DEPARTMENT OF RIVER-COASTAL SCIENCE AND ENGINEERING

Programs
Graduate
Certificate
• River Science and Engineering Certificate (Graduate) (https://catalog.tulane.edu/science-engineering/river-coastal-science-engineering/river-science-engineering-certificate-completion/)

Courses
River Coastal Science and Engineering (RCSE)

RCSE 1040 The Gulf Coast in 2100: Sustaining Healthy Ecosystems and Vibrant Community (3)
In the 21st century, Gulf Coast ecosystems, communities and economies are under unprecedented threat from the effects of a rapidly changing climate, compounded by pre-existing human and natural factors. This seminar-based course will use a diverse team of instructors and guest discussion leaders to outline the issues and challenges that are underway in the Gulf, and to explore solutions. A second goal will be to explore possible career and advocacy pathways for students to contribute to “Saving the Gulf Coast”.

RCSE 6040 Coastal Marine Geology (3)
Geomorphic features of estuarine, coastal, and continental shelf environments: erosional, depositional, and geochemical processes; field and laboratory methods; emphasis on dynamic coastal environments of the northern Gulf of Mexico.

RCSE 6660 Special Topics (1-3)
Special Topics. Courses may be repeated up to unlimited credit hours.

Maximum Hours: 99

RCSE 6710 Open Channel Flow (3)
This course covers the principles of open channel hydraulics, and their applications for analysis and design of river channels. Specifically, the course covers open channels classifications and properties, computation of uniform flow, steady gradually varied flow, flow over hydraulic structures (spillways, weirs, gates, culverts, syphons, and pumps), hydraulic jump, flow characteristics in meandering rivers and nonprismatic channels, and unsteady flow. Pre-requisite: Permission of instructor.

RCSE 6800 Intro to River Science & Eng (3)
Rivers drain the majority of non-ice-covered land surfaces on Earth and are the primary conduit for freshwater, minerals, carbon, and dissolved ions to the global ocean. In the 21st century, rivers large and small are being increasingly managed for flood control, as a source of water (agricultural, industrial, potable), recreation and navigation, all of which can have system-wide environmental consequences. Future basin and global-scale climate changes must also be considered in management decisions. This course is designed to be a graduate and advanced undergraduate, interdisciplinary examination of river science and engineering practices that can serve as a springboard to more advanced coursework on the disciplinary aspects covered. It will also be useful to practitioners who require an interdisciplinary overview of river systems to more effectively perform their professional duties.

RCSE 6810 River and Stream Restoration (3)
Rivers and streams are complex ecosystems which have interconnected geologic, geomorphologic, chemical and biological underpinnings. As the demands of human populations have increased over the past several centuries, rivers and streams have often been pushed beyond their ability to maintain the dynamic equilibrium inherent to the system. In recent decades, in an attempt to restore some of the values and functions to these systems, river and stream restoration has emerged as a multi-billion-dollar industry. This course will cover the definitions of river and stream restoration, discuss the planning process associated with solid restoration efforts, present restoration techniques, discuss environmental flows as restoration measures, present commonly applied design concepts and consider how uncertainty, monitoring, and adaptive management may be applied to river and stream restoration efforts. Prerequisite(s): RCSE 6800 or SCEN 6800.

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RCSE 6820  Hydraulic/ Hydrologic Modeling  (3)
The substantial advancement in computational power has allowed numerical models to be viable and efficient tools to solve complex problems and improve our understanding of the fundamentals in the water resources field. Despite these advancements, it is critical to fully understand the basics of numerical modeling techniques, and recognize the strengths and limitations of these techniques. This introductory modeling course provides a general overview of the basics of numerical modeling; model development and applications, and includes hands-on training on model applications to watersheds, streams, large rivers, and coastal settings.

Prerequisite(s): RCSE 6800.

RCSE 6830  River Mechanics & Management  (3)
This course will provide a thorough understanding of the practical application of river mechanics. This science is a critical, but often overlooked component, of any river management project. The River Mechanics and Management course introduces the student to a wide range of river topics related to the engineering and management of river systems. This includes an advanced examination of fluvial processes, channel stability concepts, sediment transport, and design considerations for commonly used engineering features. The course will also provide instruction on designing structural elements to aid in the management of river channels and floodplain. The course will emphasize the interdisciplinary nature of river science and engineering. Prerequisite(s): RCSE 6800.

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RCSE 6840  Methods in River Sampling  (3)
Tools and procedures developed for sampling and monitoring riverine systems over the last century are distinct from those developed for other aqueous environments. In addition to the need for tools tailored for systems of a wide range of size, energy, and setting, effective river monitoring also needs to capture highly episodic hydrographs that encompass large overbank areas during floods. River monitoring has profound implications in managing rivers for human use and for channel and riparian ecosystem health. Rivers are also highly sensitive to climate, and historical records of their behavior are a key indicator of changing climate on a basin and global scale. This course is designed to examine river sampling as conducted by agencies and academic researchers, including the use of remote sensing, and the collection of ecological, water chemistry, hydrological, sediment dynamics, and morphological evolution data sets. Historical data will be examined to define statistical data analytical procedures. Prerequisite(s): RCSE 6800.

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RCSE 6850  Rivers & Estuaries  (3)
Estuaries, where rivers meet the ocean, are among the most productive and dynamic systems on earth, and they are valued for recreation, habitat, and navigation. They are often located in areas with large populations, frequently resulting in intense competition for resources. This class will be taught to convey basic concepts that are important in estuary dynamics. It will include an introduction to estuarine ecology, descriptions of the generation of tides, tide wave propagation within the estuary, the role of salinity and density currents, estuarine sedimentation and an overview of navigation concerns. An emphasis will be placed on understanding the relationships between ecological and physical systems. The class will provide an understanding of ecosystem impacts as a result of physical changes in the estuary. Numerical models are the standard approach for investigating estuary behavior and will be used as a construct to understand estuaries, but prior knowledge of modeling is not required.

Prerequisite(s): RCSE 6800.

RCSE 6900  Independent Study  (1-3)
Independent study on a research topic of choice under the direction of a faculty member.

Maximum Hours: 99

RCSE 9980  Masters Research  (3)
Research toward completion of a master degree. Course may be repeated up to unlimited credit hours.

Maximum Hours: 99

RCSE 9990  Dissertation Research  (3)
Research toward completion of a doctoral degree. Course may be repeated up to unlimited credit hours.

Maximum Hours: 99