Government of Karnataka

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

3rd and 4th Semester Model Syllabus
for
BSc. in
Food Science & 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

SN	Name & Organization	Designation
1	Dr. Ravikumar Patil, Professor, Davanagere University, Davanagere	Chairman
2	Dr. Asna Urooj, Professor, University of Mysore, Mysore.	Member
3	Dr. Renuka Meti, Assoc. Professor, KSAW University, Vijayapura	Member
4	Dr. C. Usha Devi, Assoc. Professor, Maharani Cluster University, Bangalore.	Member
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8	Dr. Tejaswini B Yakkundimath Assoc. Professor, Government First grade Women's college, Belgaum	Member, Convener
9	Smt. Rajani B Special Officer, Karnataka State Higher Education Council	

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Model Curriculum

Program Name	**B Sc Food Science & Nutrition**	Semester	**Third Semester**
Course Title	**Food Science (Theory + Practical)**		
Course Code:	**DSC-III A3**	No. of Theory +Practical Credits	**4+2**
Contact hours	**52 hrs**	Duration of ESA/Exam	**2.30 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): Certificate with minimum 45%

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1. Basic concepts of Food Science

CO2. Food groups, food commodities and their structure

Content of Theory	**52 Hrs**
Unit–1	12

Cereals, Millets and their products

- Structure and nutrient composition rice and wheat
- Processed products of wheat and rice.
- Millets and its food use.
- Germination and Malting of Grains – process, characteristics, Nutritional benefits and uses

Fermented foods (brief)

- Mechanism of fermentation and changes occurring during fermentation.
- Indian fermented foods (idly, dosa, dhokla, and bread).
- Beverages – Types (Alcoholic & Non-alcoholic)

Unit -2	12

Legumes

- Structure and nutrient compositions of legumes.
- Factors affecting the cooking quality of legumes (soaking, fermentation, extrusion, germination, and puffing)
- Anti-nutritional factors

Nuts and oilseeds

- Oilseeds – Composition, Processing and Food uses

Unit -3	15

Vegetables and fruits

- Classification and nutrient composition of fruits and vegetables.
- Pigments – Types, Effects of cooking media on colour, texture and acceptability.
- Browning reaction and its prevention.

Sweetening Agents (Brief)

- Sugar, Jaggary, Honey etc.
- Crystallization of sugar and its application in food preparations.
- Fortifying Sugars and Candies
- Artificial Sweetening agents – Composition and Uses

Unit -4	14

Milk and milk products

- Composition of milk.
- Factors affecting the quality.
- Different types of milk and products.

Eggs

- Structure, composition
- Grading, Factors affecting the quality.
- Effect of cooking on eggs and role of egg in different preparations

Meat, poultry, and fish

- Structure of muscles and meat quality
- Post-mortem changes
- Factors to be considered in selection and preparation of meat, poultry and fish

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) / Program Outcomes (POs)	**Program Outcomes (POs)**														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Gain the basic knowledge of Food Science		✓			✓		✓								
Define the structure of common food commodities									✓				✓		
Explains structure and functions of food commodities in Indian cookery									✓				✓	✓	

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Provides excellent preparation for careers in the area of Food Science													✓		✓

Pedagogy

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	**40 Marks**

Course Title	**Food Science (Practical)**	Practical Credits	**2**

Content of Practical

1. Cereals
    a. Microscopic examination of starch molecules.
    b. Gelation of cereal flours (compare the time taken for gel formation and consistency).
    c. Observation of cooking time & quality of steamed, aged & par boiled rice.
2. Pulses – Effect of soaking, sprouting, addition of acid, alkali on cooking quality (any one or two pulses like green gram, Bengal gram, cowpea etc).
3. Vegetables & Fruits
    a. Effect of adding acid & alkali on green, red, yellow & white vegetables
    b. Methods of preventing browning
4. Milk & milk products
    a. Factors affecting curdling of milk (demonstration)
    b. Preparation of khoa (demonstration)

5. Eggs
    a. Demonstration of grading eggs for quality
    b. Ferrous sulphide formation & prevention
    c. Effects of beating egg white on stiffness of foam & its uses (Custard & Omelet)
6. Sugar cookery – Determination of stages of crystallization & its uses
7. Pre-processing techniques – Malting, germination, fermentation.
8. Visit to Food Processing & Packaging industry, research laboratory.
9. Market survey of processed food products (any one food category for batch of 2 students)

Submission of class record and project report.

Pedagogy

Formative Assessment	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	05
Test 2	05
Practical Record	10
Participation and Involvement	05
Total	**25 Marks**

References	
1	Food Processing Technology by P.J. Fellows, Woodhead publishing ltd.
2	Food Science by N.N. Potter, CBS publishing.
3	Physical principles of Food Preservation. Vol. II by M. Karel, O.R. Fenema and D.B. Lurd, Maroel, Dekker Inc. New York.
4	Alzamora, S.M., Tapia, M.S. and Lopez Malo, A. Minimally Processed Fruits and
5	Vegetables: Fundamental Aspects and Applications, Springer, 2005.
6	Chakrabarty MM. 2003. Chemistry and Technology of Oils and Fats. Prentice Hall.
7	Chakraverty.A1995.Post Harves Technology of Cereals, Pulses and Oilseeds, Oxford & IBH Publishing Co.Pvt.Ltd.

References	
8	Dendy DAV & Dobraszczyk BJ. 2001. Cereal and Cereal Products. Aspen.
9	Hamilton RJ & Bhatia. 1980. Fats and Oils - Chemistry and Technology. App. Sci. Publ.
10	Hoseney RS. 1994. Principles of Cereal Science and Technology. 2nd Ed. AACC.
11	Kay DE. 1979. Food Legumes. Tropical Products Institute.
12	Kent NL. 1983. Technology of Cereals. 4th Ed. Pergamon Press
13	Salunkhe, D.K. and Kadam, S.S. Handbook of Fruit Science and Technology: Production, Composition, Storage, and Processing, Marcel Dekker, 2005.
14	Agro Food Processing: Technology Vision 2020 Fruits & Vegetables Current Status Vision TIFAC, 1996.
15	Introductory Foods by Hughes O and Bennion, M. 5th ed. The macmillan Co., New York. 1970.
16	Experimental Study of Foods by Griswold, R.M. 1962., Houghton mifflin company, Boston.
17	Ghose, R.L.M., Ghate, M.B. and Subramaniam, V. 1960. Rice in India. ICMR, New Delhi.
18	Eckles, G.H., Combs, W.S. and Macy, H. 1951. Milk and Milk Products, RMB Publishing Co., Ltd., New Delhi
19	Fisher, P. and Bender, A. 1971. The Value of Foods. Oxford University Press, London.
20	Birch, G.C. and Cameron, A.G, and Spencer, M. Food Science, 3rd ed., Perganon Press, Oxford.
21	Sweetrnah, M.D. and Mackellar, I, 1954. Food Science and Preparation. 4th ed., John wiley & Sons Inc., New York.
22	Fitch, J.J. and Francis, C.A. 1953. Foods and Principles of Cookery, 1st ed., PrenticeHall Inc., New York.
23	Pechkham, G.C. 1969. Foundations of Food Preparation, The Macmillan Company, London.

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Model Curriculum

Program Name	**B Sc Food Science & Nutrition**	Semester	**Third Semester**
Course Title	**Food Adulteration (Theory)**		
Course Code:	**OE-III**	No. of Theory Credits	**3**
Contact hours	**42 hrs**	Duration of ESA/Exam	**2.30 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): Certificate with minimum 45%

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1. Extend the knowledge to other kinds of adulteration, detection, and remedies

CO2. Learn basic laws and procedures regarding food adulteration and consumer protection

Content of Theory	**42 Hrs**

Unit–1

Common Foods and Adulteration

A. Definition – Types; Poisonous substances, foreign matter, Cheap substitutes, Spoiled parts.

B. Adulteration through Food Additives – Intentional and incidental. General Impact on Human Health.

Unit -2

Adulteration of Common Foods and Methods of Detection

A. Means of Adulteration

B. Methods of Detection of Adulterants in the following Foods; Milk, Oil, Grain, Sugar, Spices and condiments, processed food, Fruits and vegetables. Additives and Sweetening agents (at least three methods of detection for each food item).

Unit -3

Present Laws and Procedures on Adulteration:

A. Highlights of Food Safety and Standards Act 2006 (FSSA) –Food Safety and Standards Authority of India–Rules and Procedures of Local Authorities.

B. Role of voluntary agencies suchas, AGMARK, I.S.I., Quality-control laboratories of companies, Private testing laboratories, Quality control laboratories of consumer co-operatives.

C. Consumer education, Consumer's problems rights and responsibilities, COPRA 2019 - Offenses and Penalties – Procedures to Complain – Compensation to Victims.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Gain knowledge kinds of adulteration, detection, and remedies		✓			✓		✓								
Learn basic laws and procedures regarding food adulteration and consumer protection									✓				✓	✓	

Pedagogy

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	**40 Marks**

References	
1	A firstcourseinFoodAnalysis–A.Y.Sathe,NewAgeInternational(P)Ltd.1999.
2	FoodSafety,casestudies–Ramesh.V.Bhat,NIN, 1992.
3	https://old.fssai.gov.in/Portals/0/Pdf/Draft_Manuals/Beverages and confectionary. pdf.
4	https://cbseportal.com/project/Download-CBSE-XII-Chemistry-Project
5	FoodAdulteration#gsc.tab=0 (Downloadable e material on food adulteration).
6	https://www.fssai.gov.in/.
7	https://indianlegalsolution.com/laws-on-food-adulteration/
8	https://fssai.gov.in/dart/

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Model Curriculum

Program Name	**B Sc Food Science & Nutrition**	Semester	**Fourth Semester**
Course Title	**Community Nutrition (Theory + Practical)**		
Course Code:	**DSC-IV A4**	No. of Theory +Practical Credits	**4+2**
Contact hours	**52 hrs**	Duration of ESA/Exam	**2.30 Hours**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): Certificate with minimum 45%

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1. Learn the concept of malnutrition and nutritional epidemiology

CO2. Understand major nutritional problems prevalence, prevention and control

CO3. Understand policies and programs to combat community nutrition programs discussed in class.

CO4. Know the role of organizations working towards combating malnutrition.

Content of Theory	**52 Hrs**
Unit–1	12
Introduction: Meaning and scope of community nutrition; Multidisciplinary approach of public health nutrition; Concept of food and nutritional security, Determinants of food security, Food security system in India, nutrition monitoring, nutrition surveillance, health economics, epidemiological studies, nutritional epidemiology. Malnutrition: etiology, prevalence, vicious cycle of malnutrition, economics of malnutrition	
Unit -2	12
Major Nutritional problems: Prevalence at national and international level; Prevention and control of : Vitamin A deficiency, IDD, Anaemia, Coronary heart disease, Hypertension, Diabetes Mellitus, Diarrhea , low birth weight, Child and maternal malnutrition ; Prevalence of Zn and Cu deficiency.	
Unit -3	15
Assessment of Nutritional Status in Community: Anthropometric Measurements- Measurements-body weight, stature, mid upper arm reference to standards (NCHS- Weight for Height, Weight for age) Clinical Assessment- Clinical signs of Nutritional Disorder	

Biochemical Assessment-Biochemical Test for Nutritional Deficiencies (PEM, Vitamin A , Iron, Iodine and Folic Acid) Dietary Assessment- Family Dietary Survey, Assessment of Dietary intake of Individual	
Unit -4	14
Strategies to combat Nutritional Problems Diet or Food based strategies Supplementation and short-term prevention strategy Fortification and enrichment Nutrition health education Organizations to combat malnutrition: Objectives and Functions National organizations concerned with Food and Nutrition---ICMR, NIN, CFTRI, DFRL, NIPCCD International organizations concerned with Food and Nutrition- FAO, WHO, UNICEF, WORLD BANK	

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) / Program Outcomes (POs)	**Program Outcomes (POs)**														
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Learn the concept of malnutrition and nutritional epidemiology		✓			✓		✓								
Understand major nutritional problems prevalence, prevention and control									✓				✓		
Understand policies and programs to combat community nutrition programs discussed in class.									✓				✓	✓	
Know the role of organizations working towards combating malnutrition.													✓		✓

Pedagogy

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	**40 Marks**

Course Title	**Community Nutrition (Practical)**	Practical Credits	**2**

Content of Practical

1. Preparation of audio-visual aids: Poster, Chart, Flash card, power point presentation and one video clipping.
2. Planning and Preparation of low-cost recipes for Iron Deficiency.
3. Planning and Preparation of low-cost energy rich and protein rich recipes.
4. Planning and Preparation of low-cost recipes for Vitamin A deficiency.
5. Planning and preparation of Complementary Foods (emphasis of premixes and ARF).
6. Planning and preparation of indigenous low cost, nutritive recipes (using methods to enhance the nutritive value of foods at home level) suitable for various vulnerable groups.
7. Visit to Food and Nutrition Organization.
8. Planning and conducting nutrition Health Education activity using various teaching aids for vulnerable groups.
9. Planning and conducting an Exhibition with report writing on topics related to community nutrition and health.

Pedagogy

Formative Assessment	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	05
Test 2	05
Practical Record	10
Participation and Involvement	05
Total	**25 Marks**

References	
1	Bamji SM, Rao NP and Reddy V, Text book of human nutrition, oxford and IBH publishing co.,New Delhi.

References	
2	GopalanC,Combating undernutrition-basic issues and practical approaches, Nutrition Foundation of India,1987.
3	GopalanC,Women and nutrition in India, NFI,New Delhi,1992.
4	Jelliffe D.D.1966. The assessment of Nutritional Status of the Community. WHO, monograph series.
5	Jelliffe D.D.1966. The assessment of Nutritional Status of the Community. WHO, monograph series.
6	Michael.J.G,Barrie.M.M:Public health nutrition,Blackwell publishing,2005.
7	Nweze Eunice Nnakwe., Community Nutrition – planning health promotion and disease prevention., Jones And Bartlett publishers, 2009.
8	Park.K,Park's textbook of preventive and social medicine.,12th edition.M/S Banarsidasbhanot publishers,2009.
9	Reddy V, PrahladRaoN, Sastry G and Nath KK, Nutrition trends in India, Hyderabad, NIN, 1993
10	https://www.thelancet.com/journals/lanchi/article/PIIS2352-4642(19)30273-1/fulltext
11	S. Swaminathan 2019. The burden of child and maternal malnutrition in India and trends in its indicators in the states of India: The global burden of disease study 1990-2017.

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Model Curriculum

Program Name	**B Sc Food Science & Nutrition**	Semester	**Fourth Semester**
Course Title	**Food Safety (Theory)**		
Course Code:	**OE-IV**	No. of Theory Credits	**3**
Contact hours	**42 hrs**	Duration of ESA/Exam	**2 Hrs 30 Min**
Formative Assessment Marks	**40**	Summative Assessment Marks	**60**

Course Pre-requisite(s): Certificate with minimum 45%

Course Outcomes (COs): After the successful completion of the course, the student will be able to:

CO1. To study the types of hazards associated with food

CO2. To gain knowledge on food regulations (national as well as international)

CO3. To understand the design and implementation of food safety management systems such as ISO series, HACCP and its prerequisites such as GMP, GHP etc.

Content of Theory	**42 Hrs**

Unit–1

Introduction to Food Safety

A. Definition, types of hazards, biological, chemical, physical hazards

B. Factors affecting Food Safety

C. Importance of Safe Foods

Unit -2

Food Safety Management Tools

A. Basic concept - Prerequisites- GHPs, GMPs,

B. HACCP, ISO series, TQM - concept and need for quality

C. Risk Analysis

D. Accreditation and Auditing

Unit -3

Food Laws and Standards

A. Indian Food Regulatory Regime

B. Global Scenario

C. Other laws and standards related to food

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-15)

Course Outcomes (COs) / Program Outcomes (POs)	Program Outcomes (POs)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Study the types of hazards associated with food		✓			✓		✓								
Gain knowledge on food regulations (national as well as international)									✓				✓	✓	
Understand the design and implementation of food safety management systems such as ISO series, HACCP, and its prerequisites such as GMP, GHP etc.		✓			✓		✓								

Pedagogy

Formative Assessment:	
Assessment Occasion/ type	**Weightage in Marks**
Test 1	10
Test 2	10
Assignment / Seminar	5+5
Project	10
Total	**40 Marks**

References	
1	Lawley, R., Curtis L. and Davis, J. The Food Safety Hazard Guidebook, RSC publishing, 2004
2	De Vries. Food Safety and Toxicity, CRC, New York, 1997
3	Marriott, Norman G. Principles of Food Sanitation, AVI, New York, 1985
4	Forsythe, S J. Microbiology of Safe Food, Blackwell Science, Oxford, 2000 41
5	Forsythe, S. J. The Microbiology of Safe Food, second edition, Wiley Blackwell, U.K.,2010
6	Mortimore S. and Wallace C. HACCP, A practical approach, Chapman and Hill, London,1995
7	Blackburn CDW and Mc Clure P.J. Food borne pathogens. Hazards, risk analysis & control. CRC Press, Washington, U.S.A, 2005