

COTTON UNIVERSITY
Panbazar, Guwahati, Assam

Department of Molecular Biology and Biotechnology



Ph.D. Course Work Syllabus
Year 2018

Ph.D. students of Department of Molecular Biology and Biotechnology at Cotton University are required to complete a course work of 12 credits, spread over 3 courses, in the first semester of Ph.D. Programme. Each course of 4 credits will be in the L+T+P format. For the purpose of computation of workload the mechanism is

1 credit = 1 theory period of 1 hour duration per week

1 credit = 1 tutorial period of 1 hour duration per week

1 credit = 1 practical period of 2 hour duration per week

Courses:

1. **Research Methodology:** Compulsory course for the Department of Molecular Biology and Biotechnology, Botany, Zoology and Environmental Biology and Wildlife Sciences
2. **Core Course:** Compulsory course for all students of Department of Molecular Biology and Biotechnology
3. **Special Paper:** Students have to opt for only one special paper closely related to his/her topic of PhD research from the list of given special papers.

**Paper-wise Credit Distribution
(L+T+P format)**

Paper Code	Paper Title	Credits	Marks
PHDRM103	Research Methodology (compulsory)	3+0+1	70+30
MBBCC200	Overview of Biotechnology (compulsory)	3+1+0	70+30
MBBSP301	Plant Biotechnology and Genetic Engineering (special paper)	3+0+1	70+30
MBBSP302	Microbiology (special paper)	3+0+1	70+30
MBBSP303	Human Genomics and Biomedical Research (special paper)	2+1+1	70+30
MBBSP304	Bioinformatics (special paper)	3+0+1	70+30

Paper Title: Research Methodology

Paper Code: PHDRM103

Credit: 3+0+1

Unit 1: Research Methodology

14 L

What is science?; philosophy of science from Aristotle through Popper to Feyerabend; Introduction to research and research methodology, scope and research problem; identification, selection, research hypothesis; formulation of research objectives; literature collection, reference management software and researcher network, research design-experimental and field study; sampling design, data collection and types, data processing and analysis, data presentation and interpretation.

Unit 2: Science Communication

9 L

Principles of science communication; nitty-gritty of writing a good research proposal, effective oral and poster presentation; how to read and write a scientific paper?; how to review a paper? Reference management and managing research; communication and advocacy of science to the public and to policy-makers; art of writing effective academic emails & CV.

Unit 3: Research Ethics

15 L

Intellectual Property Rights (IPR): Types of IP: Patents, Trademarks, Copyright and Related rights, Industrial Design, Traditional Knowledge, Geographical Indications, Protection of New GMOs; Indian Intellectual Property – Administrative Machinery, International framework for the protection of IP; Trade-Related Aspects of Intellectual Property Rights (TRIPS), World Intellectual Property Organization (WIPO), Intellectual Property Treaties. Roles of Institutional Ethical and Biosafety Committees, Plagiarism.

Unit 4: Biostatistics

10 L

Experimental design and scientific method (natural history, descriptive approaches, hypothesis testing, ANOVA, Post hoc test, t-test, regression, correlation, probability test.

Statistical Packages: Basics of Statistical packages like Excel/ R/ SPSS/Origin Pro etc.; introductory features and functions, data entry and interpretation.

Practicals

Review of literature, report preparation and presentation through powerpoint mode and communication to suitable journal.

References:

1. Thesis and Assignment Writing, 3rd Edition (1998) – J Anderson, BH Dursten and M Poole, John Wiley & Sons Inc.
2. A Hand book of Methodology of Research (1976) – P Rajammal and P Devadoss, RMM Vidya Press
3. The Craft of Scientific Writing (2018) – Michael Alley (Springer)
4. Research methodology (2005) – R Panneerselvam, PHI, New Delhi
5. Biological Safety: Principles and Practices, 4th Edition (2006) – DO Fleming and DA Long, ASM Press
6. Bioethics: Introduction to History, Methods and Practice, 3rd Edition (2011) – NS Jecker, AR Jonsen and RA Pearlman, Jones and Bartlett Learning, Sudbury, Massachusetts
7. BARE ACT, Indian Patent Act 1970 Acts and Rules, Universal Law Publishing Co. Pvt. Ltd., 2007.
8. A Step by Step Guide to Data Analysis using SPSS for Windows 3rd Editions, (2013) – Julie Pallant, Open University Press
9. Handbook On Intellectual Property Rights In India, Rajkumar S. Adukia; available online http://www.caaa.in/image/34_hb_on_ipr.pdf
10. The R book (2012) – MJ Crawley, John Wiley & Sons, 2012.
11. Applied statistics in ecology: common pitfalls and simple solutions (2013). SE Ashley, MC Kennedy, PG Cunningham and JS Stanovick. Ecosphere 4(9):1-13
12. BARE ACT, The Wild Life (Protection) Act, 1972 (2011). Universal law publishing Co. Pvt. Ltd. New Delhi, India 2011
13. Biostatistical Analysis (2010) –JH Zar, Prentice Hall
14. A primer of Ecological Statistics, 2nd Edition (2013) – NJ Gotelli and AM Ellison, Sinauer Associates, INC. Publishers, Sunderland, Massachusetts, USA

Paper Title: Overview of Biotechnology

Paper Code: MBCC200

Credit: 3+1+0

Unit 1: Cell and Molecular Biology

6 L

Morphological variations of cell, intracellular compartments and protein sorting, general principle of cell signaling, regulation of transcription and translation, cell cycle and check points

Unit 2: Biochemistry

9 L

Carbohydrates: classification and functions; **Proteins:** Amino acids, peptide bonds, structure and classification of proteins; **Lipids:** Classification, structure and function, Role of lipids in biomembranes. **Enzymology:** Nomenclature, Enzyme kinetics, Regulation of enzymatic activity,

Enzyme catalysis; **Bioenergetics:** Glycolytic pathway, Kreb's cycle, Electron transport system, Gluconeogenesis, Glyoxylate cycle, Pentose phosphate pathway

Unit 3: Microbiology and Immunology

6+4 L

History of Microbiology, microbial diversity, Microbial nutrition, growth kinetics, control of microbes, Isolation and pure culture Techniques, Microbes in food, industries and environment.

Types of immunity, components, mechanism of immune response, Immunoglobulins, immunization, graft rejection, basic concept of tumour antigens, reproductive immunology

Unit 4: Plant and Animal Biotechnology

5+5 L

Introduction to Plant tissue culture techniques; Introduction to DNA based molecular markers in plants: SNP, RAPD, AFLP, ISSR, SSR; *Agrobacterium* mediated gene transfer-Agrobacterium and crown gall disease, Ti plasmids, Organization of T-DNA and vir region, T-DNA transfer mechanism. Plant transformation vectors, Direct gene transfer methods, Transgenic plants.

Introduction to Animal Tissue culture techniques, hybridoma technology, Mammalian vectors, transfection methods, cell culture products: vaccines, interferons, transgenic animals production.

Unit 5: Bioinformatics

4L

Overview of Bioinformatics and Computational Biology: Introduction to Biological databases; Sequence analysis, Structural Bioinformatics; Supervised and unsupervised methods in Bioinformatics; Next generation sequence analysis

Unit 6: Molecular Biology Techniques

9L

Polymerase Chain Reaction (PCR)- PCR types-multiplex, nested, reverse transcriptase, real time PCR, touchdown PCR, hot start PCR, colony PCR; Electrophoretic techniques: PAGE, SDS PAGE, Agarose gel electrophoresis, Isoelectric Focusing, Centrifugation techniques, Principle of Microscopy, Fluorescence microscopy, Principle of UV spectrophotometer, Scanning and Transmission Electron microscopy, Gene editing tools.

References

1. Slater. A. N. S. and Fowler. M. Plant Biotechnology: The genetic manipulation of plants. oxford University Press, Oxford, 2008.
2. Grierson. C. and Covey. S. N. Plant Molecular Biology. Springer Netherlands, 1991.
3. Hammond. J. H., Mcgarvey. P. and Yusibov. V. Plant Biotechnology. Springer Verlag, Heidelberg, 2000.
4. Razdan. M.K. Plant Tissue Culture. Oxford and IBH Pub. Co. Pvt. Ltd.

5. Willey. J. M., Sherwood. L. M. and Woolverton. C. J. Prescott, Harley and Klein's Microbiology. 7th Ed, McGraw Hill Higher Education, 2008.
6. Glazer and Nikaido, Microbial Biotechnology: Fundamentals of Applied Microbiology W.H. Freeman and Co., New York,1995.
7. Campbell. A. M. and Heyer. L. J. Discovering Genomics, Proteomics, and Bioinformatics. 2nd Ed, Benjamin Cummings, 2002.
8. Cynthia. G. and Per. J. Developing Bioinformatics Computer Skill. 1st Ed, O'Reilly Publication, 2001.
9. Lehninger. A. L., Nelson. D. L., Cox. M. M., Principles of Biochemistry. CBS Publications, 2001.
10. Wilson. K and Walker. J, Principles and techniques of Biochemistry and Molecular Biology. 7th Ed, Cambridge University Press, 2010.
11. Lewin. B. Gene IX. 9th Ed, Jones and Barlett Publishers, 2007.
12. Alberts. B., Johnson. A., Lewis. J., Morgan. D., Roberts. K. and Walter. P. Molecular Biology of the Cell, Garland Science, 6th Ed, 2014.
13. Owen. J., Punt J. and Stranford. S. Kuby Immunology. 7th Ed, W. H. Freeman, 2013.

Special Paper 1: Plant Biotechnology and Genetic Engineering

Paper Code: MBBSP301

Credit: 3+0+1

Unit 1: Genome Organization

5 L

Nuclear genome organization in prokaryote and eukaryote, structure of a eukaryotic gene, Organization of chloroplast genome and mitochondrial genome, RNA editing

Unit 2: DNA Marker Technology in Plants

5 L

Role of DNA markers with special emphasis on RFLPs, RAPD markers, EST, microsatellites, SNP (single nucleotide polymorphism), SCAR (sequence characterized amplified regions) and AFLP.

Unit 3: Plant Cell and Tissue Culture

5 L

Tissue culture media; callus and suspension culture; somaclonal variation; organogenesis; somatic embryogenesis; protoplast fusion and somatic hybridization.

Unit 4: Plant Genetic Engineering

Tools and techniques in Genetic Engineering: Restriction Endonuclease- Nomenclature, types, start activity; DNA ligase; DNA polymerases; alkaline phosphatase; polynucleotide kinase; terminal transferase; DNA labelling techniques.

8L

Cloning vectors: plasmid vectors, phage vectors, cosmids, YACs, plant transformation vectors; protein expression vectors **6 L**

Agrobacterium mediated gene transfer-Agrobacterium and crown gall disease, Ti plasmids, organization of T-DNA and vir region, T-DNA transfer mechanism; direct gene transfer methods; Plant transformation vectors and their basic features; binary vectors, selection and screening of transformants- marker and reporter genes, insertion inactivation, alpha complementation; cloning strategies-cDNA cloning, genomic DNA cloning, Genetic manipulation of herbicide resistance; Construction of genomic and cDNA libraries. **12 L**

Unit 5: Nucleic Acid Sequencing Methodologies **7L**

Sanger's method of DNA sequencing; automated DNA sequencing by capillary electrophoresis; sequencing platforms; interpretation of Electropherogram; next generation sequencing technologies.

Practicals

1. Plasmid isolation and visualization in agarose gel
2. Restriction digestion
3. Polymerase Chain Reaction.

References

1. Slater. A. N. S. and Fowler. M. Plant Biotechnology: The genetic manipulation of plants. oxford University Press, Oxford, 2008.
2. Grierson. C. and Covey. S. N. Plant Molecular Biology. Springer Netherlands, 1991.
3. Hammond. J. H., Mcgarvey. P. and Yusibov. V. Plant Biotechnology. Springer Verlag, Heidelberg, 2000.
4. Razdan. M.K. Plant Tissue Culture. Oxford and IBH Pub. Co. Pvt. Ltd.
5. Primrose. S. B., Twyman. R. M. and Old. R.W. Principles of Gene Manipulation. 7th Ed, Blackwell, 2006.
6. Brown. T. A, Genomes 3. 3rd Ed, Garland Science, 2007.
7. Brown. T. A, Gene Cloning and DNA Analysis: An Introduction. 7th Ed, 2016.
8. Desmonf. S. and Nicholl. T. An introduction to Genetic Engineering. 3rd Ed, Cambridge University Press.
9. Kingsman. S. M and Kingsman. A . J. Genetic Engineering: An Introduction to gene analysis and exploitation in eukaryotes. Blackwell Scientific Publications, Oxford, 1998.
10. Watson, J. D., Gilman M., Witkowski, J. and Zoller. M. Recombinant DNA Technology. 2nd Ed, Scientific American Books, 1992.

11. Sambrook. J. and Russel. D.W. Molecular Cloning: A Laboratory Manual, Vols 1-3, 3rd Ed, Cold Spring Harbour Laboratory, 2001.

Special Paper 2: Microbiology

Paper Code: MBBSP302

Credit: 3+0+1

Unit 1: History and Scope

6L

History of microbiology, Microscopy and microscopic techniques, Isolation, cultivation and preservation of microorganisms.

Unit 2: Microbial Identification and Taxonomy

9L

Microbial diversity, Bacteria, Archaea, Eukarya: algae, fungi, and protozoa. Tools and techniques of microbial diversity, metagenomics, classical and molecular taxonomy, polyphaser taxonomy.

Unit 3: Microbial Genetics

8L

Types of mutations, spontaneous and induced mutagenesis, isolating mutants. Conjugation, transduction, transformation in bacteria, bacteriophages and their genetic systems. Lambda genetic control.

Unit 4: Microbial Growth and Communication

8L

Microbial substrates and media formulation; components of microbial fermentation process; design of laboratory bioreactor. Microbial communication and chemosensory response, quorum sensing in microbial community

Unit 5: Microbial Interactions

8L

Different types of microbial interactions; microbe-microbe interaction, microbe-plant interaction e.g. Bacterial – Rhizobium and Frankia. Cyanobacterial symbiosis. Structure, nutrition and mode of reproduction of symbiotic microorganisms. Endophytic fungi, colonization and adaptation of endophytes inside plants, symbiosis in animal model – Bacteria in ruminants and human gut.

Unit 6: Microorganisms in Human Health, Agriculture and Environment

9 L

Single cell protein, alcoholic beverages, probiotics and prebiotics, fermented food, Antibiotics, Plant growth promoting bacteria, microbial insecticides, Bioremediation, microbial degradation of xenobiotics, waste water treatment.

Practicals

1. Sterilization and lab biosafety issues
2. Isolation and maintenance of bacteria and fungi
3. Staining techniques for the study of bacteria and fungi

References

1. Atlas. R. M. Principles of Microbiology. 2nd Ed, W. M. T. Brown Publishers, 1997.
2. Brooks. G. F., Carroll. K. C, Butel. J. S. and Morse. S. A. Jawetz, Melnick and Adelberg's Medical Microbiology. 24th Ed, McGraw Hill Publication, 2007.
3. Willey. J. M., Sherwood. L. M. and Woolverton. C. J. Prescott, Harley and Klein's Microbiology. 7th Ed, McGraw Hill Higher Education, 2008.
4. Barsanti L Laura Barsanti and Paolo Gualtieri. Algae: Anatomy, Biochemistry and Biotechnology by Taylor and Francis Group, LLC; 2006.
5. Crueger W and Crueger A Biotechnology: A Text Book of Industrial Microbiology, Panima Publishing Corporation, NewDelhi/Bangalore, 2000.
6. Streips U.N. and Yasbin, R.E. Modern Microbial Genetics. 2nd edition; Wiley Publishers; 2002.
7. Stanbury,P.F. W. Whitaker W. and Hall .J. Principles of Fermentation Technology, Aditya Books (P) Ltd., New Delhi, 1997.
8. Glazer and Nikaido, Microbial Biotechnology: Fundamentals of Applied Microbiology W.H. Freeman and Co., New York,1995.

Special paper 3: Human Genomics and Biomedical Research

Paper Code: MBBSP303

Credit: 2+1+1

Unit 1: Organization of the Human Genome

5 L

General features: gene density, CpG islands, RNA-encoding genes. Gene clusters, pseudogenes. Types of repetitive DNA

Unit 2: Techniques for Genomics

6 L

Cytogenetic techniques (Karyotyping and FISH). Polymorphism screening (Genotyping of SNPs and microsatellite markers). Identification of Genetic Basis of Disease: Forward and Reverse Genetics. Positional and Candidate Gene approaches, genotypic and allelic frequencies

Unit 3: Introduction to Clinical Research

4L

Definition, scope and types of clinical research, understanding epidemiology, (infectious disease, cancer and genetics) pharmacology and pharmaceuticals, Good Clinical Practices (GCP), biocontainment facility, process of drug development and drug safety.

Unit 4: Immune Response Mechanism

12 L

Types of immunity, blood cells, cytokines, cytokine receptors, cell mediated cytotoxicity, regulation of Immune Response: role of antigen, antigen presenting cell, antibody, lymphocytes, idiotypic modulation of response, neuroendocrine modulation of responses, genetic control of immune response, blood clotting, blood groups, transfusion, tissue and organ transplantation, Immunological techniques: ELISA, RIA, FACs

Unit 5: Clinical Virology

6 L

Classification of viruses, effect of virus infection on the host cell, cytopathic effects, changes in regulation of gene expression, History, epidemiology, diagnosis, clinical features, treatment and prevention of hepatitis, small pox, herpes.

Unit 6: Toxic substances and Organ toxicities

7 L

Chemical additives in food, chemicals in the work place, solvents, pesticides, cosmetics, naturally occurring toxins, hepatotoxicity, nephrotoxicity, cardiovascular toxicity, neurotoxicity, broncho-pulmonary (inhalation) toxicity, gastro-intestinal toxicity, skin toxicity/ photosensitivity.

Unit 7: Molecular Oncology

8 L

Mechanism of carcinogenesis, tumor types, Mechanism of deregulation of cell cycle during cancer, tumor suppressor genes and viral oncogenes, growth factor signaling pathways in cancer using example of Src, Wnt, Abl, GAP and growth factors, Cellular, tissue and molecular markers, potential targets for cancer therapy, drug discovery strategy

Practicals

1. Preparation of blood smear and microscopic observation of blood cells.
2. Handling of blood samples: separation of serum and plasma.
3. Extraction of genomic DNA from blood and tissues, gene polymorphism study by type specific PCR and RFLP.

References

1. Jorde. L.B., Carey. J.C., White R.L., Medical Genetics. Mosby Press, 2002
2. Scriver et al., The metabolic and molecular basis of inherited disease. 8th Ed, McGraw – Hill, 2002.
3. 3. Strachan. T and Andrew. P. Human Molecular Genetics. John Wiley–New York, 2001.
4. Sambrook . J. and Russel. D.W. Molecular Cloning: A Laboratory Manual, Vols 1-3, 3rd Ed, Cold Spring Harbour Laboratory, 2001.

5. Voet. D., Voet. J. G and Pratt. C.W. Fundamentals of Biochemistry, 2nd Ed, Wiley, 2006.
2. Brown. T. A. Genomes 3rd Ed, Garland Science, 2006
6. Owen. J., Punt J. and Stranford. S. Kuby Immunology. 7th Ed, W.H.Freeman, 2013.
7. Lewin. B. Gene IX. 9th Ed, Jones and Barlett Publishers, 2007.
8. Alberts. B., Johnson. A., Lewis. J., Morgan. D., Roberts. K. and Walter. P. Molecular Biology of the Cell, Garland Science, 6th Ed, 2014

Special Paper 4: Bioinformatics
Paper Code: MBBSP304
Credit: 3+0+1

Unit 1: Overview of Bioinformatics

14 L

Overview of genomics and proteomics. Genome organization. Databases - Primary and derived databases for sequences, profiles, structures and networks. Sequence analysis - Pairwise Sequence alignment and database searching, Scoring Matrices. Global and local pairwise alignment using dynamic programming. Significance of scores. Heuristic methods for database search. BLAST. Clustering and supervised methods in Bioinformatics. Multiple Sequence Alignment. Phylogeny.

Unit 2: Structural Bioinformatics

14 L

Protein Structure. Tools for visualization and analysis of protein structures, Structure Determination using NMR and X-Ray Crystallography, Simulations of Biological Molecules: Molecular Mechanics and Dynamics, Force-field, Thermodynamics, Free-Energy, Principles of drug design, Structure based Drug discovery: Docking. Fragment based Drug Discovery, QSAR, Pharmacophore modeling.

Unit 3: Next Generation Sequence Analysis

10 L

Overview of sequencing techniques. Processing NGS data. Genome assembly: Gene identification. Transcriptome assembly, determining differential gene expression. Determining the protein binding sites in genome. Meta-genome assembly. Gene identification. Functional analysis (Functional genomics, Functional annotation).

Unit 4: Data Handling

10 L

Programming and database management systems. Shell scripting, Perl Programming, building pipelines, algorithm design, database management system (MySQL).

Practicals

1. Sequence analysis - Pairwise Sequence alignment and database searching.
2. Clustering and supervised methods in Bioinformatics.
3. Multiple Sequence Alignment.

4. Phylogeny.
5. Visualization and analysis of protein structures.
6. Structure based Drug discovery: Docking.
7. NGS analysis.
8. Scripting and programming.

References

1. Campbell. A. M. and Heyer. L. J. Discovering Genomics, Proteomics, and Bioinformatics. 2nd Ed, Benjamin Cummings, 2002.
2. Cynthia. G. and Per. J. Developing Bioinformatics Computer Skill. 1st Ed, O'Reilly Publication, 2001.
3. Baxevanis. A. D. and Ovellette B. F. F. Bioinformatics: A practical guide to the analysis of genes and proteins. Wiley-Interscience, 2002.
4. Prem. S. M. Introductory Statistics. Latest Ed, Wiley.
5. John. A. R., Mathematical Statistics and Data Analysis. 3rd Ed, Duxbury Press, 2007.
6. Xiong. J. Essential Bioinformatics. 1st Ed, Cambridge University Press, 2006.
7. Mount, D. W. Bioinformatics Sequence and Genome Analysis, Cold Spring Harbor Laboratory Press, 2004
8. Jones, N. C. and Pevzner, P. A. An inbtrductin to Bioinformatics Algorithms (Computational Molecular Biology), MIT Press, 2004
9. Durbin, R., Eddy, S., Krogh, A., Mitchison, G. Biological sequence analysis
10. Jamison, D. C. Perl programming for Biologists. Wiley-Interscience, 2003.
11. Baldi, P. and Brunak, S. Bioinformatics: The machine learning approach, 2nd edition, 2001.



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No: CU/Acad/ PhD/2019/166/32

Date: 07/02/2020

NOTICE

(PhD Coursework Classes)

This is for information to all newly admitted (2019-20 batch) PhD scholars that their coursework will have a total of 14 credits consisting of four papers. Papers I, II and III are each having 4 credits while Paper IV is of 2 credits. The Research Methodology paper (Paper I) shall have common syllabus for all subjects/ Departments under a particular Faculty. Paper II and III are subject/ Department specific. Paper IV is a course on '**Research and Publication Ethics**' (RPE) for awareness about the publication ethics and publication misconduct which has been introduced following a recent UGC directive. The syllabus of the RPE paper (Paper IV) shall be common to all Faculties/ Departments (syllabus attached).

The duration of PhD coursework is one semester. A PhD student will be allowed a maximum of two semesters to clear the coursework examination.

The classes of Paper II and Paper III shall be conducted by the respective Departments from 13 February. The schedule of common classes for Paper I and Paper IV shall be notified later.

(S. K. Dutta)
Academic Registrar

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प्रो. रजनीश जैन
सचिव

Prof. Rajnish Jain
Secretary



विश्वविद्यालय अनुदान आयोग
University Grants Commission

(मानव संसाधन विकास मंत्रालय, भारत सरकार)
(Ministry of Human Resource Development, Govt. of India)

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D.O.No.F.1-1/2018(Journal/CARE)

December, 2019

Respected Sir/Madam,

University Grants Commission in its 543rd meeting held on 9th August, 2019 approved two Credit Courses for awareness about publication ethics and publication misconducts entitled “**Research and Publication Ethics (RPE)**” to be made compulsory for all Ph.D. students for pre-registration course work **(attached as Annexure)**.

In view of the above, you are requested to ensure that the above two Credit courses may be made compulsory for all Ph.D. students for pre-registration course work undertaken in your University from the forthcoming academic session.

With regards,

Yours sincerely,

(Rajnish Jain)

TO THE VICE-CHANCELLORS OF ALL UNIVERSITIES

ANNEXURE

Course Title:

- **Research and Publication Ethics (RPE)**-Course for awareness about the publication ethics and publication misconducts.

Course Level:

- 2 Credit course (30 hrs.)

Eligibility:

- M.Phil., Ph.D. students and interested faculty members (It will be made available to post graduate students at later date)

Fees:

- As per University Rules

Faculty:

- Interdisciplinary Studies

Qualifications of faculty members of the course:

- Ph.D. in relevant subject areas having more than 10 years' of teaching experience

About the course

Course Code: CPE- RPE

Overview

- This course has total 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 table below. 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

Syllabus in detail

THEORY

- RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**

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

- RPE 02: SCIENTIFIC CONDUCT (5hrs.)**

- 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

- RPE 03: PUBLICATION ETHICS (7 hrs.)**

- 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 contributorship
- Identification of publication misconduct, complaints and appeals
- Predatory publishers and journals

PRACTICE

- RPE 04: OPEN ACCESS PUBLISHING(4 hrs.)**

- 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 (4hrs.)**

- 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 (7hrs.)**

- 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, altmetrics
