University of Agricultural Sciences, Bangalore
Office of the Registrar, GKVK, Bengaluru-560 065
NAAC A^{+} Accredited

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No. R/AC/Syllabus/2025-26

Date: 30.06.2025

Notification

Sub: Implementation of VI Deans Committee Syllabus for B.Sc. (Hons.) Food, Nutrition & Dietetics degree programme w.e.f. the academic year 2024-25 in Faculty of Food, Nutrition & Dietetics -reg.

Ref: 1. Approval in the 16th meeting of the reconstituted Board of Studies (UG), dated. 17.04.2025
2. Minutes of 201st meeting of Academic Council dated 26.04.2025, (Part B, item No.10)
3. Recommendations of the Director of Education, dt: 30.06.2025
4. Approval of the Hon'ble Vice-Chancellor, dt: 30.06.2025

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PREAMBLE:

The Indian Council of Agricultural Research (ICAR) New Delhi has played a crucial role in transforming the agricultural higher education to produce highly skilled human resource equipped with advanced knowledge and capable of fulfilling the technological needs of agricultural sector of the country. The National Education Policy (2020) of India represents a comprehensive and ambitious vision for the future of education in the country. There is an urgent need to revive and align the agricultural education system in the country in line with NEP 2020 norms to build a competent human resource for undertaking education, research and extension activities in the diversified, ecologically sustainable and economically viable agricultural and allied sectors with integration of skills, technology and innovation. The proposal for implementation of VI Deans committee course curriculum for Agriculture degree programme was placed in 16th meeting of the reconstituted Board of Studies (UG) held on 17.04.2025 and after thorough deliberations the house approved to implement the syllabus for B.Sc. (Hons.) Food, Nutrition & Dietetics course as per VI Deans Committee recommendations w.e.f. Academic year 2024-25.

Based on the minutes of 16th meeting of reconstituted Board of Studies (UG), an agenda item was placed before 201st meeting of the Academic Council held on 26.04.2025 for seeking approval for implementation of VI Deans Committee report w.e.f. the academic year 2024-25. Deliberations were held by the Academic Council regarding the key features of VI Deans Committee syllabus, namely, *Deeksharambha* (student orientation for 14 days), Academic Bank of Credits, Core Courses, Elective Courses, Multi-disciplinary Courses, Value Added Courses, Skill Enhancement Courses, Compulsory 10 Week Internship, Certificate Course (student exit after one year), Diploma Course (student exit after two years), Multiple Entry and Exit System and Migration of Students from one SAU to another etc. After thorough deliberations, the house approved the implementation of VI Deans Committee Syllabus w.e.f. the academic year 2024-25 for B.Sc. (Hons.) Food, Nutrition & Dietetics degree programme (Annexure). Further, it was decided that 80% attendance is compulsory for the students in order to be eligible for taking final external examinations in all the courses offered during each semester, but there will be no weightage (marks allocation) for the attendance. Hence, the notification.

NOTIFICATION

As per the approval of the Academic Council in its 201st meeting held on 26.04.2025 (Part B, item No. 10), the VI Deans Committee Report has been implemented at UAS, Bangalore w.e.f. the academic year 2024-25 and onwards for B.Sc. (Hons.) Food, Nutrition & Dietetics degree programme in the Faculty of Food, Nutrition & Dietetics. Further, 80% attendance is compulsory for all the students in order to be eligible for taking final external examinations in all courses offered during each semester, but there will be no weightage (marks) for the attendance (Annexure).

UAS, GKVK, BENGALURU-560065, INDIA
REGISTRAR

30/06/25

REGISTRAR

P.T.O

Copy to:

1. The Hon'ble Vice-Chancellor & Chairman of the Academic Council, UAS, GKVK, Bengaluru
2. The Director of Education, & Member-Secretary of the Academic Council, UAS.Bengaluru
3. The Director of Research, UASB & Member, Academic Council, UAS, GKVK, Bengaluru.
4. The Director of Extension, UASB & Member, Academic Council, UAS, GKVK, Bengaluru.
5. The Dean (PGS), UASB & Member, Academic Council, UAS, GKVK, Bengaluru.
6. The Dean (Agri.), College of Agriculture, GKVK & Member, Academic Council, UAS, GKVK, Bengaluru.
7. The Dean (Agri.), College of Agriculture, VC Farm, Mandya & Member Academic Council, UAS, GKVK, Bengaluru.
8. The Dean (Agri.), College of Agriculture, Hassan & Member Academic Council, UAS, GKVK, Bengaluru.
9. The Dean (Seri.), College of Sericulture, Chintamani & Member Academic Council, UAS, GKVK, Bengaluru.
10. The Dean of Student Welfare, UAS, GKVK & Member Academic Council, UAS, GKVK, Bengaluru.
11. The Director of Agriculture, Government of Karnataka, Seshadri Road, Bengaluru – 560009 & Member Academic Council, UAS, GKVK, Bengaluru
12. Dr. M.S. Nataraju, Former Director of Extension, UASB & Eminent Agriculture Educationist from outside the University & Expert Member, Academic Council, UAS, GKVK, Bengaluru.
13. Dr. Mohan I. Naik, Prof. & Head (Apiculture), & Univ. Head (Entomology), CoA, GKVK, Bengaluru & Member, Academic Council, UAS, GKVK, Bengaluru.
14. Dr. M. Mahadeva Murthy, Professor & Head, University Head, Dept. of Forestry and Environmental Science & Member, Academic Council, UAS, GKVK, Bengaluru.
15. Dr. Venkatesh, Professor & University Head (Plant Pathology) & Member of Academic Council for Agriculture faculty, UAS, GKVK, Bengaluru.
16. Dr. C. Doreswamy, Professor & Special Officer, CoA, Chamarajanagara, & Member, Academic Council for Sericulture faculty, UAS, GKVK, Bengaluru
17. Dr. C.T. Ramachamdra, Professor & Head, Dept. of Processing and Food Engineering, College of Agricultural Engineering, GKVK & Member of Academic Council for Agri. Engineering faculty, UAS, GKVK, Bengaluru
18. Dr. M.R. Girish, Professor, IABM & Member of Academic Council for IABM faculty, UAS, GKVK, Bengaluru.
19. Dr. Shyamalamma, S., Prof. & Head (Plant Biotechnology), CoA, GKVK & Member of Academic Council for Agri. Biotechnology, UAS, GKVK, Bengaluru.
20. Dr. K.G. Vijayalaxmi, Professor, Dept. of Food Science & Nutrition, CoA, GKVK & Member, of Academic Council for FS & N faculty UAS, GKVK, Bengaluru.
21. Dr. K.S. Jagadish, Professor & University Head, Department of Apiculture, and Scientific Officer, Directorate of Education & Invitee of Academic Council UAS, GKVK, Bengaluru.

Special Invitees:

1. The Administrative Officer, UAS, GKVK, Bengaluru.
2. The Comptroller, UAS, GKVK, Bengaluru.
3. The Coordinator PPMC & Nodal Officer - Agril. Education to ICAR, NODAEC, UAS, GKVK, Bengaluru
4. The Special Officer, College of Agriculture, Chamarajanagara.
5. The Special Officer, College of Agricultural Engineering, UAS, GKVK, Bengaluru.
6. The Controller of Examinations, UEC, UAS, GKVK, Bengaluru.
7. The Librarian, University Library, UAS, GKVK, Bengaluru.

CS to the Secretary to the Hon'ble Vice-Chancellor, UASB for kind information.

Annexure

Semester-wise allocation of courses with code for B.Sc. (Hons.) Food, Nutrition & Dietetics Degree programme as per VI Deans Committee Curriculum

I Year I Semester				
Sl. No.	**Course Code**	**Course Title**	**Credit Hours**	**Total Credits**
1.	SDAR111*	*Deeksharambh*	0+2 (NG)	22 (9 + 13)
2.	SAEX111	Communication Skills	1+1	
3.	SECN111	SEC-I : Cake Making	0+2	
4.	SECN112#	SEC-II: Hygiene Management in Food Service Units	0+2	
5.	SFND111	Introduction to Food Science and Nutrition	3+0	
6.	SFND112	Principles and Practices of Food Preparation	1+1	
7.	SFND113	Indian Cuisinology	0+2	
8.	SFND114	Nutritional Status Assessment	2+1	
9.	SFND115	Convenience and Health Food Formulation	0+2	
10.	SKAN111/ SKAN112**	Kannada-I*	0+1	
11.	SMAT111*	Introductory Mathematics (Need based)	1+0	
12.	SMDC111***	Farming Based Livelihood Systems	2+1	
13.	SNCC111/ SNSS111	National Cadet Corps (NCC-I)/ National Service Scheme (NSS-I)	0+1	

***NB:* *Non- Gradial Course**

****For Non- Kannada speaking students**

#SECN112: Jointly offered by Department of Food Science and Nutrition & Agricultural Microbiology; Coordinated by Food Science and Nutrition

*****SMDC111: Jointly offered by Department of Agronomy, Agril. Economics, Animal Scienc and Horticulture; coordinated by the Dept. of Agronomy.**

I Year II Semester				
Sl. No.	**Course Code**	**Course Title**	**Credit Hours**	**Total Credits**
1.	SAEX122	Personality Development	1+1	21 (8+13)
2.	SECN121	SEC-III : Pickle Preparation	0+2	
3.	SECN122	SEC-IV : Savory Snack Preparation	0+2	
4.	SFES121	Environmental Studies and disaster management	2+1	
5.	SFND121	Bakery Science and Technology	2+1	
6.	SFND122	Nutritional program Surveillance	1+2	
7.	SFND123	Food Preservation and Storage	0+2	
8.	SKAN121/ SKAN122**	Kannada-II *	0+1	
9.	SMDC122***	Entrepreneurship Development and Business Management	2+1	
10.	SNCC121/ SNSS121	National Cadet Corps (NCC-II)/ National Service Scheme (NSS-II)	0+1	

***NB:* * Non- Gradial Course**

****For Non- Kannada Speaking students**

*****SMDC122: Jointly offered by Department of Agricultural Economics, Agricultural Extension and IABM; Coordinated by the Department of Agricultural Economics.**

Post –II Semester Internship (10 weeks, only for exit option for Award of UG-Certificate after first year)

II Year I Semester				
Sl. No.	**Course Code**	**Course Title**	**Credit Hours**	**Total Credits**
1.	SABM214	Economics and Food Business Management	2+0	**22 (15+7)**
2.	SECN 211	SEC-V : Assessment of Clinical Signs and Symptoms	0+2	
3.	SFND211	Principles of Human Nutrition	4+0	
4.	SFND212	Fundamentals of Food Science	1+1	
5.	SFND213	Community Nutrition and Education	2+1	
6.	SFND214	Human Physiology	2+1	
7.	SFND215	Food Psychology	2+0	
8.	SFND216	Food Nutrition and Agriculture	2+0	
9.	SNCC211*/ SNSS211*	National Cadet Corps (NCC-III)/ National Service Scheme (NSS-III)	0+1	
10.	SPED211	Physical Education, First Aid, Yoga Practices and Meditation	0+2	

NB: *** Non- Gradial Course**

II Year II Semester				
Sl. No.	**Course Code**	**Course Title**	**Credit Hours**	**Total Credits**
1.	SBCM222	Nutritional Biochemistry	3+0	**20 (13+7)**
2.	SCSC221	Agricultural Informatics and Artificial Intelligence	2+1	
3.	SECN221	SEC-VI : Development of Nutritional Educational Material	0+2	
4.	SFND221	Normal Nutrition and Meal Planning	2+1	
5.	SFND222	Public Health Nutrition	2+1	
6.	SFND223	Food Standards and Quality Control	2+1	
7.	SMDC222**	Agriculture Marketing and Trade	2+1	
8.	SNCC221*/ SNSS221*	National Cadet Corps (NCC-IV)/ National Service Scheme (NSS-IV)	0+1	

NB: ***Non- Gradial Course**

****SMDC222: Jointly offered by IABM and Department of Agricultural Economics; coordinated by IABM.**

Post - IV Semester Internship (10 weeks, only for exit option for Award of UG-Diploma after second year)

III Year I Semester				
Sl. No.	**Course Code**	**Course Title**	**Credit Hours**	**Total Credits**
1.	SAEG311	Current Food Processing Technologies	2+1	**21 (13+8)**
2.	SAST311	Statistical Methods	2+1	
3.	SEDT311*	Educational Tour	0+2	
4.	SFND311	Therapeutic Nutrition	3+1	
5.	SFND312	Food Analysis	2+1	
6.	SFND313	Diet and Nutrition Counseling	0+3	
7.	SFND314	Nutraceuticals and Health Foods	2+0	
8.	SFND315	Introduction to Clinical Nutrition	2+1	

NB: ***Non Gradial Course**

III Year II Semester				
Sl. No.	**Course Code**	**Course Title**	**Credit Hours**	**Total Credits**
1.	SAMB322	Food Microbiology	2+1	**21(13+8)**
2.	SFND321	Food and Nutrition Security	1+1	
3.	SFND322	Nutrition, Body Composition and Physical Fitness	2+1	
4.	SFND323	Milk Processing and Technology	2+1	
5.	SFND324	Cereals and Millets: Processing and Technology	2+1	
6.	SFND325	Sustainable Nutrition	2+1	
7.	SFND326	Hospitality Management	1+1	
8.	SFND327	Food Hygiene and Sanitation	1+1	

IV Year I Semester				
Sl. No.	**Course Code**	**Course Title**	**Credit Hours**	**Total Credits**
1.	SFND411	Ethics in Human Research	1+0	**20 (12+8)**
2.	SFND412*	Nutrigenomics	2+0	
3.	SFND413	Nutrition for Special Conditions	2+1	
4.	SFND414	Nutrition through life cycle	2+1	
5.	SFND415	Global Nutrition	2+0	
6.	SFSC411	Food toxicology and Quality Testing	2+1	
7.	SFSC412	Sensory Evaluation of Foods	1+1	
8.	SFSM411	Institutional Food Service Management	0+3	
9.	SSEM411	Seminar	0+1	

***NB:* *SFND412: Offered by Department of Plant Biotechnology**

IV Year II Semester					
Students should register for 20 Credit Hours (either option A or option B)					
Sl. No.	**Course Code**	**Course Title**	**Credit Hours**	**Duration**	**Total Credits**
Student READY					
1.	SSRN421*	Practical extension work in villages	0+2	2 Weeks	**20**
2.		**Option A**			
	SSRN422**	In-Plant Training in Food Industry/ Research Institution/ organization	0+9	9 Weeks	
	SSRN423***	Student Project	0+8	8 Weeks	
		Option B			
	SSRN424#	Internship in Hospital / Food & Nutraceutical Industry / Food quality and analysis / testing labs	0+17	17 Weeks	
3.	SSRN425*	Finishing School Programme	0+1	1 Week	

NB: For B.Sc. (Hons.) Food, Nutrition & Dietetics, students will undergo practical extension work in villages during the last two weeks of village placement along with students of B.Sc. (Hons.) Agriculture.

***Compulsory courses for both the option**

**** Inplant training / attachment with Industry/ Research Institute (May be conducted in split manner in more than one industry/ institution/ organization).**

*****The student project will be R and D based/ field study based/ entrepreneurship based (incubation/experiential learning)**

#The internship can be taken in service Industry (Example: Hospital/ Hotel) OR in Production Industry (Example: Food/ Nutraceuticals Industry) OR in Food Quality and Analysis Laboratories.

Summary of credit distributions among different categories of courses (Credit hours)

Semester	Core Courses (Major and Minor)	Multi-Disciplinary Course (MDC)	Value Added Course (VAC)	Ability Enhancement Course (AEC)	Skill Enhancement Course (SEC)	Internship/ Project/ Student READY	Total Credits	Non Gradial	Intern ship	Online courses (MOOC/ SWAYAM)
I	12	$3^{(6)}$	-	$1^{(3)}+2^{(2)}$	4	-	22	$2^{(1)}+1^{(4)}+1^{(5)}$	-	$10^{(16)}$
II	8	$3^{(9)}$	$3^{(8)}$	$1^{(3)}+2^{(7)}$	4	-	21	$1^{(5)}$	-	
Post-II Semester	-	-	-	-	-	-	-	-	$10^{(14)}$	
III	18	-	-	$2^{(10)}$	2	-	22	$1^{(3)}$	-	
IV	12	$3^{(13)}$	$3^{(11)}$	-	2	-	20	$1^{(3)}$	-	
Post-IV Semester	-	-	-	-	-	-	-	-	$10^{(15)}$	
V	21	-	-	-	-	-	21	$2^{(12)}$	-	
VI	21	-	-	-	-	-	21	-	-	
VII	20	-	-	-	-	-	20	-	-	
VIII	-	-	-	-	-	20	20	-	-	
Total	**112**	**9**	**6**	**8**	**12**	**20**	**167**	**5+4**	**20**	**10**

(1) *Deeksharambh*
(2) Communication Skills
(3) National Cadet Crops (NCC)/ National Service Scheme (NSS)
(4) Remedial Course
(5) Kannada
(6) Farming based Livelihood systems
(7) Personality development
(8) Environmental Studies and Disaster management
(9) Entrepreneurship Development and Business Management
(10) Physical Education, First Aid, Yoga Practices and Meditation
(11) Agricultural Informatics and Artificial Intelligence
(12) Educational tour (14 days)
(13) Agricultural Marketing and Trade
(14) Internship (Only for those opting for an exit with UG-Certificate)
(15) Internship (Only for those opting for an exit with UG-Diploma)
(16) Online courses: Students will make their own planning and execution of online courses with intimating to the Dean.

Summary of Credit Distributions

Type of courses		Credits
Core courses(Major & Minor/s)	:	112
Common courses(MDC+VAC+AEC)	:	23
Skill Enhancement Courses(SEC)	:	12
Student READY	:	20
Online Courses (MOOCS/SWAYAM) Non-Gradial	:	10
Non – Gradial [*Deeksharambha* (0+2), NCC/NSS (0+2), Remedial (1+0), Kannada (0+2), and Educational tour (0+2)]		9
Total	:	**167+10+9**

Syllabus for B. Sc. (Hons.) Food, Nutrition and Dietetics as per VI Deans Committee

I Year I Semester

SDAR111 ***Deeksharambh* (Induction-cum-Foundation program)** **2(0+2)**

The activities to be taken under *Deeksharambh* shall aim at creating a platform for students to

1. Help for cultural Integration of students from different backgrounds
2. Know about the operational framework of academic process in university
3. Instilling life and social skills
4. Social Awareness, Ethics and Values, Team Work, Leadership, Creativity, etc.
5. Identify the traditional values and indigenous cultures along with diverse potentialities both in indigenous and developed scenario.

The details of activities will be decided by the parent universities. The structure shall include, but not restricted to:

i. Discussions on operational framework of academic process in university, as well as interactions with academic and research managers of the University
ii. Interaction with alumni, business leaders, perspective employers, outstanding achievers in related fields, and people with inspiring life experiences
iii. Group activities to identify the strength and weakness of students (with expert advice for their improvement) as well as to create a platform for students to learn from each other's life experiences
iv. Activities to enhance cultural Integration of students from different backgrounds.
v. Field visits to related fields/ establishments
vi. Sessions on personality development (instilling life and social skills, social awareness, ethics and values, team work, leadership, etc.) and communication skills

SAEX111 **Communication Skills** **2 (1+1)**

Objective

To acquire competence in oral, written and non-verbal communication, develop strong personal and professional communication and demonstrate positive group communication.

Theory

Communication Process: The magic of effective communication; Building self-esteem and overcoming fears; Concept, nature and significance of communication process; Meaning,types and models of communication: Verbal and non-verbal communication; Linguistic and non-linguistic barriers to communication and reasons behind communication gap/ miscommunication. Basic Communication Skills: Listening, Speaking, Reading and Writing Skills; Precis writing/ Abstracting/ Summarizing; Style of technical communication Curriculum vitae/resume writing; Innovative methods to enhance vocabulary, analogy questions. Structural and Functional Grammar: Sentence structure, modifiers, connecting words and verbals; phrases and clauses: Case: subjective case, possessive case; objective case; Correct usage of nouns, pronouns and antecedents, adjectives, adverbs and articles; Agreement of verb with the subject: tense, mood, voice; Writing effective sentences: Basic sentence faults.

Practical

Listening and note taking; Writing skills: precis writing, summarizing and abstracting; Reading and comprehension (written and oral) of general and technical articles; Micro-presentations and Impromptu Presentations: Feedback on presentations; Stage manners: grooming, body language, voice modulation, speed; Group discussions; Public speaking exercises; vocabulary building exercises; Interview Techniques; organization of events.

Suggested readings

1. Allport, G. W. 1937. Personality: A Psychological Interpretation. Holt, New York.
2. Brown Michele and Gyles Brandreth. 1994. How to Interview and be Interviewed. Sheldon Press, London.
3. Carnegie Dale. 1997. The Quick and Easy Way to Effective Speaking. Pocket Books, New York.
4. Francis Peter, S. J. 2012. Soft Skills and Professional Communication. Tata McGraw Hill, New Delhi.
5. Kumar, S. and Pushpa Lata. 2011. Communication Skills. Oxford University Press.
6. Neuliep James, W. 2003. Intercultural Communication A Contextual Approach. Houghton Mifflin Co Boston.
7. Pease, Allan. 1998. Body Language. Sudha Publications, Delhi.
8. Raman, M. and Singh, P. 2000. Business Communication. Oxford University Press.
9. Seely, J. 2013. Oxford Guide to Effective Writing and Speaking. Oxford University Press.
10. Thomson, A. J. and Martinet, A. V. 1977. A Practical English Grammar. Oxford University

SECN111 **SEC-I : Cake Making** **2 (0+2)**

Practical

Ingredient used in Cake Making Types and Varieties: Flour, Sugar, Shortening – Fats and oil, Egg, Moistening agent, Leavening Agents; Cake Making Methods: Sugar butter process, Flour butter process, Genoise method, Blending and rubbing method; Characteristic of Cakes: External characteristics, Internal Characteristics; Balancing cake formula; Cake Faults and remedies; Basic Cake Making: Plain Sponge, Madeira Cake, Rock Cake, Fruit Cake, Fatless Sponge, Swiss Rolls, Genoise Sponge; Market survey for cake and confectionary food stuffs; Project writing of small-scale bakery and confectionery unit.

SECN112 **SEC-II : Hygiene Management in food service units** **2 (0+2)**

Practical

Introduction, importance and need of food hygiene and sanitation if food service establishments; Identification of microorganism, preparation of slides, preparation of media; Collection of water samples, Testing of water for: (i) Physical quality, (ii) Bacteriological quality, (iii) water hardness; Food-Borne Diseases- Define Food-Borne illness – Food Infections – Food Poisoning- Bacterial infections -Types of Food Inspections; Sanitary Procedures in Catering Industry- Sanitary Procedures for purchasing foods - categories of commodities – Storage areas Temperature Zones- Thawing, Blanching, maceration, Blast, Freezing, Pasteurization; Introduction to Daily Cleaning Procedures in Commercial Kitchen; Visit to food service establishments; Survey of food service establishments, data collection, tabulation, report writing and presentation.

SFND111 **Introduction to Food Science and Nutrition** **3(3+0)**

Objectives

1. To make student understand basic nutrients, their functions, requirements and availability in different food groups
2. Understanding of the changes that occur in foods during preparation, processing and preservation.
3. Understanding the nutritive value of different foods and methods of preserving them during cooking.

Theory

Introduction and overview of basic principles of nutrition. Relationship of nutrition to health, growth and human welfare. Definitions of terms used in nutrition - recommended dietary allowances, balanced diet, health, functional foods, phytochemicals, nutraceuticals, dietary supplements, food groups. Concepts of food science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems etc.). Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavors, colors, miscellaneous bioactive compounds, important reactions). Food microbiology (bacteria, yeast, molds, spoilage of fresh and processed foods, production of fermented foods). Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.). Food and nutrition, malnutrition (over and under nutrition), nutritional disorders. Energy metabolism (carbohydrate, fat, proteins). Balanced/ modified diets. Menu planning. New trends in food science and nutrition. Food Groups.

Suggested Readings

1. Khader V (2003) Food, Nutrition and Health. Kalyani Publishers, Ludhiana.
2. Sehgal S and Raghuvanshi RS (2007) Textbook of Community Nutrition. DIPA, Indian Council of Agricultural Research, New Delhi.
3. Gopalan C, Rama Sastri B V and Balasubramanian S C (2011) Nutritive value of Indian Foods. National Institute of Nutrition, ICMR, Hyderabad.
4. Gurtherie H A (1989) Introductory Nutrition. Times Mirror, St. Louis.
5. Joshi S A (1999) Nutrition and Dietetics. Tata McGraw Hill Publishing Co Ltd, New Delhi.
6. Roday Sunetra (2010) Food Science and Nutrition. Oxford University Press, New Delhi.
7. Srilakshmi B (2005) Food Science. New Age International (P) Ltd., Publishers, New Delhi.
8. Potter N (2005) Food Science, CBS Publishers and Distributors, Delhi.
9. Srilakshmi B (2015) Nutrition Science. New Age International Pvt. Ltd. New Delhi.

SFND112 **Principles and Practices of Food Preparation** **2 (1+1)**

Objectives

The student will be able to:

1. Understand effect of heat transfer on texture, flavour, taste and appearance of food
2. Demonstrate correct use of small equipment and appliances
3. Identify and apply scientific principles of food selection and preparation, prepare and handle food using safe, sanitary practices; in order to retain Nutritive value and produce

quality food products

4. Demonstrate and understand ingredient substitution for recipe and describe characteristic properties of quality food products

Theory

Kitchen attire and equipment, cooking of food, heat and heat transfer cooking methods, effect of cooking on food and their nutritive value, basics of culinary practice, thickening and binding agents, basic flavoring stocks essence and glazes sauces soups garnishes, basics of cookery of various food - cereals, pulses, egg, fish, meat and poultry, principles and practice of boiling, steaming, frying, stewing, roasting, baking, grilling and combined methods of cookery

Practical

Kitchen Equipment - Identification, Description, Uses and handling. Market survey to assess the types and availability of processed products. Identification and Selection of Ingredients. Preparation of cereal products and pulse products- boiling and steaming, puffing, roasting methods. Basic dry heat cooking methods. Basic medium fat cooking – Roasting, grilling, frying. Milk cookery – pudding, custard and ice creams. Preparation of Vegetable- Boiled vegetables and Glazed vegetables. Preparation of Vegetable- Fried vegetables and Stewed vegetables. Egg cookery - Boiled (Soft and Hard), Fried, Poaches, Scrambled, Omelets. Preparation of Simple Salads: Potato salad, Beet root salad, green salad, Fruit salad, Preparation of baked products. Cold desserts - Caramel Custard, Bread and Butter Pudding, Scoufflé – Lemon / Pineapple, Mousse (Chocolate Coffee Apricot Pudding HOT desserts - Steamed Pudding. Preparation of meat and products. Preparation of Continental Stock: White stock, brown stock, chicken stock and emergency stock. Preparation of confectionery products - fudge, fondant, candies, toffees and chocolates. Identification of meat cuts of lamb. Curing of meat – sugar, salt and nitrite, Cost reporting system – daily, monthly and for special managerial decisions. Visit to kitchen equipment stores

Suggested Readings

1. Brown, A. (2018). Understanding Food: Principles and Preparation. Wadsworth Publishing Co Inc.
2. Chambers, M. D. (2009). Principles of food preparation; a manual for students of home economics. Boston cooking-school magazine Company, 1914.
3. Sethi, M. (2007). Catering Management – An Integrated Approach. New Age International (P) Limited Publishers, New Delhi.
4. The BC Cook Articulation Committee (2015). Basic Kitchen and Food Service Management. BC campus, British Columbia.

SFND113 **Indian Cuisinology** **2 (0+2)**

Objectives

1. To impart a hands-on, skill oriented intense curriculum on Indian Cuisine and Culture
2. To examine the central place of cuisine in Indian culture and society
3. To understand the importance of cuisine in cultural practices

Practical

Exploring Indian regional cuisines - North India, North East, South India, Western and Eastern India. Familiarization and identification of Indian herbs and spices. Preparation of dry/wet masalas, pastes and curries/gravies. Preparation of common recipes and meals of North, South, East, West and central zones of the country. Preparation of Mughlai cuisines. Preparation of food according to festivals in India. Preparation of non-alcoholic Indian beverages. Use of modern crockery/cutlery for presentation. Special meals during fasting. Street foods of India – Exploration and preparation.

Suggested Readings

1. Achaya K T (1998) Indian Food: A Historical Companion. Oxford University Press, USA.
2. Pant P (2007) Cuisines – Incredible India. Wisdom Tree, India.
3. O'Brien C (2012) Food Guide to India. Penguin India.
4. Martl Richard E and Derek Eelsy A (1998) Text book of basic cookery, Fundamental recipes and variations.
5. Mehta N (2013) Cookbook of Regional Cuisines of India. Snab Publishers, India.
6. Shukla S (2022) Plant-Based India: Nourishing Recipes Rooted in Tradition. The Experiment.
7. https://www.unigoa.ac.in/uploads/syllabus/bsc-culinary-arts_syllabus_33020210830.055146.pdf
8. https://www.uou.ac.in/sites/default/files/syllabus/BHM-401T.pdf.

SFND114 **Nutritional Status Assessment** **3 (2+1)**

Objectives

1. To cover the basic concepts of malnutrition, describes how nutritional status is assessed, and identifies the most commonly used nutrition indicators
2. To explain the criteria to consider when selecting the indicators in specific contexts and situations

Theory

Major Nutritional Problems–Global and India. Nutritional Status assessment – Direct and Indirect method, Anthropometric and Body composition methodology (indexes and references)

Biochemical Methods of Nutritional Assessment, Clinical nutrition methodology, Dietary Assessment methods. Nutrition Intervention programs and policies, Sustainable Nutrition Goals, Mental Health and well-being. Rapid assessment methods. Nutritional assessment of infants, -children, adults, elderly, pregnant and lactating women.

Practical

Assessment of nutritional status of community using dietary surveys, clinical, surveys, anthropometric Measurements-Data collection, tabulation, data analysis (indexes and references), interpretation and report writing. Target group selection from pediatrics, adults, elderly, pregnant and lactating women, tabulation, interpretation and report writing of their tested biomarkers.

Suggested Readings

1. Sehgal S and Raghuvanshi RS (2007). Textbook of community nutrition. DIPA, Indian

Council of Agricultural Research, New Delhi.
2. Latham M C (1997). Human nutrition in the developing world. Food and Agricultural Organization of United Nations.
3. Dahiya S, Boora P and Rani V (2013). A manual on Community Nutrition, Department of Foods and Nutrition, published under ICAR Assistance scheme.
4. Bamji S M, Rao N P and Reddy V (1996). Textbook of human nutrition. Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.
5. Flamino Fidanza (1991). Nutritional Status Assessment, Springer Science Business Media.
6. Beghan I, Cap M and Dajardan B (1988). A guide to Nutritional Status Assessment WHO Geneva.
7. Raghuvanshi R S and Mittal M (2014). Food Nutrition and Diet Therapy. India: Westville Publishing House New Delhi.

SFND115 **Convenience and Health Food Formulation** **2 (0+2)**

Objectives

1. Imparting understanding of convenience foods among students
2. Nutritional and health benefits of various healthy food recipes and convenience foods

Practical

Importance and need for convenience foods. Usefulness and types of convenience foods. FSSAI standards on health food formulations. Health foods-definition, classification and types. Food safety and quality control issues in product development. Packaging of convenience foods. Needs for effective marketing of convenience and health foods. Market survey of convenience and health foods. Cereal based traditional convenience foods and snacks. Convenience foods of millets. Ready to eat breakfast cereals. Pasta products. Legume/pulse based traditional convenience foods and snacks. Extruded products. Milk based products and mixes. Vegetable and fruit-based convenience foods. Food adjuncts (Pickles, chutneys, papad/vadi etc. Soup mixes, Fried products.

Suggested Readings

1. Arya S S (1990) Grain based snack and convenience foods. Indian Food Packer, Sept –Oct, page: 17- 34
2. Chattopadhyay P K (2007) Cereal Food Technology. Published by National Institute of Industrial Research. Pg 137-139.
3. Chaughan G S, Verma N S and Bains G S (1985) Effect of extrusion processing on the nutritional quality of protein in rice – legume blends. Die Nahrung.
4. Fast R B and Caldwell E F (2000) Breakfast Cereals and How they are made. American Association of Cereal Chemists., St. Paul, Minnesota.
5. Guy R. Extrusion Cooking, Technologies and Applications. Wood head Publishing Limited, Abington, and Cambridge.
6. Khatkar B S (2007) Food Science and Technology. Daya Publishing House, Delhi.
7. Pant P (2006) Indian Fast Food. Roli Books Pvt Limited.
8. Selves J and Devipriya J (2010) Health foods as Soya bean. Beverages and Food World Feb Pg-64.
9. Shiby V K, Sinija V R and Mishra H N (2007) Ready to eat health foods: A promising concept. Indian food Industry. Nov-Dec.pg.47-53.

10. Shukla S (2022) Plant-Based India: Nourishing Recipes Rooted in Tradition. The Experiment.

SKAN111 **Kannada -I** **1 (0+1)**

೧. ಪರಿಸರ

ಅ. ಚಿಗರಿಗಂಗಳ ಚೆಲುವಿ – ದ.ರಾ.ಬೇಂದ್ರೆ

ಆ. ಮೂಲಿಕೆ ಬಳ್ಳಿಯ ಸುತ್ತ – ಪೂರ್ಣ ಚಂದ್ರ ತೇಜಸ್ವಿ

೨. ಸಂತೆ

ಅ. ಅಮೀನಪುರದ ಸಂತೆ – ಮಲ್ಲಿಕಾರ್ಜುನ ಹಿರೇಮಠ

ಆ. ಬಿದ್ದೀಯಬೆ ಮುದುಕಿ – ಶಿಶುವಿನಾಳ ಶರೀಫ್

ಇ. ಬೆಟ್ಟದ ಮೇಲೊಂದು ಮನೆಯ ಮಾಡಿ – ಅಕ್ಕ ಮಹಾದೇವಿ

೩. ಹಬ್ಬ

ಅ. ಹಬ್ಬ ಮತ್ತು ಬಲಿ – ಬಿ.ಟಿ. ಲಲಿತಾ ನಾಯ್ಕ

ಆ. ಹಬ್ಬಕ್ಕೆ ತಂದ ಹರಕೆಯ ಕುರಿ – ಬಸವಣ್ಣ

೪. ಭಾಷಾ ಕೌಶಲ

೧. ಸೂಚಿತ ವಿಸಯ ಕುರಿತು ಮೌಖಿಕ ಮಂಡಣೆ. ೨. ಆಯ್ದ ಪಠ್ಯವನ್ನು ರಾಗಾತ್ಮಕ ಅಂಶಗಳನ್ನು ಆಧರಿಸಿ ವಾಚಿಸುವುದು. ೩. ಮೆಚ್ಚಿನ ವ್ಯಕ್ತಿಯ ಕುರಿತು ನಿರ್ದಿಷ್ಟ ತಲೆಬರಹ ದೊಂದಿಗೆ ಬರಹವನ್ನು ಸಾಧಿಸುವುದು. ೪. ಸೂಚಿಸಿರುವ ಚಿತ್ರವನ್ನು ಆಧರಿಸಿ ನಿರ್ದಿಷ್ಟ ತಲೆಬರಹದೊಂದಿಗೆ ಬರಹವನ್ನು ಸಾಧಿಸುವುದು. ೫. ವಿದ್ಯಾರ್ಥಿಗಳು ಗುಂಪಾಗಿ ಒಂದು ಬರಹವನ್ನು ಸಾಧಿಸಿ ನಿರ್ದಿಷ್ಟ ತಲೆಬರಹವನ್ನು ಸೂಚಿಸುವುದು.

SKAN112 **Kannada -I** **1 (0+1)**

Development of listening and speaking skills with Kannada structure pattern - Introducing each other - Conversation between friends - Enquiring about family - Plan to go for a movie - Routine activities of a student - In a book shop - Introducing College/University - Conversation between a farmer and a Scientist - Data collection in a village – Conversation on going on a tour.

Development of writing and reading skills with Kannada structure pattern - Kannada Script practice and reading.

SMAT111 **Introductory Mathematics (Non-gradial)** **1 (1+0)**

Theory:

Algebra: Progressions- Arithmetic, Geometric and Harmonic Progressions. Matrices: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order by adjoint method, Properties of determinants up to 3rd order and their evaluation. Differential Calculus: Definition - Differentiation of function using first principle, Derivatives of sum, difference, product and quotient of two functions, Methods, Increasing and Decreasing Functions. Application of Differentiation- Growth rate, Average Cost, and Marginal cost, Marginal Cost, Marginal Revenue. Partial differentiation: Homogeneous function, Euler's theorem, Maxima and Minima of the functions of the form $y = f(x)$ and $y = f(x1, x2)$. Integral

Calculus: Integration -Definite and Indefinite Integrals-Methods- Integration by substitution, Integration by parts. Area under simple well-known curves. Mathematical Models: Agricultural systems - Mathematical models - classification of mathematical models- Fitting of Linear, quadratic and exponential models to experimental data.

SMDC111 **Farming based Livelihood Systems** **3 (2+1)**

Objective

i) To make the students aware about farming-based livelihood systems in agriculture
ii) To disseminate the knowledge and skill how farming-based systems can be a source of livelihood

Theory

Status of agriculture in India and different states, Income of farmers and rural people in India, Livelihood-Definition, concept and livelihood pattern in urban and rural areas, Different indicatorsto study livelihood systems. Agricultural livelihood systems (ALS): Meaning, approach, approaches and framework, Definition of farming systems and farming based livelihood systems PrevalentFarming systems in India contributing to livelihood. Types of traditional and modern farming systems. Components of farming system/ farming-based livelihood systems- Crops and cropping systems, Livestock (Dairy, Piggery, Goatry, Poultry, Duckry etc.), Horticultural crops, Agro—forestry systems, Aqua culture Duck/Poultry cum Fish, Dairy cum.

Fish, Piggery cum Fish etc., small, medium and large enterprises including value chains and secondary enterprises as livelihood components for farmers, Factors affecting integration of various enterprises of farming for livelihood. Feasibility of different farming systems for different agro-climatic zones, Commercial farming-based livelihood models by NABARD, ICAR and other organizations across the country, Case studies on different livelihood enterprises associated with the farming. Risk and success factors in farming-based livelihood systems, Schemes and programs by Central and State Government, Public and Private organizations involved in promotion of farming-based livelihood opportunities. Role of farming-based livelihood enterprises in 21st Century in view of circular economy, green economy, climate change, digitalization and changing life style.

Practical

Survey of farming systems and agricultural-based livelihood enterprises, Study of components of important farming- based livelihood models/ systems in different agro-climatic zones, Study of production and profitability of crop based, livestock based, processing based and integrated farmingbased livelihood models, Field visit of innovative farming system models. Visit of agri-based enterprises and their functional aspects for integration of production, processing and distribution sectors and Study of agri-enterprises involved in industry and service sectors (Value Chain Models), Learning about concept of project formulation on farming-based livelihood systems along with cost and profit analysis, Case study of Start-Ups in agri-sectors.

Suggested Readings

1. Dixon, J. and A. Gulliver with D. Gibbon. (2001). Farming Systems and Poverty: Improving Farmers' Livelihoods in a Changing World. FAO and World Bank, Rome, Italy and Washington, DC, USA
2. Ashley, C.; Carney, D. (1999). Sustainable Livelihoods: Lessons from Early Experience;Department for International Development: London, UK, Volume 7. [Google Scholar]
3. Reddy, S.R. 2016. Farming System and Sustainable Agriculture, Kalyani Publishers, New Delhi.
4. Panwar et al. 2020. Integrated Farming System models for Agricultural Diversification,Enhanced Income and employment, Indian Council of Agricultural Research, New Delhi.
5. Singh, J.P., et al. 2015. Region Specific Integrated Farming System Models, ICAR-Indian Institute of Farming Systems Research, Modipuram.
6. Walia, S. S. and U. S. Walia, 2020. Farming System and Sustainable Agriculture, Scientific Publishers, Jodhpur, Rajasthan.
7. Livelihood Improvement of Underprivileged Farming Community: Some Experiences fromVaishali, Samastipur, Darbhanga and Munger Districts of Bihar by B. P. Bhatt, Abhay Kumar,
8. P.K. Thakur, Amitava Dey Ujjwal Kumar, Sanjeev Kumar, B.K Jha, Lokendra Kumar, K. N.Pathak, A. Hassan, S. K. Singh, K. K. Singh and K. M. Singh ICAR Research Complex for Eastern Region ICAR Parisar, P.O. Bihar Veterinary College, Patna 800 014, Bihar.
9. Carloni, A. 2001. Global Farming Systems Study: Challenges and Priorities to 2030 – Regional Analysis: Sub-Saharan Africa, Consultation Document, FAO, Rome, Italy
10. Evenson, R.E. 2000. Agricultural Producitivity and Production in Developing Countries'. In FAO, The State of Food and Agriculture, FAO, Rome, Italy
11. Agarwal, A. and Narain, S. 1989. Towards Green Villages: A strategy for Environmentally,Sound and Participatory Rural Development, Center for Science and Environment, New Delhi,India.

SNCC111 **National Cadet Corps (NCC-I)** **1 (0+1)**

Objective

As per government guidelines, for getting B and C certificate in NCC, minimum years of requirement is 2 and 3 years along with 1-2 annual camps

- Aims, objectives, organization of NCC and NCC song. DG's cardinals of discipline.
- Drill- aim, general words of command, attention, stands at ease, stand easy and turning.
- Sizing, numbering, forming in three ranks, open and close order march, and dressing.
- Saluting at the halt, getting on parade, dismissing, and falling out.
- Marching, length of pace, and time of marching in quick/slow time and halt. Side pace, pace forward and to the rear. Turning on the march and wheeling. Saluting on the march.
- Marking time, forward march, and halt. Changing step, formation of squad and squad drill.
- Command and control, organization, badges of rank, honors, and awards

SNSS111 **National Service Scheme (NSS-I)** **1 (0+1)**

Objective

Evoking social consciousness among students through various activities viz., working together, constructive, and creative social work, to be skillful in executing democratic leadership, developing skill in programme, to be able to seek self-employment, reducing gap between educated and uneducated, increasing awareness and desire to help sections of society.

All the activities related to the National Service Scheme are distributed under four different courses viz., National Service Scheme I, National Service Scheme II, National Service Scheme III and National Service Scheme IV; each having one credit load.

The entire four courses should be offered continuously for two years. A student enrolled in NSS course should put in at least 60 hours of social work in different activities in a semester other than five regular one-day camp in a year and one special camp for duration of 7 days at any semester break period in the two years. Different activities will include orientation lectures and practical works. Activities directed by the Central and State Government have to be performed by all the volunteers of NSS as per direction.

- Practical / Awareness activities, Orientation: history, objectives, principles, symbol, badge; regular programmes under NSS
- Organizational structure of NSS, code of conduct for NSS volunteers, points to be considered by NSS volunteer's awareness about health.
- NSS programmes and activities: Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analysing guiding financial patterns of scheme, youth programme/ schemes of GOI, coordination with different agencies and maintenance of diary.
- Understanding youth: Definition, profile, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change Community mobilization:
- Mapping of community stakeholders, designing the message as per problems and their culture; identifying methods of mobilization involving youth-adult partnership Social harmony and national integration:

Indian history and culture, role of youth in nation building, conflict resolution and peace-building Volunteerism and shramdan: Indian tradition of volunteerism, its need, importance, motivation and constraints; shramdan as part of volunteerism Citizenship, constitution, human rights, human values and ethics: Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information, human values and ethics. Family and society: Concept of family, community (PRIs and other community based organisations) and society

I Year II Semester

SAEX122 **Personality Development** **2 (1+1)**

Objective

To make students realize their potential strengths, cultivate their inter-personal skills and improve employability

Theory

Personality Definition, Nature of personality, theories of personality and its types . The humanistic approach - Maslow's self-actualization theory, shaping of personality, determinants of personality, Myers-Briggs Typology Indicator, Locus of control and performance, Type A and Type B Behavior's, personality and Organizational Behavior.

Foundations of individual behavior and factors influencing individual behavior, Models of individual behavior, Perception and attributes and factors affecting perception, Attribution theory and case studies on Perception and Attribution. Learning: Meaning and definition, theories and principles of learning, Learning and organizational behavior, Learning and training, learning feedback. Attitude and values, Intelligence- types of Intelligence, theories of intelligence, measurements of intelligence, factors influencing intelligence, intelligence and Organizational behavior, emotional intelligence. Motivation- theories and principles, Teamwork and group dynamics.

Practical

MBTI personality analysis. Learning Styles and Strategies, Motivational needs, FIRO-B, Interpersonal Communication, Teamwork and team building, Group Dynamics, Win-win game, Conflict Management, Leadership styles, Case studies on Personality and Organizational Behavior.

Suggested Reading

1. Andrews, Sudhir, 1988, How to Succeed at Interviews. 21st (rep.) New Delhi. Tata McGraw-Hill.
2. Heller, Robert, 2002, Effective Leadership. Essential Manager series. Dk Publishing.
3. Hindle, Tim, 2003, Reducing Stress. Essential Manager series. Dk Publishing.
4. Kumar, Pravesh, 2005, All about Self- Motivation. New Delhi. Goodwill Publishing House.
5. Lucas, Stephen, 2001, Art of Public Speaking. New Delhi. Tata - Mc-Graw Hill.
6. Mile, D.J., 2004, Power of Positive Thinking. Delhi. Rohan Book Company.
7. Shaffer, D. R., 2009, Social and Personality Development (6th edn). Belmont, CA: Wadswor.
8. Smith, B., 2004, Body Language. Delhi: Rohan Book Company.

SECN121 **SEC-III : Pickle preparation** **2 (0+2)**

Practical

Nutritional aspect of fruits and vegetables; Basic characteristics of pickles; Role of various ingredients used in fruit and vegetable preservation; Introduction to various food additives used in pickle making- Spices and other constituents, condiments and other additives and ingredients, and flavouring, colouring agent and preservative; Basic tools and equipment used in the preparation of pickle making such as boilers, choppers, mechanized peelers, sealers, autoclaves, steam jacketed kettle, pickle mixer, etc.; Introduction to different types of packaging

materials used; Identification of different types of spoilage occurring in fruits; Selection and grading of raw and ripe fruits and vegetables for preservation; Preparations of different types of pickles from fruits and vegetables-

(i) Preparation of salty and oily pickle (green mango, green chili, lemon, ginger, mixed type).

(ii) Preparation of sweet pickle (mango, plum, papaya, date, mango lather, mixed type etc.); Examination of processed products- Examination of processed products- Detection of benzoic acid, sulphur dioxide and KMS in fruits and vegetable products. Cleaning and maintenance of the equipment; Study of containers like Glass, Tin, packaging materials, such as plastic pouches, glass containers, plastic bottle and cartons; Information to be mentioned on label and pack; Waste Management and up keeping of work place.

SECN122 **SEC-IV : Savory Snack preparation** **2 (0+2)**

Practical

Market survey for availability of different types of savory snacks; Preparation of snacks with some shelf life: Types of Namkeen; Preparation of Chiwda; Chakli preparation and its variations; Preparation of mathri in different flavours; Gathiya preparation; Preparation of snacks eaten when prepared: Khaman and Dhokla with chutnies; Preparation of Dahi Vada and its chutnies; Making types of bhelpuri; Making Corn bhel/Chat; Preparations of Sago: Sago Vada and Sago Khichadi; Frying skills by preparing types of fritters and potato twisters; Cutlet preparation with various variations; Preparing Sprout Chat and Masala Peanut; Preparation of Garlic bread, Focaccia and Bruschetta; Project writing of small scale savory snack production unit.

Suggested Readings

1. Brown, A. (2018). Understanding Food: Principles and Preparation. Wadsworth Publishing Co Inc.
2. Pant, P. (2007) Cuisines – Incredible India. Wisdom Tree, India.
3. Richard, E. Martland and Derek A. Eelsy. (1998). Text book of Basic cookery, Fundamental recipes and variations.
4. Sethi, M. (2007). Catering Management – An Integrated approach. New age International (P) Limited Publishers, New Delhi.

SFES121 **Environmental Studies and Disaster Management** **3 (2+1)**

Objectives

1. To expose and acquire knowledge on the environment
2. To gain the state-of-the-art - skill and expertise on management of disasters

Theory

Introduction to Environment - Environmental studies - Definition, scope and importance - Multidisciplinary nature of environmental studies - Segments of Environment - Spheres of Earth - Lithosphere - Hydrosphere - Atmosphere - Different layers of atmosphere. Natural Resources: Classification - Forest resources. Water resources. Mineral resources Food resources. Energy resources. Land resources. Soil resources. Ecosystems - Concept of an ecosystem - Structure and function of an ecosystem - Energy flow in the ecosystem. Types of ecosystem. Biodiversity and its conservation: Introduction, definition, types. Biogeographically classification of India.

Importance and Value of biodiversity. Biodiversity hot spots. Threats and Conservation of biodiversity

Environmental Pollution: Definition, cause, effects and control measures of:

(a) Air pollution. (b) Water pollution. (c) Soil pollution. (d) Marine pollution.(e)Noise pollution. (f) Thermal pollution. (g) Light pollution. Solid Waste Management: Classification of solid wastes and management methods. Composting, Incineration, Pyrolysis, Biogas production. Causes, effects and control measures of urban and industrial wastes. Social Issues and the Environment: Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Human Population and the Environment:

Environment and human health: Human Rights, Value Education. Women and Child Welfare. Role of Information Technology in Environment and human health.

Disaster management - Disaster definition - Types - Natural Disasters - Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves. Man Made Disasters - Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, road accidents, rail accidents, air accidents, sea accidents. International and National strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community-based organizations and media in disaster management. Central, state, district and local administration in disaster control; Armed forces in disaster response; Police and other organizations in disaster management.

Practical

Visit to a local area to document environmental assets river/ forest/ grassland/hill/mountain. Energy: Biogas production from organic wastes. Visit to wind mill / hydro power / solar power generation units. Biodiversity assessment in farming system. Floral and faunal diversity assessment in polluted and un polluted system. Visit to local polluted site - Urban/Rural/Industrial/Agricultural to study common plants, insects and birds. Environmental sampling and preservation. Water quality analysis: pH, EC and TDS. Estimation of Acidity, Alkalinity. Estimation of water hardness. Estimation of DO and BOD in water samples. Estimation of COD in water samples. Enumeration of E. coli in water sample. Assessment of Suspended Particulate Matter (SPM). Study of simple ecosystem – Visit to pond/river/hills. Visit to areas affected by natural disaster.

Suggested Readings

1. Bharucha, Erach. Text book for Environmental studies. University Grants Commission, New Delhi.
2. De, A.K. 2010. Environmental chemistry. Published by New Age International Publishers, New Delhi. ISBN:13–978 81 224 2617 5. 384 pp
3. Dhar Chakrabarti, P.G. 2011. Disaster management - India's risk management policy frameworks and key challenges. Published by Centre for Social Markets (India), Bangalore. 36 pp.

4. Parthiban, K.T., Vennila, S., Prasanthrajan, M. and Umesh Kanna, S. 2023. (In Press). Forest, Environment, Biodiversity and Sustainable development. Narendra Publishing House, New Delhi, India.
5. Prasanthrajan, M. and Mahendran, P.P. 2008. A text book on Ecology and Environmental Science. ISBN 81-8321-104-6. Agrotech Publishing Academy, Udaipur - 313 002. 1st edn.
6. Prasanthrajan, M. 2018. Objective environmental studies and disaster management. ISBN 9789387893825. Scientific publishers, Jodhpur, India. Pp. 146.
7. Sharma, P.D. 2009. Ecology and Environment. Rastogi Publications, Meerut, India
8. Tyler Miller and Scot Spoolman. 2009. Living in the Environment (Concepts, Connections, and Solutions). Brooks/cole, Cengage learning publication, Belmont, USA.

SFND121 **Bakery Science and Technology** **3 (2+1)**

Objectives

1. To understand the process of different products, how their ingredients play a role in preparation of breads, cakes, biscuits, etc., their quality testing and how to modify products with desirable nutritional requirements
2. To provide individuals with key knowledge of packaging, labeling, food safety and food laws that can be applied directly in existing products and also in development of new products of bakery

Theory

Introduction to baking science. Basic materials used in bakery and confectionery, selection, properties and functions. Flours- constituents, functions and characteristics of good flour and tests. Different types of flour mixtures used bakery, egg structure, composition and its functions in bakery. Different types of fats and oils used in bakery and their functions. Sugars and functions and types of sugars used in bakery and confectionery, Salt and its functions in bakery and their functions, Yeast and types of yeast used in bakery and their functions. Improvers, leavening agents and emulsifiers used in bakery and their functions. Tools, equipment and techniques used in bakery.

Practical

Bakery unit: importance of sanitation and personal hygiene. Use of different bakery equipment microwave baking, balancing the formula for bakery products , demonstration on standard method of making different types of biscuits, salt, coconut and fruit biscuits Demonstration on standard method of making different types of cookies, preparation of different types of cookies, plain sponge cake, chocolate cake, pineapple upside down cake, walnut cake, madeira cake, fruit / plum cake, carrot cake, Demonstration on standard method of making of pastries, pastries, icings and cake decoration.

Suggested Readings

1. Ashok Kumar Y. 2012. Textbook of Bakery and Confectionery. PHI Learning, India.
2. Bakers Handbook on Practical Baking. 1994. US Wheat Associates, New Delhi
3. Mathuravalli S M D. 2022. Handbook of bakery and Confectionary. CRC Press.
4. NIIR Board of consultants and Engineers. 2014. The complete technology book on bakery products (Baking Science with formulation and production). NIIR Project consultancy services, New Delhi.

5. Scott D. 2020. Bread Baking for Beginners: A Simple essential guide to kneading and baking bread.

SFND122 **Nutritional program Surveillance** **3 (1+2)**

Objectives

This course will enable the students to-

1. Understand the concept of nutritional status and its relationship to health
2. Know aims, objectives, methods used for assessment of nutritional status
3. Identify the factors responsible for the malnutrition

Theory

Nutrition monitoring and surveillance – definition, introduction, need and significance. Principles of a food and nutrition surveillance system and implementation steps. Nutrition surveillance in developed and underdeveloped countries. Setting up food and nutrition surveillance system activities -strengthening a food and nutrition surveillance system. Nutritional programs – implementation, monitoring and evaluation. Concept of E-surveillance on the Nutritional situation in the country. Elements of the nutritional assessment - individual and population assessment - measuring malnutrition. Sampling of population. Supervision, monitoring and evaluation. Real time monitoring system. Malnutrition – causative factors. Food security assessment, health assessment and its significance in nutrition surveillance. Indicators of food and nutrition security – types and characteristics of indicators. Application and usefulness of indicators for different objectives and nutritional problems. Selection of indicators and levels of assessment.

Practical

Surveillance of National nutrition programs: ICDS, mid-day meal, availability of iodized salt in markets and households, distribution of iron-folifer tablets. Visit to ICDS centers, PHCs, *Aaganwadis*, assessing nutritional status, data analysis and report writing, visit to mid-day meal kitchen, supervising food preparation in hygienic manner, report writing.

Suggested Readings

1. Bamji M S, Rao Prahlad N and Reddy Vinodini. 2003. Text book of Human Nutrition (p-p 197-201). New Delhi. Oxford and IBH Publishing Co. Pvt. Ltd.
2. Beghan I M and Dajardan B. 1988. A guide to Nutritional Status Assessment WHO Geneva.
3. Derrick B Jelliffe. 1966. The assessment of the nutritional status of the community (With special reference to field surveys in developing regions of the World). World Health Organization, Geneva.
4. Flamino Fidanza.1991. Nutritional Status Assessment, Springer Science Business Media.
5. Gopaldas T and Seshadri S. 1987. Nutrition monitoring and assessment, Oxford University press.
6. Mason J B, Habicht J P, Tabatabai H and Valverde V. 1984. Nutritional Surveillance. WHO
7. Sehgal S and Raghuvanshi RS. 2007. Textbook of community nutrition. DIPA, Indian Council of Agricultural Research, New Delhi.
8. Saln D R, Lockwood R and Scrimshaw N S. 1981. Methods for the evaluation of the Impact and Nutrition program, U N University.
9. Spinello S. 2018. The duties of a community nutritionist. Cited from: https://careertrend.com/list- 6526713-duties-community-nutritionist.html
10. WHO 2014. Food and nutrition surveillance systems. A manual for policy-makers and program manager.

SFND123 **Food Preservation and Storage** **2 (0+2)**

Objectives

1. To provide information about the shelf-life of different food products, different preservations and processing techniques
2. To provide Students hands on experience and knowledge about handling of food items on scientific lines to prepare and develop different preserved food product

Practical

Market survey of raw and preserved products. Preparation of preserved products- Squash, cordial, crush, jams, jellies, marmalade, candy, preserves, *murabbas*, pickles with and without oil, chutneys, ketchup, sauces, candies, toffees, cheese and syrup. Drying of blanched and unblanched fruits and vegetables by solar dryer, sun and oven drying methods. Shelf life and sensory evaluation of developed products Packaging of fruits and vegetables. Labelling and costing of products. Demonstration on canning and bottling of fruits and vegetables. Demonstration on storage of food grains. Preparation of *papad, wadian* utilizing cereals and legumes and their storage. Visits to food processing and preservation units, canning bottling units, grain storage institute.

Suggested Readings

- Bhutani, R. C. 2011. Fruit and Vegetable Preservation. Daya Publishing House.
- Jood, S. and Khetarpaul, N. 2002. Food Preservation. Geeta Somani, Agrotech Publishing Academy, Udaipur.
- Kalia, M. and Sood, S. 2010. Food Preservation and Processing. Revised Edition, Kalyani Publishers, New Delhi.
- Potter, N.N. 1996. Food Science. The AVI Publishing Company, Inc. Westport, Connecticut.
- Sehgal, S., Grewal, R.B., Kawatra, A. and Kaur, Y. 1997. Practical Aspects of Food Preservation. Directorate of Publications. Haryana Agricultural University, Hisar.
- Sivasankar, B. 2002. Food Processing and Preservation. PHI Learning Pvt. Ltd. Delhi
- Srivastava, R. P. and Kumar, S. 2019. Fruits and Vegetable Preservation: Principles and Practices. Revised and Enlarged 3rd edn. CBS publishers and distributors.
- Subbulakshmi, G. and Udipi, S.A. 2006. Food processing and preservation. New Age International Publishers.
- Vijay K., 1999. Text book of Food, Storage and Preservation, Kalyani Publishers, New Dehi.

SKAN121 **Kannada-II** **1 (0+1)**

೧. ಮಹಿಳೆ ಮತ್ತು ಅಭಿವ್ಯಕ್ತಿ

ಅ. ಒಂದು ಖಾಸಗಿ ಪತ್ರ – ವಿನಯಾ ಒಕ್ಕುಂದ

ಆ. ತಿಳಿದವರೇ ಹೇಳಿ – ವೈದೇಹಿ

೨. ನಾಡು ನುಡಿ ಕಲ್ಪನೆ

ಅ. ಶಿಲಾಭೇರಿ – ಕುವೆಂಪು

ಆ. ಕನ್ನಡಾಭಿಮಾನದ ತಾತ್ವಿಕತೆ – ಬರಗೂರು ರಾಮಚಂದ್ರಪ್ಪ

ಇ. ಕನ್ನಡಗಳು ನಮಗಿರುವ ಆಯ್ಕೆಗಳೇನು – ಕೆ.ವಿ.ನಾರಾಯಣ

೩. ಕನ್ನಡ ಕೃಷಿ ಸಾಹಿತ್ಯ

ಅ. ಆಧುನಿಕಪೂರ್ವ ಕನ್ನಡ ಕೃಷಿಶಾಸ್ತ್ರ ಸಾಹಿತ್ಯ – ಜೆ. ವೀರಭದ್ರಗೌಡ

ಆ. ಕನ್ನಡದಲ್ಲಿ ಕೃಷಿ ವಿಜ್ಞಾನ ಸಾಹಿತ್ಯ ಪರಿಚಯ – ಜೆ. ಬಾಲಕೃಷ್ಣ

೪. ಭಾಷಿಕ ಚಟುವಟಿಕೆಗಳು

೧. ಸೂಚಿತ ವಿಷಯ ಕುರಿತು ಮೌಖಿಕ ಮಂಡನೆ. ೨. ಆಯ್ದ ಪಠ್ಯವನ್ನು ರಾಗಾತ್ಮಕ ಅಂಶಗಳನ್ನು ಆಧರಿಸಿ ವಾಚಿಸುವುದು.

೩. ಕಛೇರಿ ಪತ್ರಗಳ ಬರಹ ೪. ಕಾರ್ಯಕ್ರಮದ ವರದಿ ತಯಾರಿಕೆ. ೫. ಅನುವಾದ

SKAN122 **Kannada-II** **1 (0+1)**

Development of listening and speaking skills with Kannada structure pattern - Conversation between a Doctor and a Patient; About Children's Education; Halebid-Belur; Discussing about Examination and Future Plan.

Development of writing and reading skills with Kannada structure pattern : Translation of simple sentences English into Kannada, Selected lesson for reading (Nada Geete, Kannada Habbagalu, Prekshaniya Sthalagalu, Kannada Kavi, Kannada Vijnani)

SMDC121 **Entrepreneurship Development and Business Management** **3 (2+1)**

Objectives

1. To provide an insight into the concept and scope of entrepreneurship
2. To expose various aspects of establishment and management of a small business unit
3. To develop financially viable agribusiness proposal

Theory

Development of entrepreneurship, motivational factors, social factors, environmental factors, characteristics of entrepreneurs, entrepreneurial attributes/competencies. Concept, need for and importance of entrepreneurial development. Evolution of entrepreneurship, objectives of entrepreneurial activities, types of entrepreneurs, functions of entrepreneurs, importance of entrepreneurial development, and process of entrepreneurship development. Environment scanning and opportunity identification need for scanning–spotting of opportunity- scanning of environment– identification of product / service – starting a project; factors influencing sensing the opportunities. Infrastructure and support systems- good policies, schemes for entrepreneurship development; role of financial institutions, and other agencies in entrepreneurship development. Steps involved in functioning of an enterprise. Selection of the product / services, selection of form of ownership; registration, selection of site, capital sources, acquisition of manufacturing know how, packaging and distribution. Planning of an enterprise, project identification, selection, and formulation of project; project report preparation, Enterprise Management. Production management – product, levels of products, product mix, quality control, cost of production, production controls, Material management. Production management – raw material costing, inventory control. Personal management – manpower planning, labour turn over, wages / salaries. Financial management / accounting – funds, fixed capital and working capital, costing and pricing, long term planning and short-term planning, book keeping, journal, ledger, subsidiary books, annual financial statement, and taxation. Marketing management-market, types, marketing assistance, market strategies. Crisis management- raw material, production, leadership, market, finance, natural etc.

Practical

Visit to small scale industries/agro-industries, Interaction with successful entrepreneurs/ agric-entrepreneurs. Visit to financial institutions and support agencies. Preparation of project proposal for funding by different agencies.

Suggested Readings

1. Charantimath P.M. 2009. Entrepreneurship Development and Small Business Enterprises. Pearson Publications, New Delhi.
2. Desai V.2015.Entrepreneurship:Development and Management, Himalaya Publishing House.
3. Gupta CB. 2001. Management Theory and Practice. Sultan Chand and Sons.
4. Grover, Indu. 2008. Handbook on Empowerment and Entrepreneurship. Agrotech Public Academy.
5. Khanka SS. 1999. Entrepreneurial Development. S. Chand and Co.
6. Mehra P., 2016. Business Communication for Managers. Pearson India, New Delhi.
7. Pandey M. and Tewari D., 2010, The Agribusiness Book. IBDC Publishers, Lucknow.
8. Singh D. 1995. Effective Managerial Leadership. Deep and Deep Publ.
9. Singhal RK. 2013. Entrepreneurship Development and Management, Katson Books.
10. Tripathi PC and Reddy PN. 1991. Principles of Management. Tata McGraw Hill.

SNCC121 **National Cadet Corps-II** **1 (0+1)**

Objectives

- Nation Building- cultural heritage, religions, traditions, and customs of India. National integration. Values and ethics, perception, communication, motivation, decision making, discipline and duties of good citizens. Leadership traits, types of leadership. Character/ personality development. Civil defense organization, types of emergencies, firefighting, protection. Maintenance of essential services, disaster management, aid during development projects.
- Social Service and Community Activities
- Basics of social service, weaker sections of society and their needs, NGO's and their contribution, contribution of youth towards social welfare and family planning.
- Structure and function of human body, diet and exercise, hygiene and sanitation. Preventable diseases including AIDS, safe blood donation, first aid, physical and mental health. Adventure activities. Basic principles of ecology, environmental conservation, pollution and its control.

SNSS121 **National Service Scheme (NSS-II)** **1 (0+1)**

Objectives

- Importance and role of youth leadership: Meaning, types and traits of leadership, qualities of good leader; importance and roles of youth leadership
- Life competencies: Definition and importance if life competencies, problem-solving and decision-making, inter personal communication
- Youth development programmes: Development and policy at the national level, state level and voluntary sector; youth-focused and youth lead organization
- Health, hygiene and sanitation: Definition needs and scope of health education; role of food, nutrition, safe drinking water, water borne diseases and sanitation (Swachh Bharat Abhiyan) for health; national health programmes and reproductive health. Youth health, lifestyle, HIV AIDS and first aid: Healthy lifestyles, HIV AIDS, drugs and substance abuse, home nursing and first aid.

- Youth and yoga: History, Philosophy, concept, myths and misconceptions about yoga; yoga traditions and its impacts, yoga as a tool for healthy lifestyle, preventive and curative method.

Post- Semester II (Only for exit option for UG-Certificate)

Sl. No.	Course Title	Credit Hours
1.	Internship*(10 weeks)	**10(0+10)***

*Internship (only for exit option for award of UG-Certificate) 10 weeks 10 (0+10)

Objectives

To provide students with an opportunity to put into practice the skills they have learned while in the institute, so that in case they exit with UG-certificate, they will be able to get proper engagement/ employment and consider having their own startups.

1. Integrate theory and practice
2. Assess interests and abilities in their field of study
3. Develop work habits and attitudes necessary for job success
4. Develop communication, interpersonal and other critical skills in the job interview process
5. Explore career alternatives prior to graduation

Activity

The students will have internship/ training for 10 weeks' duration either in the parent institute (attaching the students to facilities such as farm machinery testing center, incubation centers, prototype production facilities, etc.) or in associated industry, food service centers, etc. The College/ University will facilitate attaching the students to the organisations. After completion of internship, the students will have to submit a report of their learnings and also present in form of a seminar before nominated faculty members and other students.

The assessment will be based on the report / assessment received from the industry/ organisation and the report and the presentation made at the University. Ideally the weightage will be 50% each for both internal and external. The SAUs may modify the weightage and breakups.

II Year I Semester

SABM214 **Economics and Food Business Management** **2 (2+0)**

Objectives

1. To study food from a scientific perspective and the food industry from a business point of view
2. To have opportunities to create new food products and develop new ways to manufacture, preserve, and package food products
3. To study food production, development, and commercialization

Theory

Economics definition and key concepts; business economics. The working of competitive markets: business in a competitive market; demand and supply population and growth food production availability, price and output determination; elasticity of demand and supply; Government intervention in competitive markets (FCI, Food Subsidies). Background to demand: marginal utility theory and demand and the firm. Background to supply: cost and production; short vs long-run. Revenue and profit maximization. Market Structures: Perfect competition, monopoly, monopolistic competition. Business in an international environment: globalization (key concepts). Business Management- Definitions, management principles, scientific principles, administrative principles; Maslow's Hierarchy of needs theory; Functions of management: Planning, organizing, staffing, directing, controlling; Organizational structures, principles of organization; Types of organization: Formal and informal, line and staff, matrix, hybrid.

Suggested Readings

1. Dewett, K.K. and Navalur, M.H. Modern Economic Theory. S. Chand and Sons, New Delhi.
2. Dorfman, Jeffrey H. 2013. Economics and Management of the Food Industry. Taylor and Francis
3. Jain, S.P. Financial Accounting. Kalyani Publications, Ludhiana.
4. Koontz, Harold. Principles of Management. Tata McGraw-Hill Education Private Limited, New Delhi.
5. Prasad, L.M. 2001. Principles and Practices of Management, 9th edn. S. Chand and Sons, New Delhi.
6. Rao, P. Subba. Human Resource Management. Himalaya Publications.
7. Thomas, P.C. Managerial Economics, 9th edn. Kalyani Publishers.

SECN211 **SEC-V:Assessment of Clinical Signs and Symptoms** **2 (0+2)**

Practical

Preparation of list of signs and symptoms of PEM; Preparation of poster on signs and symptoms of vitamin deficiency; Preparation of folder on mineral deficiencies; Visit to

Aanganwadi to assess signs of PEM deficiency in children; Visit to hospital to assess the deficiency signs and symptoms in pregnant women; Survey of adolescent boys and girls to assess micronutrient deficiency; Assessment of clinical signs and symptoms of malnutrition in school age children; Nutrition education to target groups on micro nutrient deficiency; Visit to local health centre to identify clinical signs and symptoms of nutritional problems; Community survey for nutritional deficiency disorders – data collection ,tabulation analysis, interpretation. report writing; Presentation of reports and group discussion; Comparison of data on status of various deficiency diseases in India (NFHS 3, NFHS 4, NFHS 5) in vulnerable groups; Development of tools for assessing signs and symptoms of micronutrient deficiency in vulnerable groups; Collection of data on locally available common foods and their cost and unavailability of certain foods leading to the deficiencies in particular region; Surveillance of national nutrition programs; Data analysis and Report writing.

Suggested Readings

1. Bamji M.S., Prahlad R. N. and Vinodini R.2003. Text book of Human Nutrition. New Delhi, Oxford and IBH Publishing Co. Pvt. Ltd.
2. Das S. 2022. Textbook of Community Nutrition. Academic Publishers.
3. Mason J. B., Habicht J., Tabatabai H. and Valverde V., 1984. National Surveillance WHO.
4. Sehgal S. and Raghuvanshi R. 2007. Text Book of Community Nutrition. ICAR Publication.

SFND211 Principles of Human Nutrition 4 (4+0)

Objectives

At the end of the course, the student will have knowledge of

- Different types of carbohydrates, lipids and fatty acids and proteins and amino acids required for human nutrition
- Energy requirement and expenditure in the human body during rest and physical activity
- Physiological and biochemical role of water, minerals and vitamins and their metabolism in the human body
- Diseases and symptoms resulting from deficiency of major and minor nutrients
- Biochemical monitors used to assess the nutritional status of different nutrients

Theory

Historical development and the relationship of nutrition to health, growth and human welfare. Definitions of terms used in nutrition- Recommended dietary allowances, balanced diet, health foods, functional foods, phytochemicals, Nutraceuticals, dietary supplements, ethnic foods, organic foods, fabricated foods, extruded foods, convenience foods, junk foods, GM foods and proprietary foods. Food groups (Four, Five, Seven, Nine, Eleven), Food pyramid, my plate concept, Bioavailability, enrichment, fortification and restoration of nutrients. Energy units, sources and requirements, fuel value of foods, methods of measuring energy value of food, energy requirement of body, physical activity and thermo genic effect of food, Respiratory Quotient, SDA, BMR- methods of measurement, factors affecting BMR, Energy expenditure in different activities, Energy balance. Carbohydrates- Types, functions, sources, requirement,

Digestion and absorption of carbohydrates, health conditions affected by carbohydrates, Dietary Fiber-Classification, sources, composition, properties and nutritional significance. Lipids- Types, functions, sources, requirement, Digestion and absorption of lipids health problems associated with lipids. Proteins- Types, functions, sources, requirement, Digestion and absorption of proteins, quality evaluation, improvement and deficiency and protein energy malnutrition. Vitamins- Classification, functions, sources, requirement, deficiency and toxicity of fat soluble-(A, D, E, K), (water soluble – C, B complex (thiamine, riboflavin, niacin, B_6, Pantothenic acid, B_{12} and folic acid). Minerals-Classification, functions, sources, requirements, deficiency and toxicity of calcium, phosphorus, iodine, fluorine, iron, sodium, potassium, chloride, copper and zinc, factors affecting bio availability of calcium and iron and other minerals. Water- functions, sources, distribution in body. Water balance and electrolyte balance.

Suggested Readings

- Agrawal, A. and Udipi, A.S. 2022. Textbook of Human Nutrition. Jaypee Brothers Medical Publishers.
- Recommended dietary allowances and estimated average requirements nutrient requirements for Indians – 2020- A Report of the Expert Group Indian Council of Medical Research, National Institute of Nutrition
- Raghuvanshi, R. S. and Mittal, M. 2014. Food Nutrition and Diet Therapy. India: Westville Publishing House New Delhi
- Bamji, M.S., Krishnaswamy, K. and Brahmam, G.N.V. 2009. Text book of Human Nutrition. Oxford a n d IBH Publishing Company Pvt. Ltd.
- Sehgal, S. and Raghuvanshi, R.S. 2007. Text Book of Community Nutrition. ICAR Publication.
- Wilson, E.D., Fisher, K.H. and Garcia, P.A. 1980. Principles of Nutrition. John Wiley and Sons, New York.
- Longvah, T., Ananthan, R., Bhaskarachary, K. and Venkaiah, K. 2017. Indian Food Composition Tables. National Institute of Nutrition, ICMR, New Delhi.

SFND212 **Fundamentals of Food Science** **2 (1+1)**

Objectives

1. To introduce students to the field of food science
2. To cover possible jobs, food harvest, production methods, food chemistry, preserving methods, meeting nutritional needs, grading procedures used and the science involved
3. To understand both fundamental and applied aspects of food science
4. To provide for fundamental understanding of food chemistry, and food microbiology
5. To gain insights about role of specific nutrients in maintaining health and identifying nutrient specific foods

Theory

Cooking- Objectives, cooking methods, their types, merits and demerits. Cereals and millets - Structure, composition, processing techniques, effect of heat and acid, functions of

starch in the cookery, gelatinization, dextrinization, antinutritional and retrogradation of starch. Legumes, nuts and oil seeds - Composition, processing techniques, effect of heat, acid and alkali. Fruits and vegetables - Types, composition, pigments, changes caused by heat, acid and alkali. Milk and milk products – Composition, types, products, effect of acid on pigments, effect of acid on milk cookery, uses and functions. Egg - Structure, composition, grading of egg, function and changes during cooking. Meat, poultry and fish- Types, structure, composition, pigments, factors affecting tenderness, post-mortem changes and changes during cooking. Sugars- Types, composition, manufacturing process, effect of heat and acid, crystallization factors affecting crystallization, functions of sugar in cookery, fondants and fudge. Fats and oils - kinds, composition, effect of heat, functions in cookery, processing techniques, rancidity of fats; Methods of improving nutritive value of foods – germination, fermentation, malting, mutual supplementation etc. Brief overview of beverages; Condiments and spices, importance in daily life.

Practical

Orientation to kitchen equipment and their uses, weighing and measuring food items. Condiments and spices. Cooking of foods using different methods. Cereal cookery– Practical exercise on dextrinization and gelatinization of rice starch, gluten formation in wheat. Legumes – Identification and cooking methods. Nuts and oilseeds- Use in food preparations. Preparations using Germination, fermentation, mutual supplementation. Vegetable cookery- Different preparations with vegetables and effect of heat and alkali on pigments. Preparation of soups, salads and beverages. Milk and milk products- Maillard reaction, Use in various preparations. Egg cookery - Preparations showing functions of egg as binding, coating agent: poached egg, boiled egg, scrambled egg, omelet, egg curry. Meat, poultry and fish cookery – Preparations involving various methods of cooking. Sugar – Preparations showing functions of sugar in cooker-caramelization, coating agent, crystallization, syrups of different consistencies, sweets, chocolates, candies. Fats and oils – Demonstration of smoking point, use in various preparations like deep fat frying, shallow fat frying, shortening effects of oil, factors affecting absorption of oil.

Suggested Readings

1. Sharma, A. 2017. Textbook of Food Science and Technology. CBS Publication.
2. Fox, B. F. and Cameron, A. G. 1970. Food Science - a Chemical Approach.University Press, London.
3. Raghuvanshi, R.S. and Bisht, K. 2010. Uses of Soybean: Products and Preparation.
4. Raghuvanshi, R.S. and Singh, D.P. 2009. Food preparations and use.
5. Shakuntala Manay N, Shadaksharaswamy M. 1998. Foods, Facts and Principles, New Age International Publishers, New Delhi.
6. Singh, Guriqbal (Ed.). Soybean: Botany, Production and Uses, CAB International, U.K.
7. Swaminathan, M. 1988. Handbook of Food Science and Experimental Foods BAPPCO, Bangalore.
8. William Erskina *et al.* (Eds). The Lentil: Botany Production and Uses. CAB International, U.K.

SFND213 **Community Nutrition and Education** **3 (2+1)**

Objectives

At the end of the course, the student will have knowledge of:

1. Causes, prevalence and consequences of the major nutritional problems existing in India and its control measures
2. Methods of nutritional status assessment of individual and group both directly and indirectly
3. To inculcate concept of food and nutrition security and government and international program running in the field of community nutrition for ameliorating nutritional status of population
4. To enable students to assess nutritional status and impart nutrition education among rural and needy people

Theory

Basic concept of community nutrition role of nutritionist in improving nutrition in community Food habits and influencing factors, Food taboos. Mortality and morbidity pattern of vulnerable groups and their causes. Nutritional needs of normal infants, prelacteal feeding, exclusive breast feeding, feeding of full term and premature infants. Importance of breast feeding and supplementary foods in combating malnutrition in infants and young children. Growth monitoring Malnutrition. Definition and causes, classification of grades of malnutrition. Assessment of nutritional status- Nutritional Anthropometry-Need and importance, standard for reference, techniques of measuring Length/ height, weight, head, chest and arm circumference, skinfold thickness, interpretation of these measurements. Use of growth chart. Clinical signs of deficiencies specially PEM (Kwashiorkor, marasmus), vitamin A deficiency, Anemia, Rickets, B-Complex deficiencies. Bio chemical and biophysical assessment. Diet survey: Need and importance, methods of dietary survey, Interpretation - concept of consumption unit, individual and total distribution of food in family, adequacy of diet in respect to RDA, concept of family food security. Major nutritional problems in community. National programs and policies for improving nutritional status of community. Role of national and international agencies in improving nutritional status of the community. Nutrition education: objectives, methods, channels and its role in control of malnutrition in community nutrition education -Objectives, principles and importance of nutrition education in a community nutritional survey – NFHS.

Practical

Assessing nutritional status of hostel inmates and local community dwellers. Assessing nutritional status of community as per socio-economic status. Visit to local health centers to identify clinical signs and symptoms of nutritional problems. Visit to Anganwadi centers, MDM and evaluation of feeding provided at these centers. Community survey for nutritional deficiency disorders -Data collection, tabulation, analysis, interpretation report writing. Development of audio- visual aids. Planning, implementation and evaluation of nutrition education program for a target group.

Suggested Readings

1. Bamji, S.M., Rao, N.P. and Reddy, V. 1996. Textbook of human nutrition. Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.
2. Dahiya, S., Boora, P. and Rani, V. 2013. A manual on Community nutrition, Dept. of Foods and Nutrition, published under ICAR, Assistance scheme.
3. Das, S. 2022. Textbook of Community Nutrition. Academic Publishers.
4. Latham, M.C. 1997. Human nutrition in the developing world. Food and agricultural organization of United Nations.
5. Sehgal, S. and Raghuvanshi, R.S. 2007. Textbook of community nutrition, Directorate of Information and Publications of Agriculture, Indian Council of Agricultural Research, New Delhi.

SFND214 **Human Physiology** **3 (2+1)**

Objectives

1. To understand the role of molecules, cells, tissues, organs, and organ systems (endocrine, nervous, muscular and immune systems) in human health and disease
2. To understand the physiology –the functioning of a living organism and its component parts
3. To acquire an understanding of how and why the body functions the way it does, and what happens when it does not function properly

Theory

Introduction to anatomy and physiology and structural organization of body. The cell – Structure, its organelles, functions and multiplications, different types of cells and their functions, movement of particles across cell membrane - Active transport and passive transport ,Body fluids and its compartments and functions ,Water output and input into the body and maintenance of water balance in human body , the tissues – Types, structure and their functions, the skeletal system - Anatomy and functions, structure, formation and development of bones, different types of bones and types of joints and their movements, Circulatory system - The blood - Composition and function, blood clotting and blood grouping, Heart – Structure, functions, types of circulatory systems, blood pressure and heart rate and factors affecting it, electrocardiogram, the respiratory system - anatomy, functions, mechanism of breathing and respiratory volumes, gas transport and respiratory adaptation, the digestive system - anatomy and functions of alimentary tract and accessory organs, process of digestion of food, absorption and assimilation of digested food, enzymes involved in digestion of food, liver - Structure and functions, Pancreas – Structure and functions, the urinary system - Anatomy and functions, formation and composition of urine, the endocrine system - important ductless glands of the body and their functions, the reproductive system - Male reproductive system – Anatomy and functions, female reproductive system – Anatomy and functions, menstrual cycle, the nervous system - elementary study of (anatomy and functions), sensory organs – (anatomy and functions). Glossary of terms used in physiology.

Practical

Study of a compound microscope, microscopic structure of epithelial, muscular and connective tissue, bone and cartilage, Measurement of body temperature, Basal Metabolic Rate,

Recording of systemic arterial blood pressure, Pulmonary function test, Pulse rate and respiratory rate, Effect of posture and exercise on blood pressure. Visit to anatomy and physiology lab, estimation of hemoglobin, red blood corpuscles, estimation of white blood corpuscles, determination of blood groups assessment of blood group, determination of bleeding time (bt) and clotting time (ct). Determination of blood glucose qualitative tests with urine samples -urine sugar and albumin.

Suggested Readings

1. Arthur J. V. Human physiology- The mechanisms of body function. Tata McGraw Hill Publishing Company, New Delhi.
2. Guyton C. Text Book of medical physiology. 5th edn. W.B. Saunders Company- Philadelphia, London
3. Samson's Applied Physiology. 10th edn. Revised by Keele, C.A. and Neil, B. Oxford University Press, New York.

SFND215 **Food Psychology** **2 (2+0)**

Objectives

1. To gain an understanding of the psychological factors that influence food choices, eating behaviors, and our relationship with food
2. To explore the impact of sensory experiences (taste, smell, sight, touch) on food perception and preference
3. To examine the psychology behind food marketing and advertising strategies
4. To develop practical strategies to cultivate a mindful and healthy relationship with food

Theory

Introduction to Food Psychology, Interaction of Hunger and Satiety, Sensory Perception and Food Preferences, Role of positive and negative emotions on selection / choice of foods – eating behavior. Meal composition and effect of specific nutrients on mood / stress., Understanding and Managing Cravings, Anorexia nervosa and binge eating behaviour, Mindful Eating Practices, Social Cues and Dining Environments, Psychological influence of Food Marketing and Advertising, digital food marketing – public health challenge, Cultural Food Traditions and Practices, Food and Mental Well-being, Practical Applications of Food Psychology, Overeating, Disordered Eating, and Body Image Concerns, Strategies for Individual and Community Health.

Suggested Readings

1. Cardoz F. 2009. India: The cookbook. HarperCollins Publishers India.
2. Hardcastle SJ, Thogersen-Ntoumani C, and Chatzisarantis NL. 2015. Food Choice and Nutrition: A Social Psychological Perspective. Nutrients. Oct;7(10):8712-5.

SFND216 **Food Nutrition and Agriculture** **2 (2+0)**

Objectives

1. Develop skills to apply and evaluate innovative solutions that place nutrition at the heart of a sustainable food system
2. Students will learn about the components of the food system and their link to nutrition and acquire the skills to implement and evaluate nutrition-sensitive interventions

Theory

Food production and consumption situation in India and in the world; Food production and consumption trends, food balance sheets; Role of nutrition in agricultural planning and national development. Linkages between agricultural practices, food production, food distribution and nutritional status; Factors affecting food distribution at macro and micro level, per capita food availability and consumption; Food and nutrition security at national and household level; Role of agriculture in enhancing food security; Urbanization and food security. Sustainable food systems; Food crop failure and malnutrition, poverty and vicious cycle of low food production. Innovative approaches to enhance local food production and improve food distribution systems. Effect of food production and economic policies on food availability; Impact of physical resources, farming systems, cropping system, inputs and manipulation, agricultural marketing system, post- harvest processing of foods on food and nutrition situation; Nutritional composition of commonly consumed foods. Implementation of nutrition policy, agricultural programs; nutritional impact of agricultural programs, food price control and consumer subsidy; Contribution of National and International organization in agricultural development.

Suggested Readings

1. Albert, JL. (Ed.) 2000. Food, nutrition and agriculture. FAO Publication.
2. FAO. 2017. The State of Food and Agriculture - Leveraging Food Systems for Inclusive Rural Transformation. Food and Agriculture Organization, Rome.
3. FAO. 2017. The State of Food Security and Nutrition in the World. Food and Agriculture Organization, Rome. (latest publications of FAO)
4. GOI. 2001. India 2001. A Reference Annual. Publication Division, Ministry of Information and Broad casting, Govt. of India.
5. GOI. 2011. Census of India. Government of India. (New Census Report)
6. GOI. 2017. Agriculture - Statistical Year Book India. Ministry of Statistics and program Implementation, Government of India. (latest publications of GOI)
7. GOI. 2018. A Reference Manual by Publication Division. Ministry of Information about Broadcasting, Govt. of India.
8. Raghuvanshi R.S. 2013 Nutritional Security through Diversified Food Production. in Agrarian Change and Small Farmers, Super markets, Viability and Food Policy. Ed. by K.N. Bhatt and Pradeep Bhargava, Concept Publishing Company PVT. LTD., New Delhi
9. National Family Health Survey (rchiips.org).
10. Home - Global Nutrition Report.
11. Global Food Security Index (GFSI) (economist.com).
12. https://www.who.in.

SNCC211 **National Cadet Corps (NCC-III)** **1 (0+1)**

Objectives

- Arms Drill-Attention, stand at ease, stand easy. Getting on parade. Dismissing and falling out. Ground/take up arms, examine arms. Shoulder from the order and vice-versa, present from the order and vice-versa. Saluting at the shoulder at the halt and on the march. Short/ long trail from the order and vice- versa. Guard mounting, guard of honor, Platoon/Coy Drill.
- Characteristics of rifle (.22/.303/SLR), ammunition, fire power, stripping, assembling, care, cleaning, and sight setting. Loading, cocking, and unloading. The lying position and holding.
- Trigger control and firing a shot. Range Procedure and safety precautions. Aiming and alteration of sight. Theory of groups and snap shooting. Firing at moving targets. Miniature range firing. Characteristics of Carbine and LMG.

SNSS211 **National Service Scheme (NSS-III)** **1 (0+1)**

Objectives

- Vocational skill development: To enhance the employment potential and to set up small business enterprises skills of volunteers, a list of 12 to 15 vocational skills will be drawn up based on the local conditions and opportunities.
- Each volunteer will have the option to select two skill- areas out of this list.
- Issues related environment: Environmental conservation, enrichment and sustainability, climatic change, natural resource management (rain water harvesting, energy conservation, forestation, waste land development and soil conservations) and waste management.
- Disaster management: Introduction and classification of disaster, rehabilitation and management after disaster; role of NSS volunteers in disaster management.
- Entrepreneurship development: Definition, meaning and quality of entrepreneur; steps in opening of an enterprise and role of financial and support service institution. Formulation of production oriented project:
- Planning implementation, management and impact assessment of project Documentation and data reporting: Collection and analysis of data, documentation and dissemination of project reports.

SPED211 **Physical Education, First Aid and Yoga Practices, Meditation** **2 (0+2)**

Objectives

1. To make the students aware about Physical Education, First Aid and Yoga Practices
2. To disseminate the knowledge and skill how to perform physical training, perform first aid and increase stamina and general wellbeing through yoga

Practical

Physical education; Training and Coaching - Meaning and Concept; Methods of Training; aerobic and aerobic exercises; Calisthenics, weight training, circuit training, interval training, Fartlek training; Effects of Exercise on Muscular, Respiratory, Circulatory and Digestive systems; Balanced Diet and Nutrition: Effects of Diet on Performance; Physiological changes due to ageing and role of regular exercise on ageing process; Personality, its dimensions and

types; Role of sports in personality development; Motivation and Achievements in Sports; Learning and Theories of learning; Adolescent Problems and its Management; Posture; Postural Deformities; Exercises for good posture.

Yoga; History of Yoga, Types of Yoga, Introduction to Yoga,

- Asanas (Definition and Importance) Padmasan, Gaumukhasan, Bhadrasan, Vajrajasan, Shashankasan, Pashchimotasan, Ushtrasan, Tadasan, Padhastasan, Ardhchandrasan, Bhujangasan, Utanpadasan, Sarvangasan, Parvatasan, Patangasan, Shishupalanasan – left leg- right leg, Pavanmuktasan, Halasan, Sarpasan, Ardhdhanurasan, Sawasan
- Suryanamskar Pranayama (Definitionand Importance) Omkar, Suryabhedan, Chandrabhedan, AnulomVilom, Shitali, Shitkari, Bhastrika, Bhramari
- Meditation (Definition and Importance), Yogic Kriyas (Kapalbhati), Tratak, Jalneti and Tribandh
- Mudras (Definition and Importance) Gyanmudra, Dhyanmudra, Vayumudra, Akashmudra, Pruthvimudra, Shunyamudra, Suryamudra, Varunmudra, Pranmudra, Apanmudra, Vyanmudra, Uddanmudra
- Role of yoga in sports
- Teaching of Asanas – demonstration, practice, correction and practice

History of sports and ancient games, Governance of sports in India; Important national sporting events; Awards in Sports: History, latest rules, measurements of playfield, specifications of equipment, skill, technique, style and coaching of major games (cricket, football, table tennis, badminton, volleyball, basketball, kabaddi and kho-kho) and athletics.

Need and requirement of first aid. First Aid equipment and upkeep. First AID Techniques, First aid related with respiratory system. First aid related with Heart, Blood and Circulation. First aid related with Wounds and Injuries. First aid related with Bones, Joints Muscle related injuries. First aid related with Nervous system and Unconsciousness. First aid related with Gastrointestinal Tract. First aid related with Skin, Burns. First aid related with Poisoning. First aid related with Bites and Stings. First aid related with Sense organs, Handling and transport of injured traumatized persons. Sports injuries and their treatments.

II Year II Semester

SBCM222 **Nutritional Biochemistry** **3 (3+0)**

Objectives

1. To understand the chemical characteristics of different classes of nutrients with reference to their physical properties, and to relate this to their functions in the body
2. To explain the processes of digestion, absorption and metabolism of the macronutrients and micronutrients in the context of different meals
3. To consider the main features of metabolism using the concept of energy flux through metabolic pathways as a focus
4. To explore the integration of pathways for the metabolism for fat, protein and carbohydrate and to examine the mechanisms for the regulation of flux through these pathways
5. To discuss the established functions of micronutrients and to examine the clinical and biochemical effects of depletion

Theory

Recapitulation of basic chemistry and biology Water, pH and buffers, Acid-base balance Cellular constituents. Structure and function: Amino acid and proteins, Carbohydrates, Lipids and bio membranes, Nucleic acids– Vitamins and minerals. Enzymes, function, properties, mechanism, Metabolism of cellular constituents. Basic concepts of Bioenergetics Carbohydrates metabolism: glycolysis and glycogenolysim, HMP pathway, TCA Cycle, Electron transport chain, Gluconeogenesis, Lipids metabolism: Beta-oxidation, Ketone bodies, Fatty acid synthesis. Amino acid metabolism: General reactions of nitrogen assimilation and excretion Biosynthesis of DNA, RNA and Protein replication, transcription, translation and genetic code regulation of gene expression, Enzymes - specificity, classification, factors affecting enzyme activity. Amino acid metabolism: General catabolic reactions of amino acids, Digestion and absorption. Estimation of total carbohydrates by Anthrone method, Estimation of proteins by Biuret method.

Suggested Readings

1. Conn EE and Stumpf PK. 2009. Outlines of Biochemistry. John Wiley. Y Nelson, DL and Cox,
   MM. 2004.
2. Lehninger. Principles of Biochemistry. 5th edn. MacMillan.
3. Voet D, Voet JG and Pratt CW. 2007. Fundamentals of Biochemistry. John Wiley y Jayaram. T. 1981. Laboratory manual in biochemistry, New Delhi: Wiley Estern Ltd.
4. Plummer D. 1988. An Introduction to Practical Biochemistry. 3rd edn. Tata McGraw Hill, New Delhi.
5. Hames BD, Hooper NM and Houghton JD. 1997. Instant Notes in Biochemistry. BIOS Scientific Publishers.
6. Satyanarayana U and Chakrapani U. 2008. Essentials Of Biochemistry.
7. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=NuAs6SreCGryddEfs4kkBA

SCSC221 **Informatics and Artificial Intelligence** **3 (2+1)**

Objectives

1. To acquaint students with the basics of computer applications in agriculture, multimedia,

database management, application of mobile app and decision- making processes, etc.

2. To provide basic knowledge of computer with applications in agriculture.
3. To make the students familiar with Agricultural-Informatics, its components and applications in agriculture

Theory

Introduction to Computers, Anatomy of Computers, Memory Concepts, Units of Memory, Operating System: Definition and types, Applications of MS-Office for creating, Editing and Formatting a document, Data presentation, Tabulation and graph creation, Statistical analysis, Mathematical expressions, Database, concepts and types, creating database, Uses of DBMS in Agriculture, Internet and World Wide Web (WWW): Concepts and components. Computer programming: General concepts, Introduction to Visual Basic, Java, Fortran, C/ C++, etc. concepts and standard input/output operations.

e-Agriculture, Concepts, design and development, Application of innovative ways to use information and communication technologies (IT) in Agriculture, Computer Models in Agriculture: Statistical, weather analysis and crop simulation models, concepts, structure, inputs- outputs files, limitation, advantages and application of models for understanding plant processes, sensitivity, verification, calibration and validation, IT applications for computation of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-input management, Smartphone mobile apps in agriculture for farm advice: Market price, postharvest management etc., Geospatial technology: Concepts, techniques, components and uses for generating valuable agri-information, Decision support systems: Concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems etc. for supporting farm decisions. Preparation of contingent crop-planning and crop calendars using IT tools, Digital India and schemes to promote digitalization of agriculture in India.

Introduction to artificial intelligence, background and applications, Turing test. Control strategies, Breadth-first search, Depth-first search, Heuristics search techniques: Best-first search, A* algorithm, IoT and Big Data; Use of AI in agriculture for autonomous crop management, and health, monitoring livestock health, intelligent pesticide application, yield mapping and predictive analysis, automatic weeding and harvesting, sorting of produce, and other food processing applications; Concepts of smart agriculture, use of AI in food and nutrition science etc..

Practical

Study of computer components, accessories, practice of important DoS Commands, Introduction of different operating systems such as Windows, UNIX/ Linux, creating files and folders, File Management. Use of MS-WoRD and MS Power-point for creating, editing and presenting a scientific documents, MS- EXCEL - Creating a spreadsheet, Use of statistical tools, writing expressions, Creating graphs, Analysis of scientific data, handling macros. MS-ACCESS: Creating Database, preparing queries and reports, Demonstration of Agri-information system, Introduction to World Wide Web (WWW) and its components, Introduction of programming languages. Preparation of inputs file for CSM and study of model outputs, computation of water and nutrient requirements of crop using CSM and IT tools, Use of smart phones and other devices in agro-advisory and dissemination of market information, Introduction of Geospatial Technology. Preparation of contingent crop planning, India Digital

Ecosystem of Agriculture (IDEA). AR/VR demonstration.

Suggested Readings

1. Concepts and Techniques of Programming in C by Dhabal Prasad Sethi and Manoranjan, Wiley India.
2. Fundamentals of Computer by V. Rajaroman.
3. Introduction to Information Technology by Pearson.
4. Introduction to Database Management System by C. J. Date.
5. Introductory Agri Informatics by Mahapatra, Subrat K et al., Jain Brothers Publication.

SECN221 SEC-VI : Development of Nutritional Educational Material 2 (0+2)

Practical

Objectives, principles and importance of nutrition education in a community; Deficiency diseases and public health problems-Vit. A, iron and iodine deficiencies, other micronutrient deficiencies; Identification of nutritional problems and target groups (Survey); Communication techniques: Process, its components. Mass, group and individual Communication; advantages and disadvantages; Classification and use of audio-visual aids (Electronic aid, non-projected and three dimensional); Preparation of instructional material (Chart, Poster, Flipbook, Pamphlet, Calendar); Practicing and use of nutrition education material on vulnerable groups in the community, rural and urban; Planning and organizing nutritional education program for community; Evaluation of nutrition education program.

SFND221 Normal Nutrition and Meal Planning 3 (2+1)

Objectives

1. To study general nutrition, principles of meal planning, food safety, consumer guidelines, and management techniques for lab experiences
2. To cover a variety of experiences, designed around the actual preparation of foods.
3. To cover vocabulary, reading and following recipe and/or modelled directions, selection and storage of food items, cooking methods, and related techniques
4. To successfully complete this course as it is a prerequisite to enrolment in Culinary Arts.

Theory

Basic principles of menu planning, planning menus for individual and family. Classification of vegetarianism. Factors influencing food intake and food habits. Basic principles of meal planning, planning meals for individual and family. Factors affecting food requirements of individuals, families and different groups of people. Meal planning for special occasions. Steps involved in meal planning. Food groups and their use in meal planning. Recommended dietary allowances of macro and micro nutrients for different age groups. Food exchange list. Use of food exchange list in diet planning, planning breakfast, lunch, tea, dinner, packed lunch and snacks; considering RDA for individuals Importance of balanced diets. Food and nutrient requirement of adults and diet planning (male and female of all activities level), pregnant women, lactating women, old age. Breast feeding, advantages of breast feeding, prelacteal feeding, breast feeding during illness, feeding of pre-term baby, feeding problems. Complementary feeding.

Food and nutrient requirement of pre-school children, school age children, adolescents, geriatric nutrition- physiological and psychological factors affecting the diet plan.

Practical

Standardization of serving sizes, portion, cost of locally available common foods. Food exchange list: method of using and portioning. Planning preparation and nutrient calculation of diets of preschool children, school going children, adolescents, adults and senior citizens, packed lunches for school children. Practice in formal and informal table setting and table manners.

Suggested Readings

1. Gopalan, C. and Krishnaswamy, K. 2000. Nutrition in Major Metabolic Diseaes. Oxford University Press, New Delhi.
2. Joshi, Shubhangini A. 2021. Nutrition and Dietetics. 5th edn. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
3. ICMR. 2020. Recommended Dietary allowance for Indians, ICMR, Delhi.
4. Longvah, T., Ananthan, R., Bhaskarachary, K. and Venkaiah, K. 2017. Indian Food Composition Tables. National Institute of Nutrition, ICMR, New Delhi
5. Robinson and Weicley. 1984. Basic Nutrition and diet Therapy. MacMillian Publishing Co. Inc. New York and London.
6. Raghuvanshi, R.S. and Mittal, M. 2019. *Upcharatmak Poshan* (Diet Therapy) Brillion Publishing House, New Delhi pp 1-352. (Hindi)
7. Raghuvanshi, R. S. and Mittal, M. 2014. Food Nutrition and Diet Therapy. India: Westville Publishing House New Delhi.
8. Sharma, S. 2006. Human nutrition and meal planning. Delhi, Jnanada Prakasham (P and D).
9. Sehgal, S. and Raghuvanshi, R. S. 2007. Textbook of Community Nutrition. Indian Council of Agricultural Research, New Delhi.
10. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=NuAs6SreCGryddEfs4kkBA

SFND222 **Public Health Nutrition** **3 (2+1)**

Objectives

1. To equip students with the knowledge of community nutrition, national and international nutrition programs and interventions
2. To develop, implement and evaluate the nutrition programs and policies to address the different nutritional problems with greater impact and efficiency
3. To develop an evidence-based approach to address the nutritional problems and to reduce the risk for malnutrition in different populations.

Theory

Concept of Health, Public health, Public Health Nutrition, Nutritional Epidemiology and Community nutrition- Demography, demographic cycle; Health Indicators and their significance – Birth and death rates, IMR, MMR, TFR, U5MR etc. Health Care System in India – Primary, Secondary and Tertiary, National Health Policy, National Nutrition Policy and National Nutrition Mission-An overview. Public health problems of India, nutrient deficiency diseases and other diseases, their etiology, prevalence, prevention and monitoring. Indicators and data sources

from existing macro and micro systems of information in India (NFHS, NSSO, ICDS, NSS, CENSUS). National programs relevant for public health. Vitamin A deficiency disorder control program, National diarrhoeal disease program, national iodine deficiency disorder control program, iron deficiency anemia prophylaxis program, National malaria eradication program, national immunization program, national program for control of tuberculosis, national AIDS control program, other health and nutrition programs. Communicable and infective disease control: Nature of communicable diseases, infections, contamination, transmission, vector borne diseases, environmental agents, control and prevention. National Malaria Eradication program, National Filarial control program, National Leprosy Eradication program, Japanese Encephalitis control and other national control programs (Blindness, Mental Health, etc.) National Mental Health program (NMHP. Universal Immunization program and child survival and safe motherhood program. COVID-19, its origin, life cycle of virus, mutation, detection, case tracking, vaccine development, and vaccination program. Principles and elements of public health care. Role of NNMB.

Practical

Visit to PHC to study the prevalence of the communicable disease. Epidemiological approach to study individual disease in a community. Analysis of data and report writing. Discussion for preventive and therapeutic strategies. Public health campaign in a village. Understanding the uses of screening tools.

Suggested Readings

- DeMaeyer, E.M. 1989. Preventing and controlling iron deficiency anemia through primary health care. A guide for health administrators and program managers. WHO, Geneva.
- International Institute for Population Sciences (IIPS) and ICF. 2021. National Family Health Survey (NFHS-5), 2019-21: India. Mumbai: IIPS.
- McLaren, D.S. 1976. Nutrition in the community. John Wiley and Sons, London.
- Michael, J., Gibney, Barrie, Margetts, M., Kearney, John M. and Arab Lenore. 2004.Public Health Nutrition. Blackwell Science Ltd, UK.
- Park, K. 2016. Textbook of Preventive Medicine. New Age international (P) Limited.
- Sehgal, S. and Raghuvanshi, R.S. 2007. Textbook of community nutrition, Directorate of Information and Publications of Agriculture, Indian Council of Agricultural Research, New Delhi.
- Vyas, S. 2021. Public Health Nutrition: A textbook. Vishwagyan Prakashan.
- WHO 2001. Assessment of iodine deficiency disorders and monitoring their elimination. A guide for program managers 2nd edn.
- https://www.who.int/emergencies/diseases/novel-coronavirus-2019

SFND223 **Food Standards and Quality Control** **3 (2+1)**

Objectives

1. To develop qualified and competent human resource in the field of the food standards and quality management for regulators, industry, academic/research institutions, certifying and accreditation bodies, food trade, food testing and training
2. To delve in depth on various aspects of food standards and quality management i.e. food standards, harmonization with global benchmarks, quality management systems, food analysis, instrumentation, risk analysis /management, traceability and auditing to transform the food ecosystem
3. To nurture a positive and disciplined food standard and quality culture among the professionals
4. To conduct research studies on emerging food standard issues and formulation of science based regulatory framework

Theory

Importance of food quality control and assurance. Food Standards and Regulations in India: FSSAI, Prevention of Food Adulteration Act, Fruit Product Order, AGMARK, Essential Commodity Act, Consumer Protection Act, Bureau of Indian Standards, Codex Standards, Food and Drug Administration (FDA). Food additives, preservatives, coloring agents, antioxidants, emulsifying agents, leavening agents and stabilizing agents. Various methods for the assessment of quality of different foods. Food safety management systems- GMP/GHP, HACCP, GLP, GAP, The Kosher and Halal Food Laws Food packaging, packaging material. Adulteration, heavy metals. Quality criteria of foods – food grains, fruits, vegetables and animal foods. Quality criteria of processed foods. Physical, chemical and microbial contamination of foods. Food adulteration – common adulterants – health hazards. Tests to detect adulterants in food. Pesticides-Mechanisms of Toxicity- Residues in Food, Acceptable daily limits. FosTac - Food Safety Training and Certification, Sensory Evaluation of Food Quality – Introduction - Panel Screening - Selection of Panel Members Objective/ Instrumental analysis of Quality Control. Statistical Quality Control of Foods Determination of Sensory thresholds and taste Interactions. Fundamentals of Food regulations-pertaining to Additives and Contaminants, SOP for Milk and milk products, Meat products, Fruit and vegetable products. Safety in handling of Food Additives.

Practical

Visit to FSSAI, FCI, AGMark, Sensory and nutritional evaluation of some finished products. Detection of adulterants and preservatives in products. Identification of food logos. Study of food labelling. Identification of critical control points in a product line. Sensory evaluation of different food samples. Visit to quality control laboratory/food processing industries and note the procedures and parameters used for quality assessment. Estimation of quality parameters- cereals, pulses, fruits and veg. Market survey and quality analysis of street foods. Estimation of quality parameters – cereals, pulses, fruits and vegetables - Evaluation of food quality – objective and subjective methods- Market survey and quality analysis of street foods.

Suggested Readings

- Detect Adulteration with Rapid Test (DART) booklet fssai https://www.fssai.gov.in/flipbook. php?bookid=201#book2/7
- Food Safety and Standards (Food Products Standards and Food Additives) Regulation, 2011.
- Jellinek, G. 1985. Sensory Evaluation of Foods: Theory and Practice. Ellis Honwood Ltd. Chichester, England.
- Kalia, M. and Sood, S. 2010. Food Preservation and Processing. Revised edn. Kalyani Publishers, New Delhi
- Manual of Food Standards and Quality Control. 2014. Dept. of Foods and Nutrition, CCS HAU, Hisar.
- Patricia and Cuuring A. An operational Text book, guide to Food Laws and Regulations.
- Potter, N.N. 1996. Food Science. The AVI Publishing Company Inc., Westport, Connecticut.
- Radonit Lassztity. 2008. Food Quality and Standards. Encyclopedia of Life effort systems. USA.

SMDC222 **Agriculture Marketing and Trade** **3 (2+1)**

Objectives

1. To understand the fundamentals of agricultural marketing and trade
2. To analyze the factors influencing supply and demand in agricultural markets
3. To explore different marketing channels and strategies in agriculture
4. To examine the role of government policies and regulations in agricultural markets

Theory

Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets; demand, supply and producer's surplus of agri commodities: nature and determinants of demand and supply of farm products, producer's surplus – meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities; pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing; market promotion – advertising, personal selling, sales promotion and publicity – meaning, merits and demerits; marketing process and functions: Marketing process concentration, dispersion and equalization; exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labeling (Agmark); Market functionaries and marketing channels: Types and importance of agencies involved in agricultural marketing; meaning and definition of marketing channel; number of channel levels; marketing channels for different farm products; Integration, efficiency, costs and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs; Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP and DMI – their objectives and functions; cooperative marketing in India; Risk in marketing: Types of risk in marketing; speculation and

hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for innovations in agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR. Role of government in agricultural marketing. Role of APMC and its relevance in the present day context.

Practical

Plotting and study of demand and supply curves and calculation of elasticities; Study of relationship between market arrivals and prices of some selected commodities; Computation of marketable and marketed surplus of important commodities; Study of price behavior over time for some selected commodities; Construction of index numbers; Visit to a local market to study various marketing functions performed by different agencies, identification of marketing channels for selected commodity, collection of data regarding marketing costs, margins and price spread and presentation of report in the class; Visit to market institutions –NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning. Application of principles of comparative advantage of international trade.

Suggested Readings

- Acharya, S.S. and Agarwal, N.L., 2006, Agricultural Marketing in India, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
- Chinna, S.S., 2005, Agricultural Economics and Indian Agriculture. Kalyani Pub, N Delhi.
- Dominic Salvatore, Micro Economic Theory
- Kohls Richard, L. and Uhl Josheph, N., 2002, Marketing of Agricultural Products, Prentice-Hall of India Private Ltd., New Delhi.
- Kotler and Armstrong, 2005, Principles of Marketing, Pearson Prentice-Hall.
- Lekhi, R. K. and Joginder Singh, 2006, Agricultural Economics. Kalyani Publishers, Delhi.
- Memoria, C.B., Joshi, R.L. and Mulla, N.I., 2003, Principles and Practice of Marketing in India, Kitab Mahal, New Delhi.
- Pandey Mukesh and Tewari, Deepali, 2004, Rural and Agricultural Marketing, International Book Distributing Co. Ltd, New Delhi.
- Sharma, R., 2005, Export Management, Laxmi Narain Agarwal, Agra.

SNCC221 National Cadet Corps (NCC-IV) 1 (0+1)

- Introduction to map, scales, and conventional signs. Topographical forms and technical terms.
- The grid system. Relief, contours, and gradients. Cardinal points and finding north. Types of bearings and use of service protractor. Prismatic compass and its use. Setting a map, finding north and own position. Map to ground and ground to map. Knots and lashings, Camouflage and concealment, Explosives and IEDs.
- Field defenses obstacles, mines and mine lying. Bridging, waterman ship. Field water supplies, tracks and their construction. Judging distance. Description of ground and indication of landmarks. Recognition and description of target. Observation and concealment. Field signals. Section formations. Fire control orders. Fire and movement. Movement with/without arms. Section battle drill. Types of communication, media, latest trends and developments.

SNSS221 **National Service Scheme (NSS-IV)** **1 (0+1)**

- Youth and crime: Sociological and psychological factors influencing youth crime,
- Cybercrime, pear mentoring in preventing crime and awareness for juvenile justice. Civil/self-defence:
- Civil defence services, aims and objectives of civil defence; needs and training of self-defence Resource mobilization:
- Writing a project proposal of self-fund units (SFUs) and its establishment
- Additional life skills: Positive thinking, self-confidence and esteem, setting life goals and working to achieve them, management of stress including time management.

Post- IV Semester Internship (Only for exit option for award of UG- Diploma)

S. No.	Course Title	Credit Hours
1.	Internship (10 weeks)	**10 (0+10)***

*Mandatory requirement for UG-Diploma.

III Year I Semester

SAEG311 **Current Food Processing Technologies** **3 (2+1)**

Objectives

1. To explain major food preservation techniques and underlying principles
2. To understand the technology available for food processing
3. To determine suitable methods of processing techniques for a chosen food
4. To understand novel food processing methods including non-thermal food processing techniques
5. To understand the purpose and principles of food packaging
6. To develop an understanding of major packaging materials used in food packaging
7. To evaluate the suitability of packaging material for a particular type of food
8. To understand the operations involved in packaging material manufacture
9. To gain knowledge of the legal, environmental and quality aspects associated with packaging materials and operations used in the food industry

Theory

Current scenario in food processing industry, post-harvest loss and losses in post-harvest operation. Upcoming trends in food processing-thermal treatment, ultrasound, freezing, pulse electric field, shockwave technology. Minimal processing- application of Ultra sonic food processing techniques – membrane processing – applications in food processing industries – robotics – applications and opportunities – issues and obstacles Food preservation using chemicals, radiation and hurdle technology. Nanotechnology in food preservation, food processing, agriculture and in packaging. Processing of convenient cereals and millets, processing of pulses and legumes, oilseed processing. Principle and method of preservation by-pasteurization, canning, bottling, sterilization. Advance dehydration technologies- Freeze drying, microwave dehydration, electric dehydrator, osmotic dehydration, hybrid drying technologies, vacuum drying methods, spray drying methods. High pressure processing-principle, safety and stability of high-pressured processed food. Encapsulation technology – principle, mechanism involved, encapsulation agents and uses. 3D printing and application in food manufacture. Government policy on import and export of processed fruits and vegetables.

Practical

Processing of breakfast cereals, Processing of pulses into flour, flakes and fermented Demonstration of dehydration of foods via- freeze drying, osmotic dehydration, spray drying, vacuum drying, microwave dehydration. Processing of fruits and vegetables via- canning using brine and syrup. Blanching in food items. 3D printed foods. Preservation using pasteurization and sterilization. Visit to food processing unit and nanotechnology lab.

Suggested Readings

- Chakraverty (1995). Post-harvest technology of cereal, pulses and oilseeds, 3rd edn. Oxford and IBH publishing co., Pvt. Ltd.
- Fellows PJ (2017). Food Processing Technology, Principles and Practice.4thEdition, Wood head Publishing Ltd. Cambridge.

- Hartel R W and Heldman D (2012). Principles of Food Processing. Aspen Publishers Inc. New York.
- Potter N N (2003). Food Science, AVI publishing company, INC, West Port, Connecticut.
- Shafiur Rahman M (2007). Hand book of food preservation. 2nd edn. Published by CRC Press, London.
- Sivshankar B (2002). Food Processing and Preservation. Prentice-Hall of India Pvt. Ltd. Delhi.
- Srivastava R P and Kumar Sanjeev (1994). Fruit and vegetable preservation, International book distributing Co. Lucknow.

SAST311 **Statistical Methods** **3 (2+1)**

Objectives

1. Organize, manage and present data
2. Analyze statistical data graphically using frequency distributions and cumulative frequency distributions
3. Analyze statistical data using measures of central tendency, dispersion and location
4. Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events
5. Translate real-world problems into probability models
6. Derive the probability density function of transformation of random variables
7. Calculate probabilities, and derive the marginal and conditional distributions of bivariate random variables
8. Analyze Statistical data using MS-Excel

Theory

Introduction to Statistics and its Applications in Agriculture, Graphical Representation of Data, Measures of Central Tendency & Dispersion, Definition of Probability, Addition and Multiplication Theorem (without proof). Simple Problems Based on Probability. Binomial & Poisson Distributions, Definition of Correlation, Scatter Diagram. Karl Pearson's Coefficient of Correlation. Linear Regression Equations. Introduction to Test of Significance, One sample & two sample test t for Means. Chi-Square Test of Independence of Attributes in 2 × 2 Contingency Table. Introduction to Analysis of Variance, Analysis of One-Way Classification. Introduction to Sampling Methods. Sampling versus Complete Enumeration, Simple Random Sampling with and without replacement. Use of Random Number Tables for selection of Simple Random Sample. Introduction to various statistical packages.

Practical

Graphical Representation of Data. Measures of Central Tendency (Ungrouped data) with Calculation of Quartiles, Deciles & Percentiles. Measures of Central Tendency (Grouped data) with Calculation of Quartiles, Deciles & Percentiles. Measures of Dispersion (Ungrouped Data). Measures of Dispersion (Grouped Data). Moments, Measures of Skewness & Kurtosis (Ungrouped Data). Moments, Measures of Skewness & Kurtosis (Grouped Data). Correlation & Regression Analysis. Application of One Sample t-test. Application of Two Sample Fisher's t-test. Chi-Square test of Goodness of Fit. Chi-Square test of Independence of Attributes for 2 × 2 contingency table. Analysis of Variance One Way Classification. Analysis of Variance Two Way Classification. Selection of random sample using Simple Random Sampling. Use of software packages.

Suggested readings

- Agarwal, B. L. 2006. Basic Statistics. New Age International Publisher.
- Sprent P. 1993. Applied Non-Parametric Statistical Methods. 2nd edn. Chapman and Hall.
- Wetherill GB. 1982. Elementary Statistical Methods. Chapman and Hall.
- William S. Cleveland (1994) The Elements of Graphing Data, 2nd edn, Chapman and Hall

SEDT311 **Educatioal Tour (Non-gradial)** **2 (0+2)**

There will be a educational tour of 10-14 days duration during the 5th semester of the UG programme. The students will preferably visit the leading industries / enterprises / institutions / organizations and other places of academic interest outside the state (of location of the institutions). This, in addition to exposeing the students to the indigenous as well as the latest technolgies in their related fields, will also help the students to know about the socio-economic-cultral variations within the country. The course will be of 0+2 credits, non-gradial.

SFND311 **Therapeutic Nutrition** **4 (3+1)**

Objectives

By the end of the course the students will be able to

1. Acquire basic knowledge of nutrient requirements, recommended dietary allowances, and dietary modification under different physiological conditions
2. Acquire basic knowledge of food groups, food exchange system and their nutritional significance, and application of knowledge acquired for healthy eating
3. Develop practical skills in planning and management of diets for the different age groups under normal/ physiological conditions keeping in mind the dietary guidelines
4. Gain knowledge on the nature and scope of therapeutic nutrition; and understand the principles of dietary modification and apply in planning
5. Understand nutrition-related diseases of the: gut, liver, gallbladder, pancreas, and heart
6. Know the etiology, incidence, nature, clinical symptoms, diagnosis, and medical and dietary management of disease
7. Modify the diet plans to suit the disease condition

Theory

Terminologies used in the therapeutic nutrition; Use of food groups and food pyramid. Importance and components of diet history; Different principle of therapeutic diets, Therapeutic modifications of normal diet in terms of consistency and nutrients; Normal and artificial feeding methods, Role of Dietician in medical nutrition therapy, Diet during malnutrition- under nutrition and over nutrition; Diet during infection and fever; Diet during Gastro intestinal disorder-esophagitis, diarrhea, constipation, peptic ulcers, IBD/IBS. Liver and gall bladder disorders-dietary management of jaundice, hepatitis, liver cirrhosis, cholelithiasis. Kidney disorders-dietary management of nephrosis, nephritis, renal failure, renal calculi and dialysis. Arthritis and gout, cardiovascular disorders- dietary management of atherosclerosis, hypertension and stroke and congestive heart failure. Diabetes mellitus- dietary management during diabetes mellitus and complications, glycemic index and glycemic load of food items. PCOD/PCOS: etiology, signs

and symptoms, types, risk factors and dietary management. Cancer- dietary management; inborn errors of metabolism; allergies and intolerance, burns and trauma; Common auto immune diseases/ disorders.

Practical

Planning of food exchange list, taking diet history. Planning and preparation of diet modified in consistency and nutrients for severely ill patients. Plan a diet for artificial feeding patients. Plan a diet patient with malnutrition, infections and fevers - PEM, typhoid, tuberculosis, and influenza. Plan a diet for a patient with during atherosclerosis, hypertension. Plan a diet for patient with diarrhea, constipation, peptic ulcers and esophagitis. Plan a diet for a patient suffering from liver cirrhosis, jaundice, hepatitis and cholelithiasis. Plan a diet for a diabetic patient. Plan a diet of a patient renal failure, renal calculi. Plan a diet for a patient with cancer.

Plan a diet for patient with lactose intolerance and celiac diseases.

Suggested Readings

- Corinne H. Robinson, Marilyn, R. Lawler, Wanda L. Chenoweth and Ann E. Garwick. 2013. Normal and therapeutic Nutrition (pp-1-16). New York, Macmillan Publishing Company.
- Mahan, L.K. and Escott-Stump, S. 2000. Krause's Food, Nutrition and Diet Therapy, W.B. Sanders Company, Philadelphia.
- National Institutes of Health Diet History Questionnaire. Diet History Questionnaire (nih. gov)
- Raghuvanshi, R. S. and Mittal, M. 2014. Food Nutrition and Diet Therapy. India: Westville Publishing House New Delhi.
- Raghuvanshi R.S. and Mittal M. 2016. Clinical Nutrition *Chikitskeey Poshan.* Vikas Publishing House Pvt. Ltd. New Delhi.
- Sharma, A. 2017. Principles of Therapeutic Nutrition and Dietetics. CBS.

SFND312 **Food Analysis** **3 (2+1)**

Objectives

1. To impart knowledge to students on principles and techniques of food analysis by using physical, chemical, biological methods
2. To apply their knowledge and skills acquired to solve real-world problems associated with food analysis

Theory

Terminologies associated with food analysis, Rules and regulation of food analysis. Different official methods of analysis. Familiarization to terms and calculations used in preparation of various standard solutions. Sample and sampling techniques. Principles, techniques and applications of: spectrophotometer, colorimeter, pH meter, refract meter, electrophoresis, centrifuge, HPLC, GLC, TLC, GCMS, UPLC, AAS, AES. Proximate composition analysis methods. Moisture analysis- direct and indirect methods of analysis. Protein analysis method – dumas, Biuret, Lowry's, dye binding and Spectroscopy method, amino acid analyzer.

Mineral analysis- dry ashing, wet ashing, titrimetric, gravimetric, colorimetric and instrumental methods-AAS, AES. Physical characteristic of foods, rheological properties of food. Anti-nutrients in foods: phytate, tannins, oxalates, saponins, trypsin and chymotrypsin. Animal assay: Principles, techniques and applications. Principles for estimation of water- and fat-soluble vitamins.

Practical

Orientation of food analysis laboratory. Calculation and preparation of various standard solutions. Preparation of sample for food analysis. Proximate composition of analysis- moisture, Kjeldahl method of protein analysis, Fat analysis – soxhlet, soxplus, estimation of free fatty acid (FFA), ashing and CHO by difference. Estimation of sugar, reducing and non-reducing sugars and starch. Mineral analysis- iron, calcium. Testing acidity of foods. Estimation of anti-nutrients: phytate/ tannins/oxalates/saponins. Estimation of rancidity in foods and peroxide values. Functioning and use of HPLC, GLC and pH meter, GCMS, UPLC. Visit to food quality control lab.

Suggested Readings

1. AOAC.2012. Association of official analytical chemists. Washington, DC.
2. Nielsen. S. 2010. Food Analysis, Springer Science and Business Media Pub.
3. Oser, B.L. 1979. Hawk's physiological chemistry. Tata Mc Graw Hill Pub. Co. Ltd., New Delhi.
4. Pearson, D. 1973. Laboratory Techniques in Food Analysis. United States: Wiley.
5. Pomeranz, Y. 2013. Food Analysis: Theory and Practice. United States: Springer US.
6. Raghuramulu, N., Madhavan Nair, K. and Kalyanasundaram, S. 2003. A manual of laboratory techniques. National Institute of Nutrition (India).
7. Ranganna, S. 2000. Handbook of Analysis and Quality Controlfo Fruit and Vegetable Products. Tata McGraw-Hill.

SFND313 **Diet and Nutrition Counselling** **3 (0+3)**

Objectives

1. To understand, critically assess and know how to use and apply information sources related to nutrition, food, lifestyle and health
2. To be able to provide nutrition counselling and education to individuals, groups, and communities throughout the lifespan using a variety of communication strategies

Practical

Qualities of counsellor (confidence, knowledge, communication skills, patient listener, empathetic. Self- assessment of role as a dietitian – Pre-test on role, summary of competencies. Developing diet history questionnaire and taking diet history. Preparation of standard protocol based on case studies and group discussion. Preparation of overweight and underweight fact list handout and development of counselling guidelines for weight loss and weight gain. Weight loss counselling – Use of role play technique, counselling on diet, exercise and life style Visit to hospitals with therapeutic kitchen setup. Diabetic diet counselling development of dietary fat facts list, cholesterol facts list, sodium facts list. Development of dietary counselling tips for different cardiovascular disorder and counselling; cardiac patients using role play technique.

presentation in gathering. Diet exhibition cardiovascular disorders in a specialty hospital / general hospital, preparation of handouts on ulcer facts list, high fibre facts list, low residue facts list, low lactose facts list, counselling for patients suffering from diarrhoea, constipation, gastro-esophageal reflex (GERD, colitis, diverticulosis and ulcer. Preparation of SOAP notes and gall bladder facts list handout and counselling a patient of gall stones. Preparation of liver disease facts list handout, collection of case history of patient suffering from hepatitis, cirrhosis of liver, alcoholics. Counselling the patient and conducting group discussion. Preparation of kidney disease facts list handout and development of counselling tips for kidney disorders, dietary counselling in a specialty hospital / diet and nutrition counselling centre for kidney disorder and diet exhibition for kidney disorder. Preparation of cancer facts list handout, Preparation of list of parenteral and enteral products available in the market for use during counselling. Setting up a unit for nutrition counselling. Role play exercises for counselling. Supervised counselling of patients/clients.

Suggested readings

- Antia, P. 1986. Clinical dietetics and nutrition. Oxford univ. Bombay.
- Corinne, H. Robinson, Lawler, Marilyn R., Chenoweth, Wanda L., Garwick, Ann E. 1982. Normal and Therapeutic Nutrition. (Pp- 1-16). New York, Macmillan Publishing Company
- Moris, E.S. 1994. Modern nutrition in health and disease. Leaned Febiger, USA.
- ICMR. 2020. Recommended Dietary allowance for Indians, ICMR, Delhi.
- Park, K. 1997. Textbook of Preventive and Social Medicine. 1st edn. Jabalpur: Banarsidas Bhanot.
- Raghuvanshi, R. S. and Mittal, M. 2014. Food Nutrition and Diet Therapy. India: Westville Publishing House, New Delhi.
- Raghuvanshi R.S. and Mittal M. 2016. Clinical Nutrition *Chikitskeey Poshan*. Vikas Publishing House Pvt. Ltd. New Delhi.
- https://aghealth.nih.gov/collaboration/qx/dhq.pdf.
- Dietary Guidelines for NIN website. pdf.

SFND314 **Nutraceuticals and Health Foods** **2 (2+0)**

Objectives

1. To provide an overview of the field of functional foods, nutraceuticals and natural health products
2. To understand the functional food concept as related to ingredient efficacy and safety
3. To familiarizes students with: examples of bioactive ingredient-disease relationships and the importance of clinical study support; regulatory aspects of functional foods; requirements for standards of evidence of efficacy for health claims; and market determinants of the functional food industry

Theory

Nutraceuticals and functional food definition, synonymous terms, basis of claims for a compound as a nutraceutical, regulatory issues including CODEX, FSSAI Regulation. Classification of nutraceutical substances based on food sources and based on mechanism of action, and based on chemical nature. Nutrition claims by FSSAI. Regulatory issues for

nutraceuticals including national and international standards. Potential health benefits of major nutraceuticals, omega-3, lycopene, isoflavonoids, prebiotics and probiotics, glucosamine, phytosterols etc, Metabolism, bioavailability and pharmacokinetics of nutraceuticals. Concept of angiogenesis, nutraceuticals for joint heath, cardiovascular diseases, cancer, diabetes, obesity, eye health, cholesterol management. mental health, immune enhancement, age-related macular degeneration, endurance performance and mood disorders. Clinical testing of nutraceuticals and health foods - interactions of prescribed drugs and nutraceuticals; adverse effects and toxicity aspects of nutraceuticals; Nutrigenomics – an introduction and its relation to nutraceuticals. Current research in functional foods.

Suggested Readings

1. Robert EC. 2013. Handbook of Nutraceuticals and Functional Foods. 2nd edn. Wildman. CRC Press.
2. Food Safety and Standards (Health Supplements, Nutraceuticals, Food for Special Dietary Use, Food for Special Medical Purpose, Functional Food and Novel Food) Regulations, 2016.
3. Microsoft Word - 5925gi.doc (fssai.gov.in)
4. Rotime E Aluko. 2012. Functional Foods and Nutraceuticals. Springer Publ.
5. Saarela M. 2011. Functional Foods. 2nd edn. Elsevier Publ.
6. Sarkate AP, Patil MA and Aghar de PV. 2021. Nutraceuticals and Human Health. Brillion Publishing.

SFND315 **Introduction to Clinical Nutrition** **3 (2+1)**

Objectives

1. To acquire a basic understanding of the various clinical changes related to nutrition, which are seen in different diseases, both deficiency and otherwise
2. To understand the etiology, prevalence, clinical signs and symptoms of nutritional deficiency diseases (Vitamin A deficiency, anemia, IDD, PEM etc.)
3. To gain understanding of physiology in health and pathophysiology in disease complications occurring in various conditions and the inter relationships thereon

Theory

Metabolic changes and clinical diagnosis in various diseases: Nutrient deficiency diseases like Anemia, vitamin B complex deficiencies, Vitamin A deficiency disease, Iodine deficiency disorders, Calcium and vitamin D deficiency diseases, ascorbic acid deficiency. Metabolic changes and clinical diagnosis in degenerative diseases: Diabetes, Cardiovascular diseases, renal disorder, liver diseases, cancer. Normal cut-off values for blood and urine parameters. Interpretation of report of blood and urine in different disease conditions. Drug and nutrient interaction, effect of drugs on nutritional status. Effect of diet and nutritional status on drug effectiveness. Depletion and repletion studies; Nutrient balance studies; Use of isotopically labelled nutrients. Nutrition screening and assessment methods (Mini Nutritional Assessment (MNA), Subjective Global Assessment (SGA), Patient-Generated Subjective Global Assessment (PG- SGA), Malnutrition Universal Screening tool (MUST), disease specific tools. Nutrition care process- Assessment, Diagnosis, Interpretation, Monitoring, and Evaluation (ADIME).

Practical

Identification and interpretation of clinical signs of nutritional deficiency diseases-sampling of blood and urine for nutritional status, estimation of hemoglobin. Estimation of glucose in blood and urine in normal and diabetic persons. Estimation of lipid profile in normal and heart patients. Estimation of Glycosylated Hemoglobin, Estimation of serum total protein and serum albumin, visit to a clinical laboratory.

Suggested Readings

1. Bamji, M.S, Krishnaswamy, K. and Brahmam, GNV. 2019. Textbook of Human Nutrition. 4th ed. Oxford and IBH Publishing Co Pvt. Ltd
2. Connie, W. B. and Christine, S. R.2016. Handbook of Clinical Nutrition and Ageing. Humana Press.Gibney, M. J., Elia, M., Ljungqvist, O. and Dowsett, J. 2013. Clinical Nutrition. Wiley Blackwell Publishing Company, Boston.
3. Gibney, M. J., Macdonald, I. A. and Roche, H. M. 2011. Nutrition and Metabolism. Wiley Blackwell Publishing Company, Boston.
4. Gopalan C. and Krishnaswamy K. 2000. Nutrition in Major Metabolic Diseaes. Oxford University Press, New Delhi
5. Joshi, Y.K. 2004. Basics Of Clinical Nutrition. Jaypee Brothers
6. Lee, R.D. and Nieman, D.C. 1993. Nutritional assessment. Pub. Brown and Benchmark, USA.
7. Pathak, N.N. 1997. Analytical techniques in clinical nutrition (manual); Centre of Advanced Studies in animal nutrition IVRI, Izatnagar.
8. Oser, B.L. 1979. Hawk's physiological chemistry. Tata Mc Graw Hill Pub. Co. Ltd., New Delhi
9. Raghuvanshi, R. S., Mittal, M. 2014. Food Nutrition and Diet Therapy. India: Westville Publishing House New Delhi.
10. Width, M. and Reinhard, T. 2017. The Essential Pocket Guide for Clinical Nutrition. LWW Pub.
11. https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=NuAs6SreCGryddEfs4kkBA=

III Year II Semester

SAMB322 **Food Microbiology** **3 (2+1)**

Objectives

1. To understand scope of food microbiology and food safety
2. To understand important genera associated with food
3. To learn techniques for enumeration of microbes and methods (traditional to advanced) for preserving food
4. To understand role of different microorganisms in food spoilage, food fermentation and food- borne diseases
5. To learn about microbiological quality control and food-borne illnesses investigation procedures for ensuring food safety and hygiene
6. To learn food safety rules and regulations, Food Safety Management System (FSMS), and Microbiological Risk Assessment

Theory

The discovery of micro-organism, spontaneous generation conflict, germ theory of diseases, microbial effect on organic and inorganic matter. Development of microbiology in India and composition of microbial world. Difference between prokaryotic and eukaryotic cells. Basic aspects and scope of food microbiology; Intrinsic and extrinsic factors that affect microbial growth in foods. Food preservation - Physical methods. Chemical preservatives and natural antimicrobial compounds, biology-based preservation system. Importance and scope of microorganisms in food. Primary sources of microorganisms in food. Assessment of microbial load in foods-microscopic, cultural, immunological and DNA based methods. Fermentation: methods, applications, fermented foods. Lactic acid bacteria – production of cultures for food fermentation. Fermented foods-cereals, dairy products, vegetables and fruits. - bread, beer, yoghurt, butter, cheese, kefir, kumiss, sauerkraut, olives, pickles, wine, vinegar. Control of microorganisms by use of low and high temperature, asepsis, water activity, drying, preservatives, radiation and pressure for control of microorganisms; Microbiology of milk and milk products; Sources of contamination, spoilage and prevention; Microbiology of fruits and vegetables; cereal and cereal products; meat and meat products; fish and other sea foods; poultry and eggs; sugar and sugar products; salts and spices; contamination, spoilage and prevention. Microbial spoilage of fruits, fruit juices, vegetables, cereals, meat, poultry, sea foods, carbonated soft drinks, canned foods; chemical changes caused by microorganisms; control of spoilage. Food borne diseases and safety measures. Present problem in food production/ food processing / fresh food handling industries are facing several restrictions in different stages both from domestic and global players and consumers.

Practical

Changes in practices: General laboratory practices in microbiology laboratory, Equipment used in food microbiology laboratory, Aseptic methods, Sterilization methods, Morphological studies, Preparation of media, Isolation and enrichment of microorganisms, Microbial analysis of food products and water. Isolation of molds from foods. Microbial examination of cereal and cereal products, vegetable and fruits, meat and meat products, fish and other sea foods, Eggs and poultry, milk and milk products; sugar, salts and spices. Preparation of fermented whey beverages.

Suggested Readings

1. Adams, MR and Moss MO. 2008. Food Microbiology, 3rd edin, RCS publishing, UK
2. Frazier J and Westhoff DC. 2017. Food microbiology. 5th edn. McGraw Hill.
3. Jay JM, Loessner MJ and Golden DA. 2005. Modern food microbiology. 7th edn. Springer.
4. Ray B. 2004. Fundamentals of food microbiology.3rd edn. CRC.
5. Steinkraus, KS. 1996. Handbook of Indigenous Fermented Foods. Marcel Dekker
6. http://www.gitam.edu/eresource/environmental/em_maruthi/food.htm
7. http://www.cdc.gov
8. http://www.asm.org/division/w/web-sites.htm
9. http://www.fda.gov/downloads/Food/FoodborneIllnessContaminants/UCM297627.pdf

SFND321 **Food and Nutrition Security** **2 (1+1)**

Objectives

1. To explain the concepts of food and nutrition, malnutrition, food security and livelihoods. Understanding these concepts is important to assess the nutrition situation, design and implement programs, investments and policies that address nutrition problems (also called nutrition- sensitive), and evaluate the nutritional outcomes of programs, investments and policies.
2. To introduce the concepts and tools used in food security analysis. It defines food security and its relationship to the concepts of vulnerability, hunger, malnutrition and poverty
3. To provide guidelines on how to interpret and use conceptual frameworks for analyzing food security

Theory

Food Security: Concept and definition, pillars and determinants. Global Food Security Index. Global hunger index and its indicator and how they measured. Global challenges to food and nutrition security. Inter- relationship between hunger and food insecurity. Strategy to achieve food security at household, national and global level. Role of nutrition in human health and sustainable development. Relationship between nutrition, diet and lifestyle. Growing global concern for non- communicable diseases. Opportunities and challenges of nutrition and food preferences as a means of preventing the spread of chronic and non- infectious diseases. Impact of social, cultural and economic factors on the food and nutrition security. Nutrition security: Concept and definition, pillars and determinants. Nutrition sensitive approaches to combat malnutrition. Dietary diversity for nutrition security. Dietary diversification through utilization of bio-fortified crops, indigenous and under-utilized foods. Millennium Development Goals, Sustainable Development Goals (SDG) II and way ahead. National and international policies and programs related to food and nutrition security: POSHAN Abhiyan, NARI (Nutri-sensitive Agricultural Resources and Innovations), NFSA (National Food Security Act), NFSM (National Food Security Mission), NNM (National Nutrition Mission), WFP (World Food program), FAO (Food and Agricultural Organization). Public distribution system in context to food and nutrition

security, International Fund for Agriculture Development (IFAD) etc.

Practical

Household survey for assessment of indicators of Food insecurity. Proforma dev, survey, report writing, validation. Assessment of dietary diversity, quality, food security, nutrition security. Food product development and formulation for intervention of nutri-sensitive approaches and strategies to eradicate poverty and malnutrition. Impact of nutritional policies and programs on the nutritional status of the vulnerable group. Framing questionnaire to conduct dietary survey – using Food Frequency Questionnaire.

Suggested Readings

- Coates et al. 2007. Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access: Indicator Guide. Version 3.
- Ruel, M. T., Garrett, J., Yosef, S., and Olivier, M. 2017. Urbanization, food security and nutrition. Nutrition and health in a developing world, 705-735.
- Pingali, P., Alinovi, L., and Sutton, J. 2005. Food security in complex emergencies: enhancing food system resilience. Disasters, 29(s1), 5-24.
- Raghuvanshi R.S. 2013. Nutritional Security through Diversified Food Production. In Agrarian Change and Small Farmers, Super markets, Viability and Food Policy. Ed. by K.N. Bhatt and Pradeep Bhargava, Concept Publishing Company PVT. LTD., New Delhi
- Sunderland, T., Powell, B., Ickowitz, A., Foli, S., Pinedo-Vasquez, M., Nasi, R., and Padoch, C. 2013. Food security and nutrition. Center for International Forestry Research (CIFOR), Bogor, Indonesia.
- Swindale, A., and Bilinksy, P. 2006. Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide. Vol. 2. Washington, D.C.: FHI 360/ FANTA.
- Willett, W. 2013.Nutritional Epidemiology, Oxford University Press.

SFND322 Nutrition, Body Composition and Physical Fitness 3 (2+1)

Objectives

1. To provide understanding of the interactions between nutrition and exercise by integrating metabolism and physiology concepts in the context of recreational physical fitness training
2. To identify and describe disordered eating and exercise patterns
3. To gain an understanding of the training and experience necessary to obtain various nutrition and exercise credentials

Theory

Body composition, methods of assessment- tools and techniques, changes in Body composition with age and fitness. Interrelationship between physical fitness and performance. Basic structure of a muscle with the help of a diagram - Functions and locations of muscles in the body - muscle groups –Major skeletal muscles. Basics of exercise regime - FITT formula – Frequency, Intensity, Time and Type of exercises for fitness. - Warm up exercises - Cool down exercises: Exercises - Benefits of regular and adequate exercise - Types of exercises and health benefits with suitable examples. Anaerobic exercises Flexibility exercises. Effect of nutrition in physical fitness and sports performance and athletics. Concept of energy balance - factors affecting energy – equations to assess BMR. . Aerobic exercise to increase cardiovascular endurance – benefits and examples -Treadmill, Elliptical cycle, Stationary cycle. Aerobics

workouts Macronutrients metabolism in exercise – Carbohydrates: lactose intolerance, Diabetes, hypoglycemia; Lipids and Oils, Fatty Acids, Triglycerides, Phospholipids, Sterols. Functions of fats, needs, deficiencies. Role of water and electrolytes in performance. Vitamins metabolism in sports - Free radicals in exercise role of antioxidants in exercise - Minerals and trace minerals metabolism in exercise and essential minerals and trace minerals in sports. Sports nutrition products - supplements related to energy metabolism - weight reduction and botanical and herbal supplements - sports nutrition theory to practice –, Special consideration in sports nutrition- Women, young, diabetic, vegetarian athletes - Sport specific nutrition – Gymnastics, weight lifters, skiers, cyclists, swimming, skating, Winning recipes for peak performance. Assessment of Physical fitness Functional tests: Cardiorespiratory and muscular assessment; Type of measurement and protocol for evaluation and interpretation of performance; Aerobic Power or VO2max; Anaerobic Threshold; Economy of Movement. Fitness assessment: Types of exercise, Components of physical fitness and its evaluation in health and performance. Activity Recording: Self-reporting of activities vs. Direct monitoring of activities. Techniques to measure energy expenditure and energy intake. Techniques to assess physical fitness. Aging theories, physiology, mechanism and role of nutrients in arresting aging process.

Practical

Recording of Dietary intake by 24-hour recall method for 3 consecutive days. Recording of energy expenditure by 24-hour recall method by using multipliers for 3 consecutive days. Calculation of energy balance by using above data. Demonstration and use of body composition analyzer calculation of total fat and fat free muscle mass. Calculation of fat % and BC of adults, equations to assess BMR. Physical tests: Harvard STEP test, Treadmill test to assess heart health, muscular grip test. Visit to established fitness center.

Suggested Readings

1. Falkner, F. and Tanner, J. M. 1978. Human growth - Principles and prenatal growth. Vol. I.
2. Falkner, F. and Tarnner, J. M. 1980. Human growth methodology. Ecological, genetic, and nutritional effects on growth. Vol. III. Plenum Press.
3. Heather, Hedrick Fik and Mikesky, Alan E. 2015. Practical Application in Sports and Nutrition. 4th edn. Jones and Bartlett Learning, Burlington, MA 01803.
4. Srilakshmi, B., Suganthi, V., Ashok and Kalaivani, C. 2017. Exercise Physiology Fitness and Sports Nutrition. 1st edn. New Age International (P) Ltd. Publishers, New Delhi.
5. Tindall, Falkner F and Tarnner, JM. 1980. Human Growth Methodology.
6. https://egyankosh.ac.in/bitstream/123456789/42208/3/Unit-3.pdf.

SFND323 **Milk Processing and Technology** **3 (2+1)**

Objectives

1. To understand chemistry of milk constituents. Milk and various dairy products are discussed from the perspective of the chemical, physical and biological changes that occur during processing
2. To be able to describe the composition of milk, identify the approximate content of individual

types present, and describe physicochemical characteristics of the main components

3. To learn to integrate knowledge of food chemistry/engineering/microbiology and physical properties of foods to understand the processing of dairy products
4. To be able to explain how dairy products (such as fluid milk, yogurt, butter, powder, cheese) are made and the key functions of the processing steps involved

Theory

Introduction, importance and scope of fluid milk industry in India and abroad: Brief history and present status. Composition of milk, nutritive value of milk of cow and buffalo. Physico-chemical properties of milk and milk constituents: Physical state, acidity, pH, density and specific gravity, freezing point, color and flavor. Microbiology of milk. Types of microorganisms, their production and consequent results in milk production. Types of milk: Sterilized Milk; Homogenized Milk; Flavored Milks; Standardized Milk; Reconstituted/Re-hydrated Milk; Recombined Milk; Toned Milk. Milk products- traditional products- butter, ghee, khoa, cheese in theory. Steps of milk processing: collection, chilling, standardization, pasteurization, homogenization, bactofugation, and principles of dehydration. Management of processing plant: Various kinds of designs and layouts of plants Value addition for fluid milk. Fortification of milk Waste management, Quality control aspects of milk: Status of antibiotics, pesticides, heavy metals etc., good manufacturing practices, implementation of HACCP standards, cleaning and sanitization of fluid plant: Indian standards for milk and milk products as per PFA, BIS, AGMARK etc., cleaning and sanitization procedures. Judging and grading of milk, defects in milk, their causes and prevention.

Practical

Platform test of raw milk (clot on boiling (COB) test, alcohol test). Adulteration in milk and its detection. Sampling of milk. Estimation of fat, SNF, TS platform tests. Cream separation. Detection of adulterants Microbiological quality evaluation of milk and milk products Preparation of milk products. Paneer, chenna, ice-cream, khoa, burfi, flavored milk, rasogulla. Visit to modern milk processing and manufacturing plants.

Suggested Readings

1. Aneja R.P., Mathur B.N., Chandan R.C. and Banerjee A.K. 2002. Technology of Indian milk products. Dairy India Yearbook
2. Lampert L.M. 1970. Modern dairy products. Chemical Publishing Company Inc. New York
3. Srinivasan M. R. and Anantkrishanan C.P. 1964. Milk Products of India
4. Sukumar De. 2001. Outlines of dairy technology Oxford Uni. Press New Delhi
5. Swarup A. 2013. Milk processing technology. Discovery publishing house pvt. ltd.

SFND324 Cereals and Millets: Processing and Technology 3 (2+1)

Objectives

1. To create understanding about the processing of major cereals like paddy, maize etc.
2. To study the storage and handling techniques of cereals
3. To study about the byproducts obtained during processing along with their uses
4. To gain knowledge on processing and milling of pulses.

Theory

Production and consumption scenario of cereals and millets; Structure, Chemical composition and nutritive value of cereals and millets. General unit operations in agricultural process engineering and importance of these unit operations in grain processing, Structure and composition of cereals, millets. Morphology, physico-chemical properties of cereals, major and minor millets, Chemical tests- sedimentation test, flour swelling volume; Conventional and modern milling technology of paddy processing, estimation of milling efficiency, quality characteristics of milled cereals and millets. Parboiling of rice, bran stabilization and methods. Wheat milling and processing: purification and reduction system. Different types wheat flour, Quality characteristics of flour. Characteristics of wheat flour suitable for baking. Milling and processing of oats, corn, barley, sorghum. Primary and secondary products of cereal processing. Processing of breakfast cereals: flaked, puffed, expanded, extruded and shredded. Malted cereals and cereal products. By-products of cereals and millets processing. Structure and composition of major millets - maize, sorghum - wet and dry milling methods - processing and by products. Composition of minor millets – pearl millet, finger millet, little millet, kodo millet, foxtail millet and barnyard millet. Processing of minor millets. Structure, composition and processing of oats and barley. Malting of cereals and millets - production of weaning and supplementary foods, nutrient dense foods – amylase rich foods (ARF).

Practical

Study of physicochemical properties of cereals; Parboiling of paddy: Cooking quality of rice, milling of rice; Conditioning and milling of wheat: Production of cereal flakes; Production of popcorns, flaked rice, puffed rice, noodles; Preparation of cereal malt. Determination of gelatinization temperature by amylograph; Processing of value-added products from millets. Estimation of gluten content in wheat flour. Preparation of snacks based on cereals and millets (roasting, popping, pearling, flaking, malting). Study of different unit operations and machineries in rice mills; wheat/ flour mills; Study of extrusion process.

Suggested Readings

1. Chakraverty A and Singh R P. 2014. Post-Harvest Technology and Food Process Engineering. CRC Press, Boca Raton, FL, USA.
2. Chakraverty A, Arun S, Mujumdar G S. Raghavan Vijaya and Hosahalli S Ramaswamy. 2003. Handbook of Post-Harvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices. Marcel Dekker, Inc., NY, USA.
3. Dash S K, Bebartta J P, Kar A. 2012. Rice Processing and Allied Activities. Kalyani Publishers, New Delhi
4. David A V, Dendy and Dobraszczyk Bogdan J. 2001. Cereal and Cereal Products: Technology and Chemistry. Springer-Verlag, US.
5. Khader V. 2001. Text book of Food Science and Technology. Directorate of Information and Publications of Agriculture, ICAR, Krishi Anusandhan Bhawan, Pusa, New Delhi.
6. Khan K and Shewry P R. 2009. Wheat: Chemistry and Technology. 4th edn. AACC International, Inc., St. Paul, MN, USA.
7. Manay N S and Shadakshara swamy M. 2001. Foods facts and principles. Wiley Eastern Ltd. New Delhi.
8. Pillayar P. 1988. Rice: Post Production Manual. Wiley Eastern Limited.

SFND325 **Sustainable Nutrition** **3 (2+1)**

Objectives

1. To explore the relationship between health, nutrition, environment and sustainability
2. To investigate the potential causes of unhealthy eating patterns
3. To discover the importance of a sustainable diet

Theory

Sustainable development goals and sustainable nutrition. Definition of sustainable diets, dimensions of sustainable diets. Aims and guiding principles of sustainable diets. Climate change and sustainable and healthy diets. Indicators and measures of sustainable diets. Assessing the environmental impact of diet. Nutritional indicators of sustainability. Sustainable diet: Social and cultural perspective. Sustainable diets and food-based dietary guidelines. Traditional food at the epicentre of the sustainable food system. Determinants of food choice and dietary change. Organic food and sustainable nutrition. Indian diets and sustainability. Attaining healthy and sustainable diets. Economics, food waste, biodiversity, The environmental impact and sustainability of existing food systems. Sustainable Healthy Diets: Models and Measures - the dietary dimension, the economic dimension, the sociocultural domain, the environmental domain. Metrics for Characterizing Sustainable Nutrition Security: Nutrient Adequacy of Foods, Diets and the Food Supply, Ecosystem Stability, Food Affordability and Availability, Sociocultural Wellbeing, Resilience, Food Safety, Waste and Loss Reduction.

Practical

Develop a meal plan for nutritional adequacy and sustainability; Undertake a market survey of food products with sustainable or climate-friendly labels; Assess the 7-day food menu served in university hostels in terms of sustainability; Pilot study on assessment of food choice motives of university students.

Suggested Readings

- Burlingame, B. and Dernini, S. (Ed.). 2019. Sustainable diets linking nutrition and food systems. Wallingford, Oxfordshire; Boston, MA: CABI.
- Contento, I. R. 2011. Overview of Determinants of Food Choice and Dietary Change: Implications for Nutrition Education. In *Nutrition education: Linking research, theory, and practice* (2nd ed., pp. 26–42). Jones and Bartlett Publishers.
- FAO. 2012. Sustainable Diets and Biodiversity—Directions and solutions for policy, research and actions (Proceedings of the International Scientific Symposium Biodiversity and Sustainable Diets United Against Hunger). Food and Agriculture Organization of the United Nations. www.fao.org/3/i3004e/i3004e00.htm
- FAO, and WHO. 2019. Sustainable healthy diets – Guiding principles. www.fao.org/3/ca6640en/ca6640en.pdf.
- Sarilo, S. 2018. Towards Healthy and Sustainable Diets: Perspectives and Policy to Promote the Health of People and the Planet. Springer Briefs in Public Health. Switzerland.
- https://www.kerry.com/content/dam/kerry/sustainability/people/nutrition-health/Sustainable-Nutrition- Profiling-Whitepaper.pdf

SFND326 **Hospitality Management** **2 (1+1)**

Objectives

1. To develop industry-ready professionals for the hospitality sector
2. Gear students for operational and supervisory roles in all sectors
3. Prepare students for each food production and service roles

Theory

Food preparation- Principles of food purchasing, Methods of food purchasing; Storages of foods; Different kitchen equipment- Heavy and Light equipment, Care and maintenance and their use; Management- Principles of management, Steps of effective management, techniques of effective management; Attitude towards work, behavior and personal hygiene, Do's and don'ts while working in the kitchen; Understanding the functioning of Food Production Dept. in any catering establishment / setup- Organizational structure, layout, Duties and responsibilities; Menu planning- Definition and Principles of menu planning, Types of menus; Financial management- Introduction, Principles, Costing, Budgeting. Accounting. Food cost control methods, Factors affecting food cost, labour cost, operating cost and overhead cost; Standardization of recipe- Definition of standardization of recipe, Standard recipe format and uses, portioning equipment, portion control; Personnel management- Introduction, Personal management concepts. Staff employment, Employee benefits, Methods of selection, Orientation, Training and development, Supervision, Motivation of employees.

Practical

Menu planning for industrial canteen/ hospital canteen/ cafeteria/ snack bar/ residential hostel. Standardization of recipes suitable for fast food outlet/ industrial canteen/ hospitals/ college hostel. Multiplication of standard recipes for quantity food production, quantity food management, portioning and fixing of cost. Visit to any one canteen attached to hospital and dietary department cafeteria, 3-star hotel/restaurant, 5-star hotel / restaurant, industrial canteen. Presentation of report on hospital canteen, cafeteria, 3-star hotel / restaurant, 5-star hotel / restaurant in terms of organizational set up, production, preparation and service. Calculate food cost, labour cost, operating cost and overhead cost of any standardized recipe.

Suggested reading

- Gregoire, MB. 2017. Foodservice Organizations: A Managerial and Systems Approach, 9th ed. Food Service in Institutions. John Willey.
- Sethi and Malhan. 1993. Catering Management: An Integrated Approach. Wiley Eastern.

SFND327 **Food Hygiene and Sanitation** **2 (1+1)**

Objectives

To present the rules of personal hygiene and the importance of adhering to safety rules and regulations

1. To introduce the causes and prevention of food poisoning and to introduce the requirements of safety in the workplace
2. To introduce local legislation relating to the food service industry

Theory

Meaning and principle of food hygiene. Interrelationship of health, hygiene and sanitation Food Hazards. Personal hygiene. Water Requirement and use, sources of water supply, water pollution, purification of water, portable water and its Quality-Criteria and standards, hardness of water and its treatment, defluorination of water. Food hygiene: Contamination of foods from various sources. Green plants and fruits, animals, sewage, soil, air and water and their health hazards. Food spoilage. Perishable, semi perishable and non-perishable foods. Sanitary procedures for preparation, handling and storage of foods Food borne infection and intoxication. Food poisoning caused by bacteria: *Salmonella, Staphylococcal poisoning, Botulinum, Clostridium perfringens* and *B. cerus*. Sources, incubation period, mechanism of action. Investigation of Food Poisoning, prevention and control. Food Poisoning caused by agents other than microorganism. Poisonous plants, animals, chemicals, metals and pesticides etc. Pests and Rodent Control. Hygiene Requirements for Licensing and Sale. Health status of Food Handlers. Cross-contamination and its prevention methods. Introduction to HACCP principles and their application. Concept of TQM, GMP and Risk Assessment.

Practical

Identification of microorganism, preparation of slides, preparation of media. Collection of water samples. Testing of water for: (i) Physical quality (ii) Bacteriological quality. Survey of hygienic and sanitary condition in food shops/food vendors/ canteens. Report writing.

Suggested Readings

- Adams, M.K. and Moss, M.O. 2000. Food Microbiology, New Delhi: Panima Corp.
- Longree, K.L. and Blaker, G.C. 1982. Sanitary Techniques in Food Service. New York: John Wiley and Sons.
- Park, K. 1997. Textbook of Preventive and Social Medicine. 1st edn. Jabalpur: Banarsidas Bhanot.
- Srivastava, A. 2013. Food Hygiene and Sanitation, Neha Publishers and Distributers.
- Yadav, S. 1997. Food Hazards and Food Hygiene. 1stedn. Annual Publication Ltd., New Delhi.
- Willliam, C., Frazierad Dennie and Westheff, C. 1996. Food Microbiology, 4th edn. Tata McGraw Hill Company Limited.

IV Year I Semester

SFND411 **Ethics in Human Research** **1(1+0)**

Objectives

By the end of this course students will:

1. Understand key ethical principles (e.g., respect for persons, beneficence and justice).
2. Analyze historical and contemporary cases of ethical breaches in human research.
3. Learn the role of IRBs in protecting research participants
4. Develop skills to assess and resolve ethical dilemmas in research.

Theory

Introduction to Ethics in Research: Definition and importance of ethics in research, Historical background: Nuremberg Code, Declaration of Helsinki, Belmont Report. Ethical Principles in Human Research, Respect for persons, beneficence, justice. Application to real-world research scenarios. Informed Consent. Elements of informed consent, Challenges in obtaining consent, Special populations: minors, cognitively impaired individuals. Confidentiality and Privacy. Data protection and privacy laws (e.g., GDPR, HIPAA) Ethical considerations in handling sensitive data. Institutional Review Boards (IRBs) Role and structure of IRBs. Preparing ethical research proposals. Vulnerable Populations. Research involving prisoners, children, pregnant women, and economically disadvantaged groups. Avoiding exploitation and ensuring equity, Ethical Challenges in Clinical Trials. Risk-benefit analysis, Placebo use, Compensation for harm. Contemporary Ethical Issues in Human Research, Genetic research and bio banking, Artificial intelligence and privacy in research, Cross-border and culturally sensitive research. Case Studies in Ethical Breaches. Tuskegee Syphilis Study. Henrietta Lacks and HeLa cells. Other contemporary examples. Ethical Problem-Solving Frame works Identifying, analyzing, and resolving ethical dilemmas. Student Presentations on Ethical Dilemmas, Group presentations on assigned case studies. Course Review and Assessment, Review of key principles and topics. Final discussion on future ethical challenges in human research.

Suggested Readings

1. National ethical Guidelines for Biomedical and Health Research involving Human Participants.
2. IGNOU, ICMR, Clinical Nutrition Foods, https://www.ignou.ac.in

SFND412 **Nutrigenomics** **2 (2+0)**

Objective

To understand, in depth, the influence of genetics on micronutrient metabolism, and implications for human diseases including inherited inborn disease, metabolic disease, cancer, neurodevelopment, and neurodegenerative diseases, etc.

Theory

Introduction - role of nutrition in preventing risk of disorders – proposed strategies for management of nutrient disorders – personalized medicine – personalized nutrition; Introduction

to genomics and its importance in health care, agriculture and environment – Introduction to Nutrigenomics Definition - role of Personalized nutrition in human diseases. Genes – structure – biochemical and molecular nature of genes; Central Dogma of Life; - regulation of gene expression –Role of diet/nutrition in regulation of gene expression – metabolic programming - Genetic basis of Dietary responses - Diet Vs Gene interactions. Genetic susceptibility to diets. Introduction to methods of developing nutritious foods/diet – intervention of biotechnology/genomics in producing nutritionally important molecules/compounds – production of therapeutic/medicinal proteins/ hormones/molecules through genetic engineering –Biotech processes in value addition of dietary foods - fermentation process, and genetic improvement of food grade microorganisms; crop varieties with enhanced nutrition. Introduction to transcriptomics, proteomics, metabolomics; applications in nutrition research - Metabolic Syndrome in humans - Nucleotide polymorphisms associated with common/major dietary disorders - inborn errors of metabolism – lactose intolerance, gluten enteropathy and phenylketonuria. Biomarkers – importance, discovery and validation- screening for bioactive nutrients and compounds - Cell line testing – zebrafish model and animal model - Scientific, technological and resource constraints on genomics - important factors affecting development in nutrigenomics.

Suggested readings:

- Carlsberg, C., Ulven, M. S. and Molnar, F. 2016. Nutrigenomics. Springer Pub.
- Lynnette, Ferguson R. 2013. Nutrigenomics and Nutrigenetics in Functional Foods and Personalised Nutrition. CRC Press.
- Nestle M. 2003. Safe Food: Bacteria, Biotechnology and Bioterrorism. Univ. of California Press.
- Rogers PL and Fleet GH. 19
- Journal of the American Dietetic Association,
- https://scholar.google.co.in/scholar?q= (search).
- **http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3602567/pdf/13197_2012_Article_775.pdf.**

SFND413 **Nutrition for Special Conditions** **3 (2+1)**

Objectives

1. To gain basic knowledge on changes occurring in the physiology and metabolism of human body as a result of change in extreme environment
2. To know the nutrition in emergency, nutrition and health problems, food distribution strategies and dietary management
3. To acquire basic knowledge about immune nutrition in acute and chronic inflammation

Theory

Nutritional requirements for extreme environments: Introduction - General adaptive mechanisms to environmental extremes and role of nutrition in successful acclimatization – decreased oxygen availability at high altitude – nutrition requirements for high altitude – Nutrition requirements in cold and polar environment- thermoregulation in cold –dietary guidelines for cold conditions. Nutrition requirements in hot environments- effect of heat stress – energy expenditure in hot environment. Nutrition on requirements for astronauts (space missions); Sea and air travel nutrition: introduction, need and scope for space travel, history of space travel; -changes in body composition during space expedition and nutrition requirements.

Physiological changes in human body, psychological preparedness, health and nutritional problems, nutrient requirements and dietary management during sea and air travel. Nutrition in Emergencies: need and importance, types of emergency situations such as natural and manmade, nutritional and health problems in emergencies. Control of communicable diseases through sanitation and immunization- Food distribution strategies- nutrient requirement and dietary management during emergencies. Nutritional requirements during starvation: total starvation – biochemistry of starvation, conditions developing starvation, features of starved body – survival period, effects of starvation/human body adaptation, metabolic alterations and nutrition requirements during starvation. Immuno-nutrition: nutrients affecting the immune system at the physiological, cellular and genetic level. Nutrients involved in the inflammatory response, role of specific nutrients in immune suppression and in immune promotion. Acute inflammation- features, causes, vascular and cellular events, inflammatory cells and mediators. Chronic inflammation- causes, types, classification non-specific and granulomatous with examples, repair, and wound healing by primary and secondary union, factors promoting and delaying the process. Healing in specific site including bone healing.

Practical

Studying the existing ration scale for army personnel in plains/high altitudes, space foods/ emergency ration foods, planning and preparation of diet for army person in the high altitudes, hot environment and cold environment, Planning and preparation of diet for space mission, preparation of snacks foods for space , fibre rich foods ,ergogenic foods / bars for high altitude, ready to eat appetizers - juices/candy, high energy foods for starvation, RTE/ RTC foods for emergencies, high protein foods, planning and preparation of diet for acute and chronic inflammation condition – Rheumatic arthritis/Asthma, Planning and preparation of diet for immunity

Suggested Readings

1. Aggarwal, Bharat B. and Heber, David (2014) Immuno-nutrition: Interactions of Diet, Genetics, and Inflammation, CRC Press.
2. Corinne, H.R, Marilyn, R. L., L. C. Wanda and Garwick, E. (1982). Normal and therapeutic nutrition. (Pp- 1-16). New York, Macmillan Publishing Company.
3. Kathleen, M. L. and Raymond, J. L. (2016) Krause's Food and the Nutrition Care Process. 14th Edition, Saunders, Philadelphia.
4. Moris, E. S. (1994) Modern nutrition in health and disease. Leaned Febinger, USA
5. Sehgal, S. and Raghuvanshi, R. S. (2007) Textbook of community nutrition Directorate of Information and Publications of Agriculture, Indian Council of Agricultural Research, New Delhi.
6. WHO (1997) Applied health research priorities in complex emergencies, Geneva
7. https://www.cdc.gov/ncbddd/adhd/index.html.
8. https://www.unhcr.org/45fa745b2.pdf.
9. http://apps.who.int/disasters/repo/13849_files/i/nutrition_in_emergencies_ppt.pdf.
10. https://www.unicef.org/media.
11. https://www.nasa.gov/sites/default/files/space_nutrition_book.pdf.
12. http://spacelink.nasa.gov/products.

SFND414 **Nutrition through life cycle** **3 (2+1)**

Objectives

1. To cover nutritional needs of individuals during critical stages of development
2. To learn about the biological basis for nutritional requirements in normal development and maintaining health in adulthood
3. To learn about consequences of over- and under-nutrition and how to identify and address these issues will be discussed

Theory

Infancy- Role of nutrition on physical and mental development, rate of growth-weight as an indicator, assessment of growth, nutrient requirement during infancy, feeding of infants, value of breast feeding on infants, breast feeding versus artificial feeding, types of milk and their use in infant feeding. Weaning and supplementary foods, weaning practices in community, feeding of premature and low-birth-weight infants. Nutritional disorders and common ailments in infancy, feeding the sick child, immunization schedule and growth charts Preschool age: Physical growth and mental development, prevalence of malnutrition in preschool years and food habits, nutritional requirements during preschool age and supplementary foods School age. Physical growth and mental development, nutritional requirements during school age, specific problems, specific problems in feeding school children Adolescence. Physical and physiological changes, nutritional requirements, food preferences and nutritional problems, problems, growth spurt and nutrition, adolescent fads influencing nutrition. Adulthood, Sex, occupation and income, nutritional requirements, biological and nutritional consequences and complications due to pollutants, vegetarianism. Nutrition, wok capacity and physical fitness. Nutrition, infection and immunity, nutrients and drugs interaction. Pregnancy. Eating disorders, Preconception nutrition. Nutritional related problems during pregnancy and lactation. Physiological changes in pregnancy, weight gain during pregnancy, food and nutrient requirements. Complications of pregnancy and their nutritional management, impact of nutrition on the outcome of pregnancy. Nutritional need of fetus during different stages of fetal cell growth and maternal nutritional needs. Psycho-physiology of lactation; milk synthesis and secretion, maternal needs during lactation, composition of colostrum and mature human milk, milk of mothers of pre-term babies. Non- nutritional factors of human milk; immunological factors, enzymes, hormones. Human milk banking. Elderly. Physical and physiological changes, nutritional requirements, problems of old age, nutrients influencing aging process

Practical

Grouping of foods based on richness of nutrients and quantifying foods to give uniform content of each nutrient. Planning and formulation of food exchange lists. Planning, preparation and evaluation of diet for adult men and women involved in different activities. Planning, preparation and evaluation of diets for pregnant women, , lactating mothers, weaning and supplementary foods for infants, preschool children, school going children, packed lunches for preschoolers and school children, adolescent boys and girls, elderly, preschool children with PEM and vitamin. A deficiency Planning diets for anemic children, adolescents and pregnant women.

Suggested Readings

1. Corinne H.R, Marilyn R. L, Wanda L. C and E. Garwick. (1982). Normal and therapeutic nutrition. (pp- 1-16). New York, Macmillan Publishing Company.

2. Moris, E.S. (1994). Modern nutrition in health and disease. Leaned Febinger, USA
3. Srilakshmi, B. (1995). Dietetics. Newage international publishers, New Delhi.
4. Williams, S.R., Worthington, R.S., Sneholinka, E.D., Pipes, P., Ress, J.M. and Mahal,K.L. (1988). Introduction to nutrition throughout the life cycle. Times Mirroe/Mosby College Publishers.

SFND415 **Global Nutrition** **2 (2+0)**

Objectives

1. To analyze the global burden of malnutrition and its various forms (undernutrition, overnutrition, micronutrient deficiencies)
2. To explore the ethical considerations in global food systems, including food justice, sustainable practices, and corporate accountability
3. To examine the role of technology and innovation in addressing global nutrition challenges
4. To understand the effectiveness of international nutrition programs and initiatives

Theory

Defining Global Nutrition: Scope and Challenges, Nutritional Transition, Global Trends and Regional Differences in Food Systems and Nutrition, Sustainable Agriculture and Food Production Practices, Micronutrient Deficiencies, Nutritional Epidemiology, Food Traditions and Dietary Practices in Different Regions, Food Waste and Loss: Global Challenges and Solutions, Ethics of Industrial Food Production and Food Justice Issues, Global Nutrition Programs and Policies, National Governments and International Collaboration, Issues and Trends in Global Food and Nutrition Security.

Suggested Readings:

1. Albert, J. L. (Ed.) 2000. Food, nutrition and agriculture. FAO Publication.
2. Branca, F., Lardeux, M. and Leroy, J. 2007. Food security, food safety and the right to adequate food. Agriculture and Human Values, 24(3), 285-294.
3. Fanzo, J., Hawkes, C. and Berry, E. M. 2013. Global food security and the right to food. Public Health Reviews, 35(1), 22-31.
4. Home - Global Nutrition Report

SFSC411 **Food Toxicology and Quality Testing** **3 (2+1)**

Objectives

1. To give introduction to possible toxic effects of food additives and naturally occurring environmental toxins in food
2. To be able to define toxicology
3. To be able to define the most important contaminants in food, the toxicology of various additives and environmental toxins, as well as their sources
4. To explain food safety, the substances that are of relevance for food safety
5. To be able to explain what risk analysis, assessment and management in relation to food safety is, and know which organizations are involved in this type of work nationally and internationally.

Theory

Food toxicology – definition, introduction and significance. Classification of toxic constituents. Food poisoning –types, causative factors, signs and symptoms, preventive measures. Natural food toxins – pulses, oil seeds, sea foods, processed animal foods. Anti-nutritional factors, other food toxins, their harmful effects and methods of removal. General characteristics, occurrence, properties and inactivation of protease inhibitors, trypsin inhibitors, haemagglutinins, goitrogens, gossypol. General characteristics, occurrence, properties and inactivation of saponins, lathyrogens, avidin and other antimetabolites. Microbial toxins – classification, source of contamination, effect on health, preventive measures, methods of inactivation / destruction. General characteristics, occurrence and properties of mycotoxins, aflatoxin, ochratoxin and patulin. Methods to detect and prevention of mycotoxins. Chemical toxins – Pesticides - Pesticide and insecticide residual toxicity – sources and health hazards, insecticides, metallic and others. Mineral toxicity – Chlorine and Fluorine, Heavy metals toxicity – Lead and Chromium, Mercury, Arsenic and Iron, residual effects, preventive measures, methods of removal. Food additives – classification, toxicity and effects. Toxins developed during processing. Food packaging material – Potential contaminants from food packaging material. Detection of toxins in food chain.

Practical

Methods of detect aflatoxin and gossypol. Methods of detect trypsin inhibitors and protease inhibitors. Use of AAS for detection of lead, chromium, mercury, arsenic, iron, detection of tannin and phytic acid. Visit to toxicology lab and public health laboratory. Visit to Quality Testing Laboratory, food processing industry/ government laboratory.

Suggested readings:

- Debasis Bagchi, Anand Swaroop. 2016. Food Toxicology, CRC Press.
- Derelanko, M.J. and Hollinger, M.A. 2002. Handbook of toxicology, 2nd edn, CRC Press.
- Gordon L. Robertson, 2006. Food Packaging Principles and Practice, 2nd edn, CRC press. London.
- Hodgson, Ernest. 2004. A Textbook of Modern Toxicology. John Wiley and Sons, Incl.
- Srinivasan Damodaran, Parkin, Kirk L., and Fennema, Owen R. 2007. Fennema's Food Chemistry, 4th edn. Taylor and Francis.
- Takayuki Shibamoto and F. Bjeldanes, Leonard. 2012. Introduction to Food Toxicology. Academic Press.
- Compendium_Food_Additives_Regulations_08_09_2020-compressed.pdf (fssai.gov.in)
- http://www.fda.gov/down loads/Food/Food Safety/Food borne Illness/ Food borne Illness Food borne Pathogens Natural Toxins/Bad Bug Book/UCM297627.pdf
- http://www.fda.gov/
- www.standardsdata.in/
- www.fssai.gov.in
- http://www.foodqualitynews.com/
- http://www.cdc.gov/

SFSC412 **Sensory Evaluation of Foods** **2 (1+1)**

Objectives

- To introduce the methodology used in sensory evaluation of food product
- To expose students to the ability of humans to use their senses to evaluate the quality attributes of food product using sensory evaluation methods such as analytical and effective methods
- To cover the use of relevant statistics in analyzing sensorial evaluation data

Theory

Sensory quality evaluation - introduction, method, sensory panel; physiological and psychological foundations of sensory evaluation; Principles of good practice: the sensory testing environment, test protocol considerations, Factors influencing sensory measurements, Basic principles: Senses and sensory perception, Physiology of sensory organs, Sensory and instrumental analysis in quality control. Sensory attributes of foods and beverages and their perceptions, appearance, flavor, taste, aroma, texture/mouthfeel, trigeminal sensations, Sensory evaluation methodology, threshold measurements, difference tests, scaling procedures, descriptive analytical methods, consumer tests, Instrumental measurements, color texture, flavor, Correlation of sensory and instrumental measures, Applications of sensory tests for quality assurance product development product optimization marketing. Objective methods of evaluation. Relationship between objective and subjective methods.

Practical

Determination of threshold value for basic tastes and odor; Odor recognition, difference (PC, Duo trio, triangle); Selection of judging panel; Training of judges, for recognition of certain common flavor and texture defects using different types of sensory tests; Descriptive analysis methodology; Texture profile methodology; Sensory evaluation of various food products using different scales, score cards and tests; Estimation of color; Designing a sensory laboratory.

Suggested Readings

1. Amerine, M.A., Pangborn, R.M. and Rossles, E.B. 1965. Principles of Sensory Evaluation of Food. Academic Press, London.
2. Early, R. 1995. Guide to Quality Management Systems for Food Industries. Blackie Academic.
3. Lawless, H.T. and Klein, B.P. 1991. Sensory Science Theory and Applications in Foods.
4. Lawless, Harry, T. and Heymann, Hildegarde. 2010. Sensory Evaluation of Food: Principles and Practices. 2nd edn, Springer, New York or Dordrecht Heidelberg, London.
5. Marcel Dekker. y Macrae, R., Rolonson Roles and Sadlu, M.J. 1994. Encyclopedia of Food Science and Technology and Nutrition. Vol. XI. Academic Press.
6. Maslowitz, H. 2000. Applied Sensory Analysis of Foods. Vols. I, II. CRC Press, Boca Raton, FL, USA.
7. Rai, S.C. and Bhatia, V.K. 1988. Sensory Evaluation of Agricultural Products. Indian Agricultural Statistics Research Institute (ICAR), New Delhi.

SFSM411 **Institutional Food Service Management** **3 (0+3)**

Objectives

1. To cover designing the kitchen and work space, selection of equipment and maintenance, personal and finance management, food management, hygiene and sanitation, menu planning and food composition and nutritional values
2. To help those who are interested in establishing a food service industry in making available hygienically prepared, wholesome and nutritious food to the consumers

Practical

Introduction to quantity food production, familiarization to equipment for quantity food production, Weight, measures and conversion, Recipe conversion standardization of recipes – procedure. Practical exercise on standardization of recipe, multiplication of standard recipe, portioning and cost calculation. Standardization of recipes suitable for different catering services i.e., cafeterias /canteens, snack bars, industrial canteens, residential hostels. Costing of recipes planned and fixing the price. Exercise on quantity food production for different type of food service establishments. Visit to residential hostel, hospital canteen, industrial canteen, star hotel and fast- food centre to observe the organization, management and administration. Making a detailed project report for establishing a food service unit including making purchase documents for equipment purchase and tenders etc. Organizing and planning menu for college canteen as a catering enterprise, setting up of a canteen, management of college canteen - procurement of materials. Practical exercise on food preparation, pricing and sale. Preparation and presentation of report on management of canteen. Catering for Birthday party/Mocktail Party/ Convention/ Seminar / Conference.

Suggested Readings

1. Fuller J. 1966. Chefs Manual and a Kitchen Management. B.T. Badtsford Ltd.
2. Raske L. 2017. Foodservice Management Fundamentals by Lina, Scitus Academics
3. Ratti M. 2000.Food Service Management. Neha Publishers and Distributors.
4. Sethi M and Malhan S. 1997. Catering Management - An Integral Approach. New Age International.
5. Treat N and Richards. 1997. Quantity Cookery. Little Brown and Co.
6. West BB, Wood L, Harger VF and Shugart GS. 1977. Food Service in Institutions, John Wiley and Sons.

SSEM411 **Seminar** **1 (0+1)**

A power point presentation on any topic chosen from the subjects studied will be prepared and presented in the department.

IV Year II Semester

Students should register for 20 Credit Hours (either option A or option B) with compulsory RAWE (0+2) credit as a mandatory course

IV Year II Semester					
Students should register for 20 Credit Hours (either option A or option B)					
Sl. No.	**Course Code**	**Course Title**	**Credit Hours**	**Duration**	**Total Credits**
Student READY					
1.	SSRN421*	Practical extension work in villages	0+2	2 Weeks	20
2.	**Option A**				
	SSRN422**	In-Plant Training in Food Industry/ Research Institution/ organization	0+9	9 Weeks	
	SSRN423***	Student Project	0+8	8 Weeks	
Option B					
3.	SSRN424#	Internship in Hospital / Food & Nutraceutical Industry / Food quality and analysis / testing labs	0+17	17 Weeks	
4.	SSRN425*	Finishing School Programme	0+1	1 Week	

*Compulsory course for both the option

** Inplant training / attachment with Industry/ Research Institute (May be conducted in split manner in more than one industry/ institution/ organization).

***The student project will be R and D based/ field study based/ entrepreneurship based (incubation/ experiential learning)

#The internship can be taken in service Industry (Example: Hospital/ Hotel) OR in Production Industry (Example: Food/ Nutraceuticals Industry) OR in Food Quality and Analysis Laboratories.

SSRN421 **Practical extension work in villages** **2 (0+2)**

As a part of this programme, students will camp at one of the Extension Unit (RSK) in central village and work in the surrounding satellite villages.

The details of Schedule of Activities:

1. Orientation, Data Collection & Analysis, Identification of Problems, Leader, identification
2. Programme Planning and Execution to solve the problems related to Food Nutrition and Dietetics
3. Practice of Participatory Rural Appraisal techniques in field situations
4. Awareness programmes on Balance Diet, Health, Nutrition, Personal hygiene, Food safety, Complimentary and Supplementary foods.
5. Model demonstration on Nutrition garden / Kitchen garden.
6. Organizing Group Discussion meetings on topics related to Food Nutrition and Dietetics
7. Skill training activities related to Food Processing and Value Addition
8. Field visits to FPO's and training programmes for SHG's

9. Community works as part of social responsibility
10. Demonstration/Exhibition cum interaction meetings and other suitable extension activities in villages.

Evaluation for Practical Extension Work in Villages

• Inititation, Creativity & Diligence	-	15 Marks
• General Conduct and Discipline	-	10 Marks
• Work Experience and Examination	-	55 Marks (35+20)
• Presentation and Evaluation of Reports	-	20 Marks
Total	-	**100 Marks**

Student should register for 17 Credit hours (Either Option A or Option B) along with SSRN 421 courses

OPTION A

I. SSRN422 In-plant training in food industry/Research institutions/Organizations 9 (0+9)

A. In-plant in hospitals

Understanding role of dietitian – role, concept, the recipients, duties, work schedule, Licenses, Certifications, and Registrations. Preparation of SOAP notes based on case studies and group discussion. Planning component. Preparation of list of parenteral and enteral products. Diabetic diet Counseling- organizing exhibition in for the benefit of public- food exchange list and software used in diabetic diet Counseling. Cardiovascular diseases- planning and presentation of different types of diet for disease conditions. Practicing diet Counseling for CV patients. Preparation of diet chart for different types of liver diseases, collection of case history of patient suffering from hepatitis, cirrhosis of liver and alcoholics. Kidney diseases- preparation of facts list handout and development of Counseling tips- dietary Counseling in a specialty hospital and diet exhibition for kidney disorder. Diet for gastro intestinal disorders- preparation of handouts- ulcer, high fiber, low residue Counseling- diarrhea, constipation, colitis, diverticulosis and ulcer. Preparation of overweight and underweight fact list handout and development of Counseling guidelines, workshop for patients, Weight loss Counseling– use of role play technique and workshop for patients at obesity clinic and fitness centers. Diet for pre- and post-surgery, burns. Preparation of cancer facts list handout. Home care for critically ill and requiring long term nutrition support. Planning normal and therapeutic diets – diabetes, cardiovascular diseases, liver diseases, kidney diseases, gastrointestinal disorders. Role play exercises for Counseling. Supervised Counseling of patients/clients.

or

B. In-plant in testing labs

Role of regional testing laboratories - methods of sample collection- handling and storage of samples, physical, chemical and microbiological. FSSAI - Role of Food Safety officer, method of inspection, processing of license, conducting awareness camps for stakeholders. Analysis of energy, protein, fat, vitamin, mineral and antioxidants in food groups. Attachment with food testing laboratories.

or

C. In-plant in food processing units

Attachment with – primary processing cereal, pasta making, flaking and puffing, cereal based convenience foods manufacturing, primary pulse processing, RTE / RTU foods manufacturing, fruit beverage manufacturing, Canning, pickling, preserve/ candy/ jam manufacturing, banana processing, milk processing, oil manufacturing, bakery and confectionary units.

II. SSRN423 Student Project **8 (0+8)**

The student project will be R&D based / Field study based / Entrepreneurship based (Incubation /Experiential security, Reprot writing, and presentation of the results and submission of project reports.

Option - B

SSRN424 Internship in Hospitals/ Food / Nutraceutical industry / Food quality & Analysis /Testing lab **17 (0+17)**

A: Internship in Hospitals **17 (0+17)**

Duration (Weeks)	**Internship in Hospitals Activity/Placement Training Institution**
1st and 2nd week	**FOOD SERVICE ADMINISTRATION** ➢ Orientation regarding functioning, systems and activities of the dietetic department. ➢ Kitchen functioning, Facility Layout and Management (including kitchen and equipment layout). ➢ Issue of daily ration, Store room management, Purchasing and Food procurement methods, receiving and accounting practices. ➢ Studying the dietetic department organizational and administrative set up (in terms of organizational chart, job description, work schedule, wage structure, allowances and benefits of the different employees *etc.*). ➢ Studying the work centres (receiving area, weight checking area, storage area, pre-preparation and production area, service area etc.), their functions and their inter-relationships. ➢ Review of the Sanitation, Hygiene and Waste management policy of the centre.
3rd and 4th week	➢ Studying the budgeting and food costing of the dietetic department. ➢ Menu Planning: Studying the diet scale (i.e. the amount of food to be allotted per person/day for normal diet as per hospital policy), the cycle menus planned for general/private wards, therapeutic diets and feeds. ➢ Food Production (Review of General/ Private ward cooking area, therapeutic diet area. special Feed Preparation Area etc.). ➢ Standardization of portion sizes (studying the process) of the items served to patients. ➢ Filling of pro forma - master diet charts, expense books, instruction sheets, diet slips, feed slips for therapeutic diets, intending diet in diet

	sheets etc. Check diet prescriptions and diet sheets for proper indents. ➢ Practicing calculation of mock master chart sand expense books. ➢ Preparation of therapeutic diets and feeds for the critically ill. ➢ Checking Trolley Loading. ➢ Checking Food Service and Distribution (with reference to timings, schedule, and mode of food service and distribution) in both general and private wards. ➢ Exposure to OPD Diet Clinics (Observing the dietician imparting nutrition/diet counseling). ➢ Exposure to nutrition/diet counseling print material (diet sheets, diet charts, other promotional and general awareness material specific to disease conditions, etc.) available in the department.
5th to 11th weeks	➢ Master ward round with chief dietician. ➢ Ward round with dieticians' initially to interact with patients, study case sheets and collect information on disease condition and treatment/diet prescription, and interpreting doctor's dietary prescription. ➢ Clinical posting in different general wards (*i.e.*, medicine, renal, gastrointestinal, pediatric, endocrinology, surgical and post-operative, cancer ward *etc.*). ➢ Diet planning for indoor patients based on doctor's prescription and on the basis of nutrition principles and patient's ability to eat food under the supervision of the dietitian initially and then independently. ➢ Prescribing therapeutic diets to discharged indoor patients under the supervision of dieticians'. Independent posting in the wards or in the unit to interact with patients, study case sheets, collects information on disease treatment and diet prescription, and interpreting doctor's dietary prescription. ➢ Posting in private ward to interact with patients. ➢ Prescribing therapeutic diets to OPD patients. ➢ Nutrition and diet counseling at OPD clinics (specific to diabetes, overweight, renal diseases, cardiovascular diseases, peptic ulcer/ulcerative colitis, gall stones, protein energy malnutrition, etc.) initially with the dieticians and subsequently independently.
12th to 16th Weeks	➢ Independent ward rounds (as instructed by the dietitians). ➢ Nutrition and diet counseling at OPD clinics (specific to diabetes, overweight, renal diseases, cardiovascular diseases, peptic ulcer/ulcerative colitis, gall stones, protein energy malnutrition, etc.) independently. ➢ Case Study work (identification, review of cases in the renal, gastrointestinal, cardiology, endocrinology, cancer, surgery/post-operative ward, on nutritional support i.e. enteral/parenteral feeding, etc.). ➢ Selection of five cases (one each from renal, endocrinology, cardiology, surgery/post-operative, liver disorders, tube feeding, etc.) for detailed review. ➢ Review of the cases in terms of patient profile, present problem, physical examination report, treatment prescribed (both drug and diet), blood parameters related to the disease conditions before and after the treatment, dietary management and dietary counseling provided during the patient's stay in the hospital, and patient

	prognosis. ➢ Preparation of Case Study Reports. ➢ Any other assignment given by the dietitians
17th to 19th Week	➢ Independent ward rounds. ➢ Nutrition and diet counseling at OPD clinics (specific to diabetes, overweight, renal diseases, cardiovascular diseases, peptic ulcer/ulcerative colitis, gall stones, protein energy malnutrition etc.) initially with the dietician and subsequently independently. ➢ Prescribing therapeutic diets to OPD patients/discharged warded patients independently. ➢ Presentation of Case Studies at the departmental seminar organized by the chief dietician. Presentation of the recent research of interest.
20th week	➢ Project report preparation, presentation, Examination and evaluation.

OR

B. Internship in testing labs **17 (0+17)**

SI. No.	Duration	Activities
1	1st week	Student READY Orientation programme about the in-plant in testing laboratories
	2nd week to 18th week	Attachment with in-plant testing laboratories Acclimatization about regional testing laboratory: quality control and assurance, regulatory compliance, and public health in various sectors. methods of sample collection, Handling and storage of samples, Physical, chemical and microbiological changes during storage. FSSAI - Role of Food Safety officer, method of inspection, processing of license Conducting awareness camps for stakeholders Skill acquisition on analysis of energy, protein, fat, vitamin, mineral and antioxidants in food groups.
2	19th to 20th week	Project report preparation, presentation, Examination and evaluation.

OR

C. Internship in food processing units **17 (0+17)**

Duration	Activities
1st week	Orientation to in-plant training
2nd to 18th week – Attachment to Food Processing Units- Attachment to Primary processing units- cereal, pasta making, flaking and puffing, cereal based convenience foods manufacturing/ Primary Pulse processing/ RTE/RTU foods manufacturing/Fruit beverage manufacturing/ Canning, pickling, preserve, candy, jam manufacturing/ banana processing/milk processing, oil manufacturing, bakery and confectionary units. **Production line observation**	

✓ Observing the different stages of food processing, from raw material intake to packaging, to understand how nutritional values are impacted by each step. **Ingredient analysis:** ✓ Learning to analyze the nutritional content of raw ingredients and finished products using laboratory techniques. **Product formulation:** ✓ Participating in the development of new food products, considering nutritional goals and dietary restrictions while formulating recipes. **Quality control:** ✓ Understanding the quality control measures in place to ensure consistent nutritional value and food safety throughout production. **Labeling and nutrition information:** ✓ Gaining expertise in creating accurate nutritional labels that comply with regulatory standards. ✓ **Research and development (R&D):** Assisting the R&D team in d developing new food products with specific nutritional benefits.	
19th – 20th week	Project report preparation, presentation, examination and evaluation

Note : Students can have a rotation of the internship in hospital / food industry / quality and testing labs for fixed duration to meet 17 credit hours.

SSRN425 **Finishing School Programme** **1(0+1)**

Introduction of soft skills, Communication and leadership skills, Preparation for interviews, Personal presentation skills and group discussion, Time and stress management, Planing decision making and prioritization, Basics of professional writing skills, Reports and research articles writing skills, Enterpreneurship development – Concepts of entrepreneur and enterpreseurship, Enterpreeureship development – Importance of planning, budgeting monitoring, evaluation and follow up in runiing and enterprise etc.

Evaluation : FSP Exam (MCQ for 100 marks).

ONLINE COURSES

In addition, students will have to opt for minimum 10 credits onlione courses(as per UGC guidelines for online courses) as a partial requirement for the B.Sc(Hons.) Food Nutrition & Dietetics

Suggestive list of on-line courses SWAYAM Portal

1- Food chemistry
2- Food fortification
3- Food microbiology
4- Food microbiology and Food safety
5- Food preservation Technology
6- Food and Nutrition
7- Food Laws and standards
8- Functional foods and Nutraceuticals
9- Fundamentals of food process engineering
10- Thermal processing of Foods
11- Dairy and Food process and product technology
12- Adolescent nutrition
13- Basics of nutrition
14- Mother health and Nutrition

PG Pathshala

1- Food safety and quality control
2- Food preservation
3- Principles of food processing
4- Innovation in food packaging
5- Food biotechnology
6- Food science
7- Macronutrients
8- Micronutrients
9- Human physiology
10- Nutritional biochemistry
11- Functional foods and nutraceuticals
12- Nutrition through life span
13- Nutrition wellness and fitness
14- Therapeutic nutrition
15- Research method in nutrition

Courses on Nutrition (Available on mooc.org (edx))

1. Nutrition and cancer- Wageningen X
2. Nutrition, Heart Disease and Diabetes- Wageningen X
3. Plant Based diet: Food of a sustainable future- Wageningen X
4. Nutrition and Health: Human Micro biome- Wageningen X
5. Nutrition and Health- Food Safety- Wageningen X
6. Nutrition and Health: Micronutrient and Malnutrition- Wageningen X

7. Nutrition and Health: Macronutrient and Over Nutrition- Wageningen X
8. Nutrition Exercise and Sports- Wageningen X
9. Feeding a hungry planet: Agriculture, nutrition and sustainability- SDG Academy X
10. Introduction to Food and Health- Stanford online
11. Mental health and nutrition- UCX
12. Sustainable food security: food Access- Wageningen X
13. Staying fit- Stanford online
14. Lifestyle management treatment of chronic disease- Part1- Doane X
15. Lifestyle management treatment of chronic disease- Part2- Doane X
16. The health effect of clinic change- Harvard X
17. Global Public Health- SDG Academy X
18. Sustainable food system: A Mediterranean perspective- SDG Academy X
19. Early childhood development: global strategies for implementation- Harvard X
20. Beer- the science of brewing- KULeuvenX
21. Fitness corporative
22. Sustainable global food systems

Courses on Nutrition (Available on IGNOU portal)

1. Diploma in nutrition and Health education
2. Certificate in nutrition and childcare
3. Certificate in Foods and Nutrition

Suggested Institutions / areas for Internship in Nutrition

1. Sports Authority of India (SAI)
2. Agricultural and Processed Food Products Export Development Authority (APEDA)
3. Food Safety and Standards Authority of India (FSSAI)
4. Centre For Health Research and Development, Society For Applied Studies
5. Defense Institute of Physiology and Allied Sciences (DIPAS)
6. Public Health Foundation of India (PHFI)
7. WHO, Internship program (WHO)
8. Hospitals- AIIMS, Apollo, Max, Fortis, Medanta, Etc.
9. Food Industries- Britannia, Perfetti, Pepsico India, Coca Cola, Haldirams, Bikaner
10. World Bank- Young Professional program (WBG).