CSCI 783: Topics in Software Systems: Mobile Software Engineering,

Spring 2023, 3 Credits
Department of Computer Science
North Dakota State University

Instructor Information

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Catalog Description

This course is designed to introduce the student to the best practices of mobile software engineering for developing high-quality, reliable, and secure mobile apps.

Course Objectives

People heavily rely on mobile apps to perform various types of essential tasks such as banking. Therefore, mobile app quality, reliability, and security are important for users. This course covers the concepts, tools, and techniques necessary for developing high-quality, reliable, and secure mobile apps. This course mainly focuses on four different aspects of mobile software engineering: (1) fragmentation, (2) quality and reliability, (3) security, and (4) deployment and maintenance. The first part of this course covers various types of fragmentation issues in mobile platforms, such as different devices and operating systems, and how to handle those issues while developing mobile apps. The second part of this course covers key quality and reliability issues in mobile apps. This part also covers various types of mobile app testing techniques used to improve the quality of mobile apps. The third part of this course covers security issues in mobile apps and how to avoid them. This part also touches on various types of malware and their detection techniques. Finally, the fourth part of this course covers current practices of deploying and maintaining mobile apps. This course mainly focuses on the Android platform and Android apps.

Course Goals

At the completion of this course, students will have gained the following competencies:

- Understand various challenges in developing high-quality, reliable, and secure mobile apps.
- Understand fragmentation issues within and across mobile platforms and design and develop mobile apps that support different devices with various configurations such as screen size and operating systems.
- Understand important quality and reliability issues in mobile apps including common types of bugs and be able to use different tools and techniques to identify and address those issues.
- Understand current practices of testing mobile apps at various levels and be able to use tools and techniques to write effective test cases.
- Understand key security issues in mobile apps and how to avoid those issues.
- Understand current practices of deploying and maintaining mobile apps.

Course Schedule/Outline

Week	Topic	Projects/Assignments
1-2	Introduction to Mobile Software Engineering	Assignment 1
3-4	Mobile App Development/Fragmentation	Assignment 2
5-6	Mobile App Quality	Assignment 3
7-8	Mobile App Reliability	Assignment 4, Midterm Project
9-11	Mobile App Testing	Assignments 5 and 6
12-14	Mobile App Security	Assignments 7 and 8
15-16	Mobile App Deployment and Maintenance	Assignment 9, Final Project

Approach
This course is designed for both in-person and online (asynchronous) teaching modes. Lectures will be delivered mainly using PowerPoint/Google slides, which will be available to students. The slides are detailed and will serve as course notes. Various other digital supplementary materials, such as literature and reports, will be available to students. Students are expected to study these materials to understand the subject and work on the course tasks. Students are encouraged to email or meet (in person or online) with any questions on the subject matter.

The course tasks (assignments and projects) with their due dates will be posted on Blackboard. Students are encouraged to complete the tasks by the due dates, but no penalty would be imposed if the tasks are turned in late. However, no coursework will be accepted after the semester's due date. Also, the instructor will have the discretion to impose firm due dates with late penalties if deemed necessary.

This course is designed to cover both theoretical and practical aspects of mobile software engineering. Therefore, students are expected to learn the concepts, tools, and techniques taught in the class and apply them to mobile apps for improving mobile app quality, reliability, and security.

The topics covered in this course include content from research articles and various online sites such as the official Android documentation (https://developer.android.com/), Stack Overflow (https://stackoverflow.com/), and GitHub (https://github.com/). Students are expected to read research articles and analyze data and information available on online sites to understand the subject matter and complete course tasks.

Textbooks and Readings
There are no required or recommended textbooks for this course. The lecture slides will be the main resource for students. Students may need to read research articles as part of assignments and projects. The required resources will be available electronically through various digital libraries such as IEEE Xplore.

Course Tasks
- *Assignments:* There will be one or two assignments per chapter taught in this course. The assignments will contain objective and/or subjective questions. The assignments will be posted on Blackboard and students will submit their completed work on Blackboard by the assigned due dates. For some assignments, students may also need to present the completed work in class.
- *Projects:* There will be two projects (midterm and final) in this course. The project submission links will be available on Blackboard. Students may also need to present the completed projects in class.

Evaluation and Grading
Objective questions in the assignments will be evaluated based on whether the answer is correct. If the answer is correct, students will receive full marks. Otherwise, they will receive zero marks. Subjective questions and projects will be evaluated based on the originality of the answer and fulfillment of the criteria mentioned in the questions or projects. The final grade will be calculated using the weighted grading system.
- Based on whether the course is being offered in-person or online, the following weight will be used for grading. *In-person*: attendance - 20%, assignments - 40%, and projects - 40%. *Online*: assignments - 50% and projects - 50%
- The following grading scale will be used: **A** (90-100%), **B** (80-89%), **C** (70-79%), **D** (60-69%), and **F** (0-59%).

Professional Conduct
Academic dishonesty has very bad consequences. Copying ideas, sentences, tables, or figures without citation is plagiarism, a form of academic dishonesty. This is a very serious offense because you make it appear to be your work, but in fact, it is not. You must include citations and references when you copy. Receiving unacknowledged help is considered academic dishonesty. You must include citations and references in your work when you receive help, other than from faculty or course materials. For example, if you find a useful web page that was not specified in the assignment, then you must include a citation and reference for it. Similarly, if a discussion with someone is helpful, you should thank them by name in the Acknowledgments section, even if collaboration is not allowed on the assignment. (Their discussion may not be considered "collaboration".). Citations and references are optional for informal discussions. Giving unacknowledged help is also treated as academic dishonesty.

Attendance
According to NDSU Policy 333 (www.ndsu.edu/fileadmin/policy/333.pdf), attendance in classes is expected. When offered as a web-based (online) course, it is mandatory for enrolled students to fully access all posted online and textbook materials,

study those materials, and complete all required assignments, discussions, quizzes, exams, and projects. In the case of a university-sponsored activity, required business trip, or medical procedure, a signed letter from your manager or doctor is required to allow for an extension of the due date. Please email me in advance of the expected absence to arrange any make-up or extensions. Veterans and student service members with special circumstances or who are activated are encouraged to notify the instructor as soon as possible and are encouraged to provide Activation Orders.

Americans with Disabilities Act for Students with Special Needs
Students with disabilities or other special needs requiring special accommodations in this course are invited to share these concerns or requests with the instructor and contact the Disability Services Office (www.ndsu.edu/disabilityservices) as soon as possible.

Family Educational Rights and Privacy Act (FERPA)
Your personally identifiable information and educational records as they relate to this course are subject to FERPA (https://www.ndsu.edu/onestop/student-privacy-policy-ferpa).

Academic Honesty Statement
The academic community is operated based on honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconducts have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty.