GEOG 209: Hydroclimatology

Course Information: This course provides students with a thorough background of the fundamental processes governing the climate and hydrological systems, and the links between them. The course first reviews fundamental atmospheric and hydrologic processes, and traces the flow of energy and water between the Earth's surface and the atmosphere. Then the physical processes controlling the water cycle are examined, including evapotranspiration, precipitation, runoff and water storage in the natural reservoirs (including soil and groundwater, rivers, lakes, and wetlands). Finally, students will learn about the roles of water and climate in the Earth's main biomes.

Specific learning outcomes are as follows:

1. Describe the balances of energy and water in the Earth's climate system.
2. Understand the processes controlling the cycle of water between the surface and the atmosphere
3. Describe how and where water is stored in its three phases, and the effect of changes of state
4. Appreciate the different roles of the water cycle in climate change
5. Apply this knowledge using actual datasets and real-world case studies.

Transition to Online: Lectures and labs will be made available online, and there will be no set meeting time for lecture or labs. Each week, students will be required to respond to a series of brief questions based on lecture material to ensure their participation in the course and understanding of lecture material, which will provide the instructor with valuable feedback about the ability of students to successfully complete the learning outcomes. Students will use online datasets and resources to engage with the course material, communicate their understanding of the course material, and apply their knowledge of the material. Lab assignments will leverage online resources such as Google Earth and Google Earth Engine Timelapse to both support and extend lecture material. Teaching Assistants will engage with students online to provide instruction, discussion, and feedback of laboratory assignments.

Assessment: Weekly participation/discussion based on lecture slides will be graded on effort and completeness, rather than correctness (approximately 10% of the total grade) – the instructor will provide examples of sufficient responses and will provide feedback to students. Three exploration activities, for which students will produce 1-2 page focused reports, will focus on 1) engagement of lecture material by identifying and posing additional questions based on a news article focused on a relevant hydroclimatology topic; 2) communication of knowledge by analysis of a recent research article on hydrolclimatology; and 3) application of knowledge by assessing changes to specific biomes in different climate change scenarios (15%). The class final exam will account for 25% of the total class grade. Laboratory assignments will account for the remaining 50% of the class grade.