

MDC-2 Water Management (Advanced Concepts in Water Management)

Course Outcome: This course aims to provide students with a deeper understanding of water resource management, hydrology, water quality, and water systems management in the context of changing climatic conditions. The semester will focus on the role of technology and innovation, the institutional framework for water governance, and conflict resolution.

Module 1: Water Resources and Climate Change

- Hydrological Cycle and Water Balance
- Climate Change Impacts on Water: Effects on water availability and extremes (floods, droughts)
- Integrated Water Resource Management (IWRM): Concept and case studies
- Urban Water Management: Reuse, stormwater, and sustainable city planning
- Water Resilience and Adaptation: Strategies for coping with climate impacts

Module 2: Water Quality and Health

- Water Quality Standards: WHO guidelines and national standards
- Pollution Control: Managing pollution from agriculture, industry
- Water Treatment Technologies: Desalination, wastewater treatment
- Waterborne Diseases: Public health impacts and waterborne disease prevention

Module 3: Water Governance and Institutions

- Decentralized Water Governance: Local and regional roles, public participation
- Transboundary Water Management: International treaties and conflict resolution
- Gender and Water: Role of women in water governance
- Global Water Governance: Case studies from international rivers and treaties

Suggested Textbooks

1. "Water Resource Systems Planning and Management" by Loucks, Daniel P. and van Beek, Eelco
2. "Water Resources and Climate Change: Managing the Risks" by B. D. Sharma
3. "Water Quality: An Introduction" by Claude E. Boyd
4. "Governance of Water: Institutional Alternatives and Political Economy" by Vishwa Ballabh

MDC-3 Water Management (Water Policy, Security, and Emerging Challenges)

Course Outcome: This semester will cover specialized topics in water policy, global governance frameworks, water security, and sustainable solutions for emerging water-related challenges. The emphasis will be on innovations, research trends, and practical approaches to solving water issues at local, national, and international levels.

Module 1: Water Security and Global Challenges

- Water Security: Key components and risks
- Virtual Water and Trade: Impact of global trade on water-stressed regions
- Water-Energy-Food Nexus: Interlinkages and sustainability challenges
- Water-related Disasters: Managing risks from floods and droughts
- Technological Innovations: Remote sensing, data analytics, and AI in water management

Module 2: Water Policy and Governance

- Global Water Governance: UN frameworks, international organizations
- Water Policy in Developing Countries: Challenges and solutions
- Corporate Water Stewardship: Role of the private sector in water management
- Public-Private Partnerships: Models for water services and infrastructure

Module 3. Water Rights and Ethics

- Right to Water: International law and challenges
- Water Ethics and Justice: Equitable access, social justice in water management
- Indigenous Water Knowledge: Integrating traditional practices in modern water management

Suggested Textbooks

1. "Water Security: Principles, Perspectives and Practices" by David Devlaeminck
2. "The Water-Energy Nexus in the American West" by Douglas S. Kenney
3. "Water Law, Poverty, and Development: Water Sector Reforms in India" by Philippe Cullet
4. "Transboundary Water Management: Principles and Practice" by Anton Earle