

**Six Months Course work for Ph. D. Programme in Environmental Science**

<b>Sl. NO.</b>	<b>Paper Section</b>		<b>Subject</b>	<b>Duration of paper in Hours</b>	<b>Total Marks</b>
1	I		Research Methodology	03	100
2	II		Environmental issues and Research	03	100
3	III	A	Presentation 1	01	50
		B	Presentation 2	01	50
				Total Marks: 300	

**Note:-**

**1. Passing marks is 40 percent in each paper separately including sessional/ Internal Assessment and 50% in grand total Also.**

**2. Paper / Section III (A,B) will be evaluated by the Department Committee constituted by Head of Department consisting at least three member of the concern Department.**

**DEPARTMENT OF ENVIRONMENTAL SCIENCE**  
**Faculty of Science,**  
**V.B.S. Purvanchal University Jaunpur.**

**Course work for Ph.D. Students**

There shall be two theory papers (each of 100 marks) and two presentation (each of 50 marks) in Ph.D. course work in Environmental Science. These papers will be covered in one semester and the students will have to qualify this examination (with 50% marks) within two attempts. The examination for the course work shall be held twice, normally in December and May months of each academic session. In case a student fails to qualify this examination, his/her enrollment will be automatically cancelled as per rules.

**Course 1: Research Methodology**

**: 100 Marks**

Unit 1: Objective of research, Research Problems and techniques involving in defining a problems ; steps of scientific study, formulation of hypothesis, formulation of objectives, methods of research; survey, observation, case study: experimental, historical and comparative methods. Basic concept of research design.

Unit 2: Research proposal and experimental methods (interdisciplinary approach): research material collection, sampling, preparation and presentation, methods of literature collection, planning and execution of investigation.

Unit 3: Collection, classification and tabulation of data, measures of central tendency, dispersion, probability, correlation and regression, test of hypothesis and significance. Matrix and mathematical simulation.

Unit 4: Analysis and interpretation of data, techniques of interpretation, and steps of reports / review/research paper/thesis writing, layout and presentation of reports.

Unit 5: Overview of Computer and its component (hardware and software's), application of computer in environmental research and scientific database.

Unit 6: Concept of languages, language suitable in scientific research, MS office tools, internet and its application, on line submission of research articles, cyber law.

Unit 7: A brief idea about the funding agencies such as MoEF, DST, DBT, CSIR, UGC,WHO, UP-CST and others.

***Recommended Readings:***

1. Research methodology: Methods and techniques by Kothari CR (2007), New age International Pvt Ltd.
2. Research methodology by Panneer selvam R (2007) Prenticehall India. Pvt Ltd.
3. Quantitative methods, ICFAI, University press (2004)

4. Instrumental Methods of analysis by HH Willard, Merrit, Jr .L.L. Dean, JA and Settle , Jr FA; CVS publishersand distributers (1996)
5. Business staticstis by RS Bharwadaj . Excel Books , Statical methods by Shenoy , GV and Pant IM, (1994) Mac Millan pvt Ltd.

**Course 2: Environmental issues and Research**

**: 100 Marks**

Unit 1: Understanding of environmental science, ecology and environment, environmental pollution, biodiversity loss, weather and climate change, natural resource and its conservation, environmental microbiology and biotechnology, Risk analysis and Environmental impact analysis.

Unit 2: Environmental safety: chemical, physical and biological hazards, waste disposal rule and techniques, First aid. STP and ETP plants. Environmental Ethics.

Unit 3: Online /off-line software for weather forecast, GIS & RS and NCBI-BLAST.

Unit 4: Types of microscopes and its application, visualization of cells and staining techniques.

Unit 5: Technique:

[A] Microbes; isolation, purification, characterization, morphological and molecular characterization.

[B] Plants; Plant growth and biochemical examination.

[C] Air, water and soil; SPM, NRSPM, air quality index, water quality index, soil quality index and contaminants.

Unit 5: General application of biotechnology and nano-technology in environmental research.

Unit 6: Environmental conventions and Environment protection act.

**Recommended readings**

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|---|--|---|--|
| 1 | Practical Biochemistry                                 | : | K Willson & John Walker  |
| 2 | Briefs in Environment, Security, Development and Peace | : | Springer<br>Series Ed.: Brauch, Hans Günter<br>ISSN: 2193-3162 |
| 3 | The Atmosphere: An Introduction to Meteorology         | : | Frederick K Lutgens & Edwrd J Tarbuck                          |
| 4 | Fundamental of microbiology                            | : | Jeffrey C Pommerville Jones and Bartlett publishers            |
| 5 | Soil Sciences  | : | N .C Breede  |

- 6 Advances in Global Change Research : Series Ed.: Stoffel, Markus  
ISSN: 1574-0919
- 7 Advances in Environmental Research. Volume 66 : Justin A. Daniels (Editor)  
Series: Advances in Environmental Research  
BISAC: SCI026000
- 8 A Text Book of water pollution and water quality indicators : Kugamoorthy & Belauthamorthy  
(Lambert Academic Publisher)
- Presentation 1 : 50 Marks**
- Presentation 2 : 50 Marks**