RK University (Pre-registration coursework for PhD program)

Program – PhD (Environmental Science)

Concerned Dean – Dr. T. R. Desai (email – trdesai@rku.ac.in)

Sr. No.	Subject	Contents	Method of evaluation	Credits
1.	Research Methodology	As per syllabus mentioned below	Written examination (3 hrs)	4
2.	Subject of specialization :* 1. Wetland Science 2. Solid And Hazardous Waste Management	Research topic specific	Written examination (3 hrs)	4
3.	Review of literature	Review of literature for the PhD research topic	Presentation + Detailed report in hard copy	3
Total				11

(*Shall be decided by the Dean of Faculty, individually, for each PhD scholar)

Notes –

1. The admission process of PhD program will comprise of 2 stages viz. (a) admission to PhD program (b) final registration in PhD program.
2. A successful PhD candidate (RAT examination) will be admitted to PhD program after paying admission fees (Rs. 60000/-) and upon allocation of a PhD guide by RK University.
3. An admitted PhD candidate will have to submit synopsis and presentation of his/her actual research project (in consultation with the PhD guide approved and allocated by RK university) before Doctoral Research Committee (DRC) within 6 months from date of admission (date will be declared by university).
4. An admitted PhD candidate will be registered after earning minimum of 11 credits as per above mentioned course-work structure.
5. The candidate will acquire credit of a subject on passing the examination that will be conducted at the end of 6 months (date will be declared by university).
6. On acquiring required credits, an admitted candidate will be issued a certificate of registration (along with project title) by RK University.

Course Title	Research methodology

Detailed syllabus

Research:

Meaning, purpose, Types, (Educational, Clinical, Experimental, historical descriptive, Basic applied and Patent oriented Research) and objectives of research, phases of research.

Research Design:

Review of Research Literature: Purpose and use of literature review, locating relevant information, use of library & electronic databases, preparation & presentation of literature review, research article reviews, theoretical models and frame work. Identification of gaps in research, formulation of research problem, definition of research objectives.

Documentation:

a. "How" of documentation

b. Techniques of documentation c. Importance of documentation

d. Use of computer packages in documentation

Research Publication:

Thesis, Research paper, Review Article & Technical Reports: Organization of thesis and reports, formatting issues, citation methods, references, effective oral presentation of research. Quality indices of research publication: impact factor, immediacy factor, H- index and other citation indices

Presentation (especially for oral presentation):

Importance and types of different skills, contained, format of model, introduction, Poster, Gestures, eye contact, facial, expressions, stage fright, volume of pitch, speed, pause & language, Visual aids & seating, Questionnaire etc.

Cost analysis of the project:

cost incurred on raw materials, Procedure, instrumentations and clinical trials.

Sources for procurement of research grants:

International agencies, government and private bodies.

Industrial-institution interaction:

Industrial projects, their feasibility reports, interaction with industries.

Research Ethics and Morals:

Issues related to plagiarism, collaborative models and ethics, acknowledgements. Intellectual Property Rights: copy rights, copy left: patents, Industrial designs, Trademarks.

Reference Books:

1. Research Methodology, Methods & Techniques, C. R. Kothari, Vishwa Prakashan
2. Research Methods- A Process of Inquiry, Graziano, A.M., Raulin, M.L, Pearson Publications.
3. How to Write a Thesis:, Murray, R. Tata McGraw Hill
4. Writing For Academic Journals, Murray, R., McGraw Hill International.
5. Writing for Publication, Henson, K.T., Allyn &Bacon.
6. Research Methodology by Bhattacharyya Excel Books 2nd Edition.
7. What is this thing called Science, Chalmers, A.F.,Queensland University Press.
8. Methods &Techniques of Social Research, Bhandarkar & Wilkinson, Himalaya publications.
9. Doing your Research project, Bell J., Open University Press, Berkshire.
10. A Handbook of Academic Writing, Murray, R. and Moore, S., Tata McGraw Hill International.
11. Business Research Methods Donald R. Cooper and Pamela S.Schindler Business Research Methods Tata McGraw Hill Publishing Company Ltd
12. Research Methodology: A Guide for Researchers in Management and Social Sciences Taylor, Sinha & Ghoshal

Course Title	Wetland Science

Detailed syllabus

1. Introduction to Wetlands

1.1 Wetlands-Human History, Use and Science.
1.2 Definition of Wetland.
1.3 Wetland classification. (as per Ramsar Convention and as per USFWS)
1.4 Ecological and socio-economic functions of wetlands. (ecosystem services)
1.5 Wetlands of World and India including threats to wetlands.
1.6 Ramsar Convention on Wetlands of International Importance.
1.7 India's initiatives for Wetland Conservation. (Laws, Acts, Policies etc.)

2. Wetland Hydrology

2.1 Hydrology-The Engine Behind Wetland Formation and Maintenance.
2.2 Definition of Wetland Hydrology.
2.3 Importance of Hydrology in Wetlands.
2.4 Effects of Hydrology on Wetlands.
2.5 Wetland Hydro-period.
2.6 Wetland Water Budget.
2.7 Techniques for Wetland Hydrological Studies.

3. Wetland Soils

3.1 Types and Definition.
3.2 Physico-chemical properties of Wetland soils.
3.3 Master Soil Horizons.
3.4 Soil processes.
3.5 Techniques to determine major wetland soils. (including Munsell Colour System)
3.6 Hydric Soils.

4. Wetland Plants-Hydrophytes

4.1 Definitions and Importance of Hydrophytes.
4.2 Types of Hydrophytes including Carnivorous Wetland Plants.
4.3 Morphological and Anatomical Adaptations in Hydrophytes.
4.4 Interaction between Hydrophytes and Wetlands Fauna.
4.5 Hydrophytes as Weeds, Their Effects on Wetland Ecosystem and Their Control.

5. Wetland water quality and its pollution

5.1 Physical water quality.
5.2 Chemical water quality.
5.3 Microbial water quality.

6. Wetlands as wildlife habitat

6.1 Waterfowl and other water-birds.
6.2 Bio-diversity in wetland wildlife.

7. Wetland Assessment Techniques

7.1 EMAP-Wetlands.
7.2 Indices for habitat suitability & biotic integrity.
7.2 Hydro-geo-morphic Approach (HGM).

8. Wetland Restoration and Management

8.1 Where Wetland Restoration Is Possible.
8.2 How to Restore a Wetland.
8.3 Managing the Surrounding Landscape.

Reference Books:

1. Wetlands. by William J. Mitsch and James G. Gosselink (2000), Wiley, 938 pages
2. Wetland Techniques(Vol. 1-3). by James T. Anderson and Craig Davis (Editors; 2013), Springer, 1061 pages.

Course Title	Solid And Hazardous Waste Management

Detailed syllabus

Introduction

Solid waste sources - nature and characteristics - Quantities and Qualities - generation rates – Potential of disease - nuisance and other Problems.

Collection and Storage

Solid waste management – Functional elements of solid waste-on-site storage, collection and separation. – Containers and its location – collection systems- vehicle routing- route balance- transfer station - Processing- recovery and reuse.

Disposal

Disposal methods – sanitary land filling, planning, site selection, design.
Monitoring Closure and post closure monitoring – Other methods like incineration, pyrolysis, composting, biological digestion,

Hazardous Waste Management

Introduction to hazardous waste – Definition, characterization and composition – TCLP test – The magnitude of problem – Risk assessment – Storage and transportation of hazardous waste –Labeling of hazardous waste – Physical, Chemical and Biological treatment of hazardous waste – Bioremediation of hazardous waste – Treatment of nuclear waste and Radio-active waste.

Legislation

Biomedical waste and BMW-98 Rules - MSW-2000 Rules – Legislation for E-waste and radioactive waste.

Reference Books:

1. David Rimbers, "Municipal Solid Waste Management: Pollution Technologies Review", Noyes Data Corporation, London. (1990)
2. Charles A. Wentz, "Hazardous Waste Management", McGraw Hill International Edition, New York. (1995)
3. Tchobanoglous G, “Solid Wastes: Engineering principles and Management issues”, McGraw Hill Book Company, Delhi. (1977)
4. Michael D. Lagrega, Phillip L. Buckingham, Jeffrey C. Evans, “Hazardous Waste Management” McGraw Hill, New York. (1994)
5. Gaynor W. Dawson, Basil W. Mercer, “Hazardous Waste Management” Wiley Interscience, New York. (1986)