Department of Food Processing and Technology

University School of Vocational Studies and Applied Sciences
Gautam Buddha University

Programme - Ph.D. in Food Processing and Technology

Course Structure and Syllabus

SEMESTER – I					
S.No.	**Subject Code**	**Course Name**	**Course Category**	**L-T-P**	**Credit**
1.	AS 601	Research Methodology	Core	4-0-0	04
2.	RPE 601	Research and Publication Ethics	Core	2-0-0	02
3.	FPT 601	Advance Food Processing Technologies	Core	2-0-1	03
4.	FPT 603	Advance Techniques of Food Analysis	Core	2-0-1	03
5.	FPT 605	Seminar	Core	2-0-0	02
6.	FPT 607	Field-cum-Food Plant Visit	Core	0-0-1	01
Total L-T-P (Contact hours) – 15 (12-0-3) **Total Credits – 15**					

COURSE: AS 601 RESEARCH METHODOLOGY (4-0-0)

OBJECTIVE

To explain the concept of research, steps in and methods of research, report writing, presentation and research ethics

OUTCOME

The knowledge of research and research methodology could be applied by the learners for conducting research, and presentation of research output in an ethical manner.

CONTENTS

Basics of Research: Research: Definition, Objectives, Types and Characteristics; Hypothesis: Meaning and types; Research methods vs Methodology. Positivism and post- positivistic approaches to research

Research Formulation: Research Formulation- Defining and formulating the research problem; Characteristics of a good research problem; Selecting the problem; Literature review: Primary and secondary sources; Web as a literature source, searching the web; Organizing the literature and identifying gap areas from literature review; Research proposal or synopsis

Research Design and Methods: Research Design: Basic principles, Need of research design, Features of a good research design; Important concepts relating to research design: Observations and Facts; Laws and Theories, Prediction and explanation, Induction, Deduction, Development of Models; Developing a research plan-Exploration, Description. Diagnosis, Experimentation; Determining experimental and sample designs

Data Collection and Analysis: Observations and collection of data: Sample and sampling methods; Data processing and analysis; Statistical packages of data analysis: Hypothesis testing. Generalization and interpretation: Role of ICT in research

Research Report: Types of report-Technical reports and thesis; Structure and components of a scientific report; Steps in report writing: Layout, structure and language of typical reports, illustrations and tables; Bibliographic entries. referencing and footnotes; Oral presentation: Planning and practice, use of Visual aids, Importance of effective communication

Commercialization of knowledge and technologies and academic ethics; Intellectual property rights: Citation counting and impact factor; Scientific citation index (SC), Scientific citation index-expanded (SCI-E), H-index

SUGGESTED READINGS

Anthony, M., Graziano, A.M. and Raulin, M.L. 2009. *Research Methods: A Process of Inquiry*, Allyn and Bacon, New York.

Banerjee, S. and Ramendu, Roy. 2017. *Fundamentals of Research Methodology*, (3 Edition),Kitab Mahal. New Delhi.

Cooper, D. R. and Sehindler, P. S. 2006. *Business Research Methods*, Tata McGrraw Hill Publishing P. Ltd., New Delhi.

Fisher R. A. 2004, *Statistical Methods for Research Workers*, Cosmo Publications, New Delhi. Freedman, D., Pisani, R. and Purves, R. 2007. *Statistics*, 4th Edition, W. W. Norton and Company, New York.

Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K. 2002. *An Introduction to Research Methodology*, RBSA Publishers., New Delhi.

Gupta, S.P. 2014. *Statistical Methods*. S. Chand and Sons, New Delhi.

Hart, C. 2015. *Doing Your Masters Dissertation*, Sage Publication India P. Ltd., New Delhi-,481 p.

Kothari, CR. 1990. *Research Methodology: Methods and Techniques*. New Age International,New Delhi, 418p.

Kumar. R. 2014. *Research Methodology: A Step -by- Step Guide for Beginners*, SagePublications India P. Ltd., New Delhi.

Montgomery D.C. 2001. *Design and Analysis of Experiments*, John Wiley and Sons, NewYork.

Sinha, S.C. and Dhiman, A.K. 2002. *Research Methodology*, 2 Volumes, Ess Ess Publications, New Delhi.

Snedecor GW and Cochran, G.W. 1989. *Statistical Methods* 8th Edition: lowa State University Press Ames, lowa.

Trochim, W.M.K. 2005. *Research Methods: The Concise Knowledge Base*, Atomic Dog Publishing, New Delhi, 270p

Wadehra, B.L. 2000. *Law Relating to Patents, Trade-marks, Copyright, Designs and Geographical Indications*. Universal Law Publishing, New Delhi.

COURSE: RPE 601 RESEARCH AND PUBLICATION ETHICS (RPE) (2-0-0) LEARNERS: Doctoral Students/ Scholars of all Schools of the University

FACULTY CO-ORDINATORS: Prof. Sanjay K. Sharma and Prof. N. P. Melkania

OBJECTIVE

To familiarize the learners about the importance of ethics in research and publication, and tools and databases to regulate the misconduct and unethical activities in research and publishing

OUTCOME

The learners would be able to recognize the value of ethics in research and publishing, and practice them while conducting research and publishing of research work in a professional manner.

Unit	Content	Faculty Member	Teaching Hour
I	**PHILOSOPHY AND ETHICS** ➢ Introduction to Philosophy: Definition, nature and scope, concept, branches ➢ Ethics: Definition, moralphilosophy, nature of moral judgements and reactions	Dr. Subhojeet Banerjee (Dept. of Management Studies, SoM)	02
II	**SCIENTIFIC MISCONDUCT** ➢ Ethics with respect to science and research ➢ Intellectual honesty and research integrity ➢ Scientific Misconducts:Falsification, Fabrication and Plagiarism (FFP) ➢ Redundant Publications: Duplicate and overlapping publications, salami slicing ➢ Selective reporting and misrepresentation of data	Dr. Bhupendra Chaudhary (Dept. of Biotechnology, SoBT) Prof. N. P. Melkania (Dept. of Environmental Science, SoVSAS)	02 02

Unit	Content	Faculty Member	Teaching Hour
III	**PUBLICATION ETHICS** ➢ Publication Ethics: Introduction, definition, and importance ➢ Best Practices/ Standards Setting Initiatives and Guidelines: COPE, WAME, etc. ➢ Conflicts of interest ➢ Publication Misconduct: Definition, concept, types, problems that lead to unethical behaviour and vice-versa	Dr. Dinesh K. Sharma (Dept. of Management Studies, SoM)	04
	➢ Violation of publication ethics, authorship and contributorship ➢ Identification of publication misconduct, complaints and appeals ➢ Predatory publishers and journals	Prof. N. P. Melkania	03
IV	**OPEN ACCESS PUBLISHING** ➢ Open access publications and initiatives ➢ SHERPA/RoMEO online resource to check publisher copyright and self - archiving policies ➢ Software tools to identify predatory publications development by SPPU	Prof. Sanjay K. Sharma (Dept. of Computer Science and Engineering)	05
	➢ Journal Finder/ journal suggestion tools, viz., JANE, Elseveir Journal finder, Springer Journal Suggester, etc.	Prof. Sanjay K. Sharma, Dr. Amit Awasthi, (Dept. of Applied Mathematics, SoVSAS) Dr. Arvind K. Singh (Dept. of Buddhist Studies, SoBSC)	
V	**PUBLICATION MISCONDUCT** **A. Groups Discussions** ➢ Subject- specific ethical issues, FFP, authorship ➢ Conflicts of interest ➢ Complaints and Appeals: Examples and fraud from India and abroad	Prof. Shweta Anand (Dept. of Management Studies, SoM)	02
	B. Software Tools Use of plagiarism software like Turnitin, Urkund and other open-source software tools **C. Databases** ➢ Indexing databases ➢ Citation databases: Web of Science, Scopus, etc.	Dr. Amit Awasthi, Dr. Shakti Shahi, (Dept. of Biotechnology, SoBT)	09

Unit	Content	Faculty Member	Teaching Hour
	D. Research Metrics ➢ Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score ➢ Metrics: h- index, g- index, i 10 index, almetrics	Dr. Bhupendra Chaudhary	

SUGGESTED READINGS

Ackoff, R. L. 1961.*The Design of Social Research*, University of Chicago Press, Chicago.

Ackoff, R. L. 1962. *Scientific Methods*, John Wiley& Sons, New York.

Boot, J. G. C. and Cox, E. B. 1979. *Statistical Analysis for Managerial Decisions*, 2nd ed.,(International Student Edition), McGraw Hill Publishing Co. P. Ltd., New Delhi.

Elsevier.2017. *Ethics and Research and Publication*, ethics.elseveir.com

Festinger, L. Katz, D. (Eds.). 1976. *Research Methods in the Behavioral Sciences*, (Fourth Indian Reprint), Amerind Publishing Co. P. Ltd., New Delhi.

Ghosh, B. N. 1982. *Scientific Methods and Social Research***,** Sterling Publishers P. Ltd., New Delhi.

Harrell, A. T. 1978. *New Methods in Social Science Research*, Praeger Publishers, New York. Kothari, C. R. 1984. *Quantitative Techniques*, 2nd ed., Vikas Publishing House P. Ltd., New Delhi.

Marcovitch, H. 2007. Misconduct by researchers and authors. *Gac. Sanit*. 21 (6): 492-499.

Thurstone, L.L. 1959. *The Measurement of Values*, University of Chicago press, Chicago. Torgerson, W. 1958. *Theory and Methods of Scaling*, John Wiley & Sons, New York.

Travers, R. M. W. 1978. *An Introduction to Educational Research*, 4th ed., MacMillian Publishing Co., Inc., New York.

Tryan, R. C. and Bailey, D. E. 1970. *Cluster Analysis*, McGraw- Hill Publishing Co. P. Ltd.,NewDelhi.

Ullman, N. R. 1978. *Elementary Statistics*, John Wiley & Sons, New York.

Whitney, F. L. 1950. *The Elements of Research*, 3rd ed., Prentice – Hall P. Ltd., New York.

Wilkinson, T.S. and Bhandarkar, P.L. 1979. *Methods of Techniques of Social Research*, Himalaya Publishing House, Bombay.

COURSE: FPT 601 ADVANCE FOOD PROCESSING TECHNOLOGIES (2-0-1)

OBJECTIVE

To develop an insight among the learners about the modern techniques of food processing and their applications

OUTCOME

The learners would develop capability to process and preserve food products using advance techniquesas per requirement of the food industries.

CONTENTS

Microstructural Components: Microstructural approach to heat and mass transfer operations during processing of foods; Polymer solutions of food; Mechanical and rheological properties of foods

Functionality of Carbohydrates, Proteins and Fats: Chemical changes including during processing and storage; Analysis and application in various food systems

Food Quality and Microstructure: Measurement of texture and structural aspects of food texture, Structuring and texture improvement; Freezing, crystallization, milling, crushing, baking and other operations

Drying, Dehydration and Distillation: Technological aspects and applications of drying and dehydration of foods; Distillation, Vapour liquid equlibria, flash vaporization, steam distillation, azeotropic distillation and extractive distillation for binary system; Solid-liquid and liquid –liquid extraction processes, Principles and choice of solvent; Extraction equipments

Emerging Techniques in Food Processing: Application of technologies of high intensity light, pulse electric field, ohmic heating, IR heating, inductive heating and pulsed X-rays in food processing, Cold Plasma, Nanotechnology: Principles and applications in foods. Membrane separation processes

Practicals: Study and design of equipments for distillation, membrane separation and extrusion; Evaluation and performance of microwave heating; Study of leaching process; Visit to Food processing units

SUGGESTED READINGS

Christie, J. and Geankoplis. 2006. *Transport Processes and Separation Process Principles,* 4th Edition, Prentice Hall of India Publications, New Delhi.

Barbosa-Canovas. 2002. *Novel Food Processing Technologies*. CRC Press, New York.

Da-Wen Sun. 2005. *Emerging Technologies for Food Processing,* 1st Edition, Elsevier, Academic Press, New York.

Dickinson, E. and Martin, E. 2007. *Food Colloids,* Springer, New York

Jose, M. A. and Stanley, D. W. 1999. *Microstructural Principles of Food Processing and Engineering*, Springer, New York.

Shi, J. (Ed.). 2006. *Functional Food Ingredients and Nutraceuticals: Processing Technologies,* CRCPress, New York.

Sikorski, Z.E. 2006. *Chemical and Functional Properties of Food Components,* 3rd Edition, CRCPress, New York.

COURSE: FPT 603 ADVANCE TECHNIQUES OF FOOD ANALYSIS (2-0-1)

OBJECTIVE

To develop an understanding among learners about the instrumental techniques infood analysis used for objective methods of food quality parameters

OUTCOME

The learners would be able to understand various techniques of food analysis, and applications of these techniques to the separation and analysis of multi-components of food samples.

CONTENTS

Introduction to Food Analysis: Introduction to food and its components; Sampling, Sample Preservation; Extraction; Proximate analysis

Spectroscopic Techniques: Introduction and theory of spectroscopic techniques, application in food analysis; UV-Visible, IR, Raman and Mass spectroscopy – Principle, Instrumentation, Application of techniques; Fluorescence, Turbidoimetric techniques – Principle, Instrumentation, application of technique; AAS – Principle, Instrumentation, applications;NMR/ESR spectroscopy – Principle, Instrumentation and application

Chromatographic Techniques: Introduction of HPLC, GC, Paper chromatography, TLC/HPTLC, Ion chromatography; Flash chromatography – Principle, Instrumentation, application of techniques

Neo Techniques of Food Analysis: Rheology, DSC/DTA/TGA/TMA, XRD/XRF; Electron microscopy, Refractivity; Polarimetry - Principle, Instrumentation, application of techniques; Scanning Electron Microscopy principles and applications, Study of the structure of a variety of food gels

Practicals: Lab exercises on food micro-structures, food authentication, neo approaches in food analysis; Individual exercise on design of experiments in food analysis

SUGGESTED READINGS

Blackburn, C. 2006. *Food Spoilage Microorganisms*. CRC Press, New York.

Eugene, F., Barry Grob and Robert Lee. 2004. *Modern Practice of Gas Chromatography*, Wiley-Interscience, New York.

Francis and Annick. 2007. *Chemical Analysis: Modern Instrumentation Methods and Techniques*, John Wiley & Sons Ltd. New York.

Moir, C.2001. *Spoilage of Processed Foods: Causes and Diagnosis*. AIFST Inc. (NSW Branch) Food Microbiology Group, Sydney.

Querol and Fleet, G. H. 2006. *Yeasts in Food and Beverage*, Springer, New York.

Semih, O. 2005. *Methods of Analysis of Food Components and Additives*, CRC Press, New York.

Tagu, D. and Moussard, C.2006. *Techniques of Molecular Biology*, 1st Edition, Science Publishers CRC Press, New York.

Wilfried, M.A.N., Wilfried M. N.2006. *Liquid Chromatography-Mass Spectrometry*, 3rd Edition (Chromatographic Science), CRC Press, New York.

COURSE: FPT - 605 SEMINAR (2-0-0)

OBJECTIVE

To develop broad understanding among learners of food processing topics and hands-on practice of the art of reporting of the study/work

OUTCOME

The learners would be able to acquire the understanding of food processing, emerging techniques and their analysis

PROCESS

The course will be coordinated by a faculty of the Department of Food Processing and Technology. The Coordinator will assign suitable topics to the learners considering the scholar's academic interest and physical access to the study area. Depending upon the professional requirement, the other faculty members of the Department of Food Processing and Technology will also be involved in the study. After completion of the study, the learner has to submit report (one hard copy), following the guidelines of writing a scientific report, to the Coordinator before oral presentation. The learner has to present the work orally using powerpoint by the end of the Semester in presence of the faculty members, research scholars and post graduate students of the Department of Food Processing and Technology. Following the oral presentation, the learner has to submit well-illustrated final report (hard copy 02 numbers).

COURSE: FPT - 607 FIELD-CUM-FOOD PLANT VISITS (0-0-1)

OBJECTIVE

To develop belongingness to field realities concerning food processing, food industry and research oriented activities/initiatives among the learners, and promote their observation and action-oriented real-life skills

OUTCOME

The learners would be able to correlate food processing/real-life-based issues and practices concerning current consumer demand, initiatives with the knowledge and technology inputs.

CONTENTS

The learners are required to visit any local food processing, food manufacturing and food packing industry. Each learner has to prepare a well-illustrated explanatory study report thereof in a professional manner. The plant visit study will be evaluated on the basis of written report and oral presentation. After oral presentation in presence of the faculty, research scholars and postgraduate students of the Department of Food Processing and Technology, the learner has to submit 02 hard copies of the well-illustrated plant visit study report to the Coordinator faculty member for the office record and guidance for the future learners.

No literature review-based study will be permitted under this course.