CH. CHARAN SINGH UNIVERSITY, MEERUT

चौ0 चरण सिंह विश्वविद्यालय, मेरठ

Revised Syllabus for Pre-Ph.D. Course in Toxicology under NEP-2020, w.e.f. 2023

Course of Pre Ph.d. (Toxicology)

In Pre Ph.d. course there shall be three papers (12 credits= 4+4+4) and one project work (credits=4). The three papers will be as under:

1. Two papers will be related to the concern subject Toxicology. Each paper will be of 4 credits (4+4 credits =8 credits).
2. One paper will be of Research Methodology. This paper will be of 4 credits. It will be common to all subjects.
3. One Project work of 4 credits shall be related to Toxicology. It can be literature survey, review work, original research work, field work etc.
4. A minimum passing marks or its equivalent CGPA will be as per University rules.
5. Other rules and regulations shall be as per University Ph.d. ordinances-2022.

Titles and code of the Papers in Pre PhD (Toxicology)

Course code	Paper	Paper title	credits
	Paper-1	Research methodology	4
	Paper-2	Molecular Toxicology	4
	Paper-3	Recent advances in Toxicology	4
	Paper-4	Project	4
		Total	**16**

(Jaimala) (Hare Krishna) (Dean) (S.V.S. Rana) (Sunil Kumar) (online)

(P.K.Singh) (online) (Samir Sharma) (online) (Sandeep Mithal) (Yeshvandra Verma)

Paper- 1: Research Methodology

Subject: Toxicology (Common for all faculties)		
Course Code: -----	**Course Title:** Research Methodology	Theory

Course Objeetives: The main objective of this paper is to

1. Identify and discuss the role and importance of research.
2. Identify and discuss the issues and concepts salient to the research process.
3. Identify and discuss the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project.
4. Identify and discuss the concepts and procedures of sampling, data collection, analysis and reporting.

Course Outcomes: At the end of this course, the students should be able to:

CO1. Understand some basic concepts of research and its methodologies.
CO2. Explain key research concepts and issues read, comprehend, and explain research articles in their academic discipline.
CO3. Select and define appropriate research problem and parameters.
CO4. Organize and conduct research (advanced project) in a more appropriate manner.
CO5. Write a research report and thesis.
CO6. Write a research proposal (grants).

Credits: 4	**Core Compulsory**
Max. Marks: 100	Min. Pass Marks: As per University rules

Total No. of Lectures-Tutorial-Practicals (in hours per week): L-T-P: 4-0-0

Unit	Topics	No. of Leetures Total (60)
I	Perception & Definition of Research, Objectives & Motivations of Research, Importance of Research, Types of Research, Research Methods versus Methodology, Process of Research; Review of Literature, Formulation of the Research Problem, Sources and Identification of a Research Problem, Status of the Research Problem, Formulation of Hypothesis, Research Design,	12
II	Outlines of Synopsis;Project Proposal, Project Report Writing; Research Paper Writing; Components of Research Reports;Thesis Writing:Outlines of Thesis, Reference citing, Formats of Writing References, Bibliography; Plagiarism.	12
III	Intellectual Property (IP), Intellectual Property Rights (IPR), Intellectual Property Law, Different fields of Intellectual Property Rights, Patents,Publication Ethics: Definitions importance Conflicts of Interest, Publication Misconduct Definition, Concept, Problems that lead to Unethical Behavior and vice versa, Types Identification of publication misconduct, Complaints and Appeals; Violation of publication ethics, Authorship and Contributorship; Predatory Publishers and Journals.	12

IV	Web Browsers, Search Engines, MS Word: Handling Graphs, Tables and Charts, Formatting in MS-Word, MS Power Point: Creating Slide Show, Screen Layout and Views, Applying Design Template, MS Excel: Features, Formulas and Functions.	12
V	Subject Classification Index, Citation, Citation Index, Impact Factor, h-index, i-10index, INFLIBNET, Introduction to Peer Reviewed and Open Access Journals, e-Journals, e-Library, Research Databases, Institute for Scientific Information (ISI) & Journal Citation Reports, Science Citation Index (SCI), Social Sciences Citation Index (SSCI), Arts and Humanities Citation Index (AHCI), Databases: UGC care list,Web of Science (WoS), Scopus.	12

Teaching Learning Process: Class discussions/ demonstrations, Power Point presentations, Class activities etc.

Suggested Readings:

1. **Creswell. W.**: Research Design, Qualitative, Quantitative and Mixed Methods Approaches (3rdEdition), SAGE, Inc., 2018.
2. **Gupta. S**: Research Methodology: Methods and Statistical Techniques, Deep & Deep Publications, 2010.
3. **Kumar. R**: Research Methodology: A Step-by-Step Guide for Beginners (3rd Edition), SAGE, Inc., 2011.
4. **Melville. S. and Goddard. W.**: Research Methodology: An Introduction (2nd edition),Juta Academic, 2004.
5. **Shortis, T.**: The Language of ICT: Information and Communication Technology, Taylor & Francis, 2016.
6. Research Methodology: Methods and Techniques by C.R. Kothari, Second revised edition
7. Research Methodology: A step by step guide for beginners by Ranjit Kumar
8. Information Communication Technology, by Tim Shorts Handbook of Communication and Social Interaction Skills, by John O. Green, Brant Raney Burleson
9. शोध प्रविधि -- डॉ0 विनय मोहन शर्मा
10. अनुसंधान प्रविधि -- सिद्धांत और प्रक्रिया–एस.एन.गणेशन
11. अनुसंधान प्रविधि -- डॉ0 एस0एन0राय
12. अनुसंधान की प्रविधि एवं प्रक्रिया – डॉ0 राजेन्द्र मिश्र
13. साहित्य अनुशीलन : विभिन्न दृष्टियाँ – डॉ0 दया शंकर शुक्ल
14. अनुसंधान प्रविधि और प्रक्रिया – डॉ0 मुक्त खराटे / डॉ0 शिवाजी देवरे

(Jaimala) (Hare Krishna) (S.V.S. Rana) (Sunil Kumar)

(P.K.Singh) (Samir Sharma) (Sandeep Mittal) (Yeshvandra Verma)

Programme/Class: Pr. Ph.d	Year:	Semester:
Subject: Toxicology		
Course Code:	Course Title: **Molecular Toxicology**	(Theory)

Course Objectives- To study the molecular mechanism of xenobiotics with special reference to their chemico-biological interactions.

Course outcomes: At the end of this course, students shall be able to-

1- Understand the molecular mechanism of action of chemicals in biological system.
2- Understand the chemico-biological interaction with special reference to chemical induced toxicity.
3- Understand the details of chemical induced carcinogenesis.
4- Understand the role of genetic materials in etiology of chemical induced disorders

Credits: 4	Course: Compulsory
Max. Marks: as per university rules	Min. Passing Marks: as per university rule

Total No. of Lectures-Tutorials-Practicals (in hours per week): L-T-P: 4-0-0

Unit	Topics	No. of Lectures Total (60)
I	**Nuclear Receptor mediated toxicology**- a. Introduction to receptors, classification of receptors, xenoestrogens. b. Androgen and estrogen receptor mediated toxicity. Endocrinal disruption by chemicals.	12
II	**Covalent binding of xenobiotics to DNA and protein**- a. Covalent DNA binding, Toxicological consequences, DNA alkylation, DNA adduct identification b. Covalent protein binding, Toxicological consequences of covalent protein binding	12
III	**Enzymology of biotransformation**- a. Biochemical aspects of CYP-450, Glutathione b. Glutathione-S-Transferases, Glutathione peroxidise, Catalase and superoxide dismutase	12
IV	**DNA damage**- Introduction, endogenous DNA damage, Oxidative DNA damage, mutagenesis, Mechanism of DNA damage	12
V	**Chemical carcinogenesis**- a. Chemical carcinogens, Epigenetic agents, DNA Poisons, Somatic mutation theory, Epigenetic theory of carcinogenesis. b. Oncogenes, Acute transforming retroviruses, Tumor suppressor genes	12

Suggested reading : (Books available in Departmental Library/Central Library)

1. Molecular Toxicology, 2nd edition by P.David Josephy, B.Mannervik, Oxford Uni.Press
2. Mechanistic Toxicology by Urs Boelsterli, Taylor and Francis, Newyork

3. Advances in modern toxicology, Mutagenesis (Volume- 5) by E.G. Flamm, M.A.Mehlman, Gary F.W.., John Wiley and Sons Inc.
4. Chemical induction of cancer, by Arcos, J.C., Argus, M.F., and Wolf, G., (Vol.1)

Teaching Learning process: class discussions/demonstrations, Power point presentation, class activities/assignments, dissertation etc.

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(P.K.Singh) (Online) (Samir Sharma) (Online) (Sandeep Mithal) (Yeshvandra Verma)

Programme/Class: Pr. Ph.d	Year:	Semester:
Subject: Toxicology		
Course Code:	Course Title: **Recent advances in Toxicology**	(Theory)

Course Objectives- To study the recent advancements in toxicological sciences and their applications in xenobiotics induced disorders.

Course outcomes: At the end of this course, students shall be able to-

1- Develop the molecular tools and techniques for chemical induced disorders.
2- Develop the biomarkers for early detection of chemical induced toxicity.
3- Understand the dose dependant phenomenon in toxicological/pharmacological studies.
4- Understand the ethics, safety rules and regulations for animal/microorganism involved studies.

Credits: 4	Course: Compulsory
Max. Marks: as per university rules	Min. Passing Marks: as per university rule

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: 4-0-0

Unit	Topics	No. of Lectures Total (60)
I	a. Toxicogenomics- Introduction, tools and approaches b. Genomics, functional genomics, Microarray, applications of toxicogenomics in Toxicology	12
II	a. Toxicoproteomics- Introduction, Concepts of proteome, b. Proteome platforms, Methods of proteomics, applications of proteomics	12
III	a. Metabonomics- Introduction and approaches of metabolomics, methods of metabolomics (NMR) b. Application of metabolomics in toxicology	12
IV	a. Biomarkers in molecular epidemiology. Identification and development of biomarkers b. Biomarkers of exposure. Biomarkers of internal dose, biomarkers of effective dose.	12
V	a. Biomarkers of response- Types of biomarkers and specificity of biomarkers b. Biomarkers of genetic susceptibility c. Laboratory animals and their use in toxicological studies, animal ethical laws, biosafety rules and regulations in biological research. Statistical tools- central tendency, dispersion, skewness, correlation, regression, Chi-square test, t and F tests, ANOVA- one way and two way	12

Suggested reading : (Books available in Departmental Library/Central Library)

1. An introduction to Toxicogenomics by Michael E. Burczynski, CRC Press, T&FGroup
2. Molecular and Biochemical Toxicology by Robert C.Smart and E. Hodgson, Wiley

Teaching Learning process: class discussions/demonstrations, Power point presentation, class activities/assignments, dissertation etc.

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