# Syllabus

## 1. Course Information

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|---|---|
| Title: | Introduction to Watershed Management |
| Course Number: | NRM 370 |
| Semester: | Fall 2021 |
| Credits: | 3 |
| Lecture: | Tuesday and Thursday 11:30 am – 12:30 pm (Zoom Link) |
| Lab: | 11:45 am – 2:45 pm (Murie 203), online or remote with approval |
| Prerequisites: | NRM F101 or instructor approval |

Instructor: Christina Buffington. M.S., M.Ed. (You may call me Christi)
Phone: 907-474-2794
E-mail: cbuffington@alaska.edu
E-mail Etiquette: **Subject line must have NRM 370**; Allow 48 hours for response
Office: Akasofu 203E (International Arctic Research Center)
Office Hours: Thursday 12:30-1:00 pm via zoom (or by appointment)

## 2. Academic Catalogue Description

The hydrologic cycle and the influence of land management techniques on water quantity, quality and timing. Water yield, soil erosion and non-point pollution, snowpack management, and land use alternatives.

## 3. Full Course Description

What happens on land affects the water and everything that depends on it; this central concept of watershed management frames every aspect of the course. Within the setting of the Chena River Watershed, which provides key habitat for terrestrial and aquatic species including migrating salmon, students will build employable skills in restoring habitat and monitoring water quality, soils, atmosphere and snow/ice monitoring using Global Learning and Observations to Benefit the Environment (GLOBE) protocols. Students will calculate inputs and outputs in the hydrologic cycle at the watershed scale, learn directly from watershed practitioners and explore various career opportunities.

## 4. Course Goals:

- To enhance students' awareness of the connection between watershed management, hydrological equations, water quality/quantity and community science monitoring, and their own major/career path.

- To increase student ability to contribute to watershed management and problem solving in the local community through the use of GLOBE investigations and collaboration with scientists and watershed practitioners.

## 5. Student Learning Outcomes:

By the end of the course, undergraduate students will have:

- An increased understanding of the concepts of hydrology, including the water budget, water flow and stream flow analyses, erosion and sedimentation, fluvial processes, water quality, and best management practices.
- An increased skill set for watershed planning, non-point source pollution prevention, scientific investigation, and mathematical literacy.
- An increased ability to implement monitoring protocols (including GLOBE or other protocols for monitoring atmosphere, hydrology, water quality, land cover, soils, frost, and active layer above permafrost).
- Designed and implemented an inquiry-based monitoring investigation in collaboration with a scientist or watershed manager to address an identified watershed-related issue.
- Presented a project and published an abstract and poster on the GLOBE website, with the opportunity to participate in the GLOBE International Virtual Science Symposium.

## 6. Course Materials

**Text:**

Brooks, K.N., Ffolliott, P.F., Magner, J.A. 2013. *Hydrology and the management of watersheds, 4th Ed*. Wiley-Blackwell Publishing. ISBN-13: 978-0-4709-6305-0

**Technical Plans/Guides:**

Fairbanks Green Infrastructure Group. 2019. Green infrastructure for Interior Alaska: Local benefits and implementation of best management practices. Available from http://www.fairbanksgig.com/benefits

Walter, J., Hughes, D., Moore, N., Inoue, J. 2005. Streambank revegetation and protection: A guide for Alaska. Revised 2005. Alaska Department of Fish and Game, Division of Sport Fish. Available from https://www.adfg.alaska.gov/static/home/library/pdfs/habitat/98_03.pdf

Yukon River Inter-Tribal Watershed Council. 2013. Yukon River Watershed Plan. Tribes and First Nations of the Yukon River and Yukon River Inter-Tribal Watershed Council. Available from https://www.yritwc.org/

**Journal Articles:**

Arp, C. D., Whitman, M. S., Kemnitz, R., Stuefer, S. L. 2020. Evidence of hydrological intensification and regime change from northern Alaskan watershed runoff. *Geophysical Research Letters*, 47, e2020GL089186.

Sarna-Wojcicki, D.; Sowerwine, J.; Hillman, L.; Hillman, L. and Tripp, B. 2019. Decentering watersheds and decolonising watershed governance: Towards an ecocultural politics of scale in the Klamath Basin. *Water Alternatives* 12(1): 241-266.

Toohey, R. C., N. M. Herman-Mercer, P. F. Schuster, E. A. Mutter, J. C. Koch. 2016. Multidecadal increases in the Yukon River Basin of chemical fluxes as indicators of changing flowpaths, groundwater, and permafrost, *Geophysical Research Letters*, 43, doi:10.1002/ 2016GL070817.

Technical and journal readings are on the Blackboard course management site
All course materials comply with copyright/fair use policies.

## 7. Instructional Methods

Through in-person field trips/labs, online guest speakers, weekly assignments, and culturally-responsive learning pedagogies, students will investigate and apply real data about hydrology, watershed management and climate change issues affecting local communities. The in-person labs will include data collection at campus field sites, a tour of Fairbanks Green Infrastructure Best Management Practices installations and a visit to Cripple Creek, the site of a channel bypass and channel restoration project. Students will be expected to dress for the weather.

## 8. Course Assignments, Tests and Grading

| | |
|---|---|
| Participation (15 weeks x 10 points each) | 150 points |
| Discussion Posts (8 x 25 points each) | 200 points |
| Lab Assignments (10* x 10 points each) | 100 points *Lowest of 11 is dropped |
| GLOBE Investigation (broken into parts) | 200 points |
| Exam 1 | 100 points |
| Exam 2 (this is an oral exam via zoom) | 100 points |
| Final Exam | 150 points |
| **Total Points** | **1000 points** |

**General Assignment Information**

- **Participation grade** includes a rubric to assess preparation for lectures, guest speakers, and labs, including prepared questions. After each guest speaker, students submit notes, which will be available to peers as an exam study sheet.

- **Discussion Posts or Replies are due Mondays by 11:59 pm**. Readings/Equations and are provided in Blackboard. Discussions posts span two weeks.
- **Lab Assignments are due Thursdays by 11:59 pm.** There are 11 Lab Assignments and the lowest grade will be dropped. Some labs involve activities from the Arctic and Earth STEM Integrating GLOBE and NASA (SIGNs) Curriculum (used with permission).
- A semester-long **GLOBE investigation** culminates in publishing an abstract and poster by **Monday, November 22 at 11:59 pm**. Presentations will take place during the last week of class. Discussion and lab assignments will prepare students for this culminating project.
- **Exam 1 and the Final Exam** may be in Google Forms. **Exam 2** is an oral exam (like a job interview).
- Submit all coursework and access tests in Blackboard with your UA online ID and password

**Evaluation and Grading Scale**

| **Assignment / Project / Exam Weights** | Percent |
|---|---|
| Participation (including zoom polls, surveys and guest speaker questions/notes) | 15% |
| Discussion Posts & Replies (on Readings and Equations) | 20% |
| Lab Assignments | 10% |
| GLOBE Investigation. Abstract, Poster and Presentation | 20% |
| Exam 1 | 10% |
| Exam 2 | 10% |
| Final | 15% |
| Total | 100% |

**Grading Scale**

89.5% - 100% = A
84.5% - 89.4% = B+
79.5% - 84.4% = B
74.5% - 79.4% = C+
69.5% - 74.4% = C
64.5% - 69.4% = D+
59.5% - 64.4% = D
0% - 59.4% = F

## 9. Course Schedule

| Day | Date | Topic<br><br>See Blackboard for Assigned Readings | Assignment | Due 11:59 pm |
|---|---|---|---|---|
| 1 | 8/24 Tue | Land Acknowledgement, Learning Framework in a Collaborative Space | 1st Discussion Post & Pre-Survey | Mon 8/30 |
| 2 | 8/26 Thu | Elder & Personal Stories of Changing Waters | | |
| Lab | 8/27 Fri | GLOBE Observer Clouds / Water Temperature / Dissolved Oxygen | Lab Assignment #1 | Thu 9/2 |
| 3 | 8/31 Tue | **Guest: Cynthia Nelson** Fairbanks Stormwater Sampling | Reply 1st Discussion Post | Tue 9/7 (extra day) |
| 4 | 9/2 Thu | Water Quality Stormwater Runoff | | |
| Lab | 9/3 Fri | GLOBE Hydrology Investigation **Field Trip to Ballaine Lake** | Lab Assignment #2 | Thu 9/9 |
| 9/3: Last day to change/drop a course for a full refund without a grade of "W" Last day to pay tuition and fees | | | | |
| 5 | 9/7 Tue | GLOBE Inquiry, Question Formulation Technique (QFT), Statistics | 2nd Discussion Post | Mon 9/13 |
| 6 | 9/9 Thu | Hydrographs, Flowpaths Riparian Function | | |
| Lab | 9/10 Fri | GLOBE Observer Land Cover Data Collection & Flooding Analysis | Lab Assignment #3 | Thu 9/16 |
| 7 | 9/14 Tue | **Guest: Dr. Bob Henszey** Chena River Last 100 years | Reply 2nd Discussion Post | Mon 9/20 |
| 8 | 9/16 Thu | Best Management Practices Green Infrastructure | | |
| Lab | 9/17 Fri | **Fairbanks Green Infrastructure Tour Field Trip with Andrew Ackerman** | Lab Assignment #4 | Thu 9/23 |
| 9 | 9/21 Tue | Sediment Transport Degradation & Aggradation | 3rd Discussion Post | Mon 9/27 |
| 10 | 9/23 Thu | Review for Exam 1 | | |
| No Lab | 9/24 Fri | **Exam 1** and **GLOBE Research Questions in Blackboard** | **Take Exam in 3 hour Lab time** | |
| 11 | 9/28 Tue | **Guest: Mitch Osborne** Cripple Creek Reconnection | Reply 3rd Discussion Post | Mon 10/4 |
| 12 | 9/30 Thu | Stream Flow, Surface Roughness Channel Form, Function, Stability | | |
| Lab | 10/1 Fri | **Cripple Creek Field Trip with Mitch Osborne and Will Samuel** | Lab Assignment #5 | Thu 10/7 |

| Day | Date | Topic<br><br>See Blackboard for Assigned Readings | Assignment | Due 11:59 pm |
|---|---|---|---|---|
| 13 | 10/5 Tue | Watershed Restoration Action Plan Maps<br>Best Management Practices (BMPs) | 4th Discussion Post | Mon 10/11 |
| 14 | 10/7 Thu | Soil Moisture, Infiltration<br>Groundwater | | |
| Lab | 10/8 Fri | GLOBE Soil Protocols / Darcy's Law Calculations | Lab Assignment #6 | Thu 10/14 |
| 15 | 10/12 Tue | Precipitation, Interception & Evapotranspiration (ET) | Reply 4th Discussion Post | Mon 10/18 |
| 16 | 10/14 Thu | Water Use in Urban Landscapes<br>Potential ET / Lake Evaporation | | |
| Lab | 10/15 Fri | GLOBE Atmosphere Protocols / Temperature, Humidity, Precipitation | Lab Assignment #7 | Thu 10/22 |
| 10/15: Last day for student and faculty initiated withdrawals, W on Academic Transcript | | | | |
| 17 | 10/19 Tue | How to Read Academic Journal Articles – Discussion Posts Overview | 5th Discussion Post | Mon 10/25 |
| 18 | 10/21 Thu | Wetter or Dryer?<br>Guided Reading of Arp et al. (2020) | | |
| Lab | 10/22 Fri | Arctic and Earth SIGNs Activity: Permafrost and Insulation Inquiry | **Schedule Exam 2 (oral)** | N/A |
| 19 | 10/26 Tue | **Guest: Dr. Chris Arp**<br>Arctic Hydrology | Reply 5th Discussion Post | Mon 11/1 |
| 20 | 10/28 Thu | Putting it All Together: Calculating a Water Budget | | |
| Lab | 10/29 Fri | Arctic and Earth SIGNs Activity: Climate Change and the Water Cycle | Lab Assignment #8 | Thu 11/4 |
| 21 | 11/2 Tue | Sovereignty: Decentralizing the watershed approach (Sarna-Wojcicki) | 6th Discussion Post | Mon 11/8 |
| 22 | 11/4 Thu | "Moly in the Mountains" Simulation, Cultural Survey, BMPs (Part 1) | | |
| Lab | 11/5 Fri | "Moly in the Mountains" Simulation, Cultural Survey, BMPs (Part 2) | Lab Assignment #9 | Thu 11/11 |
| 23 | 11/9 Tue | Snow Hydrology | Reply 6th Discussion Post | Mon 11/15 |
| 24 | 11/11 Thu | Soil Frost vs. Permafrost, Active Layer Monitoring | | |
| Lab | 11/12 Fri | GLOBE Frost Tube, Snowpack, pH, Snow-Water Equivalent Protocols | Lab Assignment #10 | Thu 11/18 |
| 25 | 11/16 Tue | **Guest: Dr. Ryan Toohey** Monitoring, Permafrost, Ground/Surface Water Links | 7th Discussion Post | Mon 11/22 |
| 26 | 11/18 Thu | Water, Ice and Clouds: Chemistry and Physics Refresher | | |

| Day | Date | Topic<br><br>See Blackboard for Assigned Readings | Assignment | Due 11:59 pm |
|---|---|---|---|---|
| Lab | 11/19 Fri | **Lab with Dr. Carl Schmitt**<br>Light Absorbing Particles on Snow | Lab Assignment #11 | Tue 11/30 |
| 27 | 11/23 Tue | **Guest: NASA Snow Ex Intern** (Tentative) | Reply 7th Discussion Post | Mon 11/29 |
| Thanksgiving – No Class or Lab | | | | |
| 28 | 11/30 Tue | GLOBE Presentations | 8th Discussion Post (Reflection) Post-Survey | Mon 12/6 |
| 29 | 12/2 Thu | GLOBE Presentations | | |
| Lab | 12/3 Fri | Review / URSA Proposal & GLOBE International Virtual Science Symposium | Review for Final + Opportunities | |
| Final Exam on Blackboard – may be taken on your schedule during Finals Week | | | | |

## 10. Technology Requirements

Lectures, surveys, assignments, rubrics, tests, and links to articles are located on Blackboard. To participate in learning activities and complete assignments, you will need:

- Computer access and reliable internet
- Microsoft Word, Excel and PowerPoint (available free of charge from University's Microsoft 365 Account) or Google Docs, Sheets and Slides.
- Vernier Graphical Analysis App or Software
- GLOBE Observer. https://observer.globe.gov/about/get-the-app
- Flipgrid (optional for some Lab assignments). https://info.flipgrid.com/

## 11. Course Policies and Procedures

### Conduct in Lecture and Lab

Title IX: Students at University of Alaska Fairbanks are protected against sexual harassment and discrimination and minors have additional protections. As required, if the instructor notices or is informed of certain types of misconduct, then the instructor is required to report it to the appropriate authorities.

Punctuality in class and lab is expected. Engaged participation and respect for instructors, guests and other participants is expected, including storing digital devices during lecture and lab unless being used as instructed for specific learning activities. It is expected that cameras will be on during zoom sessions, including guest presentations.

**Academic Integrity**

Plagiarism will not be tolerated and will result in the student earning a failing grade in the assignment and will result in additional disciplinary measures. Plagiarism includes using another person's work and improper citation of sources.

**Late Work**

- Discussion Posts/Replies are graded according to a set rubric. Late posts and/or replies are accepted, but earn fewer points.
- Late Lab Assignments are accepted for partial credit (up to 70%) if turned in less than one week after the due dates. Late Lab Assignments are accepted for up to half credit (up to 50%) if turned in prior to **Monday, November 29 at 11:59 pm, the final day and time to submit late work.**
- Late GLOBE abstract and poster will be accepted for partial credit (up to 70%) if submitted to Blackboard prior to **Monday, November 29 at 11:59 pm, the final day and time to submit late work.**

**Attendance Policy, Excused Absence and Make-up Work (for Participation Grade)**

Missing lab and class results in missing important information. You are responsible for learning any material covered in class and lab. Absences may be excused for legitimate reasons when the instructor is contacted in advance (e.g. sickness, time conflict with other required activities, etc.)

To arrange an excuse for an expected absence at the start of the semester, submit an email request by the end of the second week of the course. Explain the reason for the absence and the dates.

- Lecture: Notify instructor in advance of a planned absence in order to be allowed an opportunity to recover missed participation points from lecture. You will be expected to take view missed lecture recordings on Blackboard, take detailed notes, and submit them to instructor in the “make-up work” assignment tab in Blackboard.
- Lab: Making up lab participation points is difficult because lab spans three hours and is generally not recorded. To make up GLOBE labs, you will need to notify instructor in advance, get a GLOBE member account, complete the minimum number of relevant eTrainings including Introduction to GLOBE, borrow equipment from instructor, and conduct GLOBE sampling in the field.

**Incomplete (I), Withdrawal (W), and No Basis (NB) Grades**

According to the University of Alaska Fairbanks’ Incomplete Grade Policy, an Incomplete (the letter “I”) is a temporary grade that indicated the student completed with a C or better the majority of the coursework, but due to reasons outside the student’s control, the student has not been able to complete the course during the regular semester. A Withdrawal (the letter “W”) can be student or faculty initiated, resulting in a

W on the transcript. A No Basis ("NB") is rarely given; it is used when the instructor has no basis on which to assign a grade.

Syllabus Addendum (Revised 8/18/2021)

**COVID-19 statement**: Students should keep up-to-date on the university's policies, practices, and mandates related to COVID-19 by regularly checking this website: https://sites.google.com/alaska.edu/coronavirus/uaf?authuser=0
Further, students are expected to adhere to the university's policies, practices, and mandates and are subject to disciplinary actions if they do not comply.

**Student protections statement**: UAF embraces and grows a culture of respect, diversity, inclusion, and caring. Students at this university are protected against sexual harassment and discrimination (Title IX). Faculty members are designated as responsible employees which means they are required to report sexual misconduct. Graduate teaching assistants do not share the same reporting obligations. For more information on your rights as a student and the resources available to you to resolve problems, please go to the following site: https://catalog.uaf.edu/academics-regulations/students-rights-responsibilities/.

**Disability services statement:** I will work with the Office of Disability Services to provide reasonable accommodation to students with disabilities.

**Student Academic Support**:

- Speaking Center (907-474-5470, uaf-speakingcenter@alaska.edu, Gruening 507)
- Writing Center (907-474-5314, uaf-writing-center@alaska.edu, Gruening 8th floor)
- UAF Math Services, uafmathstatlab@gmail.com, Chapman Building (for math fee paying students only)
- Developmental Math Lab, Gruening 406
- The Debbie Moses Learning Center at CTC (907-455-2860, 604 Barnette St, Room 120, https://www.ctc.uaf.edu/student-services/student-success-center/)
- For more information and resources, please see the Academic Advising Resource List (https://www.uaf.edu/advising/lr/SKM_364e19011717281.pdf)

**Student Resources:**

- Disability Services (907-474-5655, uaf-disability-services@alaska.edu, Whitaker 208)
- Student Health & Counseling **[6 free counseling sessions]** (907-474-7043, https://www.uaf.edu/chc/appointments.php, Whitaker 203)
- Center for Student Rights and Responsibilities (907-474-7317, uaf-studentrights@alaska.edu, Eielson 110)
- Associated Students of the University of Alaska Fairbanks (ASUAF) or ASUAF Student Government (907-474-7355, asuaf.office@alaska.edu, Wood Center 119)

**Nondiscrimination statement**: The University of Alaska is an affirmative action/equal opportunity employer and educational institution. The University of Alaska does not discriminate on the basis of race, religion, color, national origin, citizenship, age, sex, physical or mental disability, status as a protected veteran, marital status, changes in marital status, pregnancy, childbirth or related medical conditions, parenthood, sexual orientation, gender identity, political affiliation or belief, genetic information, or other legally protected status. The University's commitment to nondiscrimination,

including against sex discrimination, applies to students, employees, and applicants for admission and employment. Contact information, applicable laws, and complaint procedures are included on UA's statement of nondiscrimination available at www.alaska.edu/nondiscrimination. For more information, contact:
UAF Department of Equity and Compliance
1692 Tok Lane, 3rd floor, Constitution Hall, Fairbanks, AK 99775
907-474-7300
uaf-deo@alaska.edu
Additional syllabi statement for courses including off-campus programs and research activities:
University Sponsored Off-Campus Programs and Research Activities
We want you to know that:

1. UA is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual: www.alaska.edu/nondiscrimination.
2. Incidents can be reported to your university's Equity and Compliance office (listed below) or online reporting portal. University of Alaska takes immediate, effective, and appropriate action to respond to reported acts of discrimination and harassment.
3. There are supportive measures available to individuals that may have experienced discrimination.
4. University of Alaska's Board of Regents' Policy & University Regulations (UA BoR P&R) 01.02.020 Nondiscrimination and 01.04 Sex and Gender-Based Discrimination Under Title IX, go to: http://alaska.edu/bor/policy-regulations/.
5. UA BoR P&R apply at all university owned or operated sites, university sanctioned events, clinical sites and during all academic or research related travel that are university sponsored.

For further information on your rights and resources click here.