# ATS 781A2 – Hydrometeorology
# Spring 2019

**Course description:**
Overview of the important processes and phenomena related to hydrometeorology from local through global scales. Students will be introduced to conceptual and theoretical foundations related to high-impact precipitation, atmosphere-land interactions related to hydrology, water resource management, and forecasting. These topics will be connected by discussing how multiscale hydrometeorological processes affect humans and the built environment. Homework assignments, expert guest lectures, a term project, and a field experience (CSU Mountain Campus) will provide a practical application of the course material.

Upon successful completion of this course, students will be able to:
1. Describe general hydrometeorological processes across the fields of atmospheric science and hydrology.
2. Assess the key physical mechanisms and processes related to high-impact precipitation, stream and groundwater flow, flooding, atmosphere-land interactions related to hydrology, water resource management, and forecasting.
3. Describe water resource and policy issues related to hydrometeorology.
4. Assess how physical processes in hydrometeorology may change in a warming climate.

The course consists of three classes per week. A short field research experience will be conducted at the CSU Mountain Campus (http://mountaincampus.colostate.edu/) during the semester with hands-on observations of the river at the site using hydrometeorological instruments. Course topics are listed at the end of this document. A course schedule is available on the class CANVAS website.

**Instructor:**
Professor Kristen Rasmussen
ATS 312
Email: kristenr@rams.colostate.edu
Office hours: Tuesday and Thursday from 2:30 – 3:30 pm; ATS 312

**Meeting Times:**
Monday, Wednesday, and Friday: 9:00 to 9:50 pm, 121 ATS West
Short field research experience at the CSU Mountain Campus: Dates TBD

**Course Evaluation:**
10% Reading research papers/participating in class discussions
60% Homework assignments/field experiment exercises
30% Term project

**Required Reading:**
Lecture notes: Available from the course Canvas website. Relevant materials will be provided where needed.

**Other Resources:**
- Sene, K., (2009). Hydrometeorology: Forecasting and Applications. ISBN-10:9048134021.

**Academic Integrity:**

All students are subject to the policies regarding academic integrity found in the 2017 – 2018 General Catalog, found at http://catalog.colostate.edu/general-catalog/policies/students-responsibilities/#academic-integrity, and the student conduct code (https://resolutioncenter.colostate.edu/conduct-code/). Other information on academic integrity can be found on the Learning@CSU website (http://learning.colostate.edu/integrity/index.cfm). Examples of academic dishonesty can be found in these sources. At a minimum, violations will result in a grading penalty in this course and a report to the Office of Conflict Resolution and Student Conduct Services.

**Special Needs:**

Please see the instructor during the first two weeks of the semester, if you have special learning needs that should be accommodated in this class, and refer to http://rds.colostate.edu/accommodation-process/ for more information.

**List of topics:**

| Course modules | Lecture topics | Number of classes |
|---|---|---|
| **Overview of Hydrometeorology** | • Hydrologic cycle<br>• Relationship between hydrology, meteorology, and climatology<br>• Movement of water in all three phases throughout the Earth system<br>• The general and historical study of hydrometeorology | 4 |
| **High-impact precipitation** | • Characteristics of precipitation around the world, including orographic precipitation<br>• Extreme precipitation processes<br>• Characteristics of storms producing floods<br>• Measurements of precipitation: In situ and remote sensing techniques | 7 |
| **Hydrology** | • Influence of different weather systems on stream and ground water flows, relationship to flooding conditions<br>• Geomorphological modeling and floodplain estimation<br>• Snow hydrology<br>• Learn how to measure stream flow and water levels<br>• Apply knowledge to stream flow measurements across the world | 7 |
| **Natural and anthropogenic influences on hydrometeorology** | • Geomorphological flows and erosion<br>• Deforestation and desertification<br>• Climate change impacts on hydrometeorology<br>• Evidence/mitigation considerations<br>• Snowpack, hydrometeorology, ecology, etc. | 5 |
| **Hydrometeorological issues related to humans and the built environment** | • Human dimensions of hydrometeorology<br>• Weather and hydrologic hazards<br>• Drought and fire weather<br>• Resilience of communities to hydrometeorological hazards<br>• Climate change impacts | 5 |