OPERATIONAL HYDROLOGY CERTIFICATE

The goal of the Operational Hydrology certificate is to create an interdisciplinary education program that produces graduates capable of applying new prediction tools (e.g., Artificial Intelligence and Machine Learning (AIML)) to advance the science and practice of hydrologic forecasting (e.g., forecasting of floods, drought, water quality, stream temperature) across space and time scales and improve the societal response to the forecast (e.g., emergency response, long-term planning.) The certificate program prepares students for success in applied hydrology research and practice. The objectives of the certificate program are to: (1) provide graduates with knowledge and capabilities to apply new approaches and techniques such as artificial intelligence and machine learning in operational hydrology applications; (2) prepare graduates with the professional competencies to be successful in careers in operational hydrology research and practice; and, (3) inform students about career pathways and help them build professional networks in the field of operational hydrology.

Admissions

Students will be required to submit an application that includes unofficial transcripts, one letter of recommendation, a statement of purpose, and a resume. These application requirements apply to both degree-earning and non-degree-earning students. To be eligible for admission, prospective students need to have an overall cumulative graduate GPA of 3.0 or better. Applications will be evaluated based on three criteria: academic and research performance (based on the transcripts, resume), research potential (based on the letter of recommendation), and fit with operational hydrology (based on statement of purpose, resume).

Curricular Requirements

The courses for the Operational Hydrology certificate program are listed in the tables below. Total coursework is 15 credits, 9 credits of required courses and 6 credits of required courses that students may choose from a list of electives.

Required Courses (9 credits, student completes all courses):

Code and Title		Hours
CE 507	Operational Hydrology I	1
CE 508	Operational Hydrology II	1
CE 509	Operational Hydrology III	1
GY 552	Environ Decision Making	3
CE 571	HF Praxis Lab	3

Required Course - Theme 1: Artificial Intelligence/Data Science (3 credits, student selects 1 course)

Code and Title		Hours
CE 528	Environmental Data Analysis	3
CS 691	Special Topics	3
GY 582	Data Science Analytics Water	3
ME 591	Special Problems	3
PH 551	Machine Learning	3

Required Course - Theme 2: Hydrologic Modeling and Analysis (3 credits, student selects 1 course)

Code and Title		Hours
BSC 695	Spec Topics Biolog Sci	1 to 4
CE 570	Open Channel Flow	3
CE 574	Paleohydrology	3
CE 576	Process Hydrology	3
GY 512	Hydroclimatology	3
GY 570	Special Topics	1 to 6
GY 585	River Hydrology	3
GY 586	Watershed Science and Managmnt	3
GY 588	Digital Terrain and Watershed	4

Special curricular requirements for the program:

Evidence of prerequisites in STEM fields – mathematics, physics, computer science – serve as the prerequisites required for the courses in the certificate program.

To complete the certificate program, students must have completed a hydrology class at the undergraduate or graduate level (e.g., CE 575 Hydrology, CE 576 Process Hydrology, GEO 565 Comparative Struct Geology, GY 585 River Hydrology) prior to entering the program or as part their program. The majority of proposed elective courses would meet this requirement.

Students completing the Graduate Certificate in Operational Hydrology have six years to complete the requirements.