

Hydrosystems Engineering

School of Sustainable Engineering
and the Built Environment



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Hydrosystems Engineering

Hydrosystems Engineering focuses on technical areas of hydrology, hydraulics, water resources engineering and environmental fluid dynamics which are interdisciplinary fields that synthesize knowledge from a wide range of subjects. The curriculum at Arizona State University presents challenging opportunities to both undergraduate and graduate students in Hydrosystems Engineering. The graduate program provides a strong foundation in basic principles, but remains flexible enough to meet changing needs within these fields. A particular emphasis in the Hydrosystems Engineering program is placed on the urban water cycle, climate interactions and land use using the Phoenix metropolitan area as an outdoor laboratory. Our program is housed in a state-of-the-art research building and its laboratory facilities in Interdisciplinary Science and Technology Building 7, including faculty and graduate student offices, conference and theater space, indoor and outdoor labs with instrumentation, and public outreach activities. The curriculum is complemented by a range of cutting-edge research activities. The Hydrosystems Engineering group at ASU receives national and international funding for a wide range of educational and research efforts with exciting opportunities available for undergraduate and graduate students and researchers. Field, laboratory, data analysis and modeling studies are available to interested students. Students are also encouraged to obtain courses and training in topic areas such as geographical information systems, numerical modeling, remote sensing, machine learning, water policy and management, and advanced data analysis techniques. Students who major in Hydrosystems Engineering go on to have careers in the fields of water resources engineering, hydraulics, hydrology including ground water hydrology and surface water hydrology, environmental fluid hydraulics, environmental remediation, sustainability and various others in the private or public sectors.

Hydrosystems Engineering faculty

- Enrique Vivoni, professor (specialty area coordinator)
- Peter Fox, professor
- Zhihua Wang, associate professor
- Giuseppe Mascaro, assistant professor
- Margaret Garcia, assistant professor
- Rebecca Muenich, assistant professor
- Tianfang Xu, assistant professor
- Ruijie Zeng, assistant professor

List of courses

The Hydrosystems Engineering graduate program consists of a set of core courses. Students are required to develop a Plan of Study (POS) which includes a minimum of four (4) of the indicated twelve (12) classes below:

CEE 440/545 Hydrology*

CEE 441/598 Water Resources Engineering*

CEE 466/598 Urban Water System Design*

CEE 540 Groundwater Hydrology

CEE 541 Surface Water Hydrology

CEE 543 Water Resources Systems

CEE 546 Advanced Watershed Hydrology

CEE 566 Water Reuse and Reclamation

CEE 598 Environmental Fluid Mechanics

CEE 598 Socio-hydrological Systems Analysis

CEE 598 Environmental Data and Analysis

EVE 571 Water Quality Modeling and Management

*Graduate credit and core course requirement is only possible if a student has not taken the undergraduate version of course at ASU.

A seminar series is offered every semester as CEE 591 Hydrosystems Engineering Seminar designed to introduce students to research topics, provide networking and career opportunities, and help with community building within the Hydrosystems Engineering graduate program. Taking classes offered in different schools or departments is encouraged for a multidisciplinary education. Students shall have their advisor approve the Plan of Study and course registration each semester. Examples of other courses that could be taken in the Hydrosystems Engineering graduate degree program include:

CEE 549 Ecohydrology of Semiarid Landscapes

CEE 560 Soil and Groundwater Remediation

CEE 562 Environmental Biochemistry and Waste Treatment

CEE 564 Contaminant Fate and Transport

CEE 598 Atmospheric Convection and Thermodynamics

CEE 598 Hydrometeorology

CEE 598 Uncertainty Analysis for Infrastructure Design

CEE 598 Machine Learning Techniques in Civil Engineering

CEE 598 GIS Applications

GLG 598 Geomorphology

GLG 598 Advanced Remote Sensing

SES 598 Cloud-based Remote Sensing

GPH 563 Urban Climates

GPH 569 Digital Analysis of Remotely Sensed Data

GPH 511 Fluvial Processes

GPH 598 Geographic Information Analysis

GPH 598 Regional Climate Modeling

Teaching Plan

The following table presents a three-year view of the undergraduate and graduate teaching plan for the Hydrosystems Engineering faculty. It covers the core courses and some of the recommended course from our faculty. Courses labeled with CEE 598 have an abbreviation of the course title that can be checked against the official lists in the previous pages. This plan is subject to change depending on faculty availability.

Course	Spring 2022	Fall 2022	Spring 2023	Fall 2023	Spring 2024	Fall 2024
CEE 341	Mascaro	Xu	Mascaro	Xu	Mascaro	Xu
CEE 440/545	Garcia	Vivoni	Garcia	Vivoni	Garcia	Vivoni
CEE 441/598	Zeng		Zeng		Zeng	
CEE 466/598		Wang		Wang		Wang
CEE 540			Xu		Xu	
CEE 541		Zeng		Zeng		Zeng
CEE 543	Mahmoud				Zeng	
CEE 546		Mascaro		Mascaro		Mascaro
CEE 549					Vivoni	
CEE 566 WRR		Fox		Fox		Fox
EVE 571 WQMM		Muenich		Muenich		Muenich
CEE 598 EFM	Wang				Wang	
CEE 598 SSA		Garcia				Garcia
CEE 598 EDA		Mascaro		Mascaro		Mascaro
CEE 598 ACT			Wang			
CEE 598 HYD	Wang				Wang	

M.S. program (thesis option)

The advisor (must be a tenure or tenure-track faculty in the Civil, Environmental and Sustainable Engineering (CESE) program) in consultation with the student will establish a Graduate Supervisory Committee (GSC). The GSC shall be composed of a minimum of three faculty with at least two being tenure or tenure-track CESE faculty. The participation of individuals from institutions external to ASU is encouraged. The advisor shall serve as the chair of the GSC, and must be a tenure or tenure-track faculty in the Hydrosystems Engineering faculty.

The Plan of Study (POS) must be in accordance with the Graduate College and CESE program requirements. This typically includes 24 credits of coursework, including at least four of the core graduate Hydrosystems Engineering classes, plus 6 credits of CEE 599 Thesis. CEE 590 (Reading and Conference) may be taken for no more than 3 credits. A 1 credit seminar, CEE 591 Hydrosystems Engineering Seminar, can be repeated up to three times to count as coursework.

M.S. program (non-thesis option)

The Graduate Supervisory Committee (GSC) shall consist of all tenure or tenure-track Hydrosystems Engineering faculty. The advisor shall serve as the chair of the GSC.

The Plan of Study (POS) must be in accordance with the Graduate College and Civil, Environmental and Sustainable Engineering (CESE) Program requirements. This includes 30 semester hours of coursework, including at least four of the core graduate Hydrosystems Engineering classes. CEE 593 (Applied Project) may be taken for no more than 3 credits (a grade of 'B' or above must be achieved to graduate). A 1 credit seminar, CEE 591 Hydrosystems Engineering Seminar, can be repeated up to three times to count as coursework.

Two options exist for successful completion of the non-thesis M.S. program:

Option 1: A final comprehensive exam will be administered by the Hydrosystems Engineering faculty twice per year, usually taken during the last semester of the program. The students will be tested on questions from four selected core courses taken within the Hydrosystems Engineering program. Course selection by students to be provided to Specialty Area Coordinator at the end of the semester prior to the exam date.

Option 2: An applied project completed under the supervision of the advisor. The students will be evaluated based on the oral and written communication skills exhibited on the final presentation of the applied project.

Ph.D. program (dissertation option)

Please refer to the Civil, Environmental and Sustainable Engineering Ph.D. manual for details on the degree program for Hydrosystems Engineering.