Received on 4th Dec'25

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GURU JAMBHESHWAR UNIVERSITY OF SCIENCE AND TECHNOLOGY, HISAR
(Established by State Legislature Act 17 of 1995)
'A+' Grade, NAAC Accredited State Govt. University

Acad./AC-III/BOS&R-1/2025/ 7862
Dated: 03/12/25

To

The Controller of Examinations,
GJUST, Hisar.

Sub: Approval of the scheme of examinations and syllabi of subject PPD-103 "Advances in Food Science and Technology" (Departmental Elective Course) of Ph.D. Course work in Food Technology w.e.f. January, 2025 for University Teaching Department.

Sir,

I am directed to inform you that the Vice-Chancellor, on the recommendations of Dean, Faculty of Environmental and Bio Sciences & Technology on 26.11.2025, is pleased to approve the scheme of examinations and syllabi of subject PPD-103 "Advances in Food Science and Technology" (Departmental Elective Course) of Ph.D. Course work in Food Technology w.e.f. January, 2025 for University Teaching Department, under Section 11(5) of the University Act, 1995 in anticipation of approval of the Academic Council.

A copy of the scheme of examinations & syllabi of above said course is enclosed herewith.

You are therefore, requested to take further necessary action accordingly.

Yours faithfully

3/12/25
Asstt. Registrar (Academic)
for Dean Academic Affairs

Endst. No. Acad./AC-III/BOS&R-1/2025/ 7863-66 Dated: 3/12/25

A copy of above is forwarded to the following for information and necessary action:-

1. Dean, Faculty of Environmental and Bio Sciences & Technology, GJUST, Hisar.
2. Chairperson, Department of Food Technology, GJUST, Hisar. She is requested to arrange to upload the scheme of examinations and syllabi of subject PPD-103 "Advances in Food Science and Technology" (Departmental Elective Course) of Ph.D. Course work in Food Technology w.e.f. January, 2025 for University Teaching Department on the website of the University on priority basis.
3. OSD to Vice-Chancellor (for kind information of the Vice-Chancellor), GJUST, Hisar.
4. P.A to Registrar (for kind information of the Registrar), GJUST, Hisar.

3/12/25
Assistant Registrar (Academic)

Pre-Ph.D. (FOOD TECHNOLOGY) COURSE SCHEME AND SYLLABI
(Effective from January 2025)

Program Objectives (POs):

1. Develop advanced research skills for addressing challenges in food technology and nutrition.
2. Enable students to critically analyse, interpret, and apply scientific findings of food science and technology.
3. Foster innovation in food systems, processing, and nutritional research.
4. Promote ethical research practices and the effective dissemination of knowledge.

Program Outcomes (COs):

1. Demonstrate proficiency in advanced research methodologies and data analysis tools.
2. Critically evaluate and synthesize research literature to identify gaps and propose innovative solutions.
3. Integrate advanced food science concepts with cutting-edge technologies for sustainable and healthy food development.
4. Exhibit ethical practices in research and publication.
5. Communicate effectively through seminars, publications, and professional interactions.

Scheme of Examination of Pre-Ph.D. Programme in Food Tech. w.e.f. January, 2025

Common Courses

1. PPD-101: Research Methodology
2. PPD-102: Review of Literature and Seminar
3. PPD-104: Research Publication and Ethics

Departmental Course

1. PPD-103: Advances in Food Science and Technology

Scheme of Examination

Sr. No.	Course Code No.	Nomenclature	Credits	Internal	External	Max. Marks	Exam. Duration
1.	PPD- 101	Research Methodology	4	30	70	100	3 Hrs.
2.	PPD- 102	Review of Literature and Seminar	2	50	--	50	--
3.	PPD- 103	Advances in Food Science and Technology (Departmental Elective course in relevant field of research)	4	30	70	100	3 Hrs.
4.	PPD-104	Research Publication and Ethics (RPE)	2	15	35	50	2 Hrs.

Note: The distribution of marks for major and sessional examinations will follow the prevailing university scheme.

PPD-102: REVIEW OF LITERATURE AND SEMINAR

Credit = 02
Maximum Marks = 50
Internal Marks = 50

Course Objectives:
1. Familiarize students with scientific literature in their research area.
2. Enhance presentation and communication skills.

Course Outcomes:
1. Conduct comprehensive literature reviews to identify research gaps.
2. Develop the ability to present and defend research findings confidently.

Course Contents:
Seminar topics will be finalized in consultation with faculty, focusing on the specialized research area.

NOTE:

Evaluation of PPD-102 shall be done at departmental level. Examination will be conducted by DRC and Dean/Dean's nominee.

The seminar presentation will be on the basis of published review/survey paper or training or field work done in the relevant area of research. The scholar shall review 20-30 research papers and shall submit the report as well as present seminar before a three member committee duly constituted by the Dean (Research and Development) and headed by the Chairperson of the Department.

PPD-103: ADVANCES IN FOOD SCIENCE AND TECHNOLOGY

Credit = 04
Maximum Marks = 100
Internal Marks = 30
External Marks = 70
Duration = 3 Hrs.

Course Objectives:

1. Provide in-depth knowledge of advanced topics in food science and technology.
2. Explore emerging research areas such as food processing, food engineering, post-harvest technology, nutrigenomics and functional foods.
3. Enable students to apply advanced technologies in food processing and preservation.

Course Outcomes:

1. Critically evaluate advanced concepts in food science.
2. Integrate emerging technologies and food science, food technology, food engineering knowledge into research.

Course Contents:

UNIT-I (Advanced Nutrition)

Nutrition Fundamentals for Food Technologists: Comprehensive coverage of macronutrients, micronutrients, and their functional roles in food systems; Focus on applying nutrition science to develop innovative, healthier, and sustainable food products.

Nutrigenomics and Personalized Nutrition: Exploration of gene-diet interactions and their implications for health and disease; Approaches to creating personalized dietary interventions and AI-driven analytics.

Functional Foods and Nutraceuticals: Innovations in Gut Health and Beyond: Development of functional foods targeting specific health benefits such as immunity, cardiovascular health, and mental well-being; Role of prebiotics, probiotics, synbiotics, and postbiotics in enhancing gut microbiome and overall health.

Bioavailability, Bio-accessibility, and Food Processing: Maximizing Nutrient Utilization; Mechanisms influencing the absorption and effectiveness of nutrients in the human body; Innovations in food processing to improve the bioavailability of bioactive compounds.

Nutritional Toxicology: Non-nutritional factors in foods; Strategies to mitigate risks through food formulation, processing.

Nutritional Aspects of Aging: Supporting Healthy Aging and Longevity: Nutritional interventions for age-related health challenges, such as sarcopenia, osteoporosis, and cognitive decline; Role of antioxidants, polyphenols, and protein quality in promoting active and healthy aging.

UNIT-II (Recent Advances in Fruit and Vegetable Processing)

Post Harvesting Physiology: Role of respiration; Maturity and ripening of fruits and vegetables; Recent harvesting tools and technique; Harvesting indices, Postharvest quality changes and treatments.

Emerging Technologies in Post-Harvest Handling and Management of Fruit and Vegetable Crops: Value addition techniques for storage; Cold chain logistics; ZECC (Zero Energy Cool Chambers); CCSR (Charcoal Cold Storage Rooms); Advances in CAS and MAP; Processing methods of frozen fruits and vegetables; IQF products; Packaging.

Thermal processing: Technological Advances in Canning of fruits and vegetables; Processing of fruit juices and beverages; Minimally processed products.

Chemistry and Manufacture of Pectin: Gel formation theories; Products; Role of pectin enzymes; Restructured fruits and vegetable products; By-product utilization of fruit and vegetable processing industries.

Spice Processing: Advanced methods of cleaning, grading; Drying; Grinding; Packaging and storage; Oleoresins and essential oils.

UNIT-III (Advances in Food Processing Engineering)

Engineering Properties of Foods: Physical properties; Mechanical properties; Thermal properties; Rheological properties; Optical properties.

Advances in Food Process Technology: High pressure processing; Radio frequency heating; Cold plasma processing; Super critical fluid extraction; Ultrasonic Processing; pulsed electric field (PEF); Oscillating Magnetic Fields (OMF)

Membrane Technology: Micro-filtration; Ultra-filtration and their application; Nano-filtration and Reverse Osmosis and their application.

UNIT- IV (Advanced Tools and Techniques in Food Research and Analysis)

Chromatographic Techniques: Adsorption; Affinity; Partition; Ion-exchange; Gel permeation; Gas chromatography (GC); Thin layer chromatography (TLC); High performance liquid chromatography (HPLC).

Spectroscopic Techniques: Ultraviolet (UV) & Visible (Vis); Infra-Red (IR); Fluorescence spectroscopy; Fourier transform infra-red spectroscopy (FTIR); Nucleo-magnetic resonance (NMR); Atomic absorption spectroscopy (AAS); Theory of lyophilization and its applications in food systems.

Microscopic Techniques: Principles and working of light and electron microscope, Microscopic Techniques; Scanning electron microscopy (SEM); Transverse electron microscopy (TEM).

Recommended Readings:

1. Gropper, S. S., Smith, J. L., & Carr, T. P. (2021). Advanced Nutrition and Human Metabolism (8th ed.). Cengage Learning.
2. Whitney, E., & Rolfes, S. R. (2023). Understanding Nutrition (16th ed.). Cengage Learning.

Acad/733
3/6/25

GURU JAMBHESHWAR UNIVERSITY OF SCIENCE AND TECHNOLOGY, HISAR-125 001
(ESTABLISHED BY STATE LEGISLATURE ACT 17 OF 1995)
'A+' GRADE 'NAAC' ACCREDITED

To

The Directors/Chairpersons
University Teaching Departments
Guru Jambheshwar University of Science & Technology
Hisar

Sub: - Approval of Uniform Guidelines (containing the scheme & sallybus) for Ph.D. Course Work for all the University Teaching Departments.

I am directed to inform you that the Hon'ble Vice-Chancellor on the recommendations of the committee meeting held on 22.04.2024 is pleased to approve the Uniform/common Guidelines (containing the scheme & sallybus) for Ph.D. Course Work for all the University Teaching Departments under section 11 (5) of the University Act, 1995 in anticipation approval of Academic Council.

A copy of the Uniform Guidelines (containing Scheme & Sallybus) for Ph.D. Course duly signed by the committee is enclosed herewith (Annexure- 1 to V, Pages -10).

You are, therefore, requested to take further necessary action accordingly.

Sd/-
Controller of Examinations

Endst. No. COE/2025/ 590-627 **Dated** 31-05-2025

A copy of the above is forwarded to the following for information and necessary action at their end, if any.

1. Dean Academic Affairs, GJUS&T, Hisar
2. Dean Research & Development, GJUS&T, Hisar
3. Deputy Registrar (R-1), GJUS&T, Hisar
4. Assistant Registrar (Registration Branch), GJUS&T, Hisar.
5. Assistant Registrar (Academic Branch), GJUS&T, Hisar
6. Assistant Registrar (Secrecy), GJUS&T, Hisar
7. OSD to Vice-Chancellor (for kind information of the Hon'ble Vice-Chancellor), GJUS&T, Hisar.
8. Secretary to Office of Registrar (for kind information of the Registrar), GJUS&T, Hisar.

31/5/25
Controller of Examinations

4/6/25
D.S.C Acad
4/6/25
AC-14

Annexure-I

UNIFORM GUIDELINES FOR ALL UNIVERSITY TEACHING DEPARTMENTS FOR PH.D. COURSE WORK W.E.F. WINTER SESSION 2024-25.

Scheme of Examination

Sr.No.	Course Code No.	Nomenclature	Credits	Internal	External	Max. Marks	Exam. Duration
1.	PPD- 101	Research Methodology	4	30	70	100	3 Hrs.
2.	PPD- 102	Review of Literature and Seminar	2	50	---	50	----
3.	PPD- 103	Departmental Elective Course	4	30	70	100	3 Hrs.
4.	PPD-104	Research and Publication Ethics (RPE)	2	15	35	50	2 Hrs.

The distribution of marks for external examination and the sessional examinations will be as per prevailing scheme for other courses in the university. **The detailed syllabus of various disciplines is attached at Annexure-II to V.**

i) The duration of the Ph.D. course work will be of one semester. It will consist of 04 papers.

ii) Each paper of the course work except PPD-101 &PDP-103 will be of 4 credits. PPD-102 &PDP-104 will be of 02 credits. 4 credits paper will be of 100 marks and 2 credits of 50 marks as per scheme.

iii) The external examinations preferably PPD 101, 102 & 104 will be conducted centrally not Department wise by the COE during Saturday/Sunday/Holiday.

iv) The scheme for Ph.D. course work is as under:

PPD-101: Research Methodology:

The syllabus of the course PPD-101: "Research Methodology" will have different contents for Ph.D. programmes which are categorized in the following three board disciplines. The content of the course should be common within a discipline.

Science Discipline: All the courses run under the Faculty of Physical Sciences, Faculty of Environmental and Bio Sciences & Technology and Faculty of Medical Science.

Engineering Discipline: The entire course run under the Faculty of Engineering & Technology.

Social sciences & Humanities Discipline: All the course run under the Faculty/School of Haryana School of Business, Faculty of Media Studies, Faculty of Religious Studies and Faculty of Humanities and Social Sciences.

The syllabus of Research Methodology course for Sciences group, Social Sciences & Humanities group and Engineering group is attached and all departments will follow the syllabus as per the attached syllabus and common classes will be held for each group and will be decided by the Dean(s) of the respective group.

PPD-102: Review of Literature and Seminar - It includes discussions on research ethics, presenting a seminar on review of published research or on own published review/survey paper or training or field work done in the relevant area of research etc.

The scholars shall review 20 to 30 research papers and shall submit the report a[illegible] present seminar before a three members committee duly constituted by the Dean, R[illegible] and Development and headed by the Chairperson/Director or Senior teacher of the Department/School for evaluation of paper PPD-102: Review of Literature and Seminar at Departmental level.

PPD-103: Departmental Elective Course- It includes an elective course related to the relevant field of research and it will be offered by the respective department/school. **(Not more than 4 departmental Elective courses will be offered by each department/ School). The syllabi of all such elective courses should be properly vetted by the Dean Research & Development of GJUS&T, Hisar before implementation.**

PPD-104: Research and Publication Ethics (RPE) It includes basics of philosophy of Science and ethics, research integrity, publication ethics.

PPD-101: RESEARCH METHODOLOGY

(FOR SCIENCES GROUP)

(For Ph. D scholars of Department of Biotechnology, Physics, Chemistry, Mathematics, Food Technology, Environmental Science & Engineering, Pharmaceutical Sciences, Physiotherapy)

PPD-101: RESEARCH METHODOLOGY

Course Code: PPD-101 Course Credits: 4.0 Contact Hours: 4 hours/week (4 Lectures) Examination Duration: 3 hours	**Course Assessment Methods:** **Internal Examination (30 marks):** *Two minor tests each of 20 marks will be conducted. The highest marks obtained by a student in any of the two minor examinations will be considered. Class performance will be measured through percentage of lectures attended (04 marks), Assignments, quiz, etc. (06 marks).* **External End semester examination (70 marks):** *The examiner is required to set 9 questions in all. The first question will be compulsory covering the entire syllabus and consisting of 4 short answers type questions of 3.5 marks each. In addition to that, 8 questions have to be set consisting of 2 questions from each unit. A candidate is required to attempt 05 questions in all, selecting one question from each unit and the compulsory question No 1. All questions carry equal marks.*

Unit-I

Introduction to Research Methodology: Meaning, Objectives, Types, and Significance of research, Creativity and Innovation, Hypothesis formulation and development of Research plan. Research Problem: Definition, necessity, and techniques of defining the research problem.Library: Classification system, e-library, Reference management, Web-based literature search engines. Use of modern aids: Making technical presentations, Research and academic integrity.

Avoiding Plagiarism: Using software, Copyright issues, Ethics in research, Intellectual Property Rights (IPRs) & Patent Law.

Unit-II

Scientific Communications: Role and importance of communications, Effective oral and written communication, Scientific and Research paper writing, Technical report writing. Making Research & Development (R&D) proposals.

Publishing Research paper: Selection of journal, formulation of problem, discussion and references, Submission and handling of reviewers' comments. **Writing of thesis**: Format of thesis, Review of literature, Formulation: Writing methods, results, preparation of tables, figures; writing discussion; writing conclusion; writing summary and synopsis; Reference citing and listing/Bibliography. **Laboratory safety issues**: Related to various labs, Workshop, electrical, health and fire safety, safe disposal of hazardous materials.

Unit-III

Statistical analysis and errors: Mean, Mode, Median, Relative and absolute errors, Hypothesis testing for mean, proportion and variance, Chi-square tests, Correlation and regression analysis, Factora nalysis. Linear and non-linear least squares fitting methods, Interpolation methods including cubic splines, Fourier Series Analysis, Fast Fourier Transform, Convolution and Correlation.

Unit-IV

Computational tools and Programming: Resume of practical approach of learning operating systems (DOS, Windows, UNIX), Graphical packages, Calculations using Spreadsheet programming. Technical research paper writing in LaTeX. Introduction to HTML, XML & programming languages, an overview of Modeling and simulation software. **Online Resources**: Introduction to Massive Open Online Courses (MOOCs) and Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM), Indexing and abstracting services, Citation index and impact factor, Research quality parameters and indicators.

Recommended Books/Sources:

1. Gurumani, N. (2010), Scientific thesis writing and Paper presentation, MJP Publishers.
2. Gerald, C.F. and Wheatley, P.O. (2002), Applied numerical analysis, 6th Ed., Addison Wesley.
3. Smith, G.D. (1982), Numerical solution of partial differential equation, Oxford University Press.
4. Schwartz H.R., Rutishauser H., Stiefel E. et al. (1976), Numerical analysis of symmetric matrices, Prentice Hall.
5. C.R. Kothari & Gaurav Garg (2014), Research Methodology, Third Edition, New Age International Publishers.
6. Web resources: www.sciencedirect.com; for journal references, www.aip.org and www.aps.org for references styles.
7. Web Resources: www.nature.com, www.sciencemag.org, www.springer.com, www.pnas.org, www.tandf.co.uk, www.opticsinfobase.org for research updates.

PPD-101: RESEARCH METHODOLOGY

(FOR HUMANITIES AND SOCIAL SCIENCES GROUP)

(For Ph.D scholars of Haryana School of Business, Department of Economics, Library Science, Psychology, Mass Communication, Hindi, English and Religious Studies)

PPD-101: RESEARCH METHODOLOGY

Course Code: PPD-101 Course Credits: 4.0 Contact Hours: 4 hours/week (4 Lectures) Examination Duration: 3 hours	**Course Assessment Methods:** **Internal Examination (30 marks):** *Two minor tests each of 20 marks will be conducted. The highest marks obtained by a student in any of the two minor examinations will be considered. Class performance will be measured through percentage of lectures attended (04 marks), Assignments, quiz, etc. (06 marks).* **External End semester examination (70 marks):** *The examiner is required to set 9 questions in all. The first question will be compulsory covering the entire syllabus and consisting of 4 short answers type questions of 3.5 marks each. In addition to that, 8 questions have to be set consisting of 2 questions from each unit. A candidate is required to attempt 05 questions in all, selecting one question from each unit and the compulsory question No 1. All questions carry equal marks.*

UNIT-I

Nature of and scope Research Methodology: Defining Research, Scientific Research, Types of Research, Theory Generation; Research Process, Problem Formulation and Statement of Research Objectives; Research Proposal; Review of Literature.

UNIT-II

Research Design: Meaning, Types of Research Design; Methods of Data Collection: Observation and Survey Methods, Primary Data, Secondary Data; Attitude Measurement Techniques: Measurement and Scaling; Questionnaire Design: Validity and Reliability; Sample Design: Sampling Methods.

UNIT-III

Statistical Analysis: Basic Concepts of Statistical Analysis; Introduction to Probability and Probability Distributions; Sampling Distribution; Estimation: Point and Interval Estimate.

UNIT-IV

Statistical Tests: Hypothesis Formulation and Testing; Parametric and Non-parametric tests; Model Building: Simple and Multiple Regression; Introduction to Multivariate Data Analysis Techniques; Introduction to SPSS and other Statistical Software Packages; Report Writing.

Recommended Books/Sources:

- Zikmund William G., Business Research Methods , Cengage Learning.
- Bajpai Naval, Business Research Methods , Pearson.
- Malhotra & Das, Marketing Research – An Applied Orientation , Pearson.
- Chawla Deepak & Sondhi Neena, Research Methodology – Concepts and Cases , Vikas Publication.
- Cooper Donald R. & Schindler Pamela S., Business Research Methods , McGraw-Hill.
- Anderson, Sweeney & Williams, Statistics for Business and Economics , Cengage Learning.
- Levin Richard I. & Rubin David S., Statistics for Management , Pearson.
- Aczel & Sounderpandian, Complete Business Statistics , McGraw-Hill.
- Carver & Nash, Doing Data Analysis with SPSS , Cengage Learning.

PPD-101: RESEARCH METHODOLOGY

(FOR ENGINEERING GROUP)

(For Ph.D scholars of Department of Mechanical Engineering, Electrical Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Civil Engineering, Data Science and Applied Health Sciences)

PPD-101: RESEARCH METHODOLOGY

Course Code: PPD-101 Course Credits: 4.0 Contact Hours: 4 hours/week (4 Lectures) Examination Duration: 3 hours	**Course Assessment Methods:** **Internal Examination (30 marks):** *Two minor tests each of 20 marks will be conducted. The highest marks obtained by a student in any of the two minor examinations will be considered. Class performance will be measured through percentage of lectures attended (04 marks), Assignments, quiz, etc. (06 marks).* **External End semester examination (70 marks):** *The examiner is required to set 9 questions in all. The first question will be compulsory covering the entire syllabus and consisting of 4 short answers type questions of 3.5 marks each. In addition to that, 8 questions have to be set consisting of 2 questions from each unit. A candidate is required to attempt 05 questions in all, selecting one question from each unit and the compulsory question No 1. All questions carry equal marks.*

UNIT I

Introduction: Nature, objectives and motivation of research, types of research, research approaches, significance of research, research and scientific method, importance of research methodology, criteria of good research, problems encountered by researches in India, benefits to the society in general, and research process.

Research problem and its formulation: Defining the research problem: definition, types and its characteristics, necessity of defining the problem, research problem identification, literature review, scope and formulation of hypothesis, and problem formulation.

UNIT II

Statistical analysis: Measure of central tendency, dispersion, mean, median, mode, range, mean deviation, standard deviation, problems, and data preparation and analysis.

Probability distribution: Discrete, continuous and mixed random variables, definition of probability, addition rules and condition probability, binomial, Poisson, sampling and geometric distributions, sample tests: Chi square test.

UNIT III

Research Design: Meaning of research design, need, and features of research design, pa[illegible] classifications, research design process, different research designs, basic principles o[illegible] experimental design and developing a research plan.

Modeling: Basics of models, design of experimental set-up, use of standards and codes, type of models, model building and stages, need and types of simulation.

UNIT IV

Research Report Writing: Format of the research report, synopsis, dissertation, thesis its differentiation, references/bibliography, technical paper writing/journal report writing, Research proposal preparation: writing a research proposal and research report, writing research grant proposals.

Computer Application for presentation: Making presentation, use of visual aids, basic presentation skills for documentation and presentation tools: PowerPoint, Microsoft office, and knowledge of online tools.

Recommended Books/ Sources:

1. Agarwal, Y.P., (2004). Statistical Methods: Concepts, Application and Computation. Sterling Publs. Pvt. Ltd., New Delhi.
2. Ganesan, R., (2011). Research Methodology for engineers, MJP Publishers.
3. Khananabis, R. & Saha, S., (2015). Research Methodology. University Press. Hyderabad.
4. Kothari, C.R., (2004). Research Methodology, Methods and Techniques. New Age International Publishers.
5. Krishnaswamy, K.N., Sivakumar, A.I. & Mathirajan, M., (2018). Research Methodology; Integration of Principles, Methods and Techniques. Pearson Education, New Delhi.
6. Kumar, R., (2005). A step by step guide for beginners, Pearson Education.
7. Meyer, P.L., (1970). Introductory Probability and Statistical Applications. Addison Wesley.
8. Singh, Y.K., (2006). Fundamentals of Research Methodology, New Age International Publishers.
9. Upagade V. & Shende, A., (2009). Research Methodology. S. Chand & Company ltd., New Delhi.

Annexure-V

PPD-104: RESEARCH AND PUBLICATION ETHICS

(COMMON FOR ALL GROUP'S)

(For Ph.D. scholars of Department of Science, Humanities, Engineering)

PPD-104: RESEARCH AND PUBLICATION ETHICS (RPE)

Course Code: PPD-104 Course Credits: 2.0 Examination Duration: 2 hours	**Course Assessment Methods:** **Internal Examination (15 marks):** *Two minor tests each of 10 marks will be conducted. The highest marks obtained by a student in any of the two minor examinations will be considered. Class performance will be measured through percentage of lectures attended (02 marks), Assignments, quiz, etc. (03 marks).* **External End semester examination (35 marks):** *The examiner is required to set 5 questions in all. The first question will be compulsory covering the entire syllabus and consisting of 5 short answers type questions of 3 marks each. In addition to that, 4 questions have to be set consisting of 2 questions from each unit. A candidate is required to attempt 03 questions in all, selecting one question from each unit and the compulsory question No 1. Except Q.No.1, all questions will carry equal marks.*

Unit-I

PHILOSOPHY AND ETHICS: - Introduction to philosophy: definition, nature and scope, concept, branches. Ethics: definition, moral philosophy, nature of moral judgements and reactions.

SCIENTIFIC CONDUCT: - 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.

PUBLICATON ETHICS: - Publication ethics: definition, introduction and importance. Best practices/standards setting initiatives and guidelines: COPE, WAME, etc. Conflicts of interest. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types. Violation of publication ethics, authorship and contributor ship. Identification of publication misconduct, complaints and appeals. Predatory publishers and journals.

Unit-II

OPEN ACCESS PUBLISHING: Open access publications and initiatives. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies. Software tool to identify predatory publications developed by SPPU. Journal finder/journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

PUBLICATION MISCONDUCT: (A) Group Discussion: Subject specific ethical issues, FFP, authorship. Conflicts of interest. Complaints and appeals: examples and fraud from India and abroad. (B) Software tools: Use of plagiarism software like Turnitin, Urkund and other open source software tools.

DATABASES AND RESEARCH METRICS: Databases: Indexing databases. Citation databases: Web of Science, Scopus, etc. Research Metrics: Impact Factor of Journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score. Metrics: H-index, g-index, i10 index, altmetrics.

References

Bird, A. (2006). *Philosophy of Science*. Routledge.

MacIntyre, Alasdair (1967) *A Short History of Ethics*. London.

P. Chaddah. (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN:978-9387480865

National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). *On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition*. National Academies Press.

Resnik, D. B. (2011). What is ethics in research & why is it important. *National Institute of Environmental Health Sciences*, 1–10. Retrieved from https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm

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