CENTRAL UNIVERSITY OF PUNJAB, BATHINDA

Ph.D. (Food Science and Technology)

Session- 2020

Department of Applied Agriculture

School of Basic and Applied Sciences

Programme Outcome

Ph.D. (Food Science and Technology) programme focusses to deal with the research problems of food industry and perform the roles in the research and development in food science and technology industries and research institutes.

S.N.	Course Code	Course Title	L	T	P	Cr
1	FST.706	Research Methodology	4	0	0	4
2	FST.707	Research and Publication Ethics	2	0	0	2
3	FST.708	Advances In Food Processing Technology	4	0	0	4
4	FST.709	Seminar	2	0	0	2
		Total	**12**	**0**	**0**	**12**

L: Lectures   T: Tutorial   P: Practical   Cr: Credits
Total Marks: Continuous Assessment and End-Term Exam

Evaluation:
The theory courses shall be evaluated by Continuous Assessment, Mid Semester Test and End Semester Exams as detailed below
Continuous Assessment
      Surprise tests (Average of two best) : 10 marks
      Assignment   : 05 marks
      Term paper   : 10 marks
Mid Semester Test   : 25 marks
End Semester Exam (Subjective)   : 25 marks
End Semester Exam (Objective)   : 25 marks

Course Name: Research Methodology
Course Code: FST.706
Total Hours-60

L	T	P	Credits
4	0	0	4

Learning Outcomes
After completion of the course the students will be able to:
- Analyze the basic framework of research process
- Assess various research designs and techniques
- Identify various sources of information for literature review and data collection
- Develop competence in the use of statistical packages for analysis of data
- Apply appropriate techniques to analyse quantitative and qualitative data

Unit-I   **15 Hours**
Introduction to Research- Meaning, Objectives, types and significance of Research- Research Methods vs. Research Methodology- Business Research: Objectives and Characteristics, Scope, Types and Significance- Qualities of Good Researcher; Research Ethics and Plagiarism
Research Process- Formulation and Selection of Research Problem- Literature Review- Methods and Reporting, Identifying Variables, Constructing Hypotheses; Conceptualizing a Research Design- Meaning and Types of Research Design

Unit-II   **15 Hours**
Sampling Design- Sampling Techniques- Probability and Non-Probability, Sample Size and its Determination, Qualities of a good Sample.
Collection and Presentation of Data- Constructing an Instrument for Data Collection- Methods for Data Collection. Validity and Reliability of Research Instruments- Ethical issues in Data Collection; Processing and Displaying Data.

Unit-III   **15 Hours**
Data Analysis and Interpretation- Introduction to Qualitative, Quantitative and Mixed methods, Quantitative Methods- Univariate, Bivariate and Multivariate, Qualitative Methods- Grounded Theory and Triangulations, Mixed Methods- Convergent Parallel, Explanatory Sequential, Exploraratory Sequential and Transformative.
Testing of Hypotheses- Parametric and Non-Parametric Test, Errors and Level of Significance

Unit-IV   **15 Hours**
Report Writing- Significance, Types and Steps; Footnote and Endnote; Referencing and Citation Styles; Writing a Bibliography

Suggested Reading:
- Adams J., et al, Research Methods for Business and Social Science Research, Sage Publishing, (2/e), 2014.
- Bajpai N., Business Research Methods, Pearson, (2/e), 2017.

- Gupta R.L. and Radhaswamy M., Advanced Accountancy (Vol. II), Sultan Chand and Sons, (17/e, Reprint).
- Gupta S.L., and Gupta H., Tata McGraw Hill Education, 2012
- Kothari C.S., and Garg G., Research Methodology: Methods and Techniques , New Age Publication, 2018
- Kumar R., Research Methodology: A step by step guide for Beginners, Sage Publishing, (4/e), 2014.
- Mishra P., Business Research Methods, Oxford University Press, (1/e), 2014.
- Phanse S.S., Research Methodology: Logic, Methods and Cases, Oxford University Press, (1/e), 2016.

Course Name: RESEARCH AND PUBLICATION ETHICS (RPE)
Course Code: FST.707
Total Hours-30

L	T	P	Cr
2	0	0	2

Learning Outcome: The students will be able to
- Aware about the publication ethics and publication misconducts.
- Explain philosophy of science and ethics, research integrity and publication ethics
- Identify research misconduct and predatory publication based on hands on sessions
- Outline indexing and citation databases
- Make use of open access publications, research metrics (citation, h-index, impact factor) and plagiarism tools.

Overview:
This course has total of 6 units focusing on basics of philosophy of science and ethics, research integrity, publication ethics. Hands-on-sessions are designed to identify research misconduct and predatory publications. Indexing and citation databases, open access publications, research metrics (citations, h-index, Impact Factor, etc.) and plagiarism tools will be introduced in this course.

Pedagogy:
Class room teaching, guest lectures, group discussions, and practical sessions.

Evaluation:
Continuous assessment will be done through tutorials, assignments, quizzes, and group discussions. Weightage will be given for active participation. Final written examination will be conducted at the end of the course.

Course Structure:
The course comprises of six modules listed in below table. Each module has 4-5 units.

Modules	Unit title	Teaching hours
Theory		
RPE 01	Philosophy and Ethics	4
RPE 02	Scientific Conduct	4
RPE 03	Publication Ethics	7
Practice		
RPE 04	Open Access Publishing	4
RPE 05	Publication Misconduct	4
RPE 06	Databases and Research Metrics	7
	Total	**30**

THEORY
RPE 01: Philosophy and Ethics   **3 hrs**
1. Introduction to Philosophy: Definition, nature and scope, concept, branches
2. Ethics: Definition, moral philosophy, nature of moral judgements and reactions

RPE 02: Scientific Conduct   **5 hrs**
1. Ethics with respect to science and research
2. Intellectual honesty and research integrity
3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
4. Redundant publications: Duplicate and overlapping publications, salami slicing
5. Selective reporting and misrepresentation of data

RPE 03: Publication Ethics   **7 hrs**
1. Publication ethics: Definition, introduction and importance
2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
3. Conflicts of interest
4. Publication misconduct: Definition, concept, problems that lead to unethical behavior and vice versa, types.
5. Violation of publication ethics, authorship and contributionship
6. Identification of publication misconduct, complaints and appeals
7. Predatory publishers and journals

PRACTICE
RPE 04: Open Access Publishing   **4 hrs**
1. Open access publications and initiatives
2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies

3. Software tool to identify predatory publications developed by SPPU
4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

RPE 05: Publication Misconduct   **4 hrs**
  A. Group discussions (2 hrs)
  1. Subject specific ethical issues, FFP, authorship
  2. Conflicts of interest
  3. Complaints and appeals: examples and fraud from India and abroad
  B. Software tools (2 hrs)
  Use of plagiarism software like Turnitin, Urkund and other open source software tools

RPE 06: Databases and Research Metrics   **7 hrs**
  A. Databases (4 hrs)
  1. Indexing databases
  2. Citation databases: Web of Science, Scopus, etc.
  B. Research Metrics (3 hrs)
  1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
  2. Metrics: h-index, g index, i10 index, almetrics.

Course Name: Advances in Food Processing Technology
Course Code: FST.708
Total Hours-60

L	T	P	Cr
4	0	0	4

Learning outcome:
This course will make students able:
- To compare novel and traditional technologies of Food Processing.
- To apply various advanced processing/preservation techniques for quality improvement of foods.
- To analyse the effect of advanced preservation techniques on processed foods
- To recommend novel techniques/methods for preservation of foods.

Unit 1   **15 Hours**
Membrane Technology: Micro-filtration, Ultra-filtration and their application; Nano-filtration and Reverse Osmosis and their application.

Unit 2   **15 Hours**
Nanotechnology: Principles and Applications in Foods; Electrical Resistance Heating of foods; High Pressure processing: Concept, Equipments for HPP Treatment, Mechanism of Microbial Inactivation and its Application in Food Processing.

Unit 3   **15 Hours**

Supercritical Fluid Extraction and its Application; Principles and Applications of Hurdle Technology; Ultrasonic Processing: Properties of Ultrasonic, Application of Ultrasonic in Food Processing; High Voltage Pulse Techniques in Food Processing.

Unit 4   **15 Hours**

Biodegradable Food Films and Coatings and Applications; Intelligent packaging; Smart packaging; Antimicrobial packaging; CAS, MAS

Suggested Readings:
- AK Haghi, *Food Science: Research and Technology*. Academic Press (2011).
- D Singh, *Food Processing and Preservation*. Shree Publisher (2015).
- G Saravakos and AK Kostaropoulos, *Handbook of Food Process Equipment*. Springer (2016).
- GV Barbosa-canovas and GW Gould, *Innovation in Food Processing*. CRC Press (2017).
- H W Xiao et al., Recent developments and trends in thermal blanching - A comprehensive review. *Information Processing in Agriculture*. Volume 4, 2017, 101-127
- HS Ramaswamy and M Marcotte, *Food Processing Principle and Application*. Taylor and Francis (2006).
- JS Smith and YH Hui, *Food Processing*. Wiley (2014).
- K Kai, *Innovative Food Processing Technologies*. WP Publisher (2016).
- M Regier, *The Microwave Processing of Foods*. Academic Press, (2017).
- MC Knirsch et al., Ohmic heating–a review. *Trends in Food Science & Technology*, 21, 2010, 436-441.
- NN Potter, *Food Science*. CBS Publishers (2007).
- P Fellows, *Food Processing Technology Principles and Practice*. CRC Press (2005).
- RL Shewfelt, *Introducing Food Science*. CRC (2013).
- T Varzakasand C Tzia, *Handbook of Food Processing*. CRCPress (2016).
- Edelstein S (2018) Food Science, Jones & Bartlett Learning
- Baisya (2019) Changing Face of Processed Food Industry in India, Ane Books
- Mehta (2020) Fermentation effects on food properties, CRC Press
- Ahmed J (2018) Novel Food Processing, CRC Press
- Sun DW (2020) Thermal food processing new technology and quality issues, CRC Press
- Boye J (2012) Green Technology in food Production
- Chemat F (2019) Green Food Processing Techniques: Preservation Transformation and Extraction, Academic Press
- Boye J (2012) Green Technology in Food Production
- James et al. (2002) Ozone: A Potential Disinfectant for Food Industry. Journal of Scientific and Industrial Research, 61, 504-509.

Course Code: FST.709
Course Title: Seminar-I

L	T	P	Cr
2	0	0	2

Learning Outcome:

- After the completion of the course students will be able to survey literature, write clear and concise technical reports and communicate concise technical presentation based on constructive criticism effectively.

Transactional Modes:

Mode of transaction shall be Lecture-cum-demonstration, Experimentation, etc.

Evaluation criteria:

Seminars shall be evaluated as detailed below:
Continuous Assessment
    Innovation in idea   : 20
    Interaction with Supervisor   : 20
    Attendance   : 10
Assessment of end term evaluation
    Report   : 15 marks
    Content   : 10 marks
    Presentation skills   : 15 marks
    Responses to queries   : 10 marks