

CIVE 571 Pipeline Engineering and Hydraulics

Spring Semester: MWF 1:00 pm, Engineering Room B4

America's infrastructure includes millions of miles of buried pipelines to convey water, wastewater, oil and gas, and other industrial fluids. The engineering and management challenges posed by this extensive infrastructure provide job opportunities across several industries. The course prepares students for these jobs by presenting the fundamentals of hydraulics, water quality, planning, engineering and management in an integrated picture of life-cycle management. Source material is drawn from research into the principles of closed conduit hydraulics, network models, water quality in closed systems, internal and external corrosion of buried pipelines, and management systems. The major focus is water supply with additional topics from the fields of oil and gas and other pipeline sectors. Students in hydraulics, environmental, civil infrastructure, energy, geotechnical, and structures fields may benefit from the course and be qualified to work in consulting firms, utilities, regulatory agencies, and supplier firms for pipe systems and equipment.

Topics

- Types of pipe and their functions
- Pipe system engineering (structural, construction, jointing)
- Flow and hydraulic principles of closed conduit hydraulics
- Network models for water flow and quality
- Hydraulic machinery and controls
- Hydroelectric energy systems
- Flow perturbations: water hammer, air pockets, intrusions, cross connections, I&I
- Chemistry and biology of fluid flows: emphasis on potable water
- Corrosion of pipelines: internal and external corrosion
- Asset management systems
- Monitoring and optimization of distribution system operations
- Assessment of pipe condition and performance
- Maintenance, renewal and repair, in-situ and trenchless technologies
- Failure modes and diagnosis
- Emergency management
- Aging, deterioration, and tuberculation
- Economics and planning of pipe systems
- Pipe industry organization
- Case studies and policy issues

Instructor: Neil S. Grigg, Department of Civil and Environmental Engineering.
Textbook material will be drawn from instructor notes and recent research papers and web-based material from pipeline industries and research organizations.