

INF 502 SOFTWARE DEVELOPMENT METHODOLOGIES Syllabus

Term	Class No.	Section	Units	Days & Times	Room	Mode
Fall 2022	10123	001	3	TuTh 2:20PM - 3:35PM	069-218	In person

Enrollment Requirements

Pre-requisite or Corequisite: Graduate status

Course Website

<https://github.com/chavesana/INF502-Fall22>

Instructor(s)

Dr. Ana Paula Chaves

Email: Ana.Chaves@nau.edu

Phone: 928-523-3107

Office Hours: TuTh 9:00AM-11:00AM; We 1:30PM-3:30PM; Room 090-216

We will also have a Microsoft Teams channel for faster communication

Academic Catalog Description

Study of advanced programming techniques, overview of software engineering principles, and study and project-based application of agile software development methods and tools.

Course Purpose

This project-based course is intended for students interested in informatics research with significant previous programming experience, including data structures, and software development techniques. The course centers on the application of practice-oriented programming and software engineering skills in the informatics domain. The course begins with an in-depth coverage of advanced programming, data structure, and algorithmic complexity topics with an emphasis on the application of these skills in the context of large-scale informatics problems. Topics relating to software engineering are subsequently explored, with an emphasis on code-level quality, effective team-based development, and specific methods and tools most appropriate for informatics problems. Throughout the course, students will apply their skills toward the development of software artifacts in a research area of interest. By the end of the course, students are prepared to develop high-quality software in a research area of interest.

Course Student Learning Outcomes

Upon successful completion of this course, students will be able to demonstrate the following competencies:

- Select and apply advanced programming and memory management techniques to a variety of software development contexts;
- Select and synthesize algorithms and data structures appropriate to computational complexity requirements;

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- Analyze and evaluate the fundamental principles of software engineering and how they inform specific software development practices;
- Select and synthesize programming techniques that promote high code-level quality;
- Select and apply agile software development techniques and tools to software design, development, source control, testing, and documentation.

Course Structure

This course consists of lectures, in-class assignments, reading assignments, homework assignments, and programming assignments, and a multi-party development project in a student's area of research interest.

Assignments / Assessments of Course Student Learning Outcomes

Methods of assessment include in- and out-of-class assignments, reading and homework, exams, software project development activities, and deliverables in stages throughout the semester. For each learning outcome there will be homework and classroom assignments.

Grading System

A weighted sum of assessment components is used to determine your final grade in the course:

- Participation in class discussion and activities: **10%**
- Homework assignments (at least 4): **20%**
- Programming assignments: **35%**
- Midterm Exam: **20%**
- Final Exam: **20%**

Grades will be assigned using the weighted sum described above using this scale:

A ≥ 90%, **B** ≥ 80%, **C** ≥ 70%, **D** ≥ 60%, **F** < 60%.

There is no “curve”. Each student's grade is based on their own outcomes assessments and not affected by the grades of other students. Extra credit opportunities may present themselves throughout the semester and will be announced during class meetings. If a student feels a mistake has been made in grading an assignment, they are encouraged to discuss such concerns with the instructor during office hours.

Readings and Materials

Readings will be provided from various sources, including:

- *Python for Informatics: Exploring Information, Version 2.7.3*, by Charles Severance, Creative Commons. Available at: <http://do1.dr-chuck.net/py4inf/EN-us/book.pdf>
- *Code Complete: A Practical Handbook of Software Construction, Second Edition*, by Steve McConnell (ISBN: 0735619670)
- *The Mythical Man Month*, by Fred Brooks (ISBN: 0201835959)

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- *Software Engineering: A Practitioner's Approach, Eighth Edition*, by Roger Pressman and Bruce Maxim (ISBN: 0078022126)
- *Think Stats, Second Edition*, by Allen Downey, Green Tea press. Available at: <http://greenteapress.com/thinkstats2/thinkstats2.pdf>

Students will also need access to a computer with the Python (3.6 or later) programming language, git, and other libraries to support programming Python for data analysis, available as part of NAU's standard software distribution in most computer labs (particularly labs in 69-106 and 69-105).

Class Outline and Tentative Schedule

The course topics and a tentative schedule serve as an outline for the class:

		Tuesday		Thursday	Assignments
Week 1	8/30	Introduction to programming languages	9/1	Git/GitHub	HW1
Week 2	9/6	Git/GitHub	9/8	Python essentials	
Week 3	9/13	Python essentials	9/15	Python essentials	PA1, HW2
Week 4	9/20	Python part 2	9/22	Python part 2	HW3
Week 5	9/27	Python practice	9/29	Python practice	
Week 6	10/4	Jupyter notebooks	10/6	Introduction to object-orientation	HW4
Week 7	10/11	Introduction to object-orientation	10/13	Python OO practice	
Week 8	10/18	Midterm exam	10/20	Midterm discussion	
Week 9	10/25	Data analysis libraries: Pandas	10/27	Data analysis libraries: Pandas	HW5
Week 10	11/1	REST API data collection	11/3	REST API data collection	PA2
Week 11	11/8	Web scraping	11/10	Scraping + Pandas practice	
Week 12	11/15	Algorithm design and sorting/searching strategies	11/17	Algorithm design and sorting/searching strategies	HW6
Week 13	11/22	Agile development: Kanban, test-driven development	11/24	Thanksgiving (university closed)	
Week 14	11/29	Project-oriented class	12/1	Project-oriented class	
Week 15	12/6	Project-oriented class	12/8	Project-oriented class	
Week 16	12/13	Finals week (no INF 502)	12/15	Final Exam 12:30PM - 2:30PM	

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Due dates for project assignments (PA) and homework (HW) are posted on the course website. Please check it frequently for updates.

Course Policies

The following policies will apply to this course:

- Attendance is required and will be recorded. Coming to class more than 15 minutes late will count as an absence. Leaving class more than 30 minutes early if work has not been completed will be counted as an absence. Excessive absences will reduce your overall grade:
 - **4** unexcused absences will result in a 10% penalty in your final grade;
 - **5** unexcused absences will result in a 20% penalty in your final grade;
 - **6** unexcused absences will result in a 30% penalty in your final grade;
 - **7** unexcused absences will result in a 40% penalty in your final grade;
 - **8** or more unexcused absences will result in a failing grade for the class.
- Students who have not completed the prerequisite(s) for this course, or who are absent from the class during the first week may be administratively dropped from the course.
- The makeup and late work policies are as follows:
 - Homework: No make-ups or late submissions allowed.
 - Exams: Make-up exams will be given only in the case of a documented emergency supported by a class missed memo from Student Life (<https://nau.edu/student-life/classes-missed-memos/>) **and** with approval from the instructor. Make-up exams may be considerably different than the original exam. Make-up exams must be taken within 3 business days of the original exam.
- Cheating and plagiarism are strictly prohibited. All academic integrity violations are treated seriously. All work you submit for grading must be your own. You are encouraged to discuss the intellectual aspects of assignments with other class participants. However, each student is responsible for formulating solutions on their own and in their own words. Academic integrity violations will result in penalties including, but not limited to, a zero on the assignment, a failing grade in the class, or expulsion from NAU, according to the Academic Integrity Policy ([100601](#)).
- 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 web surfing or other use is allowed. I devote 100% of my attention to providing a high-quality lecture; please respect this by devoting 100% of your attention to listening and participating.
- Visiting the instructor during office hours is encouraged! I am happy to talk about the class, careers, research, and topics related to this course.
- Grades will be entered in BBLearn but your final grade will be calculated offline, using the grading system described above and then entered in LOUIE. Your final course grade will **not** necessarily appear in BBLearn. Please check LOUIE for your final grade.

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- The class will use Microsoft Teams as a backchannel for discussion. This is a great way to discuss content with your peers, get quick feedback or clarification, and (most importantly) ask questions. Participation on Teams channels may be required for certain assignments.

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Appendix A. 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>.

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 conducive 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, or veteran status. Due to potentially unethical consequences, 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 is the primary federal law that prohibits discrimination on the basis of sex or gender in educational programs or activities. Sex discrimination for this purpose includes sexual harassment, sexual assault or relationship violence, and stalking (including cyber-stalking). Title IX requires that universities appoint a "Title IX Coordinator" to monitor the institution's compliance with this important civil rights law. NAU's Title IX Coordinator is Elyce C. Morris. The Title IX Coordinator is available to meet with any student to discuss any Title IX issue or concern. You may contact the Title IX Coordinator by phone at 928-523-3515, by fax at 928-523-0640, or by email at elyce.morris@nau.edu. In furtherance

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of its Title IX obligations, NAU will promptly investigate and equitably resolve all reports of sex or gender-based discrimination, harassment, or sexual misconduct and will eliminate any hostile environment as defined by law. Additional important information about Title IX and related student 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), 928-523-6906 (TTY), 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.