

Hydrology and Water Resources Engineering

From the NJIT Department of Chemicals and Materials Engineering, the Graduate Certificate in Polymers and Plastics prepares students to apply mathematical and scientific principles to the design, development and operational evaluation of synthesized macromolecular compounds and their application to specific engineering uses. This includes the development of industrial materials with tailored properties, the design of lightweight structural components, the use of liquid or solid polymers, and the analysis and control of From the NJIT Department of Civil and Environmental Engineering, the Graduate Certificate in Hydrology and Water Resources Engineering prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of systems for collecting, storing, moving, conserving and controlling surface- and groundwater, including water quality control, water cycle management, management of human and industrial water requirements, water delivery, availability, and flood control.

Who would be suited to take this program?

This program is designed Civil or Environmental Engineers in mind. Geologists and Hydrologists and public health officials must work together utilizing the techniques learned here to help build and maintain inhabitable land/towns/cities, thus both occupations would be suited for this program.

What will I learn?

- **Physical Processes of Environmental Systems** - Physical processes in various media (open water, porous media) under various hydraulic regimes (laminar and turbulent). Transport by diffusion, convection, and dispersion is considered along with absorption.
- **Introduction to Solid and Hazardous Waste Problems** - Solid waste disposal; industrial and urban sources of solid waste and conventional methods of waste disposal.
- **Environmental Microbiology** - The microbiology of natural and human impacted environment, fundamental microbiology in water treatment engineering, microbial detection methodologies, waterborne disease outbreaks, microbial risk assessment, biotechnologies for renewable energy, and other emerging topics that help enhance your problem-solving skills and increase your knowledge base.
- **Water Chemistry** - The ability to analyze and solve a wide range of chemical equilibrium problems in water chemistry.
- **Stormwater Management** - Regulatory framework, an overview of structural and non-structural BMPs, groundwater recharge analysis, estimate of runoff, and design of detention basin and drainage systems.
- **Applied Hydrogeology** - Ground water and contaminant movement through the subsurface environment; aquifer geology; hydrogeologic applications including well design, pumping tests, and computer modeling of subsurface flow, and methods to monitor and remediate contaminated groundwater.
- **Open Channel Flow** - The principles developed in fluid mechanics are applied to flow in open channels. Steady and unsteady flow, channel controls, and transitions are considered. Application is made to natural rivers and estuaries.
- **Hydrology** - The statistical nature of precipitation and runoff data is considered with emphasis on floods and droughts. The flow of groundwater is analyzed for various aquifers and conditions. Flood routing, watershed yield, and drainage problems are considered.
- **Mathematical Fluid Dynamics I** - Introduction to the basic ideas of fluid dynamics, with an emphasis on rigorous treatment of fundamentals and the mathematical developments and issues. The course focuses on the background and motivation for recent mathematical and numerical work on the Euler and Navier-Stokes equations, and presents a mathematically intensive investigation of various model equations of fluid dynamics (e.g., the Korteweg-de-Vries equations).

Why study Hydrology and Water Resources Engineering at NJIT?

The field of hydrology is a crucial area of scientific study and employment for people interested in protecting the earth's water resources, in combating water pollution and in providing engineering hydrology. Hydrologists work in conjunction with the work of civil engineers in developing water resources infrastructure. Hydrology is the scientific study of the effects, properties and distribution of water on the earth's surface in soil, underlying rock structures and in the earth's atmosphere. The NJIT Graduate Certificate in Hydrology and Water Resources enables students to transition into this highly important field.

Into what industries might holders of this program find employment?

- Water Resources Engineering
- Hydrology
- Agriculture
- Civil Engineering

Prerequisites

Applicants should have a bachelor's degree from an accredited institution with some undergraduate background in a related field (chemical engineering, manufacturing engineering, materials science, materials engineering, etc.).

Related Degree Programs

This graduate certificate may transition into either the NJIT MS in Civil Engineering (<https://catalog.njit.edu/graduate/newark-college-engineering/civil-environmental/civil-ms/>) or the NJIT MS in Environmental Engineering (<https://catalog.njit.edu/graduate/newark-college-engineering/civil-environmental/environmental-ms/>).

What are the Required Courses?

Code	Title	Credits
Core Courses		
Select four (4) of the following:		
ENE 630 (http://catalog.njit.edu/search/?P=ENE%20630)	Physical Processes of Env Syst.	12
ENE 660 (http://catalog.njit.edu/search/?P=ENE%20660)	Introduction to Solid and Hazardous Waste Problems	
ENE 661 (http://catalog.njit.edu/search/?P=ENE%20661)	Environmental Microbiology	
ENE 663 (http://catalog.njit.edu/search/?P=ENE%20663)	Water Chemistry	
ENE 672 (http://catalog.njit.edu/search/?P=ENE%20672)	Stormwater Management	
CE 618 (http://catalog.njit.edu/search/?P=CE%20618)	Applied Hydrogeology	
CE 620 (http://catalog.njit.edu/search/?P=CE%20620)	Open Channel Flow	
CE 621 (http://catalog.njit.edu/search/?P=CE%20621)	Hydrology	
MATH 715 (http://catalog.njit.edu/search/?P=MATH%20715)	Mathematical Fluid Dynamics I	