

INF 502 - SOFTWARE DEVELOPMENT METHODOLOGIES

Term	Class No.	Section	Units	Days & Times	Room	Mode
Fall 2019	10968	001	3	TuTh 2:20PM – 3:35PM	090-102	Face-to-face

Enrollment Requirements

Graduate Status

Course Website

<https://github.com/igorsteinmacher/CS502-Fall2019>

Instructor(s)

Dr. Igor Steinmacher

Email: Igor.Steinmacher@nau.edu

Office Hours: Mo1:30pm-2:30pm and Fri 9:00am-10:00am

We will also have a Slack channel which will be our main communication mean

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 advanced 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;
- 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;

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- Select and apply agile software development techniques and tools to software development, source control, build deployment, testing, and documentation.

Course Structure

This course consists of lectures, in-class assignments, reading assignments, homework assignments, programming assignments, and a multi-part 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; 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: **15%**
- 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;" your grade is completely up to you and is not affected by the grades of your classmates. Extra credit opportunities may present themselves throughout the semester and be announced during class meetings. If you feel a mistake has been made in grading your assignment, please address your concerns 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)
- *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>

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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.

Class Outline and Tentative Schedule

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

		Tuesday		Thursday
Week 1	8/27	About the course/ intro to programming languages	8/29	Git/GitHub
Week 2	9/3	Git/GitHub	9/5	Python essentials
Week 3	9/10	Python essentials	9/12	Python essentials
Week 4	9/17	Python essentials	9/19	Python essentials
Week 5	9/24	Python essentials	9/26	Jupyter Notebooks
Week 6	10/1	Jupyter Notebooks	10/3	Intro to Object Orientation
Week 7	10/8	Intro to Object Orientation	10/10	Assignment review
Week 8	10/15	Midterm	10/17	Midterm Review
Week 9	10/22	Agile development: kanban; test-driven development	10/24	Agile development: kanban; test-driven development
Week 10	10/29	Agile development: kanban; test-driven development	10/31	Scrapping/webservices/Pandas
Week 11	11/5	Scrapping/webservices/Pandas	11/7	Scrapping/webservices/Pandas
Week 12	11/12	Scrapping/webservices/Pandas	11/14	HOLIDAY
Week 13	11/19	Algorithm design and sorting/searching strategies	11/21	Algorithm design and sorting/searching strategies
Week 14	11/26	Algorithm design and sorting/searching strategies	11/28	Algorithm design and sorting/searching strategies
Week 15	12/3	Programming Assignment follow up	12/5	Wrap up
Week 16		Final Exam		

Due dates for quizzes and homework are posted on the course website. Please check it frequently for updates.

Course Policies

The following policies will apply to this course:

Commented [JDP1]: REQUIRED: What policies have you implemented specific to your class?

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- 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:
 - **3** unexcused absences will result in a 10% penalty in your final grade;
 - **4** unexcused absences will result in a 20% penalty in your final grade;
 - **5** unexcused absences will result in a 30% penalty in your final grade;
 - **6** unexcused absences will result in a 40% penalty in your final grade;
 - **7** or more unexcused absences will result in a failing grade for the class.
- 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.
- 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.
- I am happy to talk about the class, careers, research, and topics related (even loosely) to this course *during* my office hours.
- This class will use Slack as a backchannel for discussion. This is a great way to discuss content with your peers, get feedback or clarification, and (most importantly) ask questions. Participation on Slack channels may be a requirement for certain assignments.

Appendix A. POLICY STATEMENTS FOR COURSE SYLLABI

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 (Academic Credit Policy 2-224), for every unit of credit, a student should expect, on average, to do a minimum of three hours of work per week, including but not limited to class time, preparation, homework, and studying.

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 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. The Equity and Access Office (EAO) responds to complaints regarding discrimination and harassment that fall under NAU's Safe Working and Learning Environment (SWALE) policy. EAO also assists with religious accommodations. For additional information about SWALE 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 via 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 Pamela Heinonen, Director of the Equity and Access Office located in Old Main (building 10), Room 113, PO Box 4083, Flagstaff, AZ 86011. 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 928-523-3312 (TTY: 928-523-1006), by fax at 928-523-9977, or by email at pamela.heinonen@nau.edu. In furtherance of its Title IX obligations, NAU will promptly investigate and equitably resolve all reports of sex or gender-based discrimination, harassment, or

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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 <http://nau.edu/equity-and-access/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.