**Spring 2018**

Course Number: CSE 5320

Course title: Special Topics Software Engineering (**Mobile Application Development)**

Class Time: Tuesday 2:00 4:50 pm

Credit Hours: 3 credits

Instructor: Dr. Elizabeth D. Diaz

Office: ERB 555

Office Hrs: 12:20 to 1:45 pm Tuesday

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Course Description:

This project-oriented course examines the principles of mobile application design and development. Students will learn application development on the Android platform. Topics will include memory management; user interface design; user interface building; input methods; data handling; network techniques and URL loading; and, finally, specifics such as GPS and motion sensing. Students are expected to work on a project that produces a professional-quality mobile application. Projects will be deployed in real-world applications. Course work will include project conception, design, implementation, and pilot testing of mobile phone software applications.

Prerequisites:

Students in the course should be comfortable with Java or C# programming, database.

Course Objectives:

By the conclusion of this course, students will be able to:

* Describe those aspects of mobile programming that make it unique from programming from other platforms,
* Critique mobile applications on their design pros and cons,
* Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,
* Program mobile applications for the Android operating system that use basic and advanced phone features, and
* Deploy applications to the Android marketplace for distribution.

Students will have created an innovative and robust mobile application that will be valuable addition to their programming portfolio.

Classroom Format: Lecture

Required and Optional Texts:

The required text will be specified on Blackboard.

Additional Materials:

We will use material provided by Google. Students are encouraged to bring their laptops to class during the code walkthroughs sections.

Course Schedule/Outline:

Course requirements include:

(1) readings for class preparation and class participation including short in-class quizzes,

(2) programming assignments and code reviews,

(3) programming assignments and design assignments throughout the course that will support the final project, and

(4) the final programming project.

Students should be prepared to fully immerse themselves in Android programming and mobile app design and development.

Grading Procedures and Criteria:

Prior experience suggests that work in this course will generally fall into one of three categories:

 Superior, striking, or unexpected pieces of work with excellent effort demonstrating a mastery of the subject matter and a skillful use of concepts and/or materials discussed in class; work robustly and fully implemented; work that shows exceptional imagination, elegance of presentation, “originality”, creativity, and effort. A

 Good work demonstrating a capacity to use the subject matter and the ability to handle problems encountered in the course. B

 Work that is adequate but that would benefit from increased effort or preparation. C

Course work falling into these categories correspond roughly to A, B, and C grades. The final grade for the course will be computed by weighting the results from each assignment according to the following formula:

Legend:

FGrade= Final Grade

FP= Final Project

MT= Midterm Exam

* Design assignments (20% total)
  + Design 1: Hot (and not) mobile Health/Tourism/Planification/Cooking apps
  + Design 2: Addictive game mash-up
  + Design 3: Final project paper prototype design
* Project programming lead-up assignments (30% total)
  + Programming 1:
  + Programming 2:
  + Programming 3:
  + Programming 4:
  + Programming 5
* Final project interaction design and robustness (30%)
* Midterm (20 %)
* No Final

Students will be provided with a template for the presentations and will be expected to use the [Pecha Kucha](http://en.wikipedia.org/wiki/Pecha_Kucha) format (20 slides, 20 seconds each, on auto advance). *This format requires practice in advance!* Presentations will be graded on adherence to the format and overall presentation clarity and evidence of practice, as well as demonstration by the student of a thorough understanding of the topic being discussed. All students will be asked to present at least once, possibly more depending on class size. This Powerpoint template must be used: [PPT Template for Presentations](http://www.ccs.neu.edu/home/intille/teaching/MAD11/PaperPresentationTemplate.ppt). The class project’s objective is to design a professional App and to develop Team work.  
  
***Design assignments***

The best way to reduce programming time is to spend time on effective design early in the development process. Therefore, in this class, design and rapid prototyping will be emphasized throughout. Three assignments will get students thinking carefully about design, leading towards a final project, and will ensure that students are working to help each other, across teams, to develop the most innovative mobile apps possible. Individual design assignments are described in more detail below.

***Project programming lead-up assignments***

A set of five assignments will help teams incrementally converge on an innovative final project. The assignments will get increasingly challenging.

All assignments will be “submitted” via uploading apps to the app store. For grading, the apps will be updated and run. Emphasis will be on usability design, creativity of the design, professionalism of the application, and technical robustness. Students will be able to ask questions about their code, but for the most part the code behind the applications will not be reviewed during the grading process.

***Final project design and implementation***

Although there are design and programming projects along the way, they are all designed to support the development of an outstanding final project. Students will design and implement a fully-functional mobile phone application for Android mobile phones that must be sufficiently robust so that it can be deployed with actual users. Students will work in a team. Teams are expected to produce a polished and professional-looking mobile phone application that works robustly on a variety of phone models, meets the user interface design standards discussed in the course, and shows a substantial amount of design creativity. The goal is not to produce yet another app that does the same thing as other apps on the app store, but to design an app that truly stands out from the crowd. Students should aim for simple apps that are addictive/fun/engaging but with a serious purpose of helping people. The app should be extremely easy and pleasing to use. To achieve these goals will require many rounds of design iteration.

Teams:

Students will be able to self-select teams. Those students who do not will be paired by the instructor. Students are not allowed to work individually.

Team programming has been shown to have a number of benefits including increased personal satisfaction and fewer errors. Teams are expected to apply software best practices such as tracking tasks and using software configuration management, and select appropriate supporting tools.

Competition:  
  
At the end of the class, students in the class and a small panel of distinguished judges who are experts in mobile apps will try out the applications and vote for the Top Apps based on creativity, robustness, usability, and usefulness. The winning team will receive a small prize (and bragging rights!).

Equipment:

Android phones will be provided to teams as needed for testing during and after class. In some cases, they may be loaned out. In that case, students are responsible for taking excellent care of the devices and returning them. Failure to return a phone in working condition will result in a grade not being assigned.

Classroom Policies:

Students are expected to demonstrate qualities of academic integrity: a commitment, even in the face of adversity, to five fundamental values: honesty, trust, fairness, respect and responsibility.

Actively engaging in verbal exchanges of ideas and concepts will be a major component of learning in this course. This will be stimulated by readings, class discussions and case problem solving. Therefore, everyone will be expected to actively and positively listen to others and to communicate their ideas during class. Some students are less comfortable speaking in class than others, but open discussion of ideas and even disagreement is essential. Therefore, all students are expected to read course materials prior to class and will be called upon at times even if they do not raise their hands. Participation does not result from talking a lot, but as a result of critical thinking and articulation of ideas.

To facilitate discussion and learning, electronic devices, including laptops, must be turned off in class during the design and discussion period of each class session. Slides shown in class will be available on the course website after each class.

Despite the dinnertime meeting time of our class, please do not eat during the class unless you plan to provide food for everyone.

Late Policy:

*Prior to* an assignment due date, a student may request an extension with a reasonable explanation. It is the discretion of the instructor to permit late assignments. Unexcused late assignments will be subject to a reduction in approximately one half letter grade per day late.

Academic Honesty:

All students are expected and encouraged to discuss the topics raised by this course with each other. Ideas incorporated from an outside source or another student must be documented appropriately in write-ups or presentations. Acts of academic dishonesty will be referred to the Office of Student Conduct and Conflict Resolution.

Academic honesty is fundamental to the learning process. As a reminder,

* Students are expected to present as their own only that which is clearly their own work in tests and in any material submitted for credit. Students may not assist others in presenting work that is not their own.
* Purchasing term papers from commercial firms or individuals is a serious violation of University policy. Offenders are subject to disciplinary action.
* Any member of the academic community who witnesses an act of academic dishonesty should report it to the appropriate faculty member or department chair (or equivalent).
* Plagiarizing includes: representing someone’s else’s work as your own, insufficient acknowledgement, receiving or giving unauthorized help on choosing a topic, analyzing data, or drawing conclusions. Using the same paper or portions of a paper for two courses without explicit permission from professors of both courses.

**Any student found cheating on assignments will receive a zero on that assignment. A second offense will result in a failing grade for the course.**

**Design Assignment 1:**

**Hot (and not) critical analysis of mobile apps**

Due Date end of Day: Jan 30 11:59

Select two high-quality apps from the Android Market that help people with health, education, tourism, etc.

 Put some careful thought and research into the selection of the apps. Do a search for quality applications in various media, and review the apps that are top ranked in this category in Google Play store. Search some reputable online sources for data on innovative applications. I want you to pick applications that are innovative in some way ... either because they use new phone functionality, or they are particularly good, easy-to-use, or popular, or because they take an approach that is very different from competitor apps.

 Critically evaluate the two apps, ideally by running them on actual phones but via demos on websites or whatever other material you can find if you do not have a phone or a friend with a phone.

For each app, create a **one-page** write-up that includes the following:

1. Your name and the name of the app evaluated.
2. A summary paragraph that identifies key features of the app.
3. A paragraph or bullet list **describing what makes this app better than competitors**. Why did you select it?
4. A list of positive characteristics (e.g. high-quality graphics, fun, indispensable tool). Try to be as precise as possible about what makes it good. For example, don’t just say it is addictive; try to explain why it is addictive. Don’t just say that it “looks professional.” Explain what makes it look that way.
5. A list of negative characteristics (e.g. force close, slow, confusing menu titles). What could be done better? Be detailed
6. A paragraph identifying the target audience for the app. Who might use this?
7. A paragraph discussing whether you think the app is commercially viable, including the expected market for the app and the estimated number of paid downloads or estimated number of impressions/clicks per month the app might obtain if ad-based. Include your math and assumptions made (you might look in http://www.skyhookwireless.com/developers/developersguide.pdf

Name the file in this format: [your last name].pdf.

**Design Assignment 2:**

**Addictive Game Mashup**

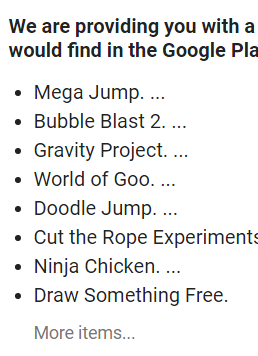
**Due end of day: Feb 6 2018**

<https://blog.prototypr.io/rapid-prototyping-for-mobile-app-ab394c9086e2#.o56t94z7q>

<https://popapp.in/pricing/>

<http://www.creativebloq.com/app-design/rapid-prototyping-mobile-71515696>

**This is an individual assignment.**Select **one** of the addictive games from the list



you find personally addictive. Find a specific version of the game, ideally on the phone but it could also be an Internet game. Spend at least 45 minutes playing the game.

 Make a half-page bullet list with a "cognitive teardown" concisely indicating what makes the game addictive. Primarily focus on interaction. Do not simply say the game has "nice graphics" or "engaging music." For instance, if you think that the graphics are important, be more specific about what makes them distinctive versus other less addictive games.

 Think as deeply as you can about the game and how it balances challenge and reward. You might consider learnability, user mental models of the game world, challenges at multiple simultaneous scales, clever aspects of scoring, use of speed and pacing, importance of storyline (or not), implementation of positive reinforcement, etc.

 Now consider the unique capabilities of mobile devices that we have talked about in class and how mobile phones are typically used.

 Using the game you analyzed as a starting point, propose a design for a new addictive game ( app). As it is played, **this new game must either help someone with a health-related task (weight loss, eating less calories, getting more physical activity, getting fitter, spending less time sedentary, etc.) or help visitors learn about Your fruits/culture, tech.**  The proposed game **must also take advantage of a unique capability of the phone** to enhance the game play. Features you can consider using are knowledge of location (and whatever additional information you might gather from the Internet based on that) or one of the phone's other sensors: accelerometer, light sensor, compass, camera, or microphone. Your proposed game may need to use the phone's data network connection to connect different users or acquire important data.

Describe your game concept as concisely as you can. In particular, describe why you think this new game will be at least as, and hopefully **more addictive**, than the game you based it on, and why it will help a typical person or a tourism researcher with a tourist-related tasks. Include sketches(prototyping) of screens if that helps you to explain the idea.

**Design Assignment 3:**

**Final Project Preliminary Paper Prototype Design**

**Due date Feb 20**

**This is a team assignment.**

It's time to propose your project idea on paper. Your goal is to use storyboards and/or paper prototypes to describe your concept as fully as you can. You may need to combine some of the techniques that have been discussed in class and in the design readings.

Your assignment should include the following information for your proposed app:

* App name (Max 30 characters, including spaces)
* App description that would appear on the Market (Max 4000 characters, including spaces)
* A slogan or promotional saying that would appear on the Market (Max 80 characters, including spaces)
* Application Type (pick either "Applications" or "Games")
* Category (specify one of the categories on the Market)
* Succinctly answer the following questions:
  + What problem/task(s) does the application help someone solve?
  + If not immediately obvious, how does this app meet the course guidelines of helping people with some tourism -related need.
  + What apps on the Market (or other app stores) would be your closest competitor?
  + Why will your app be better than the competitors?
  + What is innovative about your app idea? What will be particularly surprising or elegant about the concept?
  + What about your app will keep people engaged using it for a long time?

Next include scans of paper prototypes or storyboards showing your concept in as much detail as you can. These will need to be a combination of mock (sketched) screen shots where you will need to label just enough so someone else can tell how the app would work.

**Do:**

1. Think through the details of ALL the screens someone would encounter
2. Aim for innovation but also simplicity in design
3. Use the unique functionality of mobile devices
4. Keep in mind the design principles we've discussed in class and that have been in the readings
5. Iterate a few times with friends to try and improve the idea before you turn it in (and make the best of the in-class paper prototyping session the day before)
6. Remember that you are proposing to implement what you propose -- keep it manageable

**Do not:**

* Propose to reimplement an app that is already on the Market ... propose something new
* Oversimplify the behavior of your users or underestimate the difficulty of achieving behavior change
* Propose ideas that require a large amount of high-quality content to be generated in order to be interesting (unless you will be able to generate example content to be used to evaluate your project) .

**Programming assignments:**

The programming assignments are coming from the book. The idea behind this is to have at least the experience of a fully working app at the end of the semester.

Programming Assignment 1: Assignment at the end of Chapter 3. Add your first name, last name, email and phone. When clicking the Display button, prompt Hello My name is such and such, email me at [email@this.com](mailto:email@this.com) and call me at 555-750-4326

Programming Assignment 2: (Assignment at the end of Chapter 4 & 5)

Programming Assignment 3: (Assignment at the end of Chapter 6)

Programming Assignment 4: (Assignment at the end of Chapter 7)

Programming Assignment 5: (Assignment at the end of chapter 8)

Programming assignments are due three days after the chapter is finished.

**Final Project: Are we there yet? Almost There**

**Due May 1**

**This is a team assignment**

When you turn in this assignment you have one week to go before your turn in your whole project.

The purpose of this assignment is to help you refine your application, to help you get the help of others to squash bugs, and to help you ramp up for a final programming push that will result in a great project that you can be proud of.

Reviewing, your apps and app concepts need to be creative, well-designed, addictive, and robust. Your app must have a clean design that feels simple, operate smoothly and without sluggishness, not crash, and be well-designed and fun to play but with a clever twist. The app must take advantage of one or more of the unique capabilities of the phone and have the potential to stay interesting even after extended use. No explanation should be necessary to use the app beyond what someone might read on the Market when downloading it. The design should respect the ideas we have talked about in class and be in the scope of helping with some health-related issue. Doing this well will require that you took paper prototyping seriously ... either that or you got lucky.

Your goal for this assignment is to implement your project as possible, thoroughly test what you have, and publish. You will subsequently learn a lot as they use it and report crashes or provide you with feedback. While you can and likely still will have a substantial amount of polishing to do, enough of the app must be implemented so that someone using it can clearly get the "gist" of what it will be like in the end, perhaps without a few of the final bells and whistles you will add. The interaction model should be clear.

Once again, you will add a new button to your Market app: "Preliminary project: [Your app name]". This should run your app. Instead of updating the description of your app on the Market (which might attract people to download it, which we want to avoid at this point), please have one splash screen when the program is first run. This screen should include ONLY the following: (1) the app's name, and (2) the short description of the app that would appear on the Market (4000 characters max, including spaces), and (3) a "Start" button.

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| --- | --- | --- | --- | --- |
| Week | Date | Activity | Due Date |  |
| 1 | Jan 23 | Syllabus, Agreement, Project, group, downloading and setting SayitRight App. | Agreement, Project group, App setting. |  |
| 2 | Jan 30 | Chapter 1(Why Mobile Applications) |  |  |
| 3 | Jan 30 | Chapter 2 Prototyping |  |  |
| 4 | Feb 6 | Chapter 3 (Using Android Studio for Android Development) |  |  |
| 5 | Feb 13 | Chapter 4 (Interface and navigation) |  |  |
|  | Feb 20 | Chapter 4(Interface Design and Navigation) |  |  |
| 6 | Feb 27 | Chapter 5 |  |  |
| 7 | March 6 | Midterm |  |  |
| 8 | March 13 | Chapter 5 – Chapter 6 |  |  |
| 9 | March 20 | Chapter 6 |  |  |
| 10 | March 27 | Chapter 7 |  |  |
| 11 | April 3 | Chapter 7 |  |  |
| 12 | April 10 | Chapter 8 |  |  |
| 13 | April 17 | Chapter 15 ( Monetizing )Chapter 16 ( Publishing) |  |  |
| 14 | April 24 | Presentations |  |  |
| 15 | May 1 |  |  |

Potential Final Projects

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| Project Name | Description | Group |  |
| 1. Child’s Vaccine | Develop an app to manage a child’s vaccine. |  |  |
| 1. *Texas Voter Registration* | Develop an app to register as a new voter in Texas. |  |  |
| 1. Where is this Item? | The purpose of this project is to find out in which aisle in the supermarket is the product that I am looking for. Make it work for all the HEB’s. |  |  |
| 4) Sharing the House | Develop an app to manage a common property among 8 Heirs. Each heir gets 6 weeks per year, the remaining 4 weeks can be bought by any heir. If none of the heirs is interested can be sold outside. |  |  |
|  |  |  |  |
| 5) Internships and Opportunities | The purpose of this project is to know about all the internships and opportunities available in our community to be offered to our student. |  |  |
| 6) Managing Houses | The purpose of this project is managing several houses. Houses will be registered after being bought. All the expenses related to a house will be register. Reports related to how much have I spent in a house will be needed. |  |  |
| 7) 7Things | Develop an app to manage 7 things that everyone should do in their life time. The list include 7 places one should visit in the world, 7 people one should meet in their life, 7 things one should do in their life( Read, write,etc), 7 fruits one should eat in their life( Mango, Papaya, Apple, Coconut, etc), 7 foods( Hamburger, Chicken Marsala, Curry eggs,bread), 7 Flowers, 7 songs. |  |  |
|  |  |  |  |
| 1. Savetheplanet | Develop an app that allow users to be aware of all ethical and sustainable products in the market. The app shows availability of different companies offering their products and new companies being able register their products. |  |  |
| 1. AssigningTA’s | Develop an app to assign TA’s to different courses in Computer Science. Ph. D students get preferences over MS students. |  |  |
| 1. VirtualRobot | Crawls the internet, extract data related to a topic |  |  |