YASHWANTRAO CHAVAN MAHARASHTRA OPEN UNIVERSITY

Syllabus for

Course-Work

R92: Ph.D.

(Environmental Science)

{2019 Pattern}

2019

YCMOU, NASHIK-422 222, MH, INDIA

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BASIC INFORMATION

1. **Mode of Education**: Regular
2. **Minimum Programme Duration**: 1 Semester
3. **Required Study Efforts**: Total 36 Hours (including Self-Study) during 1 semester.
4. **Medium of Instruction**: English
5. **Attendance**: Minimum **75 %** attendance shall be essential.

PROGRAMME CALENDAR

1. **Teaching-Learning and Continuous Assessment**: Feb-May
2. **Continuous Assessment Seminar**: April/ May
3. **End Examination**: During May/June

PROGRAMME STRUCTURE

Course → Sem ↓	Course 01, 4CP, T	Course 02, 4 CP, T	Course 03, 4 CP, T
Sem 01 12 CP	**RES101**: Research Methodology	**RES142**: Advances in Environmental Science	**RES143**: Issues in Environmental Science

SEMESTERS AND COURSES

SN	Code	Name	CA	EE	TM	Type	Credits
Semester 01: 12 Credits							
01	RES101	Research Methodology	50	50	100	T	4
02	RES142	Advances in Environmental Science	50	50	100	T	4
03	RES143	Issues in Environmental Science	50	50	100	T	4

Evaluation Pattern

SN	Type of Course	Continuous Assessment	End Examination
1	**Theory (T)**	Seminar, Viva and Report Total **50** Marks which consist of (1) Presentation: 20 Marks (2) Viva: 20 Marks (3) Report:10 Marks during total **20** minutes	Closed Book Summative Evaluation with supervision at Exam Center. Conducted on prescheduled date and time. **50** Marks, Total **10** SAQs each of **05 Marks,** **05** SAQs each of 05 Marks on both CP 1 & 2 and **05** SAQs each of 05 Marks on both CP3 & 4 during total **90** minutes.

Actual CA and EE marks shall be added to compute "Total Marks (TM)". "CA, EE and Total marks" shall be separately reported for each course in the mark-statement. Only best of the past performance shall be reported.

Guidance for PhD Research

Subject wise Ph.D. research supervisors allotted to each student shall guide to the students whenever required by the students through email, on phone or during face-to-face meetings.

Student shall submit request letter along with the six monthly progress report signed by the resp. research supervisors to the Director of the School to organize Doctoral Research Committee meeting for the approval of the research progress of the student.

SEMESTER 01

RES101: RESEARCH METHODOLOGY

PROGRAMME INFORMATION

SN	Description	Details
1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: **http://ycmou.digitaluniversity.ac.in** and **http://www.ycmou.ac.in/**
2	School	School of Architecture, Science and Technology (AST)
3	Discipline	Environmental Science
4	Level	Research
5	Course Used in	R92: Ph.D. (Environmental Science)

COURSE INFORMATION

Sem	Code	Course Name	CP	CA	EE	TM	Type
01	RES101	Research Methodology	4	50	50	100	T

PRESUMED KNOWLEDGE AND LEARNING OBJECTIVES

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have: • Successfully completed Post-Graduate Degree programme and • PhD Entrance Test	After successful completion of this course, student should be able to • Select and Use Appropriate Research Methodology and Techniques for Research. • Develop research proposal and to work with research problem

UNITS

UN	Name of the Unit	CSs
01 02	Research methodology & Literature review Analysis of Literature Review	**CR 01** **CSs** **3hrs**

03 04	Method of Data Collection Scientific technical writing	**CR 02** **CSs** **3hrs**
05	Computational knowledge	**CR 03** **CSs** **3hrs**
06	Intellectual property rights	**CR 04** **CSs** **3hrs**

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	Credit
01	**Research methodology & Literature review:** Science and Research: 1. Definition – History – Evolution of Scientific Inquiry, Scientific Research: Definition, Characteristics, types, Need of research. Identification of the problem, assessing the status of the problem, formulating the objectives, preparing design (experimental or otherwise), Actual investigation. Introduction to Research Methodology Meaning and importance of Research – Types of Research – Selection and formulation of Research Problem Research Design – Need – Features – Inductive, Deductive and Development of models Developing a Research Plan – Exploration, Description, Diagnosis, Experimentation, Determining Experimental and Sample Designs.	**CR 01**
02	**Analysis of Literature Review** : Primary and Secondary Sources, Web sources – critical Literature Review Hypothesis – Different Types – Significance – Development of Working Hypothesis, Null hypothesis Research Methods: Scientific method Vs Arbitrary Method, Logical Scientific Methods: Deductive, Inductive, Deductive-Inductive, pattern of Deductive – Inductive logical process – Different types of inductive logical methods, chemical safety & disaster management.	

03	**Method of Data Collection:** Data Collection and Analysis Sources of Data – Primary, Secondary and Tertiary – Types of Data – Categorical, nominal & Ordinal. Methods of Collecting Data: Observation, field investigations, Direct studies – Reports, Records or Experimental observations. Sampling methods – Data Processing and Analysis strategies- Graphical representation – Descriptive Analysis – Inferential Analysis- Correlation analysis – Least square method - Data Analysis using statistical package – Hypothesis – testing – Generalization and Interpretation – Modeling.	
04	**Scientific technical writing:** Scientific Writing Structure and components of Scientific Reports – types of Report – Technical Reports and Thesis – Significance – Different steps in the preparation – Layout, structure and Language of typical reports - Illustrations and tables – Bibliography, Referencing and foot notes – Importance of Effective Communication. Preparing Research papers for journals, Seminars and Conferences – Design of paper using TEMPLATE, Calculations of Impact factor of a journal, citation Index, ISBN & ISSN. Preparation of Project Proposal - Title, Abstract, Introduction – Rationale, Objectives, Methodology – Time frame and work plan – Budget and Justification – References Documentation and scientific writing Results and Conclusions, Preparation of manuscript for Publication of Research paper, Presenting a paper in scientific seminar, Thesis writing. Structure and Components of Research Report, Types of Report: research papers, thesis, Research Project Reports, Pictures and Graphs, citation styles, writing a review of paper, Bibliography.	**CR 02**
05	**Computational knowledge:** Basic rules of sophisticated storage and retrieval of data, development of database structures and data base management, data processing and basic operation, sorting, indexing and primary keys, Network protocols, Development of web page, search of chemical in computer networks. Computer applications and Statistics Use of word processing spread sheet and database software. Plotting of graphs. Internet and its application: E-mail, WWW, Web browsing, acquiring technical skills, drawing inferences from data, Introduction to Statistics – Probability Theories - Conditional Probability, Poisson distribution, Binomial Distribution and Properties of Normal Distributions, Estimates of Means and Proportions; Chi Square Test, Association of Attributes t Test –ANOVA, Standard deviation Coefficient of variations. Correlation and Regression Analysis.	**CR 03**

06	**Intellectual property rights:** General introduction, patents and copyrights, Designs patents and copyrights, patent drafting, patent claims and specifications, trademarks, trade integrated circuit, patent life and geographical boundaries, utilization of intellectual patents, patent search, patent acts & Rules, legal decision making process. Ownership of patents, Author and ownership of copyright. Licensing of copyrights, Infringement of copyrights and patents, Remedies & action for infringement of copyrights IPR as protection Strategy. Patent cooperation treaty (PCT), Indian and US patent Acts and Latest amendments. Ethics Ethical Issues – Ethical Committees – Commercialization – copy right – royalty – Intellectual Property rights and patent law – Track Related aspects of intellectual property Rights – Reproduction of published material – Plagiarism – Citation and Acknowledgement – Reproducibility and accountability	**CR 04**

LEARNING RESOURCE DETAILS

LR Code	Title Author	Edition Year	ISBN Publisher
Reference Books			
RES101-R01	Research Methodology Methods and Techniques- C. R. Kothari	2004	978-81-224-2488-1 New Age
RES101-R02	Fundamental of Research Methodology and Statistics- Yogesh Singh	2006	978-81-224-2418-8 New Age

RES 142: Advances in Environmental Science

Programme Information

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1	University	Yashwantrao Chavan Maharashtra Open University Nashik - 422 222, Maharashtra, India Website: **http://ycmou.digitaluniversity.ac.in** and **http://www.ycmou.ac.in/**
2	School	School of Architecture, Science and Technology (AST)
3	Discipline	Environmental Science
4	Level	Research
5	Course Used in	R92: Ph.D. (Environmental Science)

Course Information

Sem	Code	Course Name	CP	CA	EE	TM	Type
01	RES142	Advances in Environmental Science	4	50	50	100	T

Presumed Knowledge and Learning Objectives

Presumed Knowledge	Learning Objectives
For successful completion of this course, student should have: • Successfully completed Post-Graduate Degree programme and • PhD Entrance Test	After successful completion of this course, student should be able to: • Explain investigation methodologies in Environmental Science; • Develop independent investigation that meet the requirements imposed by international academic standards; • Develop a significant number of original research projects that have provided contributions to the growing knowledge in Environmental Science, and which can be published in national and international refereed scientific publications; • Perform critical analysis, to evaluate and to synthesize new and complex ideas; • Communicate the results of their work to other geologists, academic community and society;

	• Promote the technologic, scientific, social and cultural progress.

UNITS

UN	Name of the Unit	CSs
01	Environmental impact assessment	CR 01 CSs 3 hrs
02	Conservation of environment	CR 02 CSs 3 hrs
03	Environmental Law	CR 03 CSs 3 hrs
04	Environment Management	CR 04 CSs 3 hrs

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CP
01	**Environmental impact assessment:** History, Methods, EIA in India.	CR 01
02	**Conservation of environment:** a) Sustainable development: Integration of environmental concerns into economic development, Development: A proper perspective, Equity. b) 3R mantra: meaning, application. c) Biogeochemical cycles**:** Carbon cycle, nitrogen cycle, oxygen cycle.	CR 02
03	**Environmental Law:** Overview and key components of Indian Environment laws- forest laws, pollution control laws, conservation laws.	CR 03
04	**Environment Management:** Environment Legislations in India, Salient features of some important laws, Environmental Management System [EMS] standard.	CR 04

RES 143: Issues in Environmental Science

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	to other geologists, academic community and society; • Promote the technologic, scientific, social and cultural progress.

UNITS

UN	Name of the Unit	CSs
01	Population and Environment	CR 01 CSs 3hrs
02	Water	CR 02 CSs 3hrs
03	Pollution	CR 03 CSs 3hrs
04	Natural resource depletion	CR 04 CSs 3hrs

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CP
01	**Population and Environment:** Introduction of biosphere, Concept of health and hygiene, Rural sanitation , Role of village schools , Personal hygiene Drinking water , Industrialization, Agriculture, Air, Water, Food, Infection diseases, WHO Programme, Human Rights, Value education, Women and child care.	CR 01
02	**Water:** Chemical and physical properties, Water cycle , Fresh water storage , Aquatic life forms, Effects on human civilization, Health and pollution, As a scientific standard, For drinking, Washing and Chemical uses, Water industry, Industrial applications, Food processing.	CR 02

03	**Pollution:** Define Pollutants, types of pollutions, Sources and causes, methods of Pollution control, Greenhouse gases and global warming, Ozone layer depletion Ozone cycle overview, Observations on ozone layer depletion, Chemicals in the atmosphere, Ozone hole and its causes, Effects on crops, Ozone depletion and global warming, Acid rain , Nuclear Power Reactor Accidents **Industrial and household waste**-Agricultural waste, animal by-products, Biodegradable waste, Biomedical waste, Medical waste, Sewage, Wastewater.	**CR 03**
04	**Natural resource depletion:** Causes, Minerals, Oil, Deforestation -Causes, Environmental impact, Controlling deforestation, Wetlands **Loss of biodiversity-**Definition of Biodiversity, Why Is Biodiversity Important? , Major Causes of Loss of Biodiversity, Effects of Loss of Biodiversity, Threats to Biodiversity, Biodiversity Issues, Human Impact on Biodiversity, Protecting Biodiversity, Preserving Biodiversity. Biodiversity Conservation.	**CR 04**