



**M.Tech
In
Water Resource
Engineering**

**M.Sc in River Science &
Management**

PROSPECTUS

2025-26

**ARYABHATTA KNOWLEDGE UNIVERSITY
PATNA, BIHAR
akubihar.ac.in**

School of River Studies

Mission of School:

- ❖ To impart quality teaching and promote research in the field of river basin management.
- ❖ To become a leading national institution contributing to river basin study and management.
- ❖ To maintain rivers as a resources for bring prosperity through innovative, scientific and technical interventions.
- ❖ To work with governments, society and all other stakeholders to maintain the natural integrity of rivers for sustained benefits out of it.
- ❖ To generate and disseminate knowledge to technocrats policy makers, executives and other stakeholders for the best use of rivers and to minimize loss of the precious resource.

Objectives of School

- ❖ To establish state of the art facility for teaching and research on river basin and management.
- ❖ To conduct academic courses at bachelor and post graduate levels.
- ❖ To conduct researches on various aspects of river ecology, engineering and basin management.
- ❖ To contribute and enrich knowledge on river engineering and basin management through quality publications.
- ❖ To develop programs for faculty development for field staff and for teachers and researchers of other institutions with similar objectives.

Score, Motivation and Rationale:

- ❖ Rivers, particularly large river systems, constitute one of the most fundamental life support systems that have sustained civilisations' and are projected to be a critical determinant for the future sustenance of human civilisations. In a world that is expected to witness a near doubling of the human population by the middle of the century, and a world that is likely to be impacted by an unprecedented rate of global change, one of the main sustainability agendas will be the construction of dynamic strategies for the management of natural freshwater systems. For more than 5000 years, civilizations have flourished in the South Asian Region, leading up to a population hotspot that hosts almost a fifth of the globe's human population. In turn, this has led to significant human intervention and impacts on the freshwater systems of the region. Therefore, the understanding of water problems and water security in this region has to be embedded in holistic approaches that stress the inter-relationships of earth, water, and humans. As river systems constitute a lifeline for the future of human populations, it is important to understand the large river systems, with the aim of securing their futures and thereby our own futures. In India amongst other issues, surface runoff and stream flow and discharge patterns of both the Himalayan and the peninsular rivers need detailed rigorous scientific studies. Rigorous analysis of the discharge data of the past few decades of the river systems of our country are required to build reliable time series that can be used for an improved forecasting of the future discharge trends of these systems. Water pollution, ecological loss, and degradation of the health of a river system in all its forms, confers a universal burden on all river users, uses, and system processes. As such, there is a clear imperative to provide strategic sustainable river management options for rivers experiencing poor health.

The human relationship to any given river system is a key factor for ensuring healthier river futures and the importance of place in designing rehabilitation initiatives cannot therefore be underestimated. In the past, humans have made interventions at different scales in river systems in order to use them. These interventions are largely through river engineering which is a discipline that stresses the utilitarian aspects of river systems rather than their evolutionary and their multidisciplinary aspects. It is now increasingly being realised that river engineering should be practiced on a platform of *River Science*. River Science is an integrative multi-disciplinary subject that includes the study of interactions amongst hydrological geological, chemical, and ecological processes; and their influence on the form and dynamics of river ecosystems (Figure 1). Also, river science ‘includes the study of relationship between watersheds, riparian zones, floodplains, groundwater, headwaters and downstream rivers’ (USGS 2010).

The Aryabhatta Knowledge University at Patna has set up Centre for River Studies to address these issues and to prepare human resources to handle the problems related to rivers with a clear emphasis on community participation and extensive application of Information Technology.

Academic Programs and Eligibility Criteria:

Master of Science (M.Sc.) in River Science and Management (2 years)

The applicant must have Bachelor's degree in Engineering (Civil/environmental/water resource), A Bachelor's degree in sciences and Allied Subjects, with not less than 60% marks for General Category and 55% for reserved categories in the absolute system or equivalent CGPA.

The applicant must have a Bachelor's degree in Engineering (Civil/Environment/Water Resources), A Bachelor's degree in sciences, social sciences (economics, sociology, political science, geography) and Allied subjects, with not less than 60% marks for General Category and 55% for all reserved categories in the absolute system or equivalent CGPA.

The University may relax the above eligibility criteria for working professionals in water sector with a minimum relevant experience of 2 years.

M.Tech Water Resource Engineering

The applicant must have Bachelor's degree in Engineering (Civil/Environmental/Water resource), with not less than 60% marks for General Category and 55% for reserved categories in the absolute system or equivalent C

Course Structure

M.Sc. in River Science and Management (2 years)

Semester I (20 credits) 1. Introduction to River Science (3-1-0-4) 2. Surface and Ground Water hydrology (3-0-3-4) 3. River ecosystem processes (3-1-0-4) 4. Remote Sensing and GIS applications in river studies (3-0-3-4) 5. Data analysis (3-0-4-5)	Semester II (23 credits) 1. River engineering (3-0-3-4) 2. Essentials of River Management (3-1-0-4) 3. River geomorphology and sediment transport (3-0-3-4) 4. Ecosystem services and economic valuation (3-1-0-4) 5. Water policy, law and governance (3-1-0-4) 6. Field training* (credit)
Summer term: Thesis (5 credits) Minimum of 8 weeks	
Semester III (21 credits) 1. Climate change and its impacts on river systems (3-1-0-4) 2. Elective 1 3. Elective 2 4. Elective 3 5. Seminar course (0 credits) 6. Thesis (3 credits)	Semester IV: Thesis (18 credits)

*To be conducted during winter vacation between Sem. I and II

List of Electives

1. Environmental chemistry of river systems (3-1-0-4)
2. WQ assessment and monitoring (3-0-3-4)
3. River modeling (3-1-0-4)

4. Watershed management and sustainable agriculture (3-1-0-4)
5. River hazards (3-1-0-4)
6. EIA and ecological economics (3-1-0-4)
7. River Ecology (3-1-0-4)
8. Water security and IWRM (3-1-0-4)
9. Human dimension of river management (3-1-0-4)
10. Wireless sensor network (3-1-0-4)

Tentative –

Course Structure and Syllabus

For Two Year M. Tech Programme

In

Water Resources Engineering

w. e. f 2025-26

1st YEAR 1st SEMESTER

S. No.	Course code	Name of the course	Periods per week				Credit
			L	T	P	T	
1	CENPGPC01	Advanced Hydraulic Structure	3	0	0	3	3
2	CENPGPC02	Remote Sensing & GIS	3	0	0		3
3	CENPGPE01	Elective I	3	0	0	3	3
4	CENPGPE02	Elective II	3	0	0	3	3
5	CENPGPC51	LAB-I	0	0	4	4	2
6	UCEPGAU01	Audit Course I	4	0	0	0	0
7		Audit Course II(to be opted from pool appended in appendix A)	2	0	0	0	0
TOTAL CREDIT							14

1st YEAR 2nd SEMESTER

Sl no	Paper code	Name of the paper	Periods per week				Credit
			L	T	P	T	
1	CENPGPC03	Water Resources Planning and Management	3	0	0	3	3
2	CENPGPC04	River Engineering	3	0	0	3	3
3	CENPGPE03	Elective III	3	0	0		3
4	CENPGPE04	Elective IV	3	0	0		3
5		Open Elective(to be opted from pool prepared by all engineering departments)	3	0	0	3	3
6	CENPGPC52	LAB-II	0	0	4	4	2
7	CENPGPR01	Mini Project	0	0	4	4	2
TOTAL CREDIT							19

2nd YEAR 3rd SEMESTER

Sl no	Paper code	Name of the paper	Periods per week				Credit
			L	T	P	T	
1	CENPGPE05	Elective-V	3	0	0	3	3
2	CENPGPR02	Research Methodology & IPR	2	0	0	2	2
3	CENPGPR03	Dissertation-I	0	0	20		10
TOTAL CREDIT							15

2nd YEAR 4TH SEMESTER

Sl no	Paper code	Name of the paper	Periods per week				Credit
			L	T	P	T	
1	CENPGPR04	Dissertation-II	0	0	32	32	16
TOTAL CREDIT							16

Summary of credits:

Semester I	Semester II	Semester III	Semester IV	Total
14	19	15	16	64

List of Electives:

Elective-I

1. Advanced Computing in Water Resource Engineering
2. Stochastic hydrology
3. Watershed Development and Management.
4. Soft-computing techniques in hydrology
5. Hydrological Analysis and Design

Elective-II

1. Hydropower System Planning
2. Flood forecasting
3. Climate Change and Water Resources

Elective-III

1. Application of Soft Computing in Water Resource Engineering
2. Irrigation and drainage engineering
3. Groundwater Development and Management.
4. Groundwater Hydrology
5. Water Resources System Reliability

Electives IV

1. Economics of Water Resource Planning
2. Rural Water Supply and Environmental Sanitation
3. Channel and fluvial hydraulics
4. Water and Land Laws

Electives V

1. Numerical Analysis
2. Theory and Application of GIS
3. Cost Management of Engineering Project

Appendix A

Pool of AUDIT courses II

SL	COURSE Code	COURSENAME
1	UCEPGMC01	Pedagogy Studies
2	UCEPGMC02	English for Research Paper Writing
3	UCEPGMC03	Disaster Management
4	UCEPGMC04	Sanskrit for Technical Knowledge
5	UCEPGMC05	Value Education
6	UCEPGMC06	Constitution of India
7	UCEPGMC07	Stress Management by Yoga
8	UCEPGMC08	Personality Development through Life Enlightenment Skills.

Pool of Open Elective Courses (OEC) for PG CBCS Curriculum for Engineering Branches

As per the options submitted by five engineering department, the pool of OEC is hereby constituted and tabulated in the following table. **It is expected that respective department will choose any course for their students as OEC other than the courses offered by them.**

Sl no	Code	Course	Offering department
1	PGOE01	Image Processing	CSE
2	PGOE02	Data Analytics	
3	PGOE03	Internet of Things	
4	PGOE04	Operations Research	

5	CENPGOE01	Waste to Energy	CEN
6	CENPGOE02	Remote Sensing & GIS	
7	EENPGOE01	Optimization in Engineering	EEN
8	EENPGOE02	Essentials of Renewable Energy System	
9	EENPGOE03	Industrial Automation & Control	
10	ECEPGOE01	Laser Systems and Applications	ECE
11	ECEPGOE02	Cyber Physical Systems	
12	ECEPGOE03	Signal and Image Processing	
13	MENPGOE01	Materials Engineering	MEN
14	MENPGOE02	Finite Elements Analysis	
15	MENPGOE03	Non-Conventional Energy Sources	









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