



Government of Karnataka

**Curriculum Framework for Undergraduate Programme in Colleges and
Universities of Karnataka**



**5th and 6th Semester Model Syllabus
for
BSc in
Food Science and Nutrition**

**Submitted to
Vice Chairman**

Karnataka State Higher Education Council
30, Prasanna Kumar Block, Bengaluru City University Campus,
Bengaluru, Karnataka – 560009

Composition of Subject Expert Committee Members

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2	Dr. Renuka Meti, Assoc. Professor, KSAW University, Vijayapura	Member
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10	Smt. Rajani B Special Officer, Karnataka State Higher Education Council	Member Convener

Model Curriculum
of
BSc
in
Food Science and Nutrition
5th Semester

Karnataka State Higher Education Council



Government of Karnataka

Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Fifth Semester
Course Title	Food Preservation (Theory)		
Course Code:	FSN-C9	No. of Credits	4
Contact hours	60 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Outcomes (COs): After the successful completion of the course, the student will be able to: CO1. Students will be able to apply a variety of food preservation techniques. CO2. understand the factors influencing food spoilage and deterioration. CO3. Students will have a comprehensive understanding of food safety and quality control. CO4. Students will be knowledgeable about emerging trends and technologies in food preservation.	
Theory Contents	60 Hrs
Unit 1: Introduction to Food Preservation	15 Hrs
Overview of food preservation and its significance Historical background and evolution of food preservation techniques Factors influencing food spoilage and deterioration. Importance of food safety and quality in preservation methods Introduction to different methods of food preservation (e.g., drying, canning, fermentation, freezing, etc.)	
Unit 2: Traditional Food Preservation Techniques	15 Hrs
Principles and practices of drying and dehydration methods. Canning and bottling techniques for long-term preservation. Fermentation and pickling methods for enhancing food shelf life. Salting and curing processes for meat and fish preservation. Smoking as a preservation technique and flavour enhancer.	
Unit 3: Modern Food Preservation Technologies	15 Hrs
High-temperature methods: Pasteurization and sterilization techniques Introduction to thermal processing methods (e.g., canning, retort processing) Low-temperature methods: Refrigeration and freezing techniques Vacuum packaging and modified atmosphere packaging (MAP)	

Use of food additives and preservatives	
Unit 4: Emerging Trends in Food Preservation	15 Hrs
<p>Novel techniques: High-pressure processing (HPP) and pulsed electric field (PEF).</p> <p>Non-thermal processing methods (e.g., irradiation, ultraviolet treatment).</p> <p>Application of hurdle technology in food preservation.</p> <p>Innovative packaging materials for extending shelf life.</p> <p>Use of natural antimicrobials and bioactive compounds for preservation.</p>	

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	"Food Preservation: Principles and Practices" by S. Shantha and N. R. Reddy, CRC Press, 2016
2	"Introduction to Food Engineering and Technology" by P. G. Smith, D. L. Harper, and S. S. Singh, Academic Press, 2019.
3	"Food Packaging Science and Technology" by R. Ahvenainen, CRC Press, 2007.
4	"Handbook of Food Preservation" by M. Shafiur Rahman, CRC Press, 2007.
5	"Food Preservation Techniques" by P. Zeuthen and L. Bøgh-Sørensen, Woodhead Publishing, 2018
6	"Principles of Food Processing" by M. A. Rao, S. S. H. Rizvi, A. K. Datta, and G. Venkateswara Rao, CRC Press, 2014.
7	"Food Processing Technology: Principles and Practice" by P. J. Fellows, Woodhead Publishing, 2009
8	"Food Quality Assurance: Principles and Practices" by I. M. Morton and T. J. Bridges, CRC Press, 2017
9	"Food Packaging: Principles and Practice" by G. L. Robertson, CRC Press, 2012
10	"Handbook of Food Preservation" edited by M. Siddiqui, K. S. Siddiqui, and M. A. Rahman, CRC Press, 2007.
11	"Food Process Engineering and Technology" by Zeki Berk, Academic Press, 2013
12	"Microorganisms in Foods 8: Use of Data for Assessing Process Control and Product Acceptance" edited by ICFMH, Springer, 2011.

Course Title	Food Preservation (Practical)		Practical Credits	2
Course Code	FSN-C10	Contact Hours	60 Hours	
Formative Assessment	25 Marks	Summative Assessment	25 Marks	
Practical Content				
<p>Drying Fruits and Vegetables:</p> <p>Select a variety of fruits and vegetables.</p> <p>Use different drying methods such as sun drying, air drying, or using a food dehydrator.</p> <p>Monitor the drying time and evaluate the texture and taste of the dried products.</p> <p>Canning and Bottling:</p> <p>Prepare a batch of homemade jam, jelly, or pickles.</p> <p>Follow the canning process, including sterilizing jars, filling, and sealing.</p> <p>Store the canned products and evaluate their quality over time.</p> <p>Fermentation Experiment:</p> <p>Prepare a small batch of sauerkraut or kimchi using different fermentation methods (e.g., salt brine fermentation vs. whey fermentation).</p> <p>Monitor the fermentation process and assess the taste, texture, and aroma of the final product.</p> <p>Smoking and Curing:</p> <p>Cure a piece of meat or fish using salt and/or sugar.</p> <p>Cold smoke or hot smoke the cured product using a smoking apparatus.</p> <p>Evaluate the flavor and texture of the smoked and cured product.</p> <p>Freezing Techniques:</p> <p>Select various fruits, vegetables, or prepared dishes for freezing.</p> <p>Apply blanching or pre-treatment methods to preserve color and texture.</p> <p>Freeze the samples and assess their quality after thawing.</p> <p>Pasteurization Experiment:</p> <p>Set up a small-scale pasteurization process using milk or fruit juice.</p> <p>Determine the appropriate temperature and holding time for pasteurization.</p> <p>Evaluate the microbial load before and after pasteurization.</p>				

Sterilization Using Pressure Canning:

Select low-acid food products such as vegetables or meat.

Use a pressure canner to achieve proper sterilization.

Assess the safety and quality of the canned products.

Vacuum Packaging:

Pack different food items using a vacuum sealer.

Compare the shelf life and quality of vacuum-sealed products with traditionally packaged ones.

Pickling Experiment:

Prepare different types of pickles, such as cucumber pickles, carrot pickles, or onion pickles.

Experiment with different pickling brines, spices, and flavors.

Evaluate the taste and texture of the pickled products.

High-Pressure Processing (HPP):

Observe the HPP process in a commercial facility (if possible).

Learn about the effects of high pressure on food preservation and safety.

Discuss the advantages and limitations of HPP compared to other preservation methods.

Testing Food Additives:

Select a few common food additives such as antioxidants or preservatives.

Prepare samples with different concentrations of additives.

Analyze the impact of additives on the preservation and quality of the food products.

MAP Packaging:

Pack perishable foods in modified atmosphere packaging using a MAP system.

Monitor the gas composition and adjust as needed.

Assess the impact of MAP on the shelf life and quality of the products.

Hurdle Technology Application:

Choose a specific food product and identify potential hurdles for preservation (e.g., pH adjustment, water activity control, thermal treatment, preservatives).

Design and implement a hurdle technology approach for the chosen product.

Evaluate the effectiveness of the hurdle technology in extending the shelf life.

Sensory Evaluation of Preserved Foods:

Conduct a sensory evaluation of preserved food products (e.g., dried fruits, canned vegetables, fermented foods).

Train participants in sensory evaluation techniques.

Assess attributes such as appearance, taste, aroma, texture, and overall acceptability.

Pedagogy:

Formative Assessment for Practical	
Assessment Occasion/ type	Marks
Test 1	05
Test 2	05
Practical Record	10
Participation and Involvement	05
Total	25 Marks
<i>Formative Assessments are compulsory</i>	



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Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Fifth Semester
Course Title	Principles of Diet Therapy (Theory)		
Course Code:	FSN-C11	No. of Credits	4
Contact hours	60 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Outcomes (COs): After the successful completion of the course, the student will be able to: CO1. Summarize and critically discuss/ understand both fundamental and applied aspects of diet therapy. CO2. Planning and preparation of therapeutic diets.	
Theory Contents	60 Hrs
Unit I	17 Hrs
<p>A. Introduction: Definition, objectives of diet therapy, factors to be considered in planning therapeutic diets</p> <p>Nutritional Assessment in clinical setting</p> <p>Planning of therapeutic diet</p> <p>The dietician: Classification, code of ethics, responsibilities, the dietician in India, Indian Dietetic Association</p> <p>B. Types of hospital diet:</p> <ul style="list-style-type: none"> • normal hospital diet • modification of normal diet: a) liquid diet {clear fluid diet and full fluid diet} b) soft diet and c) bland diet <p>Tube feeding: composition, osmolarity, types of formulas, mode of feeding, parenteral nutrition, Total Parenteral Nutrition (TPN), Home care of patients</p>	
Unit II	14 Hrs
<p>Diet in infections and fevers: host defence mechanisms, causes, types, general dietary considerations, typhoid, malaria, tuberculosis, Acquired Immuno Deficiency Syndrome (AIDS)</p>	

Unit III	14 Hrs
Diet in Obesity and Underweight: Aetiology, theories, assessment, types, treatment, complications, weight management guidelines for a dietician, nutritional and food requirements	
Unit IV	15 Hrs
Diet in Gastrointestinal diseases: Indigestion, peptic ulcer, constipation, diarrhoea, lactose intolerance, irritable bowel syndrome, inflammatory bowel disease, intestinal gas and flatulence.	

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	Srilakshmi, B. (2014) Dietetics, 4th and 7th edition, New Age International Publications, New Delhi
2	Shubhangini A Joshi (2011) Nutrition and Dietetics, with Indian Case Studies, 3 rd edition Tata McGraw Hill Publication, New Delhi
3	Mahan, L.K. & Ecott-Stump, S. (2000): Krause's Food, Nutrition and Diet Therapy, 12 th Edition, W.B. Saunders Ltd
4	Whitney, E.N. & Rolfes, S.R. (1999): Understanding Nutrition, 8th Edition, West Wadsworth, An International Thomson Publishing Co

Course Title	Principles of Diet Therapy (Practical)		Practical Credits	2
Course Code	FSN-C12	Contact Hours	60 Hours	
Formative Assessment	25 Marks	Summative Assessment	25 Marks	
Practical Content				
<ol style="list-style-type: none"> 1. <i>Planning and preparation of hospital diet Clear fluid, Full fluid, Soft diet, Bland diet (4 classes)</i> 2. <i>Planning and preparation of a day's diet for Typhoid and Tuberculosis (3 classes)</i> 3. <i>Planning and preparation of a day's diet for Obesity and Underweight (3 classes)</i> 4. <i>Planning and preparation of hospital diet for Peptic ulcer, Constipation and Diarrhoea (3 classes)</i> 				

Pedagogy:

Formative Assessment for Practical	
Assessment Occasion/ type	Marks
Test 1	05
Test 2	05
Practical Record	10
Participation and Involvement	05
Total	25 Marks
<i>Formative Assessments are compulsory</i>	



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Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Fifth Semester
Course Title	Principles of Food Processing (Theory)		
Course Code:	FSN-C13	No. of Credits	4
Contact hours	60 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Outcomes (COs): After the successful completion of the course, the student will be able to: CO1. Apply the knowledge of Food Technology, investigate, and solve the complex in food processing and nutrition to meet the specified needs with appropriate considerations for the society. CO2. To develop solutions for complex Engineering problems in the broad field of Food Engineering. CO3. Analyse, design and integrate knowledge of Food processing techniques in food industries and create passion for life-long learning and research in advanced fields.	
Theory Contents	60 Hrs
Unit I	15 Hrs
Introduction to Food Processing Sources, types and perishability of foods; Causes and types of food spoilage; Scope and benefit of food processing. Cereal processing- Rice- Parboiling and milling methods, High-Pressure Processing, by products of rice milling and their utilization; Wheat- Milling, by- products of milling, Nutritional losses during Processing; Storage. Conventional and nonconventional foods- Breakfast, Extruded products. Types, Pre- Processing, Processing & methods to remove toxic factors; Nutritional losses during Processing of millets, pulses	
Unit II	15 Hrs
Fruit & Vegetable Processing -Principles of processing. Harvesting, transportation and storage. Post harvest processing of fruits and vegetables: Peeling, sizing, blanching, Canning, Drying and freezing. Reception and preparation: Equipment, cleaning methods: sorting, grading, peeling and blanching, effects of processing on the quality of fruits and vegetable products., Nuts and Oil seed -Types; Pre-Processing; Processing & Preservation- Extraction of oils, meal concentrates and Value Addition; Nutritional losses during Processing; Storage.	

Coffee: Production practices, structure of coffee/cherry, Coffee processing including roasting, grinding, brewing extraction, dehydration, aromatization, instant coffee.	
Tea: Tea leaf processing, green, red, yellow, instant tea.	
Unit III	15 Hrs
Dairy Processing- Milk Pre-Processing; Processing & Preservation - Separation, Homogenization, Pasteurization, Standardization, Sterilization (UHT), Evaporation (Spray Drying), Chilling, Freezing & Refrigeration; Nutritional losses during Processing; Milk Product & By Products; Storage.	
Fleshy Food Processing – Meat, Poultry& Egg - Pre-Processing; Processing & Preservation- Smoking, Canning, Drying, Cooling, Canning Pulsed Electric Field processing; Nutritional losses during Processing; Storage. Sea Food Processing – Types; Pre-Processing; Processing & Preservation- Dielectric, Ohmic and Infra-red heating- Nutritional losses during Processing; Storage.	
Unit IV	15 Hrs
Spice (Indian) - Classification, Anti-Microbial & Antioxidant Properties, Processing, By-Products of Spices – Extraction of Oleoresin, Essential oil & Spice Blends, Medicinal Value of Spices; Nutritional losses during Processing; Storage.	
Miscellaneous Perishable Food: Confectionery- Types Confectionery & Method of Preparation Sugarcane & Sago Technology – By-Product & Its Utilization	

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	P.J.Fellows, Food Processing Technology. Principles and Practices, Second Edition, Woodland Publishing Ltd, Cambridge,England,2002
2	Avantina Sharma, Text Book of Food Science and Technology, International Book Distributing Co, Lucknow, UP, 2006.

References	
3	Sivasankar, Food Processing and Preservation, Prentice hall of India Pvt Ltd, NewDelhi.IIIRD Printing, 2005.
4	Peter Zeuthen and Leif Bogh-Sorenson, Food Preservation Techniques, Woodland Publishing Ltd, Cambridge, England, 2005.
5	NIIR Board of Food and Technologist, Modern Technology of Food Processing and Agro based industries, National Institute of Industrial Research, Delhi, 2005.
6	Peter zeuthena and Leif Bogh- Sorensen, Food Preservation Techniques, Wood Head Publishing Ltd., Cambridge, England, 2005
7	Suman Bhatti, Uma Varma, Fruit and vegetable processing organizations and institutions, CBS Publishing, New Delhi, 1 st Edition- 1995.
8	Mirdula Mirajkar, Sreelatha Menon, Food Science and Processing Technology vol-2, Commercial processing and packaging, Kanishka publishers, New Delhi- 2002.
9	NIIR Board, the complete Technology book on processing, dehydration, canning, preservation of fruits and vegetables, National Institute of Industrial Research, Delhi2005.
10	Stavros Yanniotis. 2008. Solving Problems in Food Engineering. Springer Science + Business Media, NY, USA.
11	Gaurav Tewari and Vijay K. Juneja. 2007. Advances in Thermal and Non-Thermal Food Preservation. Blackwell Publishing, Ames, Iowa, USA.
12	M. Shafiur Rahman. 2007. Handbook of Food Preservation, 2nd Ed. CRC Press, Boca Raton, FL, USA. James G. Brennan. 2006. Food Processing Handbook. Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany.
13	Marcus Karel and Darvl B. Lund. 2003. Physical Principles of Food Preservation, 2nd Ed. Marcel Dekker, Inc., NY, USA.
14	Peter Zeuthen and Leif Bugh-Sørensen. 2003. Food Preservation Techniques. CRC Press LLC, Boca Raton, FL, USA.
15	P. Fellows. 2000. Food Processing Technology: Principles and Practice, 2nd Ed. CRC Press, Boca Raton, FL, USA.
16	Norman N. Potter and Joseph H. Hotchkiss. 1995. Food Science, 5th Ed. Chapman & Hall, NY, USA.



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Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Fifth Semester
Course Title	Food and Nutrition Security (Theory)		
Course Code:	FSN-E1.1	No. of Credits	3
Contact hours	45Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

<p>Course Outcomes (COs): After the successful completion of the course, the student will be able to:</p> <p>CO1. Understanding and critical evaluation and assessment of the main theories, principles and concepts related to agronomic, environmental, economic, nutritional, and socio-political factors that influence food and nutrition security.</p> <p>CO2. Understand the role sustainable developmental goals in ensuring food and nutrition security.</p> <p>CO3. Understand the Role of Climate smart agriculture, Kitchen/terrace garden and other Agri-techniques in ensuring food and nutrition security.</p> <p>CO4. Understand the role of different national and international agencies in ensuring food security.</p> <p>CO5. Understand the effect the Government policies on food security</p>	
Theory Contents	45 Hrs
Unit 1: Food and Nutrition Security – Introduction, Definitions and Factors affecting	15 hrs
<p>Introduction to food & nutrition security- Definition, factors affecting food & nutrition security, national and house-hold food security, issues & challenges of food security, Gender issues in attaining food and nutrition security, 5 Pillars of Food Security (Availability, Accessibility, Utilization, Stability and Agency)</p> <p>Factors affecting – Food fortification, food adulteration, food additives, food toxins, food labelling, food contaminants, food taboos, Eating behaviour, Anti-nutritional factors</p> <p>Forms of food insecurity, Hunger, Poverty, chronic hunger, life cycle hunger, seasonal hunger, acute hunger, geography of hunger, wars, migration, refugee, urbanization</p>	
Unit 2: Role of Climate and Environment in food Security	15 hrs
<p>Food and Agriculture issues- Climate change, soil and environment, biodiversity and ecosystem, global issues in agriculture, greenhouse effect. Animal products and climate change, Climate Smart and Climate Proof agriculture, Millets as food and fodder crop to mitigate food insecurity. Sustainable agriculture,</p>	

<p>Kitchen and Terrace gardens, Micro greens, Balcony gardens, Aqua phonics, Vertical Gardening, Community farming, Integrated farming</p> <p>Food security and Country and State level – Availability of food, accessibility of food, consumption and utilization of food</p>	
<p>Unit 3: Role of National and International Policies and Programs in Food Security</p>	<p>15 hrs</p>
<p>Food assistance and Nutrition Improvement Programs - Food supply, food chain safety and security, role of PDS, MDM and ICDS programs, MGNREGA, Poshan Abhiyaan, Pradhan Mantri Matru Vandana Yojana, National de-worming program, Indradhanush programs, Anemia Mukht Bharath, Food Coupons</p> <p>Integrating nutrition and food security programmes- Good governance practices and human rights principles, Government of India programmes and initiatives. Food security policy and Status of macro food security in India, FCI, MSP,</p> <p>Role of Green, Yellow, Blue, White revolutions in ensuring food security. Role of Agri-biotechnology in food and nutrition security</p> <p>Capacity building in public health nutrition- The need, national and international organisations, Nutrition education, FAO, IFAD, UNICEF, WFP and WHO.</p>	

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	Routledge Handbook of Food and Nutrition Security by Bill Pritchard (Editor); Rodomiro Ortiz (Editor); Meera Shekar (Editor), 2016
2	Agricultural Urbanism by Janine M. de la Salle (Editor); Mark Holland (Editor), 2010
3	Second International Conference on Nutrition. (2014). Outcome Document, Rome Declaration on Nutrition. Rome, 19-21. Retrieved from: http://www.fao.org/3/a-ml542e.pdf

References	
4	World Health Assembly. (2014). Food and Nutrition Security in the Post-2015 Development Agenda. Retrieved from: http://www.beyond2015.org/sites/default/files/Beyond2015_FNSPositionPaper_FINAL_0.pdf
5	World Food Programme (WFP): Emergency Field Operations Pocketbook, Retrieved from: http://www.unicef.org/emerg/files/WFP_manual.pdf
6	Pingali, P., Alinovi, L., & Sutton, J. (2005). Food security in complex emergencies: enhancing food system resilience. <i>Disasters</i> , 29(s1), 5-24.
7	Barrett, C. B. (Ed.). (2013). Food security and sociopolitical stability. OUP Oxford, 1-34. Carolan, M. (2013). Reclaiming Food Security. Routledge / Earthscan: London / New York, 1-35.
8	United Nations Conference on Sustainable Development (Rio+20). (2012). The Future We Want. Outcome Document, A/Conf.216/L.1, 19. Retrieved from: http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&referer=/english/&Lang=E
9	United Nations Secretary General Report. (2012). Agricultural Development and Food Security. Retrieved from: http://www.un.org/ga/search/view_doc.asp?symbol=A/67/294&Lang=E
10	Ronald, P. (2011). Plant genetics, sustainable agriculture and global food security. <i>Genetics</i> , 188(1), 11-20.



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Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Fifth Semester
Course Title	Nutrition and Ayush (Theory)		
Course Code:	FSN-E1.2	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Outcomes (COs): After the successful completion of the course, the student will be able to:	
CO1. Upon completion of this course, the students will be able to understand the relation between nutrition,	
CO2. Ayurveda and yoga and to demonstrate the ability to develop and maintain a healthy diet and lifestyle.	
Theory Contents	45 Hrs
Unit:1- Introduction to Nutrition, Ayurveda and Yoga:	15 Hrs
Ayurveda and Indian food culture, Overview of the principles of nutrition, Ayurveda and yoga, Importance of integrating these practices for optimal health, basic principles of meal planning. Relationship between nutrition, Ayurveda and yoga: Understanding the relationship between these practices, Integrating principles of Ayurveda and yoga into a healthy diet and lifestyle, Importance of mindfulness and self – awareness in achieving optimal health, FSSAI regulations on Ayurvedic Aahar.	
Unit:2- Principles of Nutrition, Ayurveda and Yoga:	15 Hrs
Overview of macronutrients and micronutrients, nutritional requirements for optimal health, reference man and women, malnutrition, healthy eating habits and diet planning. Ayurveda: overview of Ayurvedic principles and philosophy, understanding doshas and their significance in Ayurveda, history of Ahara nutrition; Vedic and madhyayugin diet and its process, Aharashastra; definition, intention area of action. Yoga: overview of the history and philosophy of Yoga, understanding the benefits of yoga for physical and mental health, basic yoga postures and techniques.	
Unit:3- Concept of preventive Ayurvedic diet	15 Hrs
Definition of swasthya, Deha (body), prevention and maintenance of health through diet, dinacharya(daily regime), rutucharya(seasonal conduct), daily regimen and seasonal conduct applied aspect health	

definition, BMI, BMR, Anthropometry, bhojana vidhi, jalapana, Patra concept , laghana therapy, classification of dietary element basics of varga.

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	“The Complete Book of Ayurvedic Home Remedies “by Vasant Lad
2	“Yoga Anatomy” by Leslie Kaminoff and Amy Matthews
3	“Nutrition for Health and Healthcare” by Ellie Whitney and Linda Kelly DeBruyne.
4	“Charaka samhita and its commentaries”
5	“Madhav Dravyaguna- Priyavrat Sharma”
6	“Ashtanga Hrudaya and it commentaries”
7	“Pakadarpan-Nalakrut”
8	“Robinson, Lawler: Normal and Therapeutic Nutrition (17th Ed) Macmillan Publishing Co. 1986”
9	“Swaminathan S: Advanced Textbook on food and nutrition Vol I (2 nd Ed) Bapp Co 1985”



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Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Fifth Semester
Course Title	Food Additives (Theory)		
Course Code:	FSN-E1.3	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Outcomes (COs): After the successful completion of the course, the student will be able to: CO1. To understand the chemical, technological and toxicological aspects of food additives CO2. To know the permissible limits of food additives to be added in different processing methods and product development	
Theory Contents	45 Hrs
Unit 1 : Introduction, Definitions, types and classifications	14 hrs
Definitions, scope, Effects, Classifications, Functions, Intentional and Non-Intentional additives, Difference between food additives and Adulterants, Stability, Role and Uses in processed food products, Food additives generally recognised as safe (GRAS), Evaluation of food additives.	
Unit 2 : Food additive agents	16 hrs
Uses, Functions, Chemical, technological, and toxicological aspects of acid, base buffer systems, salts and chelating/sequestering agents, leavening agents, antioxidants, emulsifying and stabilizing agents, anti-caking agents, thickeners, firming agents, flour bleaching agents and bread improvers, Health implications.	
Unit 3 Other Additive Agents	15 hrs
Masticatory agents, Low calorie and Non-nutritive sweeteners, Polyols, Class I and II Preservatives as per PFA act, Clarifying agents, Gases and Propellants, Tracers, Anti-microbial agents, Indirect additives, Colours and Flavours (synthetic and Natural), Essential oils and Oleoresins.	

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks

Formative Assessments are compulsory

References	
1	Chemistry of Food Additives and Preservatives by Titus A. M. Msagati. John Wiley Sons Ltd UK, 2013.
2	Food Additives data Book. Jim Smith and Lily Hong-shwn John Wiley Sons Ltd UK, 2011.
3	Essential Guide to Food Additives by Michael Saltmaesh. Wiley Publishers, UK, 2009.
4	Encyclopedia of Food and Color Additives. George A, Burdock, Vol 11, CRC Press, 2010.
5	Natural Food Additives ingredients and flavouring. David Baines and Richard Seal. Woodhead Publishing, UK, 2012.
6	CRC Handbook of Food Additives 2nd Edition, Vol I, Thomas E. Furia, CRC Press, USA, 1972.
7	Food Additives – Characteristics, detection and estimation. S N Malindru. APH Publishing Corporation, 2008.
8	Food Processing and Perservation by G. Subbulakshmi, Shobha A. Udipi, Chapter 7, Food Additives, New Age International Publishers, New Delhi, pp-225-244.
9	Ranganna S. 1984, Modern concept and practice of chemical preservatives, Proc. Ind Conv. Food Sci and Tech, 1984.



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Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Fifth Semester
Course Title	Development of Cereal and Millet Products		
Course Code:	FSN-V1.1	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Outcomes (COs): After the successful completion of the course, the student will be able to: CO1. Understand the principles of cereal and millet science: CO2. Apply product development and processing techniques in cereal and millet products: CO3. Ensure quality control and shelf-life extension in cereal and millet products: CO4. Understand the marketing and consumer trends in the cereal and millet-based food industry:	
Theory Contents	45 Hrs
Unit 1: Introduction to Cereal and Millet Products	15Hrs
<p>Introduction to Cereal and Millet Science</p> <p>Classification and Nutritional Composition of Cereals and Millets</p> <p>Post-Harvest Handling and Storage of Cereal and Millet Grains</p> <p>Milling and Processing Technologies for Cereal and Millet Grains</p> <p>Quality Evaluation and Grading of Cereal and Millet Grains</p> <p>Food Safety and Regulatory Aspects in Cereal and Millet Processing</p>	
Unit 2: Product Development and Processing Techniques	15Hrs
<p>Formulation and Development of Cereal and Millet-Based Food Products</p> <p>Techniques for Enhancing Nutritional Value of Cereal and Millet Products</p> <p>Processing Techniques for Cereal and Millet Flours, Starches, and Grits</p> <p>Extrusion and Puffing Technology for Cereal and Millet-Based Snacks</p> <p>Fermentation and Bioprocessing of Cereal and Millet Grains</p> <p>Value-Added Product Development using Cereal and Millet By-Products</p>	

Unit 3: Quality Control and Shelf-Life Extension	15Hrs
<p>Sensory Evaluation of Cereal and Millet Products</p> <p>Quality Control and Assurance in Cereal and Millet Processing</p> <p>Packaging and Storage Technologies for Cereal and Millet Products</p> <p>Shelf-Life Extension Techniques for Cereal and Millet-Based Foods</p> <p>Post-Processing Techniques for Preservation and Fortification of Cereal and Millet Products</p> <p>Marketing and Consumer Trends in Cereal and Millet-Based Food Industry</p>	

Pedagogy:

Formative Assessment	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	"Cereal Technology" by Karel Kulp and Joseph G. Ponte Jr. (AACC International, 2019)
2	"Millet: Chemistry, Technology, and Utilization" edited by Y. H. Hui, et al. (CRC Press, 2018)
3	"Cereal Grains: Properties, Processing, and Nutritional Attributes" edited by Sergio O. Serna-Saldivar (CRC Press, 2010)
4	"Millet and Sorghum: Biology, Production and Utilization" edited by Peter S. Belton and John R.N. Taylor (CABI, 2019)
5	"Cereal Processing: Food Cycle Technology Source Book" by Alan J. Kidman (Woodhead Publishing, 2000)
6	"Cereal Foods: World List of Selected References" by Food and Agriculture Organization (FAO) (FAO, 2001)
7	"Cereal Biotechnology" edited by Peter C. Morris and James H. Bryce (Wiley-Blackwell, 2000)
8	"Handbook of Cereal Science and Technology" edited by Karel Kulp and Joseph G. Ponte Jr. (Marcel Dekker, 2000)

References

9	"Millet Grain: Properties, Processing, and Utilization in Functional Foods" edited by Brijesh K. Tiwari and Aoife Gowen (CRC Press, 2017)
10	"Advances in Cereal Science: Implications to Food Processing and Health Promotion" edited by Yong-Cheng Shi and Vasco Cadavez (Woodhead Publishing, 2011)



Government of Karnataka

Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Fifth Semester
Course Title	Diet Counselling		
Course Code:	FSN-V1.2	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

<p>Course Outcomes (COs): After the successful completion of the course, the student will be able to:</p> <p>CO5. Use various types and techniques of counselling to motivate patients to achieve wellbeing.</p> <p>CO6. To understand the principles and procedures of communication skills and role of counsellor</p>	
Theory Contents	45 Hrs
Unit 1	15Hrs
<p>A. Basic Concepts of Counselling Definition of counselling, Models for behavioural change, trans theoretical model of behaviour change Motivational interview: Principles, motivational intervention model Fundamentals of food behaviour. Assessment of readiness to change, Client counsellor relationship.</p> <p>Communication skills Objectives, Verbal, nonverbal communication skills Skills - Listening, response, action process, sharing response, observing, paraphrasing & reflecting. Behaviour change: Counselling skills for resistance behaviour Cultural competence in counselling – ABCDE approach</p> <p>B. Components of counselling process Strategies to promote change-Food management tools, Behaviour change strategy, cognitive restructuring, education during counselling. Making behaviour change last-social network, stress management, relapse prevention, counselling evaluation.</p> <p>Counselling sessions: Not ready to change, unsure about change, Ready to change, skill development for OARS (open end questions, affirmations, reflective listening, summary statements, Client rights)</p>	

Unit 2	15Hrs
<ul style="list-style-type: none"> • Preparation of Nutrition Care Plan (ABCD model) • Analysis and interpretation of SOAP format, SGA <p>Preparation of counselling aids for the following conditions Diabetes mellitus (IDDM/NIDDM/GDM), Obesity and underweight, hypertension, atherosclerosis, renal calculi, hepatitis/ cirrhosis, GIT (Gastrointestinal disorders).</p>	
Unit 3	15Hrs
<p>Conducting counselling sessions for a given condition using Open-ended questions, Affirming, Reflective listening, and Summarizing (OARS) along with counselling aids for</p> <ul style="list-style-type: none"> • Obesity • Underweight • Diabetes mellitus (IDDM/NIDDM/GDM) • GIT disorders • Liver disorders • Renal disorders • Cardiovascular disorders 	

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	Bauer Kathleen D, Sokolik Carol, Loiu Doreen., Nutrition Counselling and Education Skill Development, Wadsworth Thomson Learning, 2002
2	Bauer Kathleen D, Sokolik Carol., Basic nutrition counselling skill development, Wadsworth Thomson Learning, 2002

References	
3	Gail Morrison & Lisa Hark., Medical Nutrition & Disease, Blackwell Science Inc
4	Herrin. M., Nutrition Counselling in the Treatment of Eating Disorders. New York, NY, Brunner-Routledge, 2003
5	King Kathy, Klawitter Bridget., Nutrition Therapy: Advanced Counselling Skills Lippincott Williams & Wilkin,2007
6	Snetsellar, Linda G., Nutrition counselling skills for the nutrition care process, 4 th Edition Jones & Bartlett Publishers, 2009
7	Rollnick S, Miller WR, Butler CC. Guilford press, 2008. Motivational Interviewing in Health Care: Helping Patients Change Behaviour (Applications of Motivational Interviewing)



Government of Karnataka

Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Fifth Semester
Course Title	Baking and Confectionary Skills (Theory)		
Course Code:	FSN-V1.3	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Pre-requisite(s): Diploma with minimum 45%	
Course Outcomes (COs): After the successful completion of the course, the student will be able to: CO 1. Demonstrated proficiency in baking and confectionary techniques. CO 2. Showcase expertise in ingredients and utilizing proper techniques and achieving desired outcomes. CO 3. Showcase the ability to develop original recipes or adapt existing ones to create unique and innovative creations. CO 4. Practical knowledge of industry standards and practices in baking and confectionary	
Theory Contents	45 Hrs
Unit 1- Introduction to Baking and Confectionary	15Hrs
Overview of Baking and Confectionary. Definition and scope of baking and confectionary skills. Essential Baking and Confectionary Tools and Equipment. Identification and proper use of baking and confectionary tools and equipment. Safety guidelines and maintenance of tools and equipment. Basic Ingredients and their Functions: Understanding the role and function of key ingredients in baking and confectionary. Types of flours, sugars, fats, leavening agents, and flavorings.	
Unit 2 - Baking techniques	15Hrs
Understanding Baking Principles: Heat transfer methods in baking (conduction, convection, radiation) The science of baking (chemical reactions, gluten formation, yeast fermentation). Baking Measurements and Conversions: Accurate measurement techniques (weight vs. volume). Conversion of recipes for different quantities. Mixing Techniques: Different mixing methods (creaming, blending, folding). Proper techniques for achieving desired textures and consistencies. Baking Temperatures and Times: Understanding oven temperatures and their effects on baked goods. Determining the appropriate baking time for different recipes	

Unit 3 - Confectionary Skills	15Hrs
Introduction to Confectionary. Overview of different confectionary products. Significance of temperature control and timing in confectionary. Candy making: Techniques for making candies (hard candies, caramels, toffees). Working with different types of sugar syrups and temperatures. Melting, tempering, and molding chocolate. Creating various products (truffles, bonbons, chocolate decorations). Indian Pastry Artistry: Introduction to pastry doughs and techniques (puff pastry, shortcrust, choux pastry). Creation of pastry-based desserts and pastries for Indian bakeries	

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Attendance	10
Seminar	10
Debates and Quiz	10
Test	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	Mathurvalli S.M.D. A Textbook of Bakery and Confectionary, Narendra Publishing House, Delhi, 2021
2	Mathurvalli S.M.D. A Handbook of Bakery and Confectionary, Routledge-Talyor & Francis, 2022
3	Sivalingam Y. Textbook of Bakery and Confectionary, PHI Learning Pvt. Ltd.,
4	Friberg B. The Professional Pastry Chef: Fundamentals of Baking and Pastry, John Wiley & Sons, 2012
5	The Culinary Institute of America. Baking and Pastry: Mastering the Art and Craft, Wiley, 2015
6	Pfeiffer J. The Art of French Pastry, Knopf, 2013
7	Figoni P. I. How Baking Works: Exploring the Fundamentals of Baking Science, Wiley, 2011
8	Corriher S.O. Bakewise: The Hows and Whys of Successful Baking, Scribner, 2008
9	Suas M. Advanced Bread and Pastry: A Professional Approach, Cengage Learning, 2008
10	Reinhart P. The Bread Baker's Apprentice: Mastering the Art of Extraordinary Bread, Ten Speed, 2001
11	Greweling P. P. Chocolates and Confections: Formula, Theory, and Technique for the Artisan Confectioner, Wiley, 2012

**Model Curriculum
of
BSc
in
Food Science and Nutrition
6th Semester**

Karnataka State Higher Education Council



Government of Karnataka

Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Sixth Semester
Course Title	Food Microbiology (Theory)		
Course Code:	FSN-C14	No. of Credits (Theory + Practical)	4
Contact hours	60 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Pre-requisite(s):	
<p>Course Outcomes (COs): After the successful completion of the course, the student will be able to:</p> <p>CO1. Develop a comprehensive understanding of food microbiology:</p> <p>CO2. Identify and manage foodborne pathogens:</p> <p>CO3. Evaluate food preservation and processing techniques:</p> <p>CO4. Ensure food safety and quality assurance: Ensure food safety and quality assurance:</p> <p>CO5. Apply critical thinking and problem-solving skills in food microbiology:</p>	
Theory Contents	60 Hrs
Unit 1: Introduction to Food Microbiology	15 Hrs
<p>Basic concepts and scope of food microbiology, Microorganisms in food: bacteria, viruses, yeasts, molds, and parasites. Sources of microorganisms in food: soil, water, air, animals, humans. Factors influencing microbial growth in food: temperature, pH, water activity, nutrient availability. Food spoilage: causes, signs, and effects</p>	
Unit 2: Foodborne Pathogens	15 Hrs
<p>Introduction to foodborne illnesses and outbreaks. Common foodborne pathogens: Salmonella, Campylobacter, Escherichia coli, Listeria monocytogenes, Staphylococcus aureus, Clostridium botulinum, etc. Pathogenesis of foodborne infections and intoxications, Methods for detection and identification of foodborne pathogens. Control measures to prevent foodborne illnesses: food safety regulations, good manufacturing practices, hazard analysis critical control point (HACCP) system</p>	
Unit 3: Food Preservation and Processing	15 Hrs
<p>Principles of food preservation: physical, chemical, and biological methods, Heat processing: pasteurization, sterilization, canning. Refrigeration and freezing, Fermentation and curing, Drying and</p>	

dehydration. High-pressure processing (HPP) and other emerging technologies, Packaging and its role in food preservation	
Unit 4: Food Quality and Safety	15 Hrs
Microbiological criteria for food safety, Indicator organisms and their significance, Spoilage organisms and their detection, Foodborne toxins and their detection, Food spoilage and quality indicators, Risk assessment and management in food microbiology, Emerging issues in food microbiology: antimicrobial resistance, food fraud, genetically modified organisms (GMOs), nanotechnology	

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Attendance	10
Seminar	10
Debates and Quiz	10
Test	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	"Food Microbiology: Fundamentals and Frontiers" by Michael Doyle, Robert L. Buchanan, and Arnold L. Demain. Publisher: ASM Press. Publication Year: 2013.
2	"Food Microbiology: An Introduction" by Thomas J. Montville, Karl R. Matthews, and Martin B. Doyle. Publisher: ASM Press. Publication Year: 2005.
3	"Food Microbiology: Principles into Practice" by Osman Erkmen and Turgut Cabuk. Publisher: Wiley-Blackwell. Publication Year: 2016.
4	"Food Microbiology: A Laboratory Manual" by Ahmed E. Yousef and Carolyn Carlstrom. Publisher: Wiley-Blackwell. Publication Year: 2019.
5	"Food Microbiology: An Introduction" by M.P. Doyle. Publisher: Springer. Publication Year: 2020.
6	"Modern Food Microbiology" by James M. Jay, Martin J. Loessner, and David A. Golden. Publisher: Springer. Publication Year: 2005.
7	"Food Microbiology: An Introduction" by Thomas V. McMeekin, Tony Ross, and Richard A. Olley. Publisher: Springer. Publication Year: 2000.

References	
8	"Food Microbiology: Principles and Explorations" by Margaret Barth, Thomas Montville, and Cindy Cox. Publisher: Wiley. Publication Year: 2007.
9	"Food Microbiology: A Laboratory Manual" by Lynne McLandsborough. Publisher: Wiley. Publication Year: 2017.
10	"Microorganisms in Foods 8: Use of Data for Assessing Process Control and Product Acceptance" by International Commission on Microbiological Specifications for Foods (ICMSF). Publisher: Springer. Publication Year: 2011.

Course Title	Food Microbiology (Practical)	Practical Credits	2
Course Code	FSN-C15	Contact Hours	60 Hours
Formative Assessment	25 Marks	Summative Assessment	25 Marks

Practical Content

1. **Microbial Enumeration:** Perform serial dilution and plate count techniques to determine the microbial load in food samples. Students can practice using agar plates and counting colony-forming units (CFUs).
2. **Pathogen Detection:** Use molecular biology techniques, such as PCR or ELISA, to detect specific foodborne pathogens in food samples. Students can learn how to extract DNA or antigens from samples and perform specific assays.
3. **Microbial Isolation and Identification:** Isolate and identify different microorganisms from food samples using selective and differential media. Students can learn how to culture bacteria, perform Gram staining, and identify specific microorganisms.
4. **Food Spoilage Examination:** Examine spoiled food samples and identify the microorganisms responsible for spoilage. Students can observe different types of spoilage, such as mold growth, off-flavors, and sliminess, and perform microbial analysis.
5. **HACCP Plan Development:** Develop a Hazard Analysis Critical Control Point (HACCP) plan for a specific food product. Students can identify critical control points, establish critical limits, and develop monitoring and corrective action procedures.
6. **Fermentation Process:** Design and carry out a fermentation process to produce a food product such as yogurt or sauerkraut. Students can monitor microbial growth, pH changes, and sensory attributes during fermentation.

7. **Antibiotic Sensitivity Testing:** Perform antibiotic susceptibility testing on bacterial isolates obtained from food samples. Students can learn about the mechanisms of antibiotic resistance and interpret the results of sensitivity tests.
8. **Challenge Testing:** Conduct challenge tests to determine the effectiveness of food preservation methods. Students can inoculate food samples with specific microorganisms and monitor their growth under different conditions.
9. **Environmental Monitoring:** Set up an environmental monitoring program in a food processing facility. Students can design sampling plans, collect samples from different areas, and analyze them for indicator organisms.
10. **Quality Assurance Audits:** Conduct quality assurance audits of food facilities, focusing on microbiological aspects. Students can assess the implementation of food safety practices, evaluate sanitation procedures, and identify areas for improvement.

Pedagogy:

Formative Assessment for Practical	
Assessment Occasion/ type	Marks
Test 1	05
Test 2	05
Practical Record	10
Participation and Involvement	05
Total	25 Marks
<i>Formative Assessments are compulsory</i>	



Government of Karnataka

Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Sixth Semester
Course Title	Therapeutic Nutrition (Theory)		
Course Code:	FSN C16	No. of Credits	4
Contact hours	60 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Pre-requisite(s):	
Course Outcomes (COs): After the successful completion of the course, the student will be able to: CO1. Describe the methods used to adapt a normal diet to treat a specific clinical nutritional disorder. CO2. Apply recent various methods and techniques in the field of therapeutic nutrition. CO3. Lists methods for preparation of normal food to adjust various pathological conditions. CO4. Recommend dietary adjustments leading to better health outcomes and improved quality of life.	
Theory Contents	60 Hrs
Unit – 1 Diet Therapy, Nutritional Care in Energy Imbalance and Surgery	15Hrs
<p>Definition of normal and therapeutic diets –Principles of Diet Therapy, Assessment of nutritional status of patients using different tools (MUST, MNA, SGA etc). Therapeutic modification of normal diets, Types of Hospital Diets- Clear-fluid, full fluid and soft diet, Special Feeding Methods-Enteral and Parenteral Nutrition.</p> <p>Energy imbalance -Obesity – definition, types, aetiology, assessment, complications, Management of Obesity- Exercise, Diet, Behaviour modification</p> <p>Underweight –Aetiology, Complications, Dietary Modifications</p> <p>Nutrition in Eating Disorders Anorexia Nervosa & Bulimia Nervosa</p>	
Unit II - Nutritional Care in Gastro-Intestinal Disorders, Diabetes and Febrile Conditions	15Hrs
<p>GASTRO-INTESTINAL DISORDERS: Aetiology, Symptoms, Diagnosis, Treatment and dietary of Peptic Ulcer, Diarrhoea, Constipation,</p> <p>DIABETES MELLITUS -Types, Aetiology, Symptoms, Diagnosis, Physiological changes , Complications, Treatment–Exercise, Hypoglycaemic drugs, Insulin and Diet, Dietary Management- Glycaemic Index and Food Exchange List</p>	

FEBRILE CONDITIONS – Metabolic changes in Fever, Types- Short Duration- Typhoid, Intermittent Duration-Malaria, Long Duration- Tuberculosis, Dietary Management.	
Unit III - Nutritional Care in Cardio-Vascular Diseases and Liver Disorders	15 Hrs
Gastro-Intestinal Disorders: Aetiology, Symptoms, Diagnosis, Treatment and dietary of Peptic Ulcer, Diarrhoea, Constipation, Diabetes Mellitus -Types, Aetiology, Symptoms, Diagnosis, Physiological changes, Complications, Treatment–Exercise, Hypoglycaemic drugs, Insulin and Diet, Dietary Management- Glycaemic Index and Food Exchange List Febrile Conditions – Metabolic changes in Fever, Types- Short Duration- Typhoid, Intermittent Duration-Malaria, Long Duration- Tuberculosis, Dietary Management.	
Unit IV Nutritional Care in Renal Disorders and Cancer	15 Hrs
Nephrosis and Nephritis– Functions of kidneys, Renal function tests, Causes, symptoms, Dietary management. Renal Failure and Renal Calculi - Causes, types and Dietary management. Dialysis-Types and Dietary Treatment Cancer - Definition, Aetiology, Symptoms, Therapies, Dietary Management, Role of Functional Foods in Prevention of Cancer	

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	B. Srilakshmi- Dietetics, 7th ed
2	Gopalan, C. et. al: Nutritive value of Indian Foods, Indian Council of Medical Research.
3	Clinical Nutrition & Dietetics- F. P. Antia and Philip Abraham, Oxford University Press

References	
4	Anderson, L., Dibble, M.V., Tukki, P.R., Mitchall, H.S., and Rynbergin H.J.: Nutrition in Health and Disease, 17th edition, J. B. Lipincott & Co. Philadelphia.
5	Robinson. C.H. Lawler, M.R. Chenoweth, W. L., and Garwick, A. E. (1986): Normal and Therapeutic Nutrition. 17th edition, Mac Milian Publishing Co.
6	Williams. S. R.: Nutrition & Diet Therapy, 6th edition, Times Mirror/Mosby College Publishing St. Louis.
7	Raheena, Begum: A textbook of food, nutrition and dietetics Sterling Publishers, New Delhi
8	Joshi, S. A.: Nutrition and Dietetics, Tata McGraw Hill, Publications, New Delhi.
9	Khanna K, Gupta S, Seth R, Passi SJ, Mahna R, Puri S (2013). Textbook of Nutrition and Dietetics. Phoenix Publishing House Pvt. Ltd. Stacy Nix (2009).
10	William's Basic Nutrition and Diet Therapy, 13th Edition. Elsevier Mosby.
11	Wadhwa A and Sharma S (2003). Nutrition in the Community- A Textbook. Elite Publishing Pvt Ltd, New Delhi.
12	ICMR (2011) Nutritive value of Indian Foods. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad.
13	ICMR (2011) Dietary Guidelines for Indians – A Manual. National Institute of Nutrition
14	Indian Council of Medical Research, Hyderabad.
15	Seth V and Singh K (2007). Diet Planning through the Life Cycle Part II: Diet Therapy. A Practical Manual, 4th edition. Elite Publishing House Pvt. Ltd.
16	Mahan LK and Escott-Stump S. (2007): Krause's Food and Nutrition Therapy. 12th Ed. WB Saunders Company, London.

Course Title	Therapeutic Nutrition (Practical)		Practical Credits	2
Course Code	FSN-C17		Contact Hours	60 Hours
Formative Assessment	25 Marks	Summative Assessment	25 Marks	
Practical Content				
<ol style="list-style-type: none"> 1. Therapeutic modification of normal diets-- Planning and preparation of liquid diet, soft diet, high and low-calorie diet with modified fat and carbohydrate level. 2. Planning and preparation of diet for peptic ulcer. 3. Planning and preparation of renal disorders and cancer. 				

4. Planning and preparation of diet with modified:

- (a) Consistency,
- (b) Fibre and residue,
- (c) Diet for diarrhoea.

Pedagogy:

Formative Assessment for Practical	
Assessment Occasion/ type	Marks
Test 1	05
Test 2	05
Practical Record	10
Participation and Involvement	05
Total	25 Marks
<i>Formative Assessments are compulsory</i>	



Government of Karnataka

Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Sixth Semester
Course Title	Food Quality Control (Theory)		
Course Code:	FSN C18	No. of Credits	4
Contact hours	60 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Pre-requisite(s):	
Course Outcomes (COs): After the successful completion of the course, the student will be able to: CO1. Identify and explain the key components of food quality control systems, including quality assessment parameters, sampling techniques, and quality control plans. CO2. Apply analytical and instrumental methods for evaluating the physical, chemical, and microbiological aspects of food quality. CO3. Interpret and comply with relevant food safety regulations and standards, such as HACCP, FDA regulations, and ISO certifications. CO4. Demonstrate the ability to analyse and troubleshoot quality-related issues in the food industry, propose solutions, and implement quality improvement strategies	
Theory Contents	60 Hrs
Unit I - Introduction to Food Quality Control	15 Hrs
Definition and importance of food quality control Historical development and evolution of food quality control Basic principles and concepts of quality control in the food industry Overview of food quality control systems and standards	
Unit II - Food Safety and Regulations	15 Hrs
Introduction to food safety and its significance in quality control Food safety hazards and their sources (microbiological, chemical, physical) Regulatory agencies and organizations governing food safety Food safety regulations and standards (e.g., HACCP, FDA regulations)	

Unit III - Quality Control Techniques in Food Industry	15 Hrs
Sampling techniques for food quality control Physical and chemical analysis methods for food quality assessment Microbiological analysis methods for food safety evaluation Instrumental techniques for quality control (e.g., chromatography, spectroscopy)	
Unit IV - Food Quality Evaluation and Improvement	15 Hrs
Sensory evaluation methods for assessing food quality attributes. Statistical process control techniques in food quality management Quality improvement strategies (e.g., continuous improvement, Six Sigma) Certification and accreditation in food quality control (e.g., ISO standards)	

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	"Food Analysis" by S. Suzanne Nielsen (2017, Springer)
2	"Food Safety: A Practical and Case Study Approach" by Anna McElhatton (2018, Wiley)
3	"Food Process Engineering and Quality Assurance" by J. Peter Clark and W. James Harper (2013, Wiley)
4	"Food Quality Assurance: Principles and Practices" by Inteaz Alli (2016, CRC Press)
5	"Statistical Methods for Food Science: Introductory Procedures for the Food Practitioner" by John A. Bower (2009, Wiley-Blackwell)
6	"Food Safety Management: A Practical Guide for the Food Industry" by Yasmine Motarjemi and Huub Lelieveld (2020, Academic Press)

References	
7	"Sensory Evaluation of Food: Principles and Practices" by Harry T. Lawless and Hildegarde Heymann (2010, Springer)
8	"Food Quality and Consumer Value: Delivering Food that Satisfies" by Anne Murcott (2006, Routledge)
9	"Food Quality: Balancing Health and Disease" by Lauri Byerley and Joong-Ho Kwon (2017, CRC Press)
10	"Food Safety: A Practical Guide for the Food Industry" by Scott Brooks and Timothy Grasso (2020, CRC Press)



Government of Karnataka

Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Sixth Semester
Course Title	Sensory Evaluation (Theory)		
Course Code:	FSN E2.1	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Outcomes (COs): After the successful completion of the course, the student will be able to:	
CO1. Understand the fundamental principles of sensory perception and its application in various industries.	
CO2. Apply different sensory evaluation techniques for discrimination testing, descriptive analysis, and sensory profiling.	
CO3. Analyse and interpret sensory data using statistical methods and tools.	
CO4. Design and execute sensory evaluation studies with proper consideration for ethical guidelines.	
CO5. Demonstrate knowledge of advanced topics in sensory evaluation, such as panellist training, experimental design, and emerging technologies.	
Theory Contents	45 Hrs
Unit I: Introduction to Sensory Evaluation	15 Hrs
Introduction to sensory evaluation and its importance in various industries	
Basic principles of sensory perception and human senses (taste, smell, sight, touch, and hearing)	
Types of sensory tests and their applications (discrimination testing, descriptive analysis, consumer testing)	
Ethics and considerations in sensory evaluation (participant recruitment, bias, confidentiality)	
Unit II: Sensory Evaluation Techniques and Analysis	15 Hrs
Sensory evaluation methods and protocols (triangle test, duo-trio test, ranking, rating)	
Discrimination testing and its applications (difference thresholds, consumer preference)	
Descriptive analysis techniques and sensory profiling (flavor, aroma, texture, appearance)	
Statistical analysis in sensory evaluation (data interpretation, significance testing, analysis of variance)	

Unit III: Applications and Advanced Topics in Sensory Evaluation	15 Hrs
Selection and training of sensory panellists, Experimental design in sensory evaluation studies	
Sensory evaluation in product development and optimization, Sensory evaluation in quality control and assurance, Emerging technologies in sensory evaluation (electronic noses, digital imaging)	

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	"Sensory Evaluation Techniques" by Morten C. Meilgaard, Gail Vance Civille, and B. Thomas Carr (CRC Press, 2016)
2	"Sensory Evaluation of Food: Statistical Methods and Procedures" by Michael O'Mahony (CRC Press, 2000)
3	"Sensory Evaluation of Food: Principles and Practices" by Harry T. Lawless and Hildegarde Heymann (Springer, 2010)
4	"Quantitative Descriptive Analysis: Development, Applications, and the Future" by Jeanne-Marie D. Reid and John C. Castura (ASTM International, 2002)
5	"Consumer Perception of Product Risks and Benefits" by Lynn J. Frewer and Herve Abdi (Woodhead Publishing, 2010)
6	"Sensory Evaluation Practices" by Herbert Stone and Joel L. Sidel (Academic Press, 2004)
7	"Sensory Evaluation in Quality Control" by Roland P. Carpenter (Van Nostrand Reinhold, 1987)
8	"Sensory Evaluation of Sound" by Richard H. Lyon (CRC Press, 2016)
9	"Handbook of Food Science, Technology, and Engineering" edited by Y. H. Hui (CRC Press, 2005)
10	"Food Oral Processing: Fundamentals of Eating and Sensory Perception" by Jianshe Chen, Zeynep A. Aydin, and Kees de Graaf (Wiley-Blackwell, 2012)



Government of Karnataka

Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Sixth Semester
Course Title	Public Health Nutrition (Theory)		
Course Code:	FSN E2.2	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

<p>Course Outcomes (COs): After the successful completion of the course, the student will be able to:</p> <p>CO1. Explain the concept of population health.</p> <p>CO2. Understand the concept of "nutritional epidemiology"</p> <p>CO3. Identify the social determinants of health.</p> <p>CO4. Identify various factors that influence nutritional practices among individuals, communities, and population groups.</p> <p>CO5. Differentiate how individuals, communities, and population groups are affected by various factors such as religious and cultural beliefs.</p> <p>CO6. Describe how public health nutrition principles are applied to improve or maintain the optimal health of populations and targeted groups.</p>	
Theory Contents	45 Hrs
Unit 1: Public Health Nutrition and Health Care System	15 Hrs
<p>Introduction, definition and concept of Public Health, Core functions and essential services, Health System and Policy in India. Important Public Health Acts. Principles and Practices of Public Health.</p> <p>Current concerns in public health nutrition: An overview. Role of public health nutritionists in national development.</p> <p>Health - definition, dimensions, determinants, indicators Community health care</p> <p>Nutrition Epidemiology for Public Health, Principles of Nutrition in Public Health. Nutrition Policy and Programs Dietary Guidelines</p>	

UNIT 2 Food and Nutrition Security	15 Hrs
<p>Concepts and definitions of food and nutrition security at national, regional, household and individual levels</p> <p>CO5 B Impact of food production losses, distribution, access, availability, consumption on food and nutrition security- critical appraisal of the current scenario</p> <p>Principles of environmental health and human ecology:</p> <p>Water pollution: Water-borne diseases (Biological and Chemical) Water purification, Water quality– criteria and standards.</p> <p>Air pollution: Sources of air pollution, Air pollutants:. Effects of air pollution (Health aspects and Social and economic aspects); Prevention and control of air pollution.</p> <p>Waste disposal and waste management: Biomedical wastes and waste management Housing sanitation, Fair sanitation</p> <p>Sewage: Definition, Health aspects, composition of sewage, Aim of sewage purification, Modern sewage treatment</p>	
Unit III: Approaches for improving nutrition and health status of the community	15 Hrs
<p>Health based interventions including immunization, provision of safe drinking water/ sanitation, prevention and management of diarrhoeal diseases. Food based interventions including food fortification, dietary diversification, supplementary feeding and biotechnological approaches.</p> <p>Education based interventions including growth monitoring and promotion (GMP), health / nutrition related social and behaviour change communication. Nutrition Education: Importance of nutrition education Nutrition education methods: Posters, Charts, Audio visual aids, Lectures. Nutrition Program Development</p>	

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	Bogin, Barry (1999). Patterns of human growth, Cambridge University Press.
2	Cameron Noel (2002). Human growth and development, St. Louis, Academic Press.
3	Curry KA & Jaffe A (1998) Nutrition Counselling Skills & Communication Skills. WB Saunders & Co. Gibney MJ, Elia M, Ljungqvist } & Dowsett J. (2005) Clinical Nutrition. The Nutrition Society Textbook Series. Blackwell Publishing Company
4	Gibson R S. (2005). Principles of Nutritional Assessment. 2nd ed. Oxford University Press.
5	Harrison, GA; Tanner, JM; Pilbeam, DR; Baker PT (1988). Human biology: An introduction to human evolution, variation, growth & adaptability, Oxford, England, Oxford University Press.
6	Hickson JH (2000) Nutrition for Exercise & Sport. CRC Press. 2nd Edition
7	Krause's Food & Nutrition Therapy 12th ed.
8	Saunders-Elsevier Shils, M.E., Shike, M, Ross, A.C., Caballero B and Cousins RJ (2005) Modern Nutrition in Health and Disease. 10th ed.
9	Wiley-BlackJay JM, Loessner DA, Martin J. (2005) Modern Food Microbiology. 7th ed. Springer. Graw Hill Publishing Co. Ltd Marriott N G (1985), Principles of Food Sanitation 1st Edition. A VI publication USA.
10	Schmidt, RH. Roderick, Food Safety Handbook, G.E. Wiley Interscience, 2003, New Jersey.



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Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Sixth Semester
Course Title	Functional Foods and Nutraceuticals (Theory)		
Course Code:	FSN E2.3	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

<p>Course Outcomes (COs): After the successful completion of the course, the student will be able to:</p> <p>CO1. To provide overview of functional foods, nutraceuticals and natural health products</p> <p>CO2. To understand the functional food concept as related to ingredient efficacy and safety</p> <p>CO3. To familiarize bioactive ingredient-disease relationships & importance of clinical study support</p>	
Theory Contents	45 Hrs
Unit 1 : Functional Foods	15 hrs
<p>Overview, definition, classification, functional food science, food technology and its impact on functional food development; key issues in Indian functional food industry and nutraceutical. Relation of functional foods and nutraceutical to foods and drugs.</p> <ol style="list-style-type: none"> a. Development of functional foods, benefits and sources b. Traditional functional foods in Indian diet. c. Effects of processing conditions and storage d. Research frontiers in functional foods e. Different foods as functional food: cereal products (oats, wheat bran, rice bran, etc.), fruits and vegetables, milk and milk products, legumes, nuts, oil seeds and sea foods, herbs, spices and medicinal plants f. Coffee, tea and other beverages and their protective effects 	
Unit 2: Nutraceuticals	16 hrs
<p>Nutraceuticals</p> <p>Historical perspective, definition, nature, Nutraceutical compounds and classification based on chemical/biochemical nature, scope and future prospects. Bioavailability and factors affecting bioavailability.</p> <p>Nutraceuticals with Plant Origin</p>	

Carotenoids, Lycopene, Xanthophylls, leutin, Sulfides, Polyphenols, Flavonoids, Isoflavones, glycosides, Isoprenoids, Phytoestrogens, Isoflavones, lignans, chlorophyll

Nutraceuticals with animal origin

Chondroitin, Glucosamine, Chitin and Chitosan and Choline; mineral origin- Iodine, magnesium, manganese, molybdenum, phosphorus, potassium, selenium, zinc.

Antioxidants

Concept of free radicals and antioxidants; antioxidants role as nutraceuticals and functional foods

Unit 3: Pro and Pre-biotics	14 hrs
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Taxonomy and important features Definition, chemistry, sources, metabolism and bioavailability,
 a. Health effects of including mechanism of action:
 b. Gut health and effects of intestinal flora on human physiology
 c. Probiotics in various foods: fermented milk products, indigenous and traditional dairy products, non-milk products.
 Synbiotics – production, application and health promotion

Pedagogy:

Formative Assessment	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	Handbook of Nutraceuticals and Functional Foods Edited by Robert E.C. Wildman, Routledge Publishers.
2	Nutraceuticals by L. Rapport and B. Lockwood, Pharmaceutical Press.
3	Methods of Analysis for Functional Foods and Nutraceuticals Edited by W. Jeffrey, Hursts, Routledge Publishers.
4	Food is Medicine by P.J Cousion; Duncan Baird Publishers, London.
5	Dietary Supplements of Plant Origin, M. Maffei (Ed.), Taylor & Francis, 2003.
6	Bioprocesses and Biotechnology for Functional Foods and Nutraceuticals, Jean -

References	
	Richard Neeser & J. Bruce German, Marcel Dekker, Inc., 2004.
7	Dietary Supplements and Functional Foods -Geoffrey P. Webb. 38. A Guide to Understanding Dietary Supplements-Shawn M. Talbott.
8	Role of dietary fibres and nutraceuticals in preventing diseases by K. T Agusti and P. Faizal: BS Publication.
9	The Food Pharmacy by Jean Carper, Simon & Schuster, UK Ltd., (1988).



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Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Sixth Semester
Course Title	Development of products from pulses, nuts, and oil seeds		
Course Code:	FSN V2.1	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Pre-requisite(s):	
Course Outcomes (COs): After the successful completion of the course, the student will be able to:	
CO1. Understand the characteristics, nutritional value, and processing techniques of pulses, nuts, and oil seeds.	
CO2. Apply product development principles and processes to create innovative and marketable products using pulses, nuts, and oil seeds.	
CO3. Evaluate and select appropriate ingredients, flavors, and textures for the development of pulses, nuts, and oil seeds products.	
CO4. Demonstrate knowledge of quality control, safety regulations, and packaging requirements for pulses, nuts, and oil seeds products.	
CO5. Develop effective marketing strategies and launch plans for pulses, nuts, and oil seeds products, considering market trends and consumer demands.	
Theory Contents	45 Hrs
Unit 1: Introduction to Development of Products from Pulses, Nuts, and Oil Seeds	15 Hrs
Introduction to Pulses, Nuts, and Oil Seeds: Definition and classification of pulses, nuts, and oil seeds. Nutritional value and health benefits, Cultivation, harvesting, and processing techniques, Product Development Process.	
Overview of product development stages, Idea generation and screening, Market research and analysis Concept development and evaluation, Pulses, Nuts, and Oil Seeds Processing Techniques.	
Cleaning, sorting, and grading, Dehulling and decortication, Roasting, blanching, and toasting. Grinding, milling, and oil extraction, Formulation and Ingredient Selection. Understanding the functionality of pulses, nuts, and oil seeds, Ingredient compatibility and formulation principles, Flavoring and seasoning considerations, Texture modification and binding agents, Product Quality and Safety.	

Factors affecting product quality, Quality control measures and standards, Food safety regulations and guidelines, Packaging and labeling requirements	
Unit 2: Product Development and Commercialization	15 Hrs
<p>Product Prototyping and Testing, Prototyping techniques and equipment. Sensory evaluation and consumer testing, Product optimization and refinement, Product Scale-up and Manufacturing. Scaling up recipes and processes, Equipment selection and facility layout, Production planning and scheduling, Quality assurance and control, Market Analysis and Marketing Strategies, Market segmentation and target audience identification.</p> <p>Competitive analysis and positioning, Pricing strategies and distribution channels, Marketing communication and promotion plans, Product Launch and Post-Launch Evaluation. Launch strategies and execution, Monitoring and evaluating market performance, Feedback collection and product improvement. Long-term sustainability and growth strategies, Trends and Innovations in Pulses, Nuts, and Oil Seeds Products.</p> <p>Exploring emerging trends and consumer demands, Innovative product concepts and technologies, Sustainable and eco-friendly practices, Future prospects and opportunities in the industry</p>	
Unit 3:	15 Hrs

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	"Pulses, Sugar and Tuber Crops" by S.S. Purohit and S.P. Singh, Jain Brothers, 2019.
2	"Oilseeds: Characteristics, Properties, and Processing" by D.N. Bhatnagar, Wiley-Blackwell, 2012.
3	

References	
4	"Nut Processing and Packaging: A Guide to Nutritional Properties and Preservation" by Mohammed Wasim Siddiqui and Mohammad Shafiur Rahman, CRC Press, 2014.
5	"Pulse Foods: Processing, Quality and Nutraceutical Applications" by Brijesh K. Tiwari, Aoife Gowen, and Brian McKenna, Academic Press, 2011.
6	"Handbook of Nuts: Production, Processing, Food Science, and Nutrition" by Muhammad Siddiq and Mark A. Uebersax, John Wiley & Sons, 2017.
7	"Oilseed Crops: Yield and Adaptations under Environmental Stress" by Parvaiz Ahmad and M.N.V. Prasad, Wiley-Blackwell, 2017.
8	"Pulse Foods: Processing, Quality and Nutraceutical Applications" by Y. H. Hui, et al., Wiley-Blackwell, 2010.
9	"Advances in Pulses Research in India" by Om Prakash and S.S. Thakur, New India Publishing Agency, 2018.
10	"Oilseed Crops: Nutrient Management, Crop Yield and Sustainability" by Pardeep Kumar and Ashok Kumar Thakur, Springer, 2018



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Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Sixth Semester
Course Title	Nutritional Assessment		
Course Code:	FSN V2.2	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

<p>Course Outcomes (COs): After the successful completion of the course, the student will be able to:</p> <p>CO1. To understand and define the different terminology used in nutrition assessment.</p> <p>CO2. To assess the individual nutrition status through different methods</p> <p>CO3. To understand the use of different tools and techniques used in nutrition status assessment.</p> <p>CO4. Gain an understanding of the appropriate applications of biochemical and clinical methods and interpretation of results in nutritional assessment of individuals and population.</p> <p>CO5. Gain an understanding of the advantages and disadvantages of various approaches used to evaluate the nutritional status of individual and communities. 4. Identify and describe basic training in common anthropometric methods</p>	
Theory Contents	45 Hrs
Unit 1: Introduction, definitions, components	14 hrs
<p>Introduction, definitions objectives of nutrition assessment, Nutrition assessment systems Methods and components of nutrition screening, Nutrition surveillance,</p> <p>Nutrition status of Individual, Nutrition status of community, Role of Nutrition surveys in assessing nutrition status of community, Types of Nutrition surveys, organization of nutrition surveys, NCHS,</p> <p>Indirect methods - Demography, population dynamics and vital events and their health implications, indicators of health and nutrition (IMR, TMR, MMR)</p>	
Unit 2: Direct methods	17 hrs
<p>a. Anthropometry – methods, reference standards in children and adults, scales of comparison (percentiles, Z score), classification and interpretation of somatic data, somatic indicators of PEM, growth charts, advantages and disadvantages</p>	

<p>b. Biochemical - use of specimen types, indicators of protein-energy status, anemia, immune function, CVD risk, oxidative stress. Urine and stool analysis.</p> <p>c. Dietary- methods, nutrient intake analysis, dietary assessment in special populations and specific situations, Dietary reference intakes</p> <p>d. Clinical- components of clinical assessment, associations with nutrient deficiencies and biochemical status</p>	
<p>Unit 3: Tools and Technique of Assessment</p>	14 Hrs
<p>Tools and Techniques of nutritional assessments by dietary</p> <p>a. Preparation of assessment schedules</p> <p>b. Nutritional anthropometry</p> <p>c. Standardization of raw and cooked weights, use of nutritional composition tables</p> <p>Dietary survey techniques-intakes of individual/ family /inmates of institutions</p>	

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	Nieman, DC. 2019. Nutritional Assessment. 7 th edition. New York, NY: McGraw-Hill. ISBN 0078021405.
2	Charney, P, and Malone, A. 2015. ADA Pocket Guide to Nutrition Assessment. American Dietetic Association, Chicago, Illinois
3	Gibson, S. 2005. Principles of Nutritional Assessment. 2nd Edition. Oxford University Press, New York, New York.
4	Nkakwe, N.E. (2013). Community Nutrition. (2nd ed), Jones & Bartlett Learning.
5	Edelstein, S. (2011). Nutrition in Public Health. (3rd ed), Jones & Bartlett Learning.

References	
6	Vir, S.C. (2011). Public Health Nutrition in developing countries. Part I and II, Woodhead Publishing India, Pvt Ltd.
7	Bendich, A & Deckelbaum, R.J.(2005). Preventive Nutrition. (3rd ed),Humana Press, Totowa, New Jersey
8	Mishra, R.C. (2005). Health and Nutrition Education. A.P.H. Publishing Corporation, New Delhi.
9	Wadhava , A. & Sharma , S. (2003). Nutrition in community. New Delhi : Elite publication house Pvt. Ltd.



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Model Curriculum

Program Name	BSc in Food Science and Nutrition	Semester	Sixth Semester
Course Title	Food Service Management		
Course Code:	FSN V2.3	No. of Credits	3
Contact hours	45 Hours	Duration of SEA/Exam	2 hours
Formative Assessment Marks	40	Summative Assessment Marks	60

Course Outcomes (COs): After the successful completion of the course, the student will be able to: CO1. Demonstrate a deep understanding of food service management concepts and principles. CO2. Apply financial management techniques to control costs, analyse pricing, and measure performance in food service operations. CO3. Exhibit proficiency in human resource management strategies, including recruitment, training, and employee relations in the food service industry. CO4. Plan, organize, and manage food service operations effectively, considering factors such as menu planning, procurement, production, and service. CO5. Students will develop analytical and problem-solving skills related to food service management, allowing them to make informed decisions in real-world scenarios. CO6. Students will gain an understanding of the importance of customer satisfaction and quality service in food service management, enabling them to deliver exceptional experiences to guests and patrons. CO7. Students will develop effective communication and teamwork skills necessary for collaborating with diverse stakeholders in the food service industry, including employees, suppliers, and customers.	
Theory Contents	45 Hrs
Unit I - Introduction to Food Service Management	15Hrs
1.1 Overview of Food Service Management Definition and scope of food service management Importance of effective food service management in various sectors (restaurants, cafeterias, hotels, healthcare facilities, etc.) Key responsibilities and roles of food service managers 1.2 Food Service Operations	

Types of food service operations (full-service restaurants, quick-service restaurants, catering, etc.)

Understanding the workflow and processes involved in food service operations.

Identifying key components of successful food service operations (menu planning, procurement, food production, service, etc.)

Introduction to food safety and sanitation practices in food service operations

1.3 Menu Planning and Development

Understanding the importance of menu planning in food service management

Factors influencing menu planning decisions (customer preferences, dietary requirements, seasonality, etc.)

Menu engineering techniques to maximize profitability.

Introduction to recipe development, standardization, and costing

Unit II - Financial Management in Food Service	15Hrs
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2.1 Cost Control in Food Service

Understanding food and labour costs and their impact on profitability

Cost control methods and techniques (portion control, inventory management, waste reduction, etc.)

Budgeting and forecasting in food service management

2.2 Pricing and Revenue Management

Strategies for setting menu prices to ensure profitability.

Analysing menu pricing and profitability through cost-volume-profit analysis

Revenue management techniques to optimize sales and maximize revenue.

2.3 Financial Analysis and Performance Measurement

Unit III - Human Resource Management in Food Service	15Hrs
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3.1 Recruitment and Selection

Identifying staffing needs and job analysis in food service operations

Recruitment strategies and sources

Selection process and techniques for hiring suitable employees.

3.2 Training and Development

Importance of training and development in the food service industry

Designing and implementing training programs for employees

Performance evaluation and feedback mechanisms

3.3 Employee Relations and Motivation

Understanding employee relations issues and strategies for managing them
Employee motivation techniques and reward systems
Handling conflicts and fostering a positive work environment

Pedagogy:

Formative Assessment for Theory	
Assessment Occasion/ type	Marks
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	40 Marks
<i>Formative Assessments are compulsory</i>	

References	
1	Foodservice Management: Principles and Practices by June Payne-Palacio and Monica Theis (Publisher: Prentice Hall, Year: 2017)
2	Introduction to Foodservice by June Payne-Palacio and Monica Theis (Publisher: Prentice Hall, Year: 2014)
3	Food and Beverage Cost Control by Lea R. Dopson and David K. Hayes (Publisher: Wiley, Year: 2016)
4	Managing Quality Service In Hospitality: How Organizations Achieve Excellence In The Guest Experience by Robert C. Ford and Michael C. Sturman (Publisher: Delmar Cengage Learning, Year: 2018)
5	Menu Design: Merchandising and Marketing by Albin Seaberg and C. William Davis (Publisher: Wiley, Year: 2012)
6	Purchasing: Selection and Procurement for the Hospitality Industry by Andrew H. Feinstein and John M. Stefanelli (Publisher: Wiley, Year: 2017)
7	Foodservice Organizations: A Managerial and Systems Approach by Mary B. Gregoire and Priscilla A. Parke (Publisher: Pearson, Year: 2019)
8	Hospitality Facilities Management and Design by David M. Stipanuk (Publisher: Wiley, Year: 2012)

References	
9	Food Safety Management: A Practical Guide for the Food Industry by Yasmine Motarjemi and Huub Lelieveld (Publisher: Academic Press, Year: 2013)
10	Restaurant Financial Basics by Raymond S. Schmidgall, David K. Hayes, and Jack D. Ninemeier (Publisher: Wiley, Year: 2017)
11	Human Resources in Hospitality: How to Attract and Retain Great Employees by Dana V. Tesone (Publisher: Pearson, Year: 2015)
12	Operations Management for Hospitality and Tourism: Concepts and Techniques by Dimitrios Buhalis and Robin B. C. Ritchie (Publisher: Butterworth-Heinemann, Year: 2013) Reference books

Question Paper Pattern

Paper Code:		Paper Title:		
Duration of Exam	2 Hours	Max Marks	60	
Instruction:	Answer all the sections			

Section-A

.....	Marks

Section-B

.....	Marks

Section-C

.....	Marks