YASHWANTRAO CHAVAN MAHARASHTRA OPEN UNIVERSITY

Syllabus for
Course-Work
R41: Ph.D.
(Geology){2019 Pattern}

2019

YCMOU, NASHIK-422 222, MH, INDIA

CONTENTS

Basic Information **3**
- **Programme Calendar** **3**
- **Programme Structure** **3**
- **Semesters and Courses** **3**
- **Evaluation Pattern** **3**
- **Guidance for PhD Research** **3**

Semester 01 ..... **4**
- **RES101: Research Methodology** **4**
  - Programme Information 4
  - Course Information 4
  - Presumed Knowledge and Learning Objectives 4
  - Units 4
  - Detailed Syllabus 5
  - Learning Resource Details 6
- **RES 132: Applications of Geospatial techniques** **7**
  - Programme Information 7
  - Course Information 7
  - Presumed Knowledge and Learning Objectives 7
  - Units 7
  - Detailed Syllabus 8
  - Learning Resource Details 8
  - Programme Information 9
  - Course Information 9
  - Presumed Knowledge and Learning Objectives 9
  - Units 9
  - Detailed Syllabus 9
  - Learning Resource Details 10

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	RES132:Applications of Geospatial techniques	RES133:Geology

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	RES132	Applications of Geospatial techniques	50	50	100	T	4
03	RES133	Geology	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: 20Marks (2) Viva: 20Marks (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	Geology
4	Level	Research
5	Course Used in	R41: Ph.D. (Geology)

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 132: APPLICATIONS OF GEOSPATIAL TECHNIQUES

PROGRAMME INFORMATION

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2	School	School of Architecture, Science and Technology (AST)
3	Discipline	Geology
4	Level	Research
5	Course Used in	R41: Ph.D. (Geology)

COURSE INFORMATION

Sem	Code	Course Name	CP	CA	EE	TM	Type
01	RES132	Applications of Geospatial techniques	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: • Identify, describe, and classify earth materials, formations, and structures and interpret them in the context of geologic processes • Analyze and report quantitative geologic data collected in the field and laboratory • Read, write, present, and critically evaluate geologic reports, professional papers and maps • Synthesize information from a variety of disciplines to solve geologic problems.

UNITS

UN	Name of the Unit	CSs
01	Introduction to Remote sensing	**CR 01** **CSs** **3hrs**
02	Fundamentals of Remote Sensing and GIS	**CR 02** **CSs** **3hrs**
03	Spatial data analysis and Cartography	**CR 03** **CSs** **3hrs**
04	Computer applications in geospatial data	**CR 04** **CSs** **3hrs**

Detailed Syllabus

UN	Detailed Syllabus of the Unit	CP
01	**Introduction to Remote sensing:**	**CR 01**
02	**Fundamentals of Remote Sensing and GIS:** - EMR and its Interactions - Platforms, Sensors, Orbits - Introduction to GIS - Components of GIS - Concepts of GPS / IRNSS	**CR 02**
03	**Spatial data analysis and Cartography:** - Spatial data models - Spatial data structure - Introduction to SOI topographical map and its interpretation - Map projections and coordinate systems	**CR 03**
04	**Computer applications in geospatial data:** - Interface of open source Geographic Information System software - Spatial Data Inputs - Attribute Data Input and its Management - Familiarization with Image Processing System - Map Composition	**CR 04**

Learning Resource Details

LR Code	Title Author	Edition Year	ISBN Publisher
Reference Books			
RES132-R01	Fundamentals of Remote Sensing – Joseph, G.	2004	Universities Press, Hyderabad, India
RES132-R02	Textbook of Remote Sensing and Geographic Information System – Anji Reddy, M.	2008	B.S. Publication, Hyderabad

RES 133: GEOLOGY

PROGRAMME INFORMATION

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2	School	School of Architecture, Science and Technology (AST)
3	Discipline	Geology
4	Level	Research
5	Course Used in	R41: Ph.D. (Geology)

COURSE INFORMATION

Sem	Code	Course Name	CP	CA	EE	TM	Type
01	RES133	Geology	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: • Identify, describe, and classify earth materials, formations, and structures and interpret them in the context of geologic processes • Analyze and report quantitative geologic data collected in the field and laboratory • Read, write, present, and critically evaluate geologic reports, professional papers and maps • Synthesize information from a variety of disciplines to solve geologic problems

UNITS

UN	Name of the Unit	CSs
01	Introduction	**CR 01 CSs 3hrs**
02	Occurrence and distribution of Groundwater	**Cr 02 CSs 3hrs**
03	Groundwater quality	**Cr 03 CSs 3hrs**
04	Watershed Development and management	**Cr 04 CSs 3hrs**

DETAILED SYLLABUS

UN	Detailed Syllabus of the Unit	CP
01	**Introduction:** Hydrosphere– Evaporation, condensation, precipitation, interception, runoff cycle (surface, subsurface and groundwater), infiltration. Factors that affect occurrence of groundwater – Climate, topography, geology and hydro geologic properties of rocks. Hydro geological classification of rocks Constraints of water resources.	**CR 01**

02	**Occurrence and distribution of Groundwater**: Vertical distribution of groundwater. Hydrologic properties of Rocks – Porosity, Hydraulic conductivity Derivation and validation of Darcy's Law. Aquifers – Characteristics of unconfined and confined aquifers Behavior of alluvium, sedimentary, crystalline and volcanic rocks as aquifers Flow net analysis Types of well.	**CR 02**
03	**Groundwater quality** Quality of groundwater – chemical standards for drinking and irrigational water, Seawater intrusion – Ghyben Herzberg relation – remedial measures Exploration techniques Integrated approach to groundwater prospecting: Role of toposheets and remote sensing in groundwater exploration Hydro geo morphological mapping Surface and subsurface Geophysical methods, Tracer techniques Exploratory Bore well programme **Pumping tests** Pumping tests – principles – types of pumping tests, procedures, determination of aquifer properties and well characteristics by simple graphical methods. Significance of transmissivity, storability and specific capacity of wells.	**CR 03**
04	**Watershed Development and management** Introduction to Watershed development: Artificial recharge techniques, surface water harvesting techniques. Conjunctive use of surface and groundwater. Groundwater provinces of India. Groundwater in Maharashtra state. Groundwater legislation.	**CR 04**

Learning Resource Details

LR Code	Title Author	Edition Year	ISBN Publisher
Reference Books			
RES133-R01	A Textbook of Engineering and Geology – Parbin Singh, S. K. Kataria and sons	-	New Delhi
RES133-R02	Groundwater Water Assessment Development and Management – K. R. Karana	-	Tata McGraw Hill Publishing Company Ltd., New Delhi