

## SCHISM modeling system with application to intertidal habitat change

This course will focus on learning SCHISM modeling system, an inter-disciplinary simulation package for flow and transport processes as commonly encountered in rivers, estuaries and oceans, and apply pertinent components of the system ('modules') to study the intertidal habitat change in Chesapeake Bay. Students will develop a deeper understanding of all aspects of the modeling system, including underlying assumptions in physics/biogeochemistry, numerical methods to solve the partial differential equations, and the High Performance Computing environment required to conduct model runs. For this course, the emphasis will be placed on the hydrodynamic, sediment transport, and wind wave modules. Students will then apply the knowledge to develop a tidal marsh model to simulate the habitat change in the Bay, and calibrate it against available historic spatial information. The class will also use the model module to assess the impact of relative sea level processes and land management in Virginia.

The class will read, discuss, and synthesize pertinent literature on SCHISM. The SCHISM model will be reviewed, with focus on relevant model options for simulating marsh migration. Students will develop their own documentation for the model, including the calibration document for application to the Chesapeake Bay.

The class will meet twice a week for approximately 1.5 hours, with an expectation for approximately 6 hours per week of work outside of class reviewing literature, preparing data, and analyzing simulations. The class will be offered for 3 credits and will be graded as pass/fail. Students will generate a literature review, model documentation, necessary input data files, and a report on model application in a few test areas.

Instructor: Joseph Zhang

Class time: Wed & Friday, 10:00-11:30am

Venue: Technology Room, Waterman's Hall

week 1	Intro
week 2	Paper reading: SELFE, SCHISM
week 3	Tutorial: (1) 2D barotropic case (Quarter Annulus); (2) 3D b-tropic (QA, w/o and with friction); (3) Ches Bay with wind, rivers
week 4	SCHISM physics & numerics (hydro part)
week 5	Tutorial of 3D baroclinic cases: (1) lock exchange; (2) Columbia River (homogeneous ocean)
week 6,7	Gridgen; tutorial (Columbia R for inundation test and baroclinic); tips on using SCHISM; LSC <sup>2</sup>
week 8	3D sediment transport module; Wind Wave Module; Marsh Migration Module (review MEM)
week 9	Using SCHISM-SED3D-WWM, hands-on exercise: Ches Bay
week 10	Data preparation for marsh model
week 11	Setting up the marsh model: grid generation

week 12      Setting up the marsh model: test runs and analysis of results  
week 13      Marsh model calibration; Scenario studies (SLR; land management)