# SHIVAJI UNIVERSITY, KOLHAPUR.

**Accredited By NAAC with 'A' Grade**
**Revised Syllabus For**

## M. Phil./ Ph. D. Course Work

## Food Science and Technology

**Syllabus to be implemented from**
**June, 2020 onwards.**

# SHIVAJI UNIVERSITY, KOLHAPUR
# Syllabus for Ph. D. Food Science and Technology - 2020

## COURSE STRUCTURE

There will be three theory papers, each of 100 marks.

The titles of the papers are as under:

| | |
|---|---|
| Paper - I: Research methodology and scientific report writing | 100 marks |
| Paper - II: Recent trends in food processing and preservation | 100 marks |
| Paper – III: Elective I or II (80 Marks) + Seminar (20 Marks) | 100 marks |

For each Paper there will be 60 hours of work load

(Lectures -40 hours, Discussion/Seminars - 10 hours and Library work -10 hours).

**Paper - I: Research methodology and scientific report writing (100 Marks)**

1. An Insight into Research:

Definition and basic concepts, objectives, significance and techniques of research, finding research materials – literature survey, compiling records.

2. Scientific Writing:

a. Definition and kinds of scientific documents – research paper, review paper, book reviews, theses, conference and project reports (for the scientific community and for funding agencies).
b. Components of a research paper – the IMRAD system, title, authors and addresses, abstract, acknowledgements, references, tables and illustrations.
c. Dealing with publishers – submission of manuscript, ordering reprints.
d. Oral and poster presentation of research papers in conferences/symposia.
e. Preparation and submission of research project proposals to funding agencies.

3. Biostatistics:

a. Definition, population and sample, sampling techniques and types of samples, Statistics and parameters.
b. Summarization of data and estimation
   Measures of Central tendency – Mean, Median, Mode
   Measures of Dispersion – Variance and Standard Deviation
   Estimation – Confidence Interval
c. Hypothesis testing – significance testing, Student's `t' test, Chi square test.
d. Analysis – ANOVA, Regression and Correlation analysis.

4. Analytical Techniques for Food Quality Evaluation:

   i) Physico-chemical analysis

   ii) Instrumental analysis

   iii) Microbial Analysis

   iv) Biochemical Analysis

   v) Organoleptic Analysis

5. Patenting and Intellectual property:

   Introduction, Patent laws, composition of a patent

   Applying and obtaining a patent and problems encountered

**BOOKS RECOMMENDED**


1. How to Write and Publish a Scientific Paper by Robert A. Day.
2. Biostatistics – A Foundation for Analysis of Health Sciences by Wayne Daniel. John Wiley and Sons, Inc.
3. Statistics for Biologists by R. C. Campbell. Cambridge University Press
4. Elementary Bioinformatics by Imtiaz Alam Khan. Pharma Book Syndicate
5. Food Analysis- theory and practices by Pomeranz. Y. and Meloan C.E.
6. Pearson's chemical analysois of food by Egan H. and Kirk R.S.
7. Bergey's Manual of Systematic Bacteriology (2nd Ed.), Volume.1 Springer


**Paper-II: Recent trends in food processing and preservation (100 Marks)**

1. Newer developments in food processing method

   - Minimal processing

   - Unconventional & non-thermal processing

2. Advances in low-temp processing & preservation

3. Advances in drying technology as a preservation method

4. Processing and preservation of alcoholic and non-alcoholic beverages

5. Advances in food packaging

   - Modified & active packaging

   - Aseptic packaging

   - Packaging for specialty foods

**BOOKS RECOMMENDED**


1) Process Heat Transfer (2nd edition) D. Q. Kern.

2) Batty, J.C. and Folkman, S.L. 1983. Food Engineering Fundamentals. John wiley and Sons, New York.

3) Fennema O.R. Ed. 1985, Principles of Food Science: Part-II Physical Principles of food Preservation. Marcel Dekker, New York.

4) Harper, J.C. 1975. Elements of Food Engineering. AVI, Westport.

5) Heldman, D.R. and Lund, D.B. Ed. 1992. Handbood of Food Engineering marcel Dekker, New York.

**Paper-III: Elective Paper** **(80 Marks)**

**The student has to select one elective from the following.**

**Elective 1: Advances in Food Science and Nutrition**

1. Advances in Carbohydrate and Protein chemistry.
2. Advances in chemistry of Lipids, Vitamins and Minerals.
3. Newer developments in food additives and ingredients: Colours, Flavours, Antioxidants, Emulsufiers, Satbilisers, Sweetners, Bakery and Confectionary ingredients.
4. Functional foods and nutraceuticals: Low Calorie foods, Diabetic Foods, Development of specialty products for nutritional and metabolic disorders, Diets for specific purposes.

**BOOKS RECOMMENDED**


1. Fennema O. R., Principles of Food Science, Marcel Dekker, New York.
2. Salunkhe, O. K. and Kadam, S. S., Handbook of world Legumes: Nutritional
3. Chemistry, Processing Technology and Utilization. Volume I to III. CRC Press.
4. Altschul, A. M. and Wilcke, H. L., New Protein Foods. Vol. III. Academic Press, New York.
5. Bodwell, C. E., Evaluation of Proteins for Humans. AVI, Westport.
6. Milner, M., Scrimshaw, N. S. and Wang, D.I.C., protein resources and Technology. AVI, Westport.
7. Nutrition and Dietetics, Shubhangini A Joshi.
8. Experimental Foods and Nutrition, Dr. M. Swaminathan, Vol. I & II.


**Elective 2: Advances in Food Bio-technology**

1. Production of enzymes: (a) Isolation, purification, characterization and their applications.
   (b) Immobilization of enzymes and its applications.
2. Developments in plant and animal tissue culture, and genetically modified foods.
3. Biotechnological approaches for production for production of alcoholic beverages and organic acids.
4. Advances in traditional non-alcoholic fermented foods.

**BOOKS RECOMMENDED**


1. Bains W. 1993, Biotechnology from A to Z, Oxford Univ. Press, Oxford.
2. Crueger, W. and Crueger A. 1984. Biotechnology: A Textbook of Industrial Microbiology, Science Tech. Madison, USA.
3. Joshi, V. K. and Pandey, A Ed. 1999. Biotechnology. Food Fermentation, (2Vol. set). Education Publ. New Delhi.
4. Knorr, D. 1982. Food Biotechnology. Marcel Dekker, New York.


**Seminar** **(20 Marks)**

**(Presentation on review of research papers published in National or International journals)**