

*Innovative Applications and Network
Protocols for Mobile Wireless Devices*

The compute capability of today's high end mobile devices rivals the desktop performance of the early 90s. With increasing system integration these devices now offer rich set of features that are uniquely well suited for mobile environments, such as built in GPS receivers, multi mega pixel cameras with video recording capability. The next step in progression is the development of software that takes advantage of these features to provide services to mobile users on the go. To effectively make this transition to a mobile software world with ubiquitous connectivity one needs to understand the entire mobile system stack, from network protocols to the application layers. This course aims to provide a thorough understanding of how to design mobile applications using top-of-the-line Nokia N95 mobile devices.

There will be several lectures introducing students to key topics pertaining to the wireless network protocols (Cellular networks, Bluetooth, 802.11*, GPS), mobile application infrastructure (MIDP) and three-tier client-server architecture (databases, Java application servers). These lectures will be augmented with several prototype demos that show how to take advantage of various sensors on the N95 (Camera, GPS, Bluetooth) phone. Further, we will have several invited guest lectures from industrial and academic research labs highlighting the state-of-the-art in mobile platform research. Alongside the lecture component, there will be a significant (read as LOTS OF CODING) hands-on component that focuses on project development experience where students in groups (of 2-3) will *propose, implement and demonstrate* an end-to-end mobile application that satisfies a compelling user need and uses several "cool" features of N95.

Instructors Info:

Instructor:	Murali Annavaram	Office Hours:	Tues: 2-4PM
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Instructor:	Bhaskar	Office Hours:	Thursdays: 1-3PM
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TA Info:

TA:	Yi Wang
Office:	RTH 419
Office Hours:	Monday 2-4pm
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Class Time: Wednesday 3:30PM-6:20PM GFS 101

Discussion Time: Friday 2PM-2:50PM VHE 217

Course Materials and Info:

URL (Blackboard): <http://blackboard.usc.edu>

Textbook ("Required"): There is NO required text for this course. But it is expected that students will familiarize themselves with Java ME, Databases, Java Application Servers on their own time.

Textbook (Recommended):

[Knudsen & Li, "Beginning J2ME: From Novice to Professional," Third Edition. Apress.](#)

[Keogh, J2ME: "The Complete Reference," McGraw-Hill/OsborneMedia.](#)

[Scheible & Tuulos: "Mobile Python: Rapid Prototyping of Applications on the Mobile Platform," Wiley.](#)

[Ramakrishnan & Gehrke: "Database Management Systems," Third Edition, McGraw-Hill.](#)

Grading Policy:

6 Introductory Labs =	30%
Project Phase 1 Presentation=	15%
Project Phase 2 Presentation =	20%
Project Phase 3 Presentation =	30%
Final Exam =	NONE
Office visit & Class Participation=	5%

Labs: Labs are critical not only to your grade but are really the true evaluation of your learning. The labs in this class are intended to prepare you with the skills needed to succeed in industry and real-world jobs. Copying or allowing others to copy labs will result in a 1 letter grade deduction for the entire course. There will be 6 labs. These are designed to familiarize you with the problems and skills you will need for developing the final project. Only by working with these labs and gaining hands-on expertise you will be able to even come close to finishing the final project. **It is expected that each student will do the first 4 introductory labs on their own work in their own creative way.** Any copying or cheating detected on these labs will result in a letter grade reduction. **The last two labs (lab 5 and lab 6) can be done in groups of 3 students.** Note that group composition can change during these two labs. The idea behind forming groups for the last two labs is to allow you find the right partners you can work with cohesively in preparation for the group project. All lab exercises should be demonstrated to the TA/Grader on the lab due date. **Due to large class size and staff constraints, the labs are graded as *all or nothing*.** In other words, you will either get full grade for a working lab or get no grade (0%) for non-working labs. Hence, please ensure you put your full effort in getting the labs to work. **No late submissions are allowed.** If you have extenuating circumstances, e-mail the instructor but note that we are going to reject most excuses.

Project Development: After the completion of 6 labs you are required to form groups of 3 to brain storm and come up with ideas for mobile applications. It is expected that your group will *propose, implement and demonstrate* an end-to-end mobile application that satisfies a compelling user need and uses several "cool" features of N95. The project development is split into 3 phases.

Phase 1:

In phase 1 you will propose your mobile application in the form of a phase 1 presentation to the entire class. You will need to convince us why the application is compelling and then present a development plan -- your plan to split the big project goal into smaller goals that can be worked on by each member of the team.

Phase 2:

In phase 2 you will demo the intermediate working prototype that has some pieces of the larger application already in working order. You will explain what each member of the team has implemented.

Phase 3:

In phase 3 you will demo the final prototype of the end-to-end application. You will document your learnings – what was easiest, what was challenging, what are the pitfalls etc.

Note that each of the 3 phase presentations will be done in class so the entire class can learn from each other. The instructors decide which member of the team is going to do the presentation in each phase using a random drawing few minutes before the presentation. By using the random drawing mechanism every member is expected to be fully abreast with what the other members of the team have done.

Select Project Demos: Based on phase 3 presentations, instructors plan to choose up to 6 projects that will be showcased to a panel of industry and academic experts in a special end of the semester session. **The top 3 projects at this showcase will earn special prizes, supported by funds awarded for this class by USC Stevens.**

Attendance: You are expected to attend ALL lectures and discussion sections.

Office visits and Participation: You will receive 5% of your course grade for class participation and office visits. Please make effective use of the TA and Professors' office hours.

Academic Integrity: You are expected to maintain the highest standards of academic conduct. Any form of plagiarism or other violation of academic integrity will be referred to Student Judicial Affairs and will likely result in a stiff penalty (ranging from a letter grade reduction to an "F" in the course).

Academic Accommodations: Students requiring academic accommodations based on a disability are required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. - 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Expectations: Attend class, do your assignments, avoid cheating/copying, ask questions and participate!

Course Grade: $\geq 90\%$ guaranteed A. $\geq 80\%$ guaranteed B. $\geq 70\%$ guaranteed C.

Course Schedule and Lecture Topics:

Wk	Date	Lecture Topic	Demo	What is due from the student?
1	16-Jan	Intro to Class; Mobile Platforms; Overview of Cellular;	Hello World	
2	23-Jan	Bluetooth	Blue Tooth	Hello World Lab
3	30-Jan	Guest Lecture (Nokia)	Camera	BlueTooth Lab
4	6-Feb	802.11/Wifi	Video	Camera Lab
5	13-Feb	GPS knowledge; Mapping Coordinates;	GPS	Video Lab
6	20-Feb	Database/Java	Web Service	GPS Lab
7	27-Feb	Guest Lecture (UCLA)		Web Service Lab
8	5-Mar	Guest Lecture (Nokia: Quinn Jacobson)		
9	12-Mar	Proposal Presentation		Proposal Presentation
10	26-Mar	Guest Lecture		
11	2-Apr	Guest Lecture		
12	9-Apr	Midterm Presentation		Midterm Presentation
13	16-Apr	Guest Lecture		
14	23-Apr	Final Presentation		Final Presentation
15	30-Apr	Final Presentation		Final Presentation

Lab Schedule and Due Dates:

Lab#	Description	Assigned	Discussion	Due
1	Install all required tools on the laptop and run HelloWorld Midlet	Jan 16 th	Jan 18 th	Jan 28 th
2	Write a MIDlet that turns on Bluetooth and communicate with another phone. You have to first transfer a picture file from one phone to other. Second, you have to enable a continuous chat between the two phones.	Jan 23 rd	Jan 25 th	Feb 4 th
3	Write a MIDlet that turns on Camera and takes a picture. It then uses Lab#2 expertise to transfer that picture to another phone using Bluetooth.	Jan 30 th	Feb 1 st	Feb 11 th
4	A simple extension of Lab#3. Write a MIDlet that turns on Camera and takes a Video clip. It then uses Lab#2 expertise to transfer that picture to another phone using Bluetooth.	Feb 6 th	Feb 8 th	Feb 18 th
5	Write a MIDlet that turns on GPS and records the GPS coordinates. It then uses Lab#3/4 expertise to geo tag a picture (just label the picture with lat,long values) and then transfer the picture to another phone.	Feb 13 th	Feb 15 th	Feb 25 th
6	Write a MIDlet that communicates with a backend Java servlet and transfer a picture taken using Lab#5 to store on backend server. The MIDlet also downloads the same picture from the server and displays the image on phone.	Feb 20 th	Feb 22 nd	Mar 3 rd
7-P1	Project Phase1 Presentations	Feb 27 th	Feb 29 th	Mar 12 th
8-P2	Project Phase2 Presentations	Apr 9 th	Apr 9 th	Apr 9 th
9-P3	Project Final Presentations	Apr 30 th	Apr 30 th	Apr 30 th
10-P4	Select 6 Project Demos to USC	TBA	TBA	TBA

We plan have to have a series of exciting guest lecturers from both industry and academia: Nokia, Motorola, Qualcomm, UCLA, USC.