

CS 4381/5381: Topics in Software Engineering Cross-Platform Application Development Spring 2025

CRN: 26933 (CS 4381), 26934 (CS 5381)

Lecture: TR 10:30 AM - 11:50 AM in CCSB G.0208

Instructor: Yoonsik Cheon (x-8028, ycheon@utep.edu); office hours: TR 1:30 PM - 2:30 PM in CCSB 3.0606

Teaching assistant: TBA

Prerequisite: CS 3331 or instructor's approval

Description

This course provides an immersive, project-oriented learning experience for students eager to develop dynamic, cross-platform applications that seamlessly run on both Android and iOS devices. Students will work on a semester-long project, applying their skills to develop a full-featured Flutter application. This hands-on approach ensures students gain practical expertise in tackling real-world development challenges while building a publishable app.

The course begins with an introduction to Dart, the programming language powering Flutter, ensuring students acquire the essential skills to navigate the development process. From there, the focus shifts to Flutter widgets—the building blocks of intuitive and visually appealing app interfaces. Through structured instruction and iterative development of the semester project, students will progressively master the principles and techniques of Flutter app development.

By the end of the course, students will have created a feature-rich Flutter application, gaining deep insights into cross-platform mobile application development while equipping themselves with skills that are directly transferable to industry needs.

Textbook

The required textbook for this course is *Practical Flutter: Improve Your Mobile Development with Google's Latest Open-Source SDK* by Frank Zammetti (Apress, 2019). This concise and succinct textbook provides a focused introduction to Flutter, making it an excellent resource for the course. However, for students seeking more detailed descriptions or in-depth explanations, the supplementary book *Flutter for Beginners* by Thomas Bailey and Alessandro (3rd edition, Packt Publishing, 2023) is highly recommended.

In addition to the required textbook, the following supplementary books are available:

- *The Dart Programming Language* by Gilad Bracha (Addison-Wesley Professional, 2015). A foundational resource covering the Dart language.
- *Flutter for Beginners* by Thomas Bailey and Alessandro Biessek (3rd edition, Packt Publishing, 2023). A comprehensive guide to learning Flutter, highly recommended for its detailed explanations and examples.
- *Flutter Recipes: Mobile Development Solutions for iOS and Android* by Fu Cheng (Apress, 2019). A collection of practical solutions to common Flutter development challenges.
- *Flutter in Action* by Eric Windmill (Manning, 2020). A developer-friendly introduction to Flutter, focusing on actionable insights.
- *Flutter Projects* by Simone Alessandria (Packt, 2020). A project-based book for learning Flutter through practical examples.

Electronic copies of the required textbook and supplementary materials are accessible to authorized UTEP users through the UTEP Library.

Examinations

This course includes one mid-term exam and no final exam. The mid-term exam will assess your understanding of the core topics covered in the first half of the course, focusing on the Dart programming language and Flutter widgets. The exam will be conducted during a regular class session.

Makeup exams will only be allowed under exceptional circumstances, such as a documented medical emergency or participation in an academic event like presenting at a conference. If you anticipate a conflict, you must notify the instructor in advance and provide official documentation to support your request.

The scheduled final exam time will be reserved for the semester project demonstrations or presentations, if needed. This session offers an opportunity to showcase your project work and receive constructive feedback.

Homework Assignments

Throughout the course, you will complete several homework assignments, most of which will involve programming tasks. These assignments are designed to reinforce your understanding of the course material and provide hands-on practice with the concepts taught in class.

Some assignments will be completed individually, while others may involve pair or team collaboration, as specified by the instructor. To ensure fairness and timely feedback, late submissions will not be accepted unless prior approval has been granted under exceptional circumstances.

All submissions must be made through Blackboard. Email submissions will not be accepted under any circumstances. It is crucial to adhere to the specified deadlines and promptly upload your work to the appropriate Blackboard assignment link.

By actively engaging with the homework assignments, you will gain practical experience and further solidify your understanding of Flutter app development.

Semester Project

The semester-long project is a cornerstone of this course, designed to provide comprehensive, hands-on experience in Flutter app development. Through this project, you will apply the skills and knowledge acquired during the course to design and implement a feature-rich Flutter application. The goal is to create a functional, real-world app with the potential for publication on Android and iOS platforms.

You will begin by submitting an individual project proposal outlining your app idea, which must be approved by the instructor before development begins. While the initial proposal is completed individually, the project itself may be completed individually, in pairs, or in teams, depending on its scope and complexity.

Key milestones throughout the semester include:

- **Project proposal:** An initial submission describing your app concept and planned features.
- **Prototype demonstration:** A working prototype showcasing core functionalities.
- **Final presentation:** A comprehensive showcase of the completed project.
- **Final report:** A detailed written report documenting the design, development, and testing processes.

These milestones ensure consistent progress and provide opportunities for feedback and improvement. All deliverables must be submitted via Blackboard by the specified deadlines.

Engaging in this semester project will not only deepen your understanding of cross-platform app development but also offer valuable experience in tackling practical, real-world challenges. It serves as a culmination of the skills you've developed throughout the course.

CS 5381 Presentations

As part of the university's requirement for graduate students enrolled in a course cross-listed with an undergraduate course, CS 5381 students must fulfill additional requirements to ensure a higher level of academic engagement. In this course, graduate students will deliver a class presentation on a topic related to Flutter or cross-platform application development.

The presentation can take one of two forms:

- *A mini-lecture or tutorial:* This should explore advanced topics or additional features of Flutter programming that extend beyond the core curriculum.
- *A technical paper presentation:* This should critically analyze a research paper or technical article centered on Flutter or cross-platform app development.

The presentation length will range from 10 to 20 minutes, depending on the class size, and must be approved by the instructor in advance. Graduate students are encouraged to select topics that align with their interests and expertise while contributing valuable insights to the class.

These presentations provide an opportunity for graduate students to delve deeper into the subject matter, enhance their research and communication skills, and contribute to the collaborative learning environment of the course.

Grading

Your grade is based on your individual performance, with no curve applied. The aim is to maintain high academic standards and provide meaningful feedback. Your final letter grade will be determined by the following approximate distribution:

Activity	Percent (%)
Lessons (reading quizzes and exercises)	30
Homework assignments	30
Semester project	25
Mid-term exam	15

Additionally, up to 5% bonus points can be earned through class attendance and participation. To qualify for this bonus, you must attend lectures regularly, participate actively in class discussions, and demonstrate preparedness by asking and answering relevant questions that reflect your understanding of the material. Completing in-class activities and assignments on time is also essential.

All assignments, quizzes, and exams must be submitted electronically via Blackboard unless stated otherwise. No email submissions will be accepted. Please adhere to deadlines; no late work will be accepted unless exceptional circumstances apply, and prior approval is obtained from the instructor.

Your final grade will be determined based on the percentage of total points earned, with the following standard grading scale:

Letter grade	Percent (%)	Performance
A	90-100	Excellent
B	80-89	Good
C	70-79	Average
D	60-69	Poor
F	0-59	Failing

The instructor reserves the right to adjust grading criteria downward (e.g., considering 88% or higher as an A), based on the overall performance of the class. However, there will be no upward adjustments to the criteria.

Attendance/Participation

Regular and punctual attendance is essential for success in this course. Active participation in class discussions and activities significantly enhances your learning experience and overall performance. Therefore, consistent attendance is not only expected but mandatory.

The instructor reserves the right to impose penalties for unexcused absences if your attendance falls below a 70% threshold of the total class meetings. If your attendance drops below this threshold, your final grade may be reduced,

or you may be at risk of being dropped from the course. It is important to attend regularly to stay on track with the course material and assignments.

In line with university policy, it is your responsibility to inform the instructor of any extended absences. If, in the instructor's judgment, student's absences affect their progress to the point of impairing their ability to earn credit for the course, the instructor may drop the student from the course with a grade of W (before the course drop deadline) or F (after the drop deadline).

Active participation is not limited to attendance; it also involves engaging with the material. Contributing to discussions, asking relevant questions, and completing in-class activities are all considered part of your participation. Timely submission of assignments and participation in group work also contribute to your participation evaluation.

To maximize your grade and learning experience, ensure that you attend class regularly and actively participate in all

Standards of Conduct

Maintaining a professional and respectful demeanor is essential to fostering a positive learning environment. All graded assignments, including reading, exercises, homework, and exams, must be completed independently and reflect your own work. While discussing general ideas with peers is encouraged, presenting material copied from external sources—such as individuals, books, websites, or generative AI—is strictly prohibited.

Plagiarism, as defined by university policy, is the unauthorized use or reproduction of someone else's work or ideas without proper acknowledgment. This includes submitting work that was not created by you, reusing work from other courses without permission, or presenting borrowed content as your own. Instructors are required to report any suspected instances of plagiarism or academic dishonesty to the Office of Community Standards (formerly the Office of Conduct and Conflict Resolution) for investigation and appropriate action. Plagiarism is a serious violation of academic integrity and will not be tolerated.

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The use of generative AIs or large language models (LLMs) is encouraged as they are excellent tools for learning the Dart programming language, the Flutter framework, and various third-party packages. These tools can assist with conceptual understanding, exploring solutions, and generating sample pieces of code. However, all submitted work, including code, must be written by you, the student. While LLMs can provide valuable guidance and clarification, it is essential that the final submissions reflect your own understanding, effort, and mastery of the material.

Upholding the highest standards of academic integrity is critical to maintaining a fair and honest educational environment, and all students are expected to adhere to these principles.

Accommodations

If you have a disability and require classroom accommodations, please contact the Center for Accommodations and Support Services (CASS) as soon as possible. It is important that you reach out to CASS promptly to ensure that appropriate accommodations are arranged in a timely manner. You can contact CASS by phone at 747-5148 or via email at cass@utep.edu. Their office is at UTEP Union East, Room 106.

For more information and to access additional resources, please visit the CASS website: <http://www.sa.utep.edu/cass>.

Please note that the instructor is only able to provide accommodations listed in the accommodation letter provided by CASS. Any additional accommodations not specified in the letter cannot be granted. It is your responsibility to ensure that the instructor receives a copy of the accommodation letter at the beginning of the course and to discuss it with the instructor to facilitate the timely implementation of necessary accommodations.

Course Outline

The course is structured into three primary components: Dart language, Flutter framework, and case studies. A detailed and tentative schedule can be found on the next page

Introduction (1.5 weeks)

1. Basic understanding of Flutter
2. Development environment

Lab: Flutter IDE

Dart language (3 weeks; Chapter 2)

1. Variables and data types
2. Expressions and control structures
3. Functions, classes, and object-oriented programming
4. Asynchrony
5. Lab demo

Lab: Dart app

Flutter framework (3.5 weeks)

1. Widgets (Chapters 3-4)
 - a. Overview of the Flutter framework and its architecture
 - b. Exploring Flutter widgets and user interface design
 - c. Navigation and routing in Flutter
2. Lab demo

Lab: Flutter app

Case studies (3.5 weeks)

1. FlutterBook (Chapters 5-6)
 - a. Incremental development of feature-rich Flutter apps
 - b. State management in Flutter apps
 - c. Integrating platform-specific features and APIs
2. Lab demo
3. Optionally, FlutterChat (Chapters 7-8) and FlutterHero (Chapter 9)

Lab: FlutterBook

Semester Project (2 weeks)

1. Project proposal
2. Prototype demo
3. Final presentation

Others (2.5 weeks)

1. Exam
2. CS 5381 presentations

Schedule

The following table shows a planned schedule for the course; refer to Blackboard for an up-to-date schedule.

Dates		Topics	Readings	Assignments
Week 1	Jan. 21, 23	About CS 4381/5381 Introduction to Flutter	Chapter 1	
Week 2	Jan. 28, 30	Introduction to Flutter (cont.) Dart: Introduction	Chapter 2	
Week 3	Feb. 4, 6	Dart: Basic Dart: OOP	Chapters 1, 3, and 6 [Bracha16]	Lab 1
Week 4	Feb. 11, 13	Dart: Expressions and functions	Chapters 2 [Bracha16]	
Week 5	Feb. 18, 20	Dart: Lab 1 demo Flutter: Basic widgets	Chapters 4 and 6 [Bracha16]	
Week 6	Feb. 25, 27	Flutter: Layout Flutter: Input and selection	Chapter 3	Lab 2
Week 7	Mar. 4, 6	Flutter: Navigation Flutter: Styling and animation	Chapter 4	
	Mar. 11, 13	Spring break		
Week 8	Mar. 18, 20	Flutter: Others Exam 1		
Week 9	Mar. 25, 27	<i>Project proposal</i> Flutter: Lab 2 demo		
Week 10	Apr. 1, 3	App: FlutterBook – UI and state	Chapter 5	
Week 11	Apr. 8, 10	FlutterBook – Notes	Chapter 5	Lab 3
Week 12	Apr. 15, 17	FlutterBook – Tasks, appointments, contacts	Chapter 6	
Week 13	Apr. 22, 24	<i>Project prototype demo</i> FlutterBook: Lab 3 demo		
Week 14	Apr. 29, May 1	CS 5381 presentations		
Week 15	May 6, 8	<i>Project presentations</i>		
Week 16	May 15	Final at 10:00 pm – 12:45 pm		

Important Dates

January 20:	Dr. Martin Luther King, Jr. holiday – University closed
January 21:	Classes begin
February 5:	Census day
March 10-14:	Spring break
March 20:	Exam 1
March 28:	Cesar Chavez holiday – No classes
April 4:	Drop/withdrawal deadline
April 18:	Study day
May 8:	Last day of classes
May 9:	Dead day
May 15:	Final on Thursday at 10:00–12:45 pm