Interpretation.

Module 4: Nutrition Education

- Planning, Implementation and Evaluation of a comprehensive Nutrition Education programme in the selected community
- Formulation of an educational aid or programme to be used in Radio /TV Channels/Internet /Public Nutrition Initiatives to disseminate Nutrition Messages to the masses

Module 5. Field Visit

Case Study of any National Programme involved in Public Health Nutrition

B. DIETETICS

Module 6: Planning and Preparation of Therapeutic Diets for the Following Conditions

1. Diabetes mellitus
2. Atherosclerosis
3. Chronic Renal Failure
4. Glomerulonephritis
5. Hepatitis
6. Cirrhosis
7. Hepatic Encephalopathy
8. Peptic Ulcer
9. Gluten Sensitive Enteropathy
10. Hypertension
11. Obesity
12. Underweight

Module 7

Commonly used tests for diagnosis of various diseases, interpretation of patient data and Diagnostic tests and drawing up of patient diet prescription using a case study approach.

Module 8

Development of a diet counselling aid for an individual or a community with utility for Nutrition Health Education (Individual or group project).

Familiarization to recent software/mobile applications that can be used for Nutritive Value Computation/Dietetic Management.

Module 9

One month Internship in a well-established Dietary Department of a Reputed Hospital with Compilation of Case study Reports of two patients during the period of Internship.

Learning Resources

References:

- Garrow JS, James WPT and Ralph AC, (1993) Nutrition and Dietetics, Churchill Livingstone
- Michael J Gibney, Ian A Macdonald and Helen M Roche (2003) Nutrition and Metabolism, The Nutrition Society Textbook Series, Blackwell Publishing, First Edition
- Maurice B Shils, Moshe Shike A, Catherine Ross, Benjamin Cabellero, Robert J Cousins, (2006), Modern Nutrition in Health and Disease, Lippincott Williams and Wilkins.
- Mahan L.K, and Stump S.E, (2012), Krause's Food, Nutrition and Diet Therapy, Elsevier Limited.13th Edition
- Mahan K L and Raymond J L(2017),Krause's Food and The Nutrition Care Process,14th Edition, Elsevier Publishers

- Indian Dietetic Association (2018), Clinical Dietetics Manual, Elite Publishing House, New Delhi.
- Public health nutrition practical manual, IGNOU self learning material, e Gyan kosh.

SEMESTER III

SEMESTER III

FN3C09TM20-ADVANCED FOOD SCIENCE

Total Credit: 4

Total Lecture Hours: 72

Course Outcomes:

CO1: Understand the physico-chemical properties of foods and the properties and applications of colloidal systems

CO2: Obtain an insight into the chemistry of nutrients

CO3: Comprehend the changes that take place in foods containing starch, proteins, fats and oils during processing and action of physical and chemical agents.

CO4: Apply the principles of food preservation in increasing the shelf life of foods through various processing and preservation techniques

CO5: Obtain an insight into the role of additives used in the food industry for various processed food products and the health benefits of functional foods.

Course Content:

Module 1: Physico Chemical properties in Foods (10 hours)

Physical properties of water – role of water in food systems, bound water in food products, hydrogen ion concentration (pH), solubility, solutions, crystallization, emulsification, osmosis, enzyme action (review) oxidation –reduction, colloids – classification of colloidal systems, properties and applications of sols, gels, foams and emulsions. denaturation and coagulation of proteins.

Module 2: Food Chemistry (18 hours)

Starch and Sugars

Sugars: Properties of sugar, stages of sugar cookery. crystallization, factors affecting, action of acid, alkalies and enzymes, types of candies. caramelisation, maillard reaction and its industrial application. types of sweeteners.

Starch: components and characteristics of food starches. native and modified starches and their applications, effect of dry and moist heat on starch. gel formation, factors affecting gelatinization, retrogradation, syneresis, effect of acid, fat and heat on starch.

Food Polysaccharides: Food hydrocolloids, non-starch polysaccharides; algal polysaccharides; seed gums, exudates gums, microbial polysaccharides.

Proteins: Classification, chemical and physical properties. structure of proteins and forces involved in protein conformation, functional properties of proteins in foods, hydrolysis of proteins. changes in protein during processing.

Fats and Oils: chemistry, occurrence, classification, composition. physical and chemical properties of fats. rancidity and flavor reversion, processing of oil bearing materials, refining of oils and fats, fat hydrolysis and inter esterification.

Module 3: Study of Foods (16)

Cereals - Structure, composition, processing.

Pulses - Structure, composition, processing, toxic constituents, effect of soaking, fermentation and germination of pulse protein, texturised proteins, protein isolates and concentrates, protein hydrolysates.

Milk-Composition, physical and functional properties, effect of processing.

Meat, Poultry, Fish – composition and structure, post mortem changes, effects of cooking.

Egg – Structure and composition, changes during storage, functional properties, culinary role

Fats and Oils - classification, functional properties of lipids, rancidity, hydrogenation, winterization, shortening of fats, changes in fats and oils during heating and storage, factors affecting fat absorption of foods.

Vegetables and Fruits - Pectin, phenolic components, enzymatic and non-enzymatic browning reactions in fruits and vegetables, preventive measures. Plant Pigments, Action of heat, acid and alkali on vegetable pigments. Plants as Food Colorants

Module 4: Food Processing and Preservation (18 hours)

Principles of food preservation, traditional and modern methods of processing.

High Temperature - Principles & application– blanching, pasteurization, sterilization, ultra high temperature sterilization.

Drying and Dehydration- Natural drying- solar drying, artificial drying- hot air drying, drum drying, spray drying, dehydro freezing , freeze drying, pre treatments-blanching, sulphuring.

Low temperature - Effect of low temperature on foods, cellar storage, refrigeration, freezing- freezing rate, quick freezing, slow freezing, air blast freezing, contact freezing, immersion freezing, cryogenic freezing.

Irradiation - Source of ionization irradiation, mode of action, scope of irradiation, high pressure, aseptic packaging, MAP, chemical preservatives, natural antimicrobial compounds.

Module 5: Additives and Functional foods(10)

Definitions, functions and uses of additives in food industry - chelating/sequestering agents, leavening agents, antioxidants, emulsifying and stabilizing agents, anti-caking agents, thickeners, firming agents, flour bleaching agents and bread improvers.

Food Flavours: Spices and flavouring constituents, flavours in food industries.

Functional Foods - Types, sources and Health benefits

Learning Resources:

References

- Bowers, J (1992): Food Theory and Applications, 2nd MacMillan Publishing Co., New York.
- Charley, H (1982): Food Science, 2nd Edition, John Wiley & Sons, New York.
- Peckham, G and Freeland-Graves, G.H (1979): Foundations of Food Preparation
- Pomeranz, Y (1991): Functional Properties of Food Components, 2nd Edition, Academic Press, New York.
- Potter, N. and Hotchkiss, J.H (1996): Food Science, 5th Edition, CBS Publishers and Distributors, New Delhi.
- Srilakshmi B., (2003), 'Food Science", New Age International.

Journals

- Journal of Food Science
- Advances in Food Research
- Journal of Food Science and Technology
- Cereal Science
- Journal of Dairy Science

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FN3C09TM20- ADVANCED FOOD CIENCE

Module	Hours (72)	Section A 8/10 1 weight	Section B 6/8 2 weight	Section C 2/4 5 weight
1	10	2	1	1
2	18	2	1	
3	16	2	3	1
4	18	2	1	1
5	10	2	2	1

SEMESTER III

FN3C10TM20-NUTRITIONAL BIOCHEMISTRY

Total credit: 4

Total lecture hours: 72

Course outcomes:

CO1: Gain systematic understanding of the metabolic pathways of major nutrients and it's regulatory aspects

CO2: Correlate principles of nutritional sciences with it's biochemical aspects

CO3: Insight about inborn errors of metabolism and it's dietary management

CO4: Comprehend significance of vitamins and minerals in the biochemical aspects of health and disease.

Course Content:

Module 1: Carbohydrates and Biological Oxidation (15 hours)

Carbohydrates- Classification. Monosaccharides - Isomerism ,Important Reactions of monosaacharides . Oligosaccharides and Polysaccharides-Homopolysaacharides, Heteropolysaacahrides(Hyaluronic acid, Heparin, Chondrotin Sulphate.)

Major pathways of Carbohydrate Metabolism - Significance, Metabolic reactions and regulation of Glycolysis, Citric Acid Cycle, Hexose Mono Phosphate pathway, Gluconeogenesis, Glycogenesis, Glycogenolysis, Fructose metabolism.

Biological Oxidation-Bioenergetics, Coupled reactions in transfer of energy, High energy compounds, Significance of ATP. Electron Transport Chain and Oxidative Phosphorylation. Inborn errors of Carbohydrate metabolism – Pentosuria, Fructosuria, fructose intolerance, Galactosemia, Hereditary lactose intolerance, Glycogen storage diseases-Review

Module 2: Lipids (15 hours)

Chemistry of Lipids- Structure and Classification, Properties of fatty acids and neutral fats.

Metabolism of Lipids – De novo Synthesis of fatty acids (Palmitic acid), Beta Oxidation of fatty acids.

Cholesterol Biosynthesis and Regulation. Metabolism of Ketone bodies, Plasma lipoproteins and Hyperlipidemias. Inborn errors of lipid metabolism – Gaucher's disease, Niemann-Pick disease, Tay – Sach's disease -Review

Module 3: Proteins (15 hours)

Chemistry of Proteins-Structure and Classification of Amino acids, Peptide bond formation, Structure of Proteins.

Protein Metabolism –Transamination, Deamination and Urea Cycle. Protein Biosynthesis.

Inborn errors of protein metabolism –Alkaptonuria, Phenylketonuria, Tyrosinemia, Albinism, Cystinuria, Maple Syrup Urine Disease -Review

Module 4: Nucleic Acids (15 hours)

Composition and Classification, Structure and properties of DNA and RNA,

DNA replication, DNA Mutation and Repair, Recombinant DNA technology

Disorders of nucleic acid metabolism- Gout.

Module 5: Regulation of Metabolism, Coenzymes and Antioxidants (12 hours)

Regulation of Carbohydrate and Lipid Metabolism at Organ, Enzyme and Hormonal level.

Major vitamins with coenzyme functions - mode of action of Thiamine, riboflavin, niacin, pyridoxine, biotin and folic acid as coenzymes.

Antioxidants and Free radicals. Types of Free Radicals, Sources, Generation and harmful effects of Free Radicals, Antioxidants in Biological Systems.

Learning Resources

References:

- Rodwell, V.W. Bender, D. Botham M.K. Kennely P.J (2018), Harper's Illustrated Biochemistry, 31st International Edition.
- Satyanarayana, U. and Chakrapani, U.(2018)Biochemistry.7th edition. Elsivier/ Books and Allied.

- Vasudevan DM, Sreekumari S and Vaidyanathan K(2019) Textbook of Biochemistry for Medical students,9th ed. Jaypee brothers Medical publishers, Kochi
- Harvey, Richard A. (2011). Lippincott's Illustrated reviews: Biochemistry. Philadelphia: Wolters Kluwer Health.
- Nelson, L. and Michael.M.Cox. (2005), Lehninger Principles of Biochemistry, 4th Edition, W.H. Freeman and Company, NewYork.
- Deb, A.C. (2002), Fundamentals of Biochemistry, New Central Book Agency (P) Ltd.
- Voet, D., Voet, G.J. and Pralt, W.C. (2002), Fundamentals of Biochemistry, Upgrade edition, John Wiley and Sons, Inc.
- Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H. (2001): 5th Ed. Outlines of Biochemistry, John Wiley and Sons.

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FN3C10TM20-NUTRITIONAL BIOCHEMISTRY

Module	Hours	Section A 8/10 1 weight	Section B 6/8 2 weight	Section C 2/4 5 weight
1	15	2	1	1
2	15	2	1	1
3	15	2	2	1
4	15	2	2	1
5	12	2	2	

SEMESTER III

FN3C11TM20- FOOD TECHNOLOGY

Total Credit : 4

Total lecture hours: 72

Course Outcome:

CO1: Develop knowledge on handling, storage and processing of food.

CO2: Comprehend the potential use of various by-products of food industry.

CO3: Integrate the principles and current practices of processing techniques of important food products

CO3: Relate properties and uses of various packaging materials.

CO4: Demonstrate an ability to participate in research and development projects in food technology.

Course Content:

Module 1: Technology of Cereals and Pulses (20 hours)

Wheat -Milling of wheat, by-products - Whole wheat flour, Maida, semolina, Gluten

Rice -Milling of rice, by products of rice milling. Parboiling- Merits and demerits, Curing and Aging of rice, Rice products. Industrial uses of bran.

Pulses: processing methods, Secondary processing of pulses. Industrial Products- Textured Vegetable Proteins, Protein isolates, concentrates, protein hydrolysates and their applications.

Module 2: Technology of Meat, Fish, and Egg (15 hours)

Technology of Meat and Poultry: Ante mortem handling, Stunning methods, Slaughtering Techniques, Rigor mortis-Post mortem biochemical changes. Methods of increasing tenderness of Meat. Cured Meat - Role of ingredients, Methods of curing, Meat Products.

Technology of Fish - Biochemical changes in fish during storage. Methods to detect quality of fish, Fish Processing and Fish Products.

Egg and Egg Products: Processing of Egg, Technology of Egg Products.

Module 3: Processing of Milk (8 hours)

Processing of milk – Clarification, pasteurization and homogenization, Distribution and storage of liquid milk, Packaging of milk, Technology of important milk products-Butter, cheese. Fermented Milk products - Curd, Butter milk, Yoghurt, Acidophilus milk

Module 4: Post harvest technology of fruits, vegetables, plantation crops and spices (20 hours)

Maturation changes, and maturity indices for harvesting. Post harvest treatments to hasten and delay ripening. Post harvest handling: Sorting, grading, packing, storage and transportation, Processed Fruit and Vegetable Products- fruit beverages/jams and jellies

Processing of tea, coffee, cocoa

Processing of pepper and cardamom, spice oils and oleoresins.

Module-5: Food Packaging (9 hours)

Functions of Packaging, Packaging materials- Paper and Paper products, rigid plastics Metal packaging, Collapsible tubes, Corrugated Fibre Board (CFB), Wooden containers, Miscellaneous containers.

Modified and controlled atmosphere packaging, Intelligent and smart packaging. Aseptic and retort pouch packaging, Insect resistant packaging, antimicrobial food packaging, Coding and labelling of food packages, Nutrition labelling requirements of foods.

Related Experience

Industrial visits related to food processing

Learning Resources:

References

- In Yıkmış, S. (2020). Technological developments in food preservation, processing, and storage. Hershey Publishers.
- Chakraverty A. (2019). Post Harvest Technology of Cereals, Pulses and Oilseeds, Oxford & IBH Publishing Co. Pvt Ltd.

- Manay S. and Shadaksharaswamy M. (2008). Food Facts and Principles, New age International Ltd
- De Sukumar. (2007). Outlines of Dairy Technology, Oxford University Press, Oxford.
- Verma LR& Joshi V.K. (2000). Post Harvest Technology of Fruits & Vegetables. Indus Publication
- Sen DP (2005). Advances in Fish Processing Technology, Allied Publishers Pvt.Limited
- Stadelman WJ and Owen J Cotterill. (2002). Egg Science and Technology, 4th Ed. CBS Publication New Delhi.
- Banerjee B. (2002).Tea production and Processing ,Oxford university press
- Kader A.Adel. (2002). Post Harvest Technology of Horticultural Crops, Oakland publishers, University of California.
- Kent, N.L. (2003). Technology of Cereals, 5th Ed. Pergamon Press.
- Sen DP (2005). Advances in Fish Processing Technology, Allied Publishers Pvt. Limited

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FN3C11TM20- FOOD TECHNOLOGY

Module	Hours (72)	Section A 8/10 1 weightage	Section B 6/8 2 weightage	Section C 2/4 5 weightage
1	20	2	2	1
2	15	2	2	1
3	8	2	1	1
4	20	2	2	
5	9	2	1	1

SEMESTER III

FN3C12TM20- FOOD SERVICE MANAGEMENT

Total credit: 3

Total lecture hours: 54

Course Outcome

CO1: Trace the growth of the hospitality and food service sector in India, its contribution to National Development, the various types of food service operations, recent trends.

CO2 Understand the basic principles and tools of effective organization and management in food service establishments.

CO3: Apply the principles of space planning and utilisation to design effective layouts of the different functional work areas and equipment in food service units

CO4: Relate the regulatory aspects governing the food service industry- food laws, standards and regulations.

CO5: Understand the steps and dimensions involved in quantity food preparation and service ensuring cost and quality control

CO6: Identify the financial and personnel management aspects involved in management of food service organisations.

Course Content

Module 1: Development, Scope, Types of Food Service Establishments, Organisation and Management (12 hours)

Evolution of the food service industry, factors affecting development, recent trends, Types of food service establishments (commercial and non-commercial) and their characteristic features. Planning for a food service Unit - Planning, Investment, Project Report, Registration (License and Inspection)

Organisation – Definition, Types, Steps in Organisation, Principles of Management, Functions of Management (Planning, Organising, Directing, Coordinating, Evaluating, Controlling,)

Tools of Management – a)Tangible Tools: Organization chart, Job description, Job specification, Job analysis: Path way chart, Process chart, Work schedule, Production schedule, Staff and service analysis, Budget

b) Intangible tools: Communication, Leadership, Decision making, Total Quality Management (TQM), Management by Objectives (MBO)

Module 2: Material Management (Quantity Food Production and Service) (12 hours)

Menu Planning - Functions, Types of menu - Al a carte, table d'hote and combination, Factors affecting menu planning, Steps in Menu Planning, Sequence of Courses, and Design of Menu Card.

Purchase - Methods of purchase (formal and informal), Identifying needs, Selection, Receiving, Storage types, Issuing,

Quantity food preparation- Standardisation, Recipe adjustments and portion control, Quality control in food preparation. Food Laws

Food Service Delivery Systems (Centralised and Decentralised) Type of food service systems (conventional, commissary, ready prepared, assembly), Service Styles-(table, assisted, self, single point, specialised/in situ)

Table Setting and Arrangement - Indian and Western Styles of Table Setting, Table Appointments, Napkin folding styles, Flower arrangement, Table Etiquettes.

Module 3: Organisation of Space and Equipment (10 hours)

Design and layout of kitchen, service and storage areas - factors to be considered, Types of kitchens, Planning space and layout of work Centres. Equipments - classification, factors affecting selection and purchase.

Module 4: Financial Management (10 hours)

Book keeping (Single and Double entry system), Books of Accounts, Journal, ledger, trial balance, balance sheet, Components of Cost, Concept of contribution and breakeven, Behaviour of costs, profit analysis, Budget, Importance of Cost control, Factors affecting losses, Methods of controlling food cost and labour cost

Module 5: Manpower Management (10 hours)

Styles of Leadership, Effective Leadership and Communication, Employment-Staff Recruitment, Selection, Placement, Induction, Training, Evaluation and Appraisal, Labour laws, Personnel hygiene, Safety at work - measures adopted.

Related experience

Visits to various food service establishments

Learning Resources

References

- Dennis L. Foster (1995), 'An Introduction to Hospitality', McGraw Hill International Edition.
- Dennis, R. Lillicrap, John, A. Cousins (1993), "Food and Beverage Service', Hodder and Stoughton Publishers Ltd, England, 4th Edition.
- Jack D. Ninemeier (1995), 'Food and Beverage Management', 2nd Edition, American Hotel and Motel Association, U.S.A.
- Kotschevar, L.H. and Donnely, R. (1993), 'Quantity Food Purchasing', McMillan Publishing Co., New York, 4th, Edition.
- Mahmood A. Khan, (1987), 'Food Service Operations', AVI, U.S.A.
- Marian C. Spears (1995), 'Food Service Organisation', IIIrd Edition, Prentice Hall Inc., USA
- Mohini Sethi and Surjeet Singh Malhan (2015), 'Catering Management- An Integrated Approach', 2nd Edition, Wiley Publication, Mumbai.
- Sudhir Andrews (2005), 'Food and Beverage Service- Training Manual', 23rd Reprint, Tata McGraw Hill Publishing Co., Delhi.
- West, B.B and Wood, L. (1994), 'Introduction to Food Service', Macmillan Publishing Company, New York, 7th Edition.
- June Payne-Palacio, and Monica Theis (2016), 'Foodservice Management: Principles and Practices', 13th Edition Pub. Harlow Pearson,
- John B. Knight, Lendal H. Kotschevar (2017), 'Quantity: Food Production, Planning, and Management', 3rd Edition, John Wiley and Sons.

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FN3C12TM20- FOOD SERVICE MANAGEMENT

Module	Hours (54)	Section A 8/10 1 weightage	Section B 6/8 2 weightage	Section C 2/4 5 weightage
1	12	2	2	1
2	12	2	2	1
3	10	2	1	1
4	10	2	2	
5	10	2	1	1

SEMESTER III

FN3C03PM20 - FOOD SCIENCE AND FOOD SERVICE MANAGEMENT PRACTICALS

Total credit: 4

Total lecture hours: 180

Course Outcome:

CO1: Understand the physico-chemical properties of foods from food groups such as cereals, fats and oils and milk

CO2: Analyse the factors affecting stability of colloids viz. emulsions and foams.

CO3: Analyse techniques effective in vegetables for moisture removal and rehydration.

CO4: Apply the principles involved in planning, organising and management in quantity food preparation and service ensuring cost and quality control.

Course Content:

A. Food Science

1. Cereals and Flours

- Gelatinisation temperature of flours
- Microscopic examination of starches
- Determination of gluten content
- Stages of sugar cookery
- Determination of alcoholic acidity in a given sample of flour

2. Fats and Oils

- Determination of Acid value, Free fatty acids
- Determination of Peroxide value
- Purity tests of oils and fats

3. Milk

- Physical characteristics and additives
- Fat content
- SNF%
- Total Solids
- Protein content

4. **Colloidal Chemistry**
   - Preparation of a stable emulsion
   - Effect of foaming in preparation of soufflé
   - Effect of additives on egg white foaming

5. **Fruits and Vegetables**
   - Peroxidase inactivity test
   - Moisture removal techniques
   - Rehydration test for dried samples
   - Microscopic examination of starches
   - Determination of gluten content
   - Stages of sugar cookery
   - Determination of alcoholic acidity in a given sample of flour

6. **Fats and Oils**
   - Determination of Acid value, Free fatty acids
   - Determination of Peroxide value
   - Purity tests of oils and fats

7. **Milk**
   - Physical characteristics and additives
   - Fat content
   - SNF%
   - Total Solids
   - Protein content

8. **Colloidal Chemistry**
   - Preparation of a stable emulsion
   - Effect of foaming in preparation of soufflé
   - Effect of additives on egg white foaming

9. **Fruits and Vegetables**
   - Peroxidase inactivity test
   - Moisture removal techniques
   - Rehydration test for dried samples

B. Food Service Management

1. Standardization of Recipes – Selection, formulation and standardisation of recipes. Determination of standard serving size, product yield, calculation of Food cost.
2. Stepping up of recipes - Recipe conversion and yield of standardized recipes, stepping up for quantity preparation and service.
3. Quantity Food Preparation and Service.
4. Recipe Evaluation and Profit analysis.
5. Case study of an entrepreneurial food service unit /food service establishment.

Learning Resources:

References

- Sethi M and Mahan S (Revised 2nd edition, 2007)). Catering Management, An Integrated Approach. New Age International (P) Ltd
- Andrews S (2009) Food and beverage service : Training Manual 2nd edition. New Delhi Tata McGraw Hill.
- Bessie Brooks West and Levelle Wood MS (1988). Food Service in Institutions (6th ed.). John MacMillan Publishing Co., New York
- Harris N (1984) Meal management (6th ed.). New York : Mac Millan.
- Wailey BH (1986) Production management handbook. U.K.: Gower Publishing.
- Kotas R (1981). Accounting in hotel and catering industry. publisher-Thomson Learning; 4th Revised edition edition (Jun 1981)
- Fuller J and Thomas S (2006). Modern Restaurant Service, Amazon
- Kotler P and Keller K (2008). Marketing Management (13th ed.). Prentice Hall, USA.

SEMESTER IV

ELECTIVE COURSES

ELECTIVES COURSES BUNCH 1

SEMESTER IV

FN4E01TM20- FOOD BIOTECHNOLOGY

Total credit: 5

Total lecture hours: 90

Course outcomes:

CO 1: Critically evaluate applications of genetic engineering in the area of Food and Nutrition

CO 2: Correlate molecular aspects of Biotechnology and principles of Nutrigenomics

CO 3: Comprehend emerging role of biotechnology in Food industries

CO 4: Relate the role of biotechnology in food processing industry

CO 5: Comprehend role of Xenobiotics in food industries

Course Content:

Module 1: Introduction to Biotechnology and Genetic Engineering ((20 hours)

Definition, Importance and Scope of Biotechnology, Pathways of biotechnological development.

Tools and Techniques of Genetic Engineering, Application of genetics to enhance food production- Extended shelf life , Improved nutrition, Palatability, Appearance of foods. Transgenic plants - FlavrSavr tomato, Golden rice, Bt brinjal, GM mustard and others .

GM foods-Pros and cons

Regulatory Aspects in Biotechnology - Ethical and legal issues in biotechnology, Intellectual Property Rights.

Module 2: Molecular Aspects of Biotechnology and Tissue Culture ((15 hours)

Core Concepts in molecular biology-The genome, the genetic code and gene expression. Human Genome Project. Polymerase Chain Reaction.

Plant cell and Tissue culture -Principles and Technique. Culture media, Applications.

Animal Cell Culture - Technique, Culture Media, Applications

Module 3: Industrial Biotechnology ((20 hours)

Fermentation –Objectives, Stage course of fermentation. Bioreactor design.

Food additives: Synthesis of acidulants- Citric Acid; Sweeteners –High Fructose Corn Syrup (HFCS).

Synthesis Of Vitamins, Amino Acids And Lipids– Vitamin A., Riboflavin, Vitamin B_{12}, Amino Acids – Lysine, Methionine, Glutamate. Lipid Production by Microorganisms.

Downstream processing.

Application of enzymes in food industries. Immobilised enzymes and methods of immobilization.

Module 4: Role of Biotechnology in Food Industries ((20 hours)

Food fermentation-Alcoholic beverages, Fermented Soya based foods, Bread, Fermented meat products, Vinegar production

Single cell proteins-Advantages of producing microbial protein, Nutritional value, cultivation and harvesting of algae. Yeast, bacterial and fungal biomass production. Mushroom culture.

Probiotics –Important Features of Pro Biotic Microorganisms. Health Effects, Mechanism of Action, Probiotics in Various Foods

Module 5: Xenobiotics, Nanotechnology and Nutrigenomics ((15 hours)

Definition, Components, Metabolism of Xenobiotics- Phase I And Phase II

Reactions, Bio- Dynamics of Xenobiotics.

Biochips and Biosensors.

Definition, Concepts and applications of Nanotechnology and Nutrigenomics.

Learning Resources:

References

- Satyanarayana, U, 2007. Biotechnology, Books and Allied (P) Ltd., Kolkata
- V.K.Joshi and Ashok Pandaey (2009) Biotechnology: Food Fermentation-Microbiology, Biochemistry and Technology ,volume –I and II. Asia Tech Publishers, New Delhi.
- Green P.J 2002, Introduction to Food Biotechnology, CRC press, U.S.A

- Mansi, EMT, Bryce, CFA, Demain,A.L and Allman, R, Fermentation Microbiology and Biotechnology, Taylor and Francis, New York, 2007
- Meenakshi Paul ,2007,Biotechnology and Food Processing Mechanics, Gene-Tech Publishers
- JayantoAchrekar ,2007 ,Fermentation Biotechnology, Dominant Publishers
- Trehan K.(1997),Biotechnology.4thed.New Age International (P)Ltd.
- Kumar.HD.(2000.),Biotechnology,Saris Publications, Kanyakumari.
- Singh B.D.(2000),Biotechnology,Kalyani Publications, New Delhi.
- Dubey, R.C. S .(2002),A text book of Biotechnology Chand & Co, New Delhi.

Journals:

- Food Technology, Journal of Institute of Food Technology, Illinois, USA
- Journal of Food Science and Technology by Association of Food Scientists and Technologists, CFTRI India
- Food Technology, Abstracts, Central Food Technological Research Institute, Mysore.
- Food Processing, Pitman Publishing Company, New York, USA
- Journal of Food Science, The Institute of Food Technologists, Illinois, USA.
- Nutrition and Food Science, Forbes Publications Ltd., Hatree House, Queenway, London.
- Trends in Biotechnology, USA .

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FN4E01TM20-FOOD BIOTECHNOLOGY

Module	Hours (90 hours)	Section A 8/10 1 weight	Section B 6/8 2 weight	Section C 2/4 5 weight
1	20	2	2	1
2	15	2	1	1
3	20	2	2	1
4	20	2	2	1
5	15	2	1	

FN4E02TM20-FOOD MICROBIOLOGY

Total credit: 4

Total Lecture hours: 90

Course Outcomes:

CO1: Obtain a basic insight on scope of microbiology as a science, sources of micro-organisms, factors affecting their growth and economic importance.

CO2: Identify the role and types of microorganisms involved in food spoilage, causes and types of spoilages, prevention and control

CO3: Apply the knowledge gained on the types of food borne infections and infestations in its prevention and control

CO4: Understand the food safety management systems that are currently adopted in food industries and national and international food safety regulations.

Course Content:

Module 1: Scope of food microbiology, factors affecting growth of microorganisms, economic importance of micro organisms (20 hours)

History, Scope and Importance of Food Microbiology, Micro- organisms found in air, soil, water, plants and animals. Normal flora of skin, nose, throat, GI tract.

Factors affecting the survival and growth of micro-organisms in food- Intrinsic Factors (Substrate Limitations)-nutrient content, pH and buffering Capacity, redox potential, Eh, antimicrobial barriers and constituents water Activity. Extrinsic Factors (Environmental Limitations)-relative Humidity, temperature, gaseous atmosphere.

Economic Importance of moulds, yeast and bacteria

Module 2: Isolation and Detection of Microorganisms (15 hours)

Conventional methods, Rapid methods (newer techniques), Immunological methods; Fluorescent antibody, radio immune assay and ELISA, Chemical methods: Thermostable nuclease, DNA probes, ATP measurements, PCR techniques. Microbiological criteria for various food products and Sampling plans.

Module 3: Spoilage of foods (20 hours)

Classification of foods by ease of spoilage, Sources of contamination, types of spoilage and microorganisms involved in the spoilage, preservation and prevention of contamination.Spoilage of cereals and cereal products – molding, ropiness, Spoilage of milk and milk products –gas production, proteolysis, ropiness, Spoilage of meat and meat products –aerobic and anerobic, Spoilage of fish and other sea foods, poultry and eggs, Spoilage of fresh fruits and vegetables, Spoilage of canned products –spoilage by spore forming and non spore forming bacteria, Spoilage of sugar products.

Module 4: Food Contamination and hazards of microbial origin (20 hours)

Food contamination-Naturally occurring toxicants-Toxicants in animal foods and toxicants in plant foods, Environmental Contaminants-Biological contaminants, Pesticide residues, Veterinary drug residues and Heavy metals, Miscellaneous contaminants-Dioxins, Polychlorinated biphenyls, acrylamide and contaminants from plastics.

Food Borne Diseases-Types, causes and symptoms

Food Borne Intoxications-Staphylococcal poisoning, Bacillus cerues poisoning, Botulism,

Food Borne Infections-Salmonellosis, Shigellosis, Vibrio gastroenteritis, E.Coli, Hepatitis A and Shellfish poisoning,

Food Borne Toxic infections-Clostridium perfringens, E.coli gastroenteritis, Cholera, Listeriosis, Yersinia, Campylobacter,

Mycotoxins- Aflatoxicosis, Ergotism

Naturally occurring toxicants-Lathyrism,epidemic dropsy and veno occlusive disease

Module 5: Risk Analysis, HACCP and food regulations (15 hours)

Risk Analysis-Risk assessment, Risk management and Risk communication

HACCP, VACCP, TACCP, HARPC-Need, principles, benefits and guidelines

International and National Food standards and regulations –FSSAI (India)

Learning Resources

References

- Jay JM (2004). Modern Food Microbiology (7th ed.). CBS Publishers and Distributors. Springer Publications, Delhi
- Banwart GJ (1998). Basic Food Microbiology (2nd ed.). CBS Publishers and Distributors, New Delhi
- William Frazier (2008). Food Microbiology (4th ed.). The Mc Graw Hill Co Inc., New York
- Dr. K. Vijaya Ramesh (2007). Food Microbiology. MJP Publishers, Chennai.
- Adams, M.R and Moss M.G (1995): Food Microbiology, 1st Edition, New Age International (P) Ltd.
- Atlas, M. Ronald (1995), Principles of Microbiology, 1st Edition, Mosby-Year Book, Inc, Missouri, USA.
- Pelczar, M.I and Reid, R.D (1993), Microbiology, McGraw Hill Book Company, New York, 5th Edition.
- Pommerville C. Jeffrey, (2004)Fundamentals of Microbiology, 7th Edition
- Roday, S (1999) Food Hygiene and Sanitation, 1st Edition, Tata McGraw Hill, New Delhi

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FN4E02TM20-FOOD MICROBIOLOGY

Module	Hours (90)	Section A 8/10 1 weight	Section B 6/8 2 weight	Section C 2/4 5 weight
1	20	2	2	
2	15	2	1	1
3	20	2	2	1
4	20	2	2	1
5	15	2	1	1

SEMESTER IV

FN4E03TM20-BIOPHYSICAL TECHNIQUES

Total Credit: 3

Teaching hours: 90

Course Outcome:

CO1: Demonstrate a core knowledge base in the theory and practice of modern Biophysics.

CO2: Understand modern instrumental techniques in nutrition research.

CO3: Enhance comprehension on the applications, strengths and limitations of biophysical methods.

CO4: Comprehend the role of enzymes in the human body.

Course Content:

Module 1: Chromatographic Techniques (20 hours)

Chromatographic Techniques Basics and Classification of Chromatography-Adsorption, partition, size exclusion, ion-exchange, affinity Gas Chromatography, Liquid Chromatography - Instrumentation, Sampling Techniques and Applications .Applications of HPLC, Comparison of HPLC and GC

Advanced Chromatographic Techniques and Electrophoresis Thin Layer Chromatography, High Performance Thin Layer Chromatography (HPTLC), Hyphenated Techniques - Gas Chromatography-Mass Spectrometry (GC-MS), Liquid Chromatography-Mass Spectrometry (LC-MS**).**

Module 2: Electrophoresis (15 hours)

Principles and applications of electrophoresis – Paper, Starch gel, Agar gel, Polyacrylamide gel, Moving boundary electrophoresis, Immunoelectrophoresis, Isoelectric focusing.

Module 3: Enzymes (20 hours)

Introduction, classification of enzymes, Mechanism of action, Factors affecting enzyme activity, enzyme inhibition – competitive, non-competitive and uncompetitive inhibition, Clinical applications of enzymes, Enzyme kinetics – Michael's Menten equation. Coenzymes and role of coenzymes in enzyme catalysis, ELISA

Module 4: Basics of Instrumentation– Physico-chemical principles and methodology (20 hours)

Principles and applications of colorimetry, Fluorometry, Spectrophotometry, AAS, Flame photometry. Electron microscopy-Principle, Instrumentation and Applications.

Module 5: Radioactive Isotopes and Bioassays (15 hours)

Radioactive and stable isotopes used in biological investigations. Applications of isotopes in Food and Nutrition research, Microbiological Assays.

Learning Resources:

References

- Boyer R (2000). Experimental Biochemistry (3rded.). Modern Person education, Asia
- Dawes EA (1980). Quantitative Problems in Biochemistry (6thed.). Longman Group Ltd.
- Khosla BD, Garg VC and Khosla A (1987). Senior Practical Physical Chemistry (5thed.). R.Chand & Sons, New Delhi.
- Oser BL (1965). Hawk's Physiological chemistry (14thed.).Tata McGraw-Hill Publishing Co. Ltd
- Raghuramulu N, Nair M and Kalyanasundaram KS (1983). A manual of laboratory techniques. NIN, ICMR.
- Sharma BK (1999). Instrumental methods of chemical Analysis Gel (8thed.). Publishing House
- Srivastava AK and Jain PC (1986). Chemical Analysis. An Instrumental Approach (2nded.). S. Chand Company Limited
- Fung, D.Y.C and Mathews, R. 1991. Instrumental methods for Quality Assurance in Foods. Marcel Dekker Inc. New York.
- Pomeran,Y. and MeLoan,C.E. 1996. Food Analysis –Theory and Practice, 3rd Ed. CBS Publishers and Distributors, New Delhi.
- Skoog, D.A., Holler, F.H and Nieman. 1998. Principles of Instrumental Analysis. Saunders College Publishing, Philadelphia.

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FN4E03TM20-BIOPHYSICAL TECHNIQUES

Module	Hours	Section A 8/10 1 weightage	Section B 6/8 2 weightage	Section C 2/4 5 weightage
1	20	2	2	1
2	15	2	1	1
3	20	2	2	1
4	20	2	2	1
5	15	2	1	

SEMESTER IV

FN4C04PM20 -MICROBIOLOGY PRACTICALS

Total Credits: 4

Total Lecture Hours: 180

Course Outcomes:

CO1: Understand the morphology and structural features of various micro-organisms.

CO2: Comprehend various techniques used for isolation, purification, identification and controlling the growth of micro-organisms

CO3: Equip students on the preparation of common lab media and bacteriological assay of processed and unprocessed foods, Staining and identification of bacteria**.**

CO: 4: Apply the principles of microbiology in laboratory estimation food spoilage

Course Content:

1) Introduction to microbiology lab safety, Basic microbiological techniques-Cleaning and sterilization of glassware.
2) Preparation of common lab media and special media for cultivation of bacteria, yeasts and moulds
3) Techniques of culturing
4) Staining and identification of bacteria (gram staining, acid-fast, spore, capsule), yeasts and moulds
5) Cultivation and identification of importance moulds and yeasts(slides and mould culture)
6) Isolation of micro organisms-plating techniques
7) Bacteriological analysis of processed and unprocessed foods
8) Bacteriological analysis of water and milk(Methylene Blue Reduction Test)
9) Enumeration of Coliforms and indicator organisms (Most Probable Number)
10) Microbiology of hand and effect of sanitation on the hand microbiology in a small food joint

PROJECT:

Project Report on

- An experimental study based on any topic within the syllabus

OR

- An internship in Microbiology at a laboratory/industry

Learning Resources:

References

- Bell, C., Neaves, P. & Williams, A.P. (2005). Food Microbiology and Lab Practice. Wiley Press.
- Yousef, A.L. (2003). Food Microbiology. A Laboratory Manual. Wiley Inter-Science New Jersey.
- Benson, H.J. (2002). Microbiological Application.8th Edition. Tata McGraw Hill.
- Mortimore & Wallace. (2013). HACCP: A Practical Approach. 3rd Edition. Springer Publication.
- Cappuccino & Sherman. (2007). Microbiology: A laboratory Manual. 7th Edition. Pearson Education Inc.
- Hoorfar, J. (2011). Rapid Detection, Characterization and Enumeration of Food Borne Pathogens. American Society for Microbiology, Washington, USA.
- Drinking Water Specification- Indian Standard. (2012).2nd Revision. IS 10500:2012. Bureau of Indian Standard, Manak Bhawan, New Delhi, India.
- Manual of Methods of Analysis of Foods- Microbiological Testing. (2012). Lab Manual 14. FSSAI, GoI, New Delhi.

ELECTIVE COURSES BUNCH 2

SEMESTER IV

FN4E04TM20-SPORTS NUTRITION

Total credit: 4

Total Lecture Hours: 90

Course Outcome

CO1: Develop competence to make nutritional, dietary and physical activity recommendations to achieve fitness and well-being.

CO2: Develop ability to evaluate fitness and well-being of athletes

CO3: Prescribe ways to regulate body composition level ideal for various sports performance

CO4: Formulate and apply appropriate strategies for the measurement and monitoring of the nutritional status of athletes

CO5: Formulate recipes suitable for athletes

Course content:

Module 1: Sports physiology (15 hours)

Introduction to Fitness, Muscular adaptations during endurance exercise, Hormonal adaptations during endurance exercise, Role of nutrition in stress, Fracture and injury.

Module 2: Body Composition and Weight Management in Sports (20 hours)

Body build, size and body composition, levels of body composition, methods to measure body composition- Direct and indirect, Significance of body composition measures for athletes

Body composition and performance Safe, effective weight loss, Weight gain

Module 3: Exercise Performance and Nutrition (20hours)

Energy expenditure during physical activity, Carbohydrates and performance**,** Fat metabolism and performance**,** Effect of exercise on protein requirements, Vitamins and Minerals**,** Fluid and electrolyte loss and replacement in exercise

Nutritional requirements in Sports events-Team, Power and Endurance events, Pre-game and Post game regime .Carbohydrate loading, Water and electrolyte balance.

Module 4: Nutritional Ergogenics (15 hours)

Ergogenic aids and Supplements-Types, Potential and Concerns

Module 5: Measures of performance and physical fitness (20 hours)

Work Capacity, Physical capacity tests, Physical fitness, parameters of fitness, fitness tests.

Learning resources

References:

- Bamji M.S., Krishnaswamy K. and Brahman G.N.V.(2017) . Textbook of Human Nutrition, 4th Edition, Oxford & Ibh Publishing.
- Fink H.H., Mikesky E.A and Burgoon A.L.(2012).Practical Applications in Sports Nutrition.3 rd ed. Jones and Barlett Learning.USA.
- Gibney J.M. Macdonald A.I and Roche M.H (2003). Nutrition and Metabolism. Blackwell Publishing.
- Maurice B Shils, Moshe Shike. A, Catherine Ross, Benjamin Cabellero, Robert J Cousins. 2006. Modern Nutrition in Health and Disesase edited by Lippincott Williams al Wilkins.
- Melvin Williams. 2007. Nutrition for Health, Fitness and Sport, eighth edition, by McGraw-Hill.
- Cherie Moore .2004.Practical Nutrition for a Fit Life, by, Kendall-Hunt Publishers

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FN4E04TM20-SPORTS NUTRITION

Modules	Hours	Section A 8/10 1 weight	Section B 6/8 2 weight	Section C 2/4 5 weight
1	15	2	1	
2	20	2	2	1
3	20	2	2	1
4	15	2	1	1
5	20	2	2	1

SEMESTER IV

FN4E05TM20 – FOOD SAFETY AND QUALITY CONTROL

Total credit: 4

Total Lecture Hours: 90

Course Outcome

CO1: Develop Competency in Food quality assurance

CO2: Apply principles of food safety in product evaluation

CO3: Analyze food samples for quality and safety

CO4: Demonstrate food safety standards

Course content:

Module 1: **Introduction to quality assurance (10 Hours)**

Food safety assurance. Current concepts of quality control.

Module 2: Quality assurance programme (15 Hours)

Quality plan, documentation of records, products standards products and purchase specifications, process control and HACCP, hygiene and housekeeping corrective action, quality and programme and total quality process.

Module 3: Quality Costs: Measurement and analysis. **(20Hours)**

Module 4: Product Evaluation: **(25 Hours)**

- Sampling for product evaluation and line control.
- Statistical quality and process control
- Specifications and food standards. International, National-Mandatory, Voluntary.
- Sample preparation
- Reporting results and reliability of analysis.
- Tests for specific raw food ingredients and processed. Foods including additives:
    a) Proximate principles
    b) Nutrient analysis
    c) Quality parameters and tests of adulterants.

Module 5: Consumer protection (20 Hours)

Food safety

Food standards.

Learning Resources:

References:

- Graf, E. and Saguy, I.S. (1991) Food Product Development : From Concept to the Market Place, Van Nostrand Reinhold New York.
- Oickle, J.G. (1990) New Product Development and Value Added. Food Development Division Agriculture, Canada.
- Proc. Food Processors Institute : A key to Sharpening your Competitive Edge. Food Processors Institute, Washington, DC.
- Shapton, D.A. and Shapton, N.F. (1991) Principles and Practices for the Safe Processing of Foods. Butterworth Heinemann Ltd, Oxford.

Journals

- Critical Reviews is Food Science and Nutrition.
- Food Technology
- International Journal of Food Science and Technology.
- Journal of Food Technology
- Trends in Food Science and Technology

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FN4E05TM20 – FOOD SAFETY AND QUALITY CONTROL

Modules	Hours	Section A 8/10 1 weight	Section B 6/8 2 weight	Section C 2/4 5 weight
1	10	2	1	1
2	15	2	2	
3	20	2	1	1
4	25	2	2	1
5	20	2	2	1

SEMESTER IV

FN4E06TM20 -FOOD PRODUCT DEVELOPMENT AND MARKETING

Total credit: 3

Total lecture hours: 90

Course Outcome:

CO1: Acquire skills on novel food product development

CO2: Develop ideas on product development to meet consumer needs which is nutritionally and commercially viable.

CO3: Explore the avenues for new product development and marketing

CO4: Analyse the market feasibility for new products

Course Content:

Module 1: New Food Products (15 Hours)

Definition, Classification, Characterization Factors shaping new product development-Social concerns, health concerns impact of technology and market place influence. Reasons for new food product development (corporate, market place, technological and governmental influences) Assessing needs from various perspectives.

Module 2: Brief introduction to Phases in Food Product Development. (15 Hours)

Idea generation, Screening (Feasibility, Consumer studies Financial Review), Development Production, Consumer trials and Test Market. Internal sources of ideas; External sources of ideas; Market place analysis

Team Approach and involvement of various departments; Objectives of screening; Criterion of screening

Module 3: Development process (20 Hours)

Market Sector perspective and Market research. Technical development – Recipe development and scale up, food safety and food spoilage, Newer food stabilising systems : Thermal processing, ohmic heating, stabilizing with high pressure, other non-thermal stabilzing systems, control of water, controlled/modified atmosphere packaging, irradiation, hurdle technology, low temperature stabilization, .Use of various new ingredients to suit product functions. Packaging, Design Graphics and Labelling.

Module 4: Refining the Screening Procedure for the product (20 Hours)

Sensory Evaluation, Shelf life Testing, Product Integrity and conformance to standards

Module 5: Test Marketing; Evaluating results and analysing (20 Hours)

Learning resources:

References:

1) Howard R. Moskowitz, Jacqueline H. Beckley, Anna V. A. Resurreccion, (2012), Sensory and Consumer Research in Food Product Design and Development", John Wiley & Sons Publishers.
2) Kenneth B. Kahn, (2012), The PDMA Handbook of New Product Development , John Wiley & Sons Publishers.
3) Jacqueline H. Beckley, M. Michele Foley, Elizabeth J. Topp, Jack C. Huang, Witoon Prinyawiwatkul, (2008), Accelerating New Food Product Design and Developmen, John Wiley & Sons Publishers
4) Howard R. Moskowitz, I. Sam Saguy& Tim Straus (2009), An Integrated Approach to New Food Product Development. Taylor and Francis Group, LLC.USA
5) Anil Kumar, S., Poornima, S.C., Abraham, M.K.&Jayashree, K.(2004) Entrepreneurship Development. New Age International Publishers.

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FN4E06TM20 -FOOD PRODUCT DEVELOPMENT AND MARKETING

Modules	Hours	Section A 8/10 1 weight	Section B 6/8 2 weight	Section C 2/4 5 weight
1	15	2	2	1
2	15	2	1	
3	20	2	1	1
4	20	2	2	1
5	20	2	2	1

ELECTIVE COURSES BUNCH 3

SEMESTER IV

FN4E07TM20- ENTREPRENEURSHIP MANAGEMENT

Total credit: 4

Total lecture hours: 90

Course Outcome:

CO1: Demonstrate the meaning, functions, types and roles of an entrepreneur and describe various institutional support.

CO2: Distinguish scope of modern business and different sources of finance

CO3: Develop ideas for the process of setting up small enterprise and prepare project report.

CO4: Develop skills in accounting, book keeping and marketing

CO5: Enhance effective entrepreneurship skills

Course Content:

Module 1: Entrepreneurship and its development (15 Hours)

Entrepreneurship-Definition, types, characteristics, Entrepreneurship development for employment generation- importance, Factors affecting entrepreneurial growth- economic, social, cultural and personal factors.

Module 2: Women and Employment & Forms of Entrepreneurial Organizations (20 Hours)

Women employment in India - categories of employment, problems related to employment, Unemployment in India- causes & remedies, Importance of self employment.

Scope and Objectives of modern business, Essentials of successful business, Sole proprietorship, Partnership, Joint Stock company, State enterprises and Co-operative societies – meaning, merits and demerits of each, Types of important documents of companies

Module 3: Entrepreneurship and Institutional support (20 Hours)

Objectives, functions and assistance given by SIDCO, SIDO, SFCK, IDBI, SIDBI, KSIDC, KSWDC, KITCO, SEWA,SGSY **(**Swarnjayanti Gram Swarozgar Yojana), JGSY **(**Jawahar Gram Samridhi Yojana), Agencies promoting entrepreneurship –

role of NSIC (National Small Industry Corporation) , Small Industry Extension Training Institute (SIETI), Central Small Industry Organisation (CSIO) DCK, DRDA, KVIC (Khadi and Village Industry Commission) and other voluntary organizations, Small Scale

Industries (SSI) - Definition, types, procedure for setting a small scale unit, training facilities for small scale unit, Problems faced by emerging small scale units and remedies

Module 4: Source of Finance (15 Hours)

Importance of finance- sources of company finance - long term and short term, Role of banks and other financial institutions, Basics of Costs and Cost Control, Project Appraisal

Module 6: Book keeping & Accounting & Marketing (20 Hours)

Concepts and Basics of accounting methods- Journal and ledger, balancing, trial balance, cash book, subsidiary books, Brief study of Financial Statements, Basics of Auditing, Sales Tax- meaning and types, Registration of business, turnover, filing & assessment of returns.

Marketing- Marketing mix, Functions, types, Advertising & Salesmanship, Public relations, Personal selling, Interpersonal skills, factors affecting the entrepreneur's skill

Related Experience:

1 Visits to agencies involved in development of entrepreneurship

2 Preparation of a project proposal by

- Selection of a trade
- Visits to 1 or 2 units related to trade
- Study the infrastructural requirements
- Records to be maintained
- Procedure for obtaining loan

Learning Resources:

References

- Arora, S. P., Business Organization, Vikas Publishing House Pvt. Ltd. New Delhi, (1980)

- Bhattacharyya, S.K Accounting for Management, Vikas Publishing House Pvt. Ltd., New Delhi
- Bhushan, Business Organization, Sultan Chand & Sons, New Delhi, (1985)
- Chetnakal, Women and Development, Discovery Publishing House, New Delhi (1991)
- Desai V., Entrepreneurial Development- Vol -3,Himalaya Publishing House, New Delhi (1993)
- Gupta C.B. (Dr.), Office Organization and Management, Sultan Chand & Sons, New Delhi, (1999)
- Kanikar Entrepreneurs and Micro Enterprises in Rural India, New Age International Publishers Ltd., New Delhi (1995)
- Khanka S.S, Entrepreneurial Development, S.Chand & Co.Ltd., New Delhi, (1999)
- Ramesh Babbu's Handbook of Entrepreneurs, Business Intelligence Publications
- Sherlekar S.A, Principles of Business Management, Himalaya Publishing house, New Delhi, (1999)
- Shukla M.C., Business Organization, S. Chand & Co. New Delhi, (1970)

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FN4E07TM20- ENTREPRENEURSHIP MANAGEMENT

Modules	Hours	Section A 8/10 1 weight	Section B 6/8 2 weight	Section C 2/4 5 weight
1	15	2	1	1
2	20	2	2	
3	20	2	2	1
4	15	2	1	1
5	20	2	2	1

SEMESTER IV

FN4E08TM20-NUTRITION EDUCATION AND DIETETIC COUNSELLING

Total Credit: 4

Teaching hours: 90

Course Outcome

CO1: Comprehend the importance of dietician in hospitals

CO2: Develop competency in giving dietary prescription and diet counselling

CO3: Understand the method of working with hospitalized patients.

CO4: Acquire advanced knowledge in the field of dietetic counselling

Course Content:

Module 1: Role of Dieticians in the Hospital and Community (15 Hours)

Professional qualification and personal attributes, types of dieticians, Professional ethics, responsibilities. Dietitian as part of the Medical Team and Outreach Services Indian dietetic association- origin, objectives, membership, chapters, registration.

Module 2: Diet Therapy and Nutritional Care in Disease (15 Hours)

The Nutritional Care Process - Nutritional Care Plan -Setting goals and objectives short term and long term; Assessment and Therapy in Patient Care - Implementation of Nutritional Care- Counselling and Patient Education, Dietary Prescription.

Module 3: Clinical Information Medical History and Patient Profile Techniques (20Hours)

Clinical Information - Medical History and Patient Profile Techniques of obtaining relevant information, Retrospective information, Dietary Diagnosis, Assessing food and nutrient intakes, Lifestyles, Physical activity, Stress, Nutritional Status. Correlating Relevant Information and identifying areas of need.

Module 4: Working with - Hospitalized patients (20Hours)

Adjusting and adopting to individual needs (adults, pediatric, elderly, and handicapped), Outpatients (adults, pediatric, elderly, handicapped), patients'

education, techniques and modes. Motivating Patients, follow up, Monitoring and Evaluation of outcome, Home visits

Module 5: Nutrition education and counselling (20 Hours)

Maintaining records, Reporting findings, Applying findings, Resources and Aids for education and counselling, Terminating counselling, Education for individual patients, Use of regional language, linguistics in communication process, Counselling and education.

Learning Resources

References:

- Garrow JS, James WPT and Ralph AC, (1993) Nutrition and Dietetics, Churchill Livingstone
- Mahan L.K, and Stump S.E, (2001), Krause's Food, Nutrition and Diet Therapy, WB Saunders Limited.10th Edition
- Shils N.E, Olson J.A., Shike A, Ross A.C,(2006), Modern Nutrition in Health and Disease, 9th Edition, William and Wilkins.

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FN4E08TM20-NUTRITION EDUCATION AND DIETETIC COUNSELING

Modules	Hours	Section A 8/10 1 weight	Section B 6/8 2 weight	Section C 2/4 5 weight
1	15	2	1	
2	15	2	2	1
3	20	2	2	1
4	20	2	1	1
5	20	2	2	1

SEMESTER IV

FN4E09TM20-BAKERY AND CONFECTIONERY TECHNOLOGY

Total Credits: 3

Total Lecture Hours: 90

Course Outcomes:

CO1: Impart basic and applied technology of baking and confectionary.

CO2: Highlight the processing methods used in baking and confectionery industries.

CO3: Apply the principles of baking technology in the manufacture of food products.

CO4: Equip to start a small scale bakery and confectionery unit.

Course Content:

Module 1: Manufacture of Sugar (15Hours)

Sugarcane, jaggery, khandasari sugar, raw sugar, refined sugar, white sugar, beet sugar, manufacture of sugar from sugar cane, refining of sugar.

Module 2: Classification of confectionery (15 Hours)

Sugar boiled confectionery- crystalline and amorphous confectionery, rock candy, hard candy, lemon drop, china balls, soft candy, lollypop, marshmallows, fudge, cream, caramel, toffee, lozenges, gumdrops, honeycomb candy.

Module 3: Properties of wheat (20 Hours)

Wheat – Properties, Quality – Hardness, Gluten strength, protein content, soundness. Methodology and approaches to evaluate bread and bread – wheat quality – processing factors, product factors.

Module 4: Principles of baking and Bread manufacturing (20 Hours)

Major baking ingredients and their functions, role of baking ingredients in improving the quality of bread. Characteristics of good flour used for making bread, biscuits and cakes. Ingredients used for bread manufacture, methods of mixing the ingredients, dough development methods - straight dough, sponge dough, moulding, proofing, baking, packing, spoilage, bread staling, methods to reduce bread staling and spoilage.

Module 5: Cake and Biscuit manufacturing (20Hours)

Processing of cakes and biscuits- ingredients, development of batter, baking and packing, Spoilage in cakes and biscuits.

Learning Resources

References

- Zhou. W, Hui Y,H; (2014). Bakery Products Science and Technology, 2nd Edition, Wiley Blackwell Publishers,
- Pyler, E. J. and Gorton, L.A.(2009). Baking Science & Technology" Vol.1 Fourth Edition,Sosland Publications.
- Stanley P. Cauvain, Linda S. Young, (2008). Baked Products: Science Technology and Practice. John Wiley & Sons Publishers.

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FN4E09TM20-BAKERY AND CONFECTIONERY TECHNOLOGY

Modules	Hours	Section A 8/10 1 weight	Section B 6/8 2 weight	Section C 2/4 5 weight
1	15	2	2	1
2	15	2	3	
3	20	2	1	1
4	20	2	1	1
5	20	2	1	1

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