NORTHERN ARIZONA UNIVERSITY

School of Informatics, Computing, and Cyber Systems

INF 599 **Team-based Interdisciplinary Research** Syllabus

Term	Class	Section	Units	Days & Times	Room	Mode
Fall 2023	INF690	005	3	T/Th 11:10-12:25 AM	SICCS, 223	In-person

In this course, you will learn team-science skills for engaging in collaborative research, and for being a productive member of high-performing teams. You will work in small teams (4-5 members) to develop an interdisciplinary research product (proposal, manuscript, or code package) with an emphasis on applying informatics tools to address a biological, ecological, or environmental-motivated problem. You will learn and employ team-science approaches to developing this proposal and to conducting preliminary research that aligns with the proposal. You will present as a team on the proposed project, approaches, and initial results.

Enrollment Requirements
At least one year completed in a graduate program and permission from the instructor.

Course Website
The course may use Canvas to post announcements and students will submit assignments via Canvas. We will be using a GitHub wiki as the primary source for course materials, assignment instructions, the course schedule, and syllabus:
https://anamtk.github.io/team_based_science/

Instructor(s)
Dr. Katharyn Duffy and Dr. Ana Miller-ter Kuile
Email: Katharyn.Duffy@nau.edu (Dr. Duffy) and ana.miller-ter-kuile@nau.edu (Dr. Miller-ter Kuile)
Email replies may take up to 2 business days.
Office Hours:

- Dr. Duffy: Wednesdays by appointment
- Dr. Miller-ter Kuile: Tuesdays 1:00 - 3:00 pm; SICCS cubicle 201E-7 or via Zoom (email in advance for Zoom)

Discussions immediately before and after class are also encouraged, but may not always be possible.

Academic Catalog Description
Students learn team-science skills for engaging in collaborative research, and for being a productive member of high-performing teams. Students work in small teams (3-4 members) to develop an interdisciplinary research proposal with an emphasis on applying informatics tools to address a biological, ecological, or environmental-motivated problem. Students learn and employ team-science approaches to developing this proposal and to conducting preliminary research that aligns with the proposal. Teams present on the proposed project, approaches, and initial results.

Class Meeting Mode(s)
When we have outside speakers / facilitators joining via Zoom, we will meet virtually, via Zoom. You can choose to come to our assigned classroom for virtual class meetings; but, you'll need to bring your laptop so you can participate in this mode.

For virtual class meetings, use the following Zoom link:
https://nau.zoom.us/j/81707795339?pwd=bCtqZnAzbjFNZk9qZy9yUFpOK1p2UT09

Rules of Conduct and Expectations for Zoom / Virtual Meetings
Everyone is expected to have access to a personal computer, either laptop or desktop. The laptop / computer must be equipped with a working microphone and video (you may need to purchase one; you can find relatively inexpensive options at, for example, Staples or Amazon.com). During Zoom meetings, either with external speakers or during virtual office hours, please turn-on your video. Mute yourself when you are not talking. You must also have access to "good" internet, so that you can use your video during Zoom meetings. You are welcome to come to our assigned classroom for virtual class meetings (internet connection should be decent in the classroom), but you will need to bring a headset as other students in the class may also be there.

Course Purpose
The purpose of this course is to prepare students for a future career that involves collaborative or team-based approaches to scientific research and problem solving. Students will gain expertise in team-science concepts and approaches, including: (1) team building, (2) team diversity and social sensitivity, (3) effective individual and team communication, (4) collaboration tools and strategies, (5) constructive/destructive group behaviors, (6) conflict resolution, (7) individual and team time/project management, (8) creating effective team policies, procedures, and expectations, including authorship and data sharing policies, (9) assessing team functioning, (10) collaborative manuscript and proposal writing, and (11) collaborative presentations. Student teams will employ these team-science skills to develop an interdisciplinary research proposal, to conduct preliminary research that aligns with the proposed project, and to develop and deliver an oral presentation of their proposed research and preliminary results. Towards developing a research proposal and conducting preliminary analyses, students will work together to develop the team's rules of conduct and a project plan or roadmap. The team will work together to review relevant literature, to initiate preliminary analyses, coding, or modeling, to identify individual and team-oriented tasks, and to set milestones. The course will culminate with submission of a fully developed research proposal and team presentations of their proposed research project, preliminary results, and potential future directions.

Course Student Learning Outcomes
Upon completion of this course, students (student teams) will have:
- Learned effective team-science skills and actively applied these skills to a collaborative project.
- Gained experience in individual and team project management.
- Acquired skills in developing and implementing team policies, procedures, and expectations.
- Assembled into teams to collaborate on a research proposal and preliminary analysis.
- Identified a research question/problem that all members of the team can participate in.
- Identified appropriate methods and approaches to tackle the proposed research project.
- Gained experience writing a concise and compelling research proposal as a team.
- Delivered a collaborative presentation on their research ideas and results.

Assignments / Assessments of Course Student Learning Outcomes
Student grades will be assessed via several mechanisms. Participation in in-class activities is essential as the class will involve hands-on and interactive activities, especially those focused on developing team-science skills. Students will be expected to read papers from the primary literature and discuss and report on their

findings. Students are also expected to be engaged in presentations or activities delivered by guest speakers and to fully participate in relevant activities and discussions. Student teams will produce a refined research proposal. Student teams will present their team research proposal twice, (1) once mid-semester (give an overview of the research problem, potential approaches to addressing it, and their team-based strategies to work on the project), and (2) once at the end of the semester. Anonymous peer-evaluations, one-on-one meetings with the instructor, and team meetings with the instructor will also be employed to evaluate contributions of individuals and overall team functioning.

Grading System

Final grades will be determined by the following allocation among assessment components:

1. Attendance 5%
2. Participation in class activities and discussions 15%
3. Individual and team mini-projects 25%
4. Collaborative presentation of preliminary proposal 15%
5. Final collaborative research project 25%
6. Collaborative presentation of final proposal and preliminary results 15%

   Total 100%

1. ***Attendance.*** All students are expected to attend each class meeting; if attendance is not possible, the instructors should be notified asap via email.
2. ***Participation.*** All students are expected to contribute to in-class discussions and hands-on activities.
3. ***Mini-projects.*** A variety of mini-projects will be assigned over the course of the semester, with each involving an activity related to a team-science skill. Many of these may occur as in-class activities; some may require time outside of class ("homework").
4. ***Presentation of preliminary project.*** Each team will develop a presentation (10-15 min, depending on class size) that provides an overview of their preliminary proposal ideas and plans, including the project roadmap. Team members will collaborate on the delivery of the oral presentation.
5. ***Final research project.*** Each team will collaboratively write and submit a detailed research pre-proposal (5-8 pages). The pre-proposal will provide relevant background information, identify the research objectives and questions/hypotheses, outline the proposed approach (including potential data sources and analysis/modeling approaches), and identify the significance of the proposed work. Each pre-proposal will also include sections for a "time-line and project management" and for "preliminary results." The preliminary results (including example figures or table) are based on exploratory analysis and modeling results produced by the team. Teams should be using effective tools for collaborating on the pre-proposal writing and exploratory analyses.
6. ***Presentation of final project.*** Each team will develop a presentation (10-15 min, depending on class size) that describes their final proposed research project, proposed approaches, and preliminary results, and any adjustments they made to improve collaboration and team-work to achieve project goals. The team will collaborate on the delivery of the oral presentation.

Readings and Materials

Reading materials will focus on team-science approaches, interdisciplinary research, and examples of successful collaboration efforts. Reading materials will often motivate the mini-project activities. The course

textbooks are listed below. We will assign other readings some weeks, which will be hosted on the GitHub wiki.

Bennett et al. (2010). Collaboration and Team Science: A Field Guide. *National Institutes of Health.* https://brdo.berkeley.edu/sites/default/files/teamscience_fieldguide_reduced.pdf

Brown, B. (2018). Dare to lead: Brave work. Tough conversations. Whole hearts. *Random house.* (provided at no cost to students)

Dare to Lead Read-Along Workbook: https://brenebrown.com/workbook-art-pics-glossary/

Class Outline and Tentative Schedule

The tentative schedule for Fall 2023 is given below. Please visit the course Wiki for a more detailed schedule that will be regularly updated as the course progresses (see: https://anamtk.github.io/team_based_science/schedule.html).

Week	Day	Title/topic
Block 1: Initial training in team-science skills		
1	Aug 29	Course overview, Course website, Introductions
	Aug 31	Importance and rise of collaborative, interdisciplinary research & science
2	Sept 5	Group formation; 1 slide elevator pitch
	Sept 7	Team building
3	Sept 12	Effective leadership skills
	Sept 14	Group Work: Dare to Lead
4	Sept 19	Team diversity & social sensitivity
	Sept 21	Effective individual & team communication
5	Sept 26	Constructive/destructive group behaviors
	Sept 28	Facilitation
6	Oct 3	Collaboration strategies; Collaborative research agreements
	Oct 5	Conflict resolution; Coauthorship
7	Oct 10	Group work: Collaborative Agreement
	Oct 12	Group work: Collaborative Agreement
8	Oct 17	Presentation of collaborative agreements
	Oct 19	Group collaborative presentations
9	Oct 24	Group work: Collaborative Presentation
	Oct 26	Presentation of collaborative efforts
10	Oct 31	Individual time management
	Nov 2	Team time & project management
11	Nov 7	Project workflows & concept maps
	Nov 9	Group work: Concept Maps
12	Nov 14	Collaborative code & data sharing Part 1
	Nov 16	Collaborative code & data sharing Part 2
13	Nov 21	Group work: Collaborative analytics
	Nov 23	University Holiday: No Class

14	Nov 28	Collaboration Field Guides
	Nov 30	Group work
15	Dec 5	Group work
	Dec 7	Group work
16	Dec 14	Final Exam: Group presentation of collaborative efforts

Course Policies

The following course-specific policies apply, in addition to all University Policies (Appendix A)

- Electronic device usage must support learning in the class. All cell phones, PDAs, music players and other entertainment devices must be turned off (or in silent mode) during lecture, and may not be used at any time. Laptops or workstations (if present) are allowed for note-taking and activities only during lectures; no non-class-related use is allowed.
- Email to the instructors must be short, clear, respectful, and professional, and must include an appropriate salutation, a subject line beginning with the course's title (i.e., INF 690) and a descriptive topic, an explanation of the purpose of the email, and a clear request for action or a clear question. If it does not contain these features, it may not be answered effectively or in a timely fashion.

Additional Course Policies as Per NAU Requirements

The following policies will apply to this course: Attendance is expected. However, missing an *occasional* class for a valid reason is acceptable as long as it does not compromise the team project or team functioning (missing more than 3 classes is strongly discouraged). In such situations, the instructor(s) must be informed, via email, of a student's upcoming absence in advance, and the reason for the absence. Potentially valid reasons may include, for example, critical field or lab work that cannot be conducted at another time, attending a professionally important conference or workshop, or health/medical related issues.

Appendix A

(as of August 17, 2023)

Syllabus Policy Statements

ACADEMIC INTEGRITY
NAU expects every student to firmly adhere to a strong ethical code of academic integrity in all their scholarly pursuits. The primary attributes of academic integrity are honesty, trustworthiness, fairness, and responsibility. As a student, you are expected to submit original work while giving proper credit to other people's ideas or contributions. Acting with academic integrity means completing your assignments independently while truthfully acknowledging all sources of information, or collaboration with others when appropriate. When you submit your work, you are implicitly declaring that the work is your own. Academic integrity is expected not only during formal coursework, but in all your relationships or interactions that are connected to the educational enterprise. All forms of academic deceit such as plagiarism, cheating, collusion, falsification or fabrication of results or records, permitting your work to be submitted by another, or inappropriately recycling your own work from one class to another, constitute academic misconduct that may result in serious disciplinary consequences. All students and faculty members are responsible for reporting suspected instances of academic misconduct. All students are encouraged to complete NAU's online academic integrity workshop available in the E-Learning Center and should review the full Academic Integrity policy available at https://policy.nau.edu/policy/policy.aspx?num=100601.

COPYRIGHT INFRINGEMENT
All lectures and course materials, including but not limited to exams, quizzes, study outlines, and similar materials are protected by copyright. These materials may not be shared, uploaded, distributed, reproduced, or publicly displayed without the express written permission of NAU. Sharing materials on websites such as Course Hero, Chegg, or related websites is considered copyright infringement subject to United States Copyright Law and a violation of NAU Student Code of Conduct. For additional information on ABOR policies relating to course materials, please refer to ABOR Policy 6-908 A(2)(5).

COURSE TIME COMMITMENT
Pursuant to Arizona Board of Regents guidance (ABOR Policy 2-224, Academic Credit), each unit of credit requires a minimum of 45 hours of work by students, including but not limited to, class time, preparation, homework, and studying. For example, for a 3-credit course a student should expect to work at least 8.5 hours each week in a 16-week session and a minimum of 33 hours per week for a 3-credit course in a 4-week session.

DISRUPTIVE BEHAVIOR
Membership in NAU's academic community entails a special obligation to maintain class environments that are conductive to learning, whether instruction is taking place in the classroom, a laboratory or clinical setting, during course-related fieldwork, or online. Students have the obligation to engage in the educational process in a manner that does not interfere with normal class activities or violate the rights of others. Instructors have the authority and responsibility to address disruptive behavior that interferes with student learning, which can include the involuntary withdrawal of a student from a course with a grade of "W". For additional information, see NAU's Disruptive Behavior in an Instructional Setting policy at https://nau.edu/university-policy-library/disruptive-behavior.

NONDISCRIMINATION AND ANTI-HARASSMENT

NAU prohibits discrimination and harassment based on sex, gender, gender identity, race, color, age, national origin, religion, sexual orientation, disability, veteran status and genetic information. Certain consensual amorous or sexual relationships between faculty and students are also prohibited as set forth in the Consensual Romantic and Sexual Relationships policy. The Equity and Access Office (EAO) responds to complaints regarding discrimination and harassment that fall under NAU's Nondiscrimination and Anti-Harassment policy. EAO also assists with religious accommodations. For additional information about nondiscrimination or anti-harassment or to file a complaint, contact EAO located in Old Main (building 10), Room 113, PO Box 4083, Flagstaff, AZ 86011, or by phone at 928-523-3312 (TTY: 928-523-1006), fax at 928-523-9977, email at equityandaccess@nau.edu, or visit the EAO website at https://nau.edu/equity-and-access.

TITLE IX

Title IX of the Education Amendments of 1972, as amended, protects individuals from discrimination based on sex in any educational program or activity operated by recipients of federal financial assistance. In accordance with Title IX, Northern Arizona University prohibits discrimination based on sex or gender in all its programs or activities. Sex discrimination includes sexual harassment, sexual assault, relationship violence, and stalking. NAU does not discriminate on the basis of sex in the education programs or activities that it operates, including in admission and employment. NAU is committed to providing an environment free from discrimination based on sex or gender and provides a number of supportive measures that assist students, faculty, and staff.

One may direct inquiries concerning the application of Title IX to either or both the Title IX Coordinator or the U.S. Department of Education, Assistant Secretary, Office of Civil Rights. You may contact the Title IX Coordinator in the Office for the Resolution of Sexual Misconduct by phone at 928-523-5434, by fax at 928-523-0640, or by email at titleix@nau.edu. In furtherance of its Title IX obligations, NAU promptly will investigate or equitably resolve all reports of sex or gender-based discrimination, harassment, or sexual misconduct and will eliminate any hostile environment as defined by law. The Office for the Resolution of Sexual Misconduct (ORSM): Title IX Institutional Compliance, Prevention & Response addresses matters that fall under the university's Sexual Misconduct policy. Additional important information and related resources, including how to request immediate help or confidential support following an act of sexual violence, is available at https://in.nau.edu/title-ix.

ACCESSIBILITY

Professional disability specialists are available at Disability Resources to facilitate a range of academic support services and accommodations for students with disabilities. If you have a documented disability, you can request assistance by contacting Disability Resources at 928-523-8773 (voice), ,928-523-8747 (fax), or dr@nau.edu (e-mail). Once eligibility has been determined, students register with Disability Resources every semester to activate their approved accommodations. Although a student may request an accommodation at any time, it is best to initiate the application process at least four weeks before a student wishes to receive an accommodation. Students may begin the accommodation process by submitting a self-identification form online at https://nau.edu/disability-resources/student-eligibility-process or by contacting Disability Resources. The Director of Disability Resources, Jamie Axelrod, serves as NAU's Americans with Disabilities Act Coordinator and Section 504 Compliance Officer. He can be reached at jamie.axelrod@nau.edu.

RESPONSIBLE CONDUCT OF RESEARCH

Students who engage in research at NAU must receive appropriate Responsible Conduct of Research (RCR) training. This instruction is designed to help ensure proper awareness and application of well-established professional norms and ethical principles related to the performance of all scientific research activities. More information regarding RCR training is available at https://nau.edu/research/compliance/research-integrity.

MISCONDUCT IN RESEARCH

As noted, NAU expects every student to firmly adhere to a strong code of academic integrity in all their scholarly pursuits. This includes avoiding fabrication, falsification, or plagiarism when conducting research or reporting research results. Engaging in research misconduct may result in serious disciplinary consequences. Students must also report any suspected or actual instances of research misconduct of which they become aware. Allegations of research misconduct should be reported to your instructor or the University's Research Integrity Officer, Dr. David Faguy, who can be reached at david.faguy@nau.edu or 928-523-6117. More information about misconduct in research is available at https://nau.edu/university-policy-library/misconduct-in-research.

SENSITIVE COURSE MATERIALS

University education aims to expand student understanding and awareness. Thus, it necessarily involves engagement with a wide range of information, ideas, and creative representations. In their college studies, students can expect to encounter and to critically appraise materials that may differ from and perhaps challenge familiar understandings, ideas, and beliefs. Students are encouraged to discuss these matters with faculty.

Last revised August 4, 2022