

Irrigation Engineering, MS, PhD

Department: Civil and Environmental Engineering Department

College: College of Engineering

Overview

About This Degree

The irrigation engineering program at USU has long been recognized as the best program of its kind in the nation, and possibly the world. Many of the prominent irrigation engineers in the United States and around the world are graduates of the USU program, and the program's faculty continues a tradition of leadership in international development projects in several dozen countries across the globe. Projects have been conducted in Latin America, the Caribbean region, Asia, Europe, the Middle East, and Africa. At USU, irrigation engineering students are exposed to classroom instruction, laboratory work in hydraulics, remote-sensing, and more. They also have the opportunity to conduct field work.

Students may study in the following areas:

- **Integrated Water Management:** In this area, students study a broad range of topics related to irrigation, including the use of treated wastewater in irrigation, conjunctive use of surface and ground water, water policy, training tools for improving water management, and many others.
- **Crop Water Requirements:** Students studying crop water requirements focus on the evapotranspiration (ET) of agricultural crops and other vegetation based on weather station instrumentation and or lysimeter measurements or flux systems, such as eddy covariance and Bowen ratio. It is important to estimate ET to understand water requirements and to lead to improvements in water management. This sometimes also includes measurements and/or estimations of crop production.
- **Irrigation System Operation and Maintenance:** This area focuses on the operation and maintenance of irrigation systems, which sometimes includes organizational development and institutional strengthening of water users' associations. Topics include specific procedures, operational plans, maintenance plans, and irrigation system administration.
- **Remote Sensing and Spatial Apps:** This is the application of ground-based, airborne, and satellite remote-sensing technologies with Geographical Information Systems for evapotranspiration estimation, irrigation system mapping, crop identification, crop yield estimation, water balance and efficiency estimations, and many others.
- **On-farm Irrigation Methods:** Students will learn to design and evaluate on-farm irrigation methods, including surface (furrows, borders, and basins) and pressurized (sprinkler and micro-irrigation) methods. This may also include other topics, such as pressure regulation, water application uniformity, water filtration, chemigation, and many others.

Career Options

Graduates in irrigation engineering work primarily in the following careers:

- Irrigation system design, construction, and installation
- Consulting and technical advising
- Teaching and training
- Research

Irrigation engineers also perform various projects, including:

- Design farm irrigation and drainage systems
- Design irrigation conveyance, distribution, and drainage systems
- Manage the operation and maintenance of irrigation systems
- Develop manuals on operation, design, and evaluation
- Evaluate and analyze the performance of irrigation systems
- Build irrigation and drainage systems
- Design and build center pivots, linear moves, and other pressurized systems
- On-farm irrigation system sales
- Develop and apply flow measurement methods and devices
- Develop automation techniques, devices, and systems
- Develop and apply mathematical models
- Develop and apply remote sensing technologies

- Management transfer of irrigation projects to farmer organizations
- Train farmers, technicians, engineers, and others working with irrigation systems
- Teach irrigation engineering courses
- Perform research in irrigation engineering
- Agricultural extension
- Provide guidance to environmental preservation efforts and water sharing
- Manage fresh-water resources
- Help develop irrigation development policies
- Work on agricultural development projects

What it takes

Admissions Requirements

Students without civil and environmental engineering backgrounds may be required to complete select undergraduate courses prior to admission as a graduate student. This is determined by the committee on a case-to-case basis.

Application Requirements:

- Complete the [online application](#)
- Pay the \$55 application fee
- Score at or above the 40th percentile on the GRE
- Have a 3.0 or higher GPA on your last 60 semester or 90 quarter credits
- Provide transcripts of all college/university credits
- Provide three contacts for letters of recommendation

International students have [additional admissions requirements](#).

Admissions Deadlines

The department has the following application deadlines:

- Fall semester – June 15
- Spring semester – October 15
- Summer semester – March 15 (This date also serves as first review of applications for available financial assistance.)

Master's Degree Plan Options

Students can receive the MS by pursuing one of three options:

- In the **Plan A** option, students complete graduate-level coursework and must write a thesis.
- The **Plan B** option requires the production of a paper or creative work of art and is expected to reflect equivalent scholarship standards as a thesis.
- A third option, **Plan C**, does not involve a thesis or a defense meeting and is comprised of coursework only.

Financial Assistance

A variety of funding opportunities are available, including [fellowships](#), [scholarships](#), [assistantships](#), [tuition awards](#), and [travel support](#). Additionally, students may be eligible for subsidized [health insurance](#) through qualifying assistantships.

Program Requirements

[Click here](#) to see course requirements for the **Master of Science**.

[Click here](#) to see course requirements for the **Doctor of Philosophy**.

PhD Qualifying Exams:

PhD qualifying exams are written exams on subject areas related to the student's dissertation research topic, usually administered by the student's graduate committee members. Qualifying exams are usually taken after the student

has completed most or all of the coursework in their program of study. If the student has a sufficiently high GPA, the committee can recommend an oral exam at a committee meeting in lieu of a written exam, or the committee may require the exam in both oral and written formats. If the student is the main author of a significant research grant proposal, or has published at least one refereed journal article on his or her research topic while at USU, the qualifying exams may be waived by the committee.

Contact

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Get Involved

Professional Organizations, Honor Societies, and Clubs

American Society of Agricultural and Biological Engineers: This is a professional society of people interested in the engineering approach to food, agriculture, and biological concerns. ASABE seeks methods for the development of producing food and renewable resources.

American Society of Civil Engineers: ASCE is a professional organization representing members of the civil engineering profession worldwide. It is the oldest national engineering society in the United States. ASCE's vision is to have engineers positioned as global leaders who strive toward building a better quality of life. ASCE features many engineering journals, including the *Journal of Irrigation and Drainage Engineering*.

American Water Works Association: AWWA is the authoritative resource on safe water, with more than 60,000 members worldwide sharing knowledge on water resource development, water and wastewater treatment technology, water storage and distribution, and utility management and operations.

United States Committee on Irrigation and Drainage: The mission of USCID is to foster sustainable, socially acceptable, and environmentally responsible irrigation, drainage, and flood control systems and practices for providing food, clothing, and shelter to the people of the United States and the world. USCID has two national conferences each year in the United States, and the parent organization, the International Commission on Irrigation and Drainage, has an annual international conference each year in a different member country.

Labs, Centers, Research

International Irrigation Center: The IIC was established in a response to an increasing need for providing training and research to enhance the capabilities of professionals and scientists outside the United States for improving irrigated agriculture in their countries.

Utah Center for Water Resources Research: The UCWRR facilitates water research, outreach, design, and testing elements within a university environment that supports student education and citizen training.

Utah Water Research Laboratory: The UWRL works on nearly 250 water-related projects a year and has projects in all of Utah's 29 counties and more than 40 countries. The lab is one of the go-to places that addresses the technical and societal aspects of water-related issues, including quality, quantity, and distribution of water.

Water Initiative: Utah State University supports a broad community of students and faculty engaged in water education, research, and outreach. The USU Water Initiative provides an overarching umbrella for the activities of this community aimed at fostering interdisciplinary collaboration and collegial sharing of ideas related to water across the departments and colleges of USU.