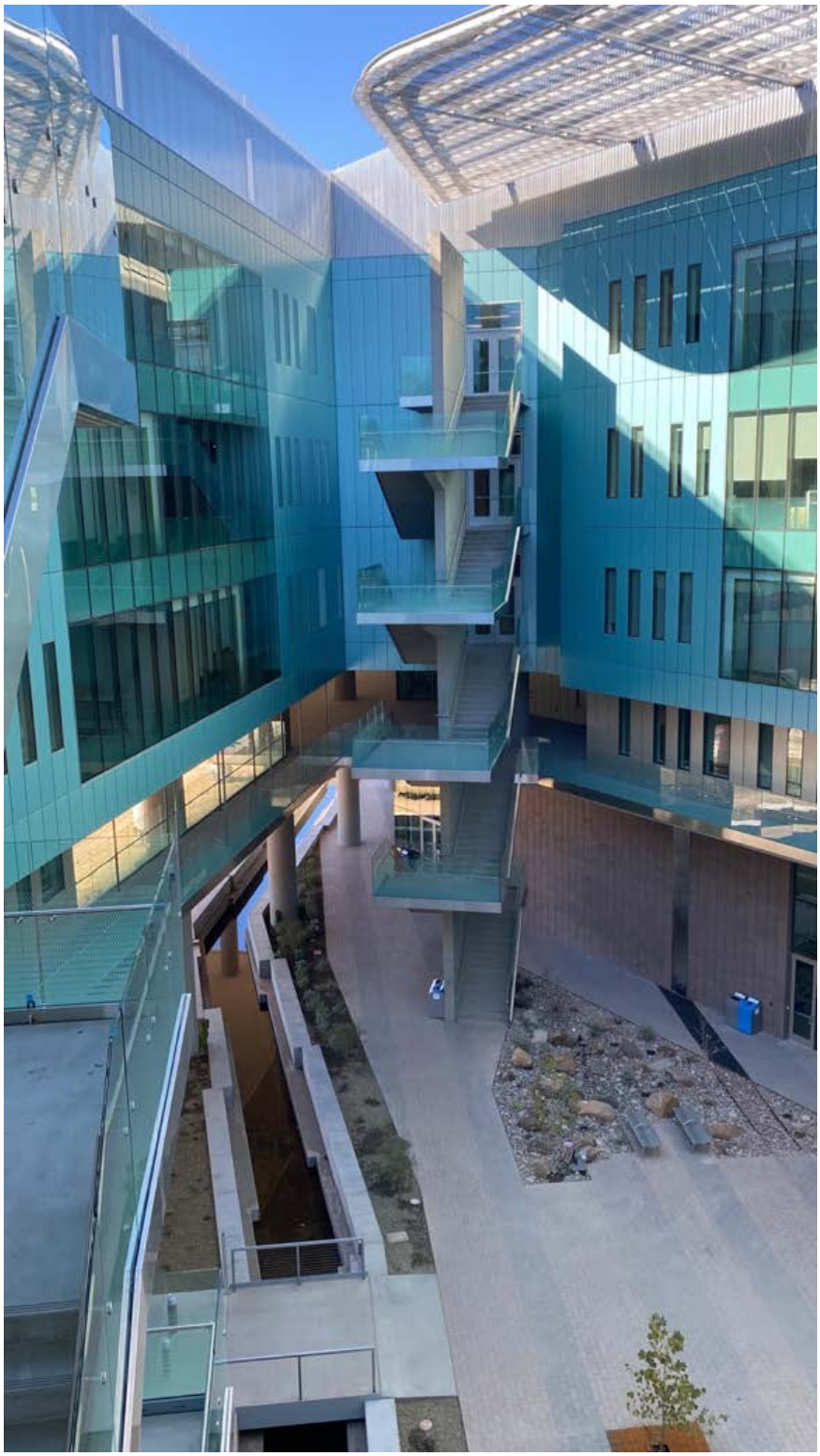
Hydrosystem Engineering

2026-2027 Graduate Student Manual



Ira A. Fulton Schools of Engineering
Arizona State University

School of Sustainable Engineering and the Built Environment

Hydrosystems Engineering, M.S. and Ph.D. Manual

Hydrosystems Engineering focuses on technical areas of hydrology, hydrometeorology, environmental fluid dynamics, and water resources engineering 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 the Walton Center for Planetary Health (WCPH), 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 efforts, including within the Center for Hydrologic Innovations. 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 take courses and training in topic areas such as geographical information systems, numerical modeling, remote sensing, artificial intelligence, 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, groundwater hydrology, surface water hydrology, environmental remediation, water resources sustainability, and various others in the private, public, and non-profit sectors.

Hydrosystems Engineering Faculty

• Enrique Vivoni, Fulton Professor (specialty area coordinator)

• Zhihua Wang, Professor

• Giuseppe Mascaro, Associate Professor

• Margaret Garcia, Associate Professor

• Tianfang Xu, Associate Professor

• Ruijie Zeng, Associate Professor

• Saurav Kumar, 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 441/544 Water Resources Engineering*

CEE 466/598 Urban Water System Design*

CEE 540 Groundwater Hydrology

CEE 541 Surface Water Hydrology

CEE 542 Socio-hydrological Systems Analysis

CEE 543 Water Resources Systems

CEE 546 Advanced Watershed Hydrology

CEE 548 Advanced Environmental Analysis

CEE 549 Ecohydrology of Semiarid Landscapes

CEE 598 Environmental Fluid Mechanics

CEE 598 Remote Sensing Methods for Water Resources and Civil Engineering

*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 and practitioner 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 graduate education. Students shall have their advisor approve the interactive Plan of Study (iPOS) and course registration each semester. Examples of other courses that could be taken in the Hydrosystems Engineering graduate degree program include:

CEE 501 Artificial Intelligence for Civil Engineers

CEE 560 Soil and Groundwater Remediation

CEE 562 Biological Wastewater Treatment

CEE 564 Contaminant Fate and Transport

CEE 566 Water Reuse and Reclamation

CEE 598 Groundwater Modeling

CEE 598 Atmospheric Convection and Thermodynamics

CEE 598 Hydrometeorology

CEE 598 Uncertainty Analysis for Infrastructure

CEE 598 Numerical Methods in Civil Engineering

CEE 598 Advanced Surface Water Quality Modeling

GLG 598 Geomorphology

SES 598 Cloud-based Remote Sensing

GPH 563 Urban Climates

GPH 511 Fluvial Processes

GPH 598 Geographic Information Analysis

SOS 598 Water Sustainability: Challenges and Solutions

CAS 598 Space-time Data Analysis

PAF 591 Topic: Water Management and Policy

Teaching Plan

The table presents a three-year view of the 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	Fall 2026	Spring 2027	Fall 2027	Spring 2028	Fall 2028	Spring 2029
CEE 341	Xu	Mascaro	Xu	Mascaro	Xu	Mascaro
CEE 384	Kumar		Kumar		Kumar	
CEE 440/545	Vivoni	Garcia	Vivoni	Garcia	Vivoni	Garcia
CEE 441/544		Zeng		Zeng		Zeng
CEE 466/598	Wang		Wang		Wang	
CEE 540				Xu		
CEE 541			Zeng			
CEE 542	Garcia				Garcia	
CEE 543					Zeng	
CEE 546		Vivoni				Vivoni
CEE 548	Mascaro		Mascaro		Mascaro	
CEE 549				Vivoni		
CEE 598 EFM		Wang				
CEE 598 UAI			Garcia			
CEE 598 ACT				Wang		
CEE 598 HYD						Wang
CEE 598 GWM		Xu				
CEE 598 RSM		Kumar				Kumar
CEE 598 WQM				Kumar		
CEE 591 Seminar	Vivoni Zeng	Mascaro Wang	Xu Garcia	Kumar Zeng	Vivoni Wang	Garcia Mascaro

M.S. Program (thesis option)

The advisor (must be a tenure or tenure-track faculty in the Civil, Environmental and Sustainable Engineering 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 faculty in the program. 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 interactive Plan of Study (iPOS) must be in accordance with the Graduate College and 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)

A tenure or tenure-track Hydrosystems Engineering faculty shall serve as the advisor, with the default assignment of the Specialty Area Coordinator.

The interactive Plan of Study (iPOS) must be in accordance with the Graduate College and Civil, Environmental and Sustainable Engineering 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. Students will be tested on questions from four selected core courses taken within the Hydrosystems Engineering program. Course selection by students shall be provided to the 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 communication skills exhibited on the final report or presentation of the applied project.

Ph.D. Program

Graduate courses and advising

The advisor (must be a tenure or tenure-track faculty in the Civil, Environmental and Sustainable Engineering 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 faculty in the program. 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 and approved by the Graduate College. In select circumstances, students can also choose to have two faculty members act as co-chairs of their committee. The Graduate College maintains a list of ASU faculty who can serve as a chair of the dissertation committee in each department. The chair will assist the student in the selection of the remainder of the GSC. At least half of the committee must be tenure/tenure-track faculty within the CESE program.

The interactive Plan of Study (iPOS) must be in accordance with the Graduate College and program requirements. A Ph.D. student is expected to complete a minimum of 84 semester hours of academic credit beyond the bachelor's degree.

This normally includes 30 semester hours for the master's degree, an additional 30 hours of Ph.D. course work (500 level or higher), including at least four core graduate Hydrosystems Engineering classes, 12 hours of CEE 792 Research, and 12 hours of CEE 799 Dissertation. CEE 790 (Reading and Conference) may be taken for no more than 6 credits. A 1 credit seminar, CEE 591 Hydrosystems Engineering Seminar, can be repeated up to three times to count as coursework.

Students should note that the course work during a Ph.D. is not taken from a prescribed list of courses (except for the requirement of four core course), but is individualized for each student. The course work should be formed in consultation with the student's primary advisor(s) and the GSC to meet the requirements of Graduate College and the degree program as well as help the student meet the expectations of their (individual) Ph.D. Comprehensive Exam.

Comprehensive exam and dissertation

A student must pass a comprehensive examination administered by the GSC prior to being formally admitted to candidacy for the Ph.D. degree. The exam timing will be determined by the advisor in consultation with the GSC. This oral and written examination is designed to probe the depth of the student's knowledge in the area of specialization. It will also include an oral defense of the dissertation proposal. The student must have an approved iPOS prior to taking the comprehensive examination. The student will receive a PASS or FAIL grade on the comprehensive examination. Should the student fail the examination, the GSC will decide if and when a retake of the examination is allowed. The second examination must be taken within a period of three to 12 months after the first examination. Only one retake examination is permitted. If the student fails to pass the comprehensive exam in the retake, the department may recommend to the Graduate College the withdrawal of the student from the Ph.D. program.

A student is expected to become an active participant in a research program the first semester of study after being admitted to the Ph.D. program. Research leading to a dissertation is performed under the direction of the advisor and GSC. The candidate must register for a total of at least 12 hours of research (CEE 792) and 12 hours of dissertation (CEE 799). Dissertation research will normally be undertaken on campus. Off campus research will be considered only by special petition. Such research will be considered only if the research cannot be undertaken on campus and if the problem appears to be of sufficient merit that it should be pursued even though proper facilities do not exist on campus.

An annual meeting of the GSC is recommended to present progress on research and coursework. The GSC will meet before and after the comprehensive exam in preparation for the dissertation defense. Upon completion, the student must pass an oral examination in defense of the dissertation. Defenses must be scheduled with the Graduate College at least 10 business days in advance following the defense dates for each semester. Dissertation defenses are open to all members of the university community and the public and conducted on campus.

Policies on Artificial Intelligence

Our program adheres to the ASU policies on artificial intelligence, as described at: https://ai.asu.edu/policy-and-resources