# Government Degree College (Autonomous), Baramulla

**(4th SEMESTER)** **Major/Minor**

**Subject: Water Management**

Course Title: Water Pollution Course code: BWM22C401

Credit: (4+2) Theory: 04; Practical: 02 Contact Hours: 64 (T) + 64 L)

**Course Objectives**:

- This course aims to provide students with a comprehensive understanding of the various aspects of water pollution and to enhance student's critical thinking and problem-solving abilities in addressing water pollution challenges.
- Through theoretical knowledge and practical applications, the course intends to offer a better picture to the students with regard to nature and magnitude of water pollution problem, potential sources, impacts and management strategies thereof.

**Course Outcomes**:

- Students will be equipped with the knowledge and skills necessary to contribute to the protection and management of water resources, promoting a healthier environment for current and future generations.
- Students will be in a position to have better analysis and assessment of cost associated with water pollution and how and in what ways the impact can be minimised.
- It is also expected to have an understanding on role in implementing water related laws, policies, governance, ethical and societal interface and advocacy for sustainable water management practices.

**Unit I: Surface water pollution 16 hrs**

1.1. Water Pollution: Emerging environmental and public health concern
1.2. Types and sources of water pollution
1.3. Nutrient Enrichmentof lakes and wetlands
1.4. Water pollution scenario of J&K rivers and streams
1.5. Impacts of water pollution

**Unit II: Groundwater Pollution 16 hrs**

2.1. Sources and types of ground water pollution
2.2. Contaminant transport in groundwater systems
2.3. Nitrate and pesticide pollution
2.4.Emerging contaminants in Groundwater: Microplastics and Pharmaceuticals
2.5. Impacts of Groundwater pollution on Public health

**Unit III: Marine Pollution 16 hrs**

3.1. Marine pollution: Global Scenario
3.2. Marine litter: Types and sources
3.3. Oil pollution
3.4. Ocean Acidification
3.5. Impacts of Marine pollution

**Unit IV: Thermal and Radioactive pollution 16 hrs**

4.1. Thermal and Radioactive pollution: Global Scenario
4.2. Sources of thermal pollution
4.3. Sources and types of radioactive pollutants

4.4. Impacts of thermal pollution
4.5. Impacts of radioactive pollution

**Laboratory course** **32 hrs**

1. Estimation of Nitrate nitrogen in different water samples
2. Estimation of Total iron in different water samples
3. Estimation of Chloride in different water samples
4. Estimation of Phosphorus in different water samples
5. Primary productivity in aquatic ecosystems (Dark and Light bottle method)
6. Estimation of Chlorophyll in different aquatic plants
7. Case study on Oil spill (Exxon Valdez and Gulf war)
8. Case study on Nuclear Accident (Chernobyl and Fekushima)

**Suggested Readings**


1. Barzilay, J. L., W. G. Weinberg, and J. W. Eley. 1999. The water we drink: Water quality and its effects on health. Rutgers University Press, New Brunswick, NJ.
2. Bulloch, D. K. 1989. The wasted ocean. Lyons &Burford Publishers, American Littoral Society, Highlands, NJ.
3. Carson, R. 1962. Silent spring. Houghton Mifflin Co., Boston.
4. Carson, R. T., and R. C. Mitchell. 1983. The Value of Clean Water. The Public's Willingness to Pay for Boatable, Fishable, and Swimmable Quality Water. Water Resources Research, Vol. 29, No. 7, pp. 2445 -2454.
5. CE. 1995. Economic indicators: Chemical engineering plant cost index. Chem. Eng. (McGraw-Hill Companies) 102(7):192.
6. Chadwick, E. 1842. Report on the sanitary condition of the labouring population of Great Britain. Edinburgh University Press, Edinburgh, Scotland.
7. Chapra, S. C. 1997. Surface water quality modeling. McGraw-Hill, New York.
8. Clark, J. W., W. Viessman, and M. J. Hammer. 1977. Water supply and pollution control, 3rd ed. John Wiley & Sons, New York.
9. Cleary, E. J. 1978. Perspective on river-quality diagnosis. J. WPCF 50(5):825-831.
10. Viessman, W. and M. J. Hammer. 1985. Water supply and pollution control, 4th ed. Harper & Row, New York.