

**CMPS 455
SPECIAL PROJECTS
SPRING 2018**

CATALOG DESCRIPTION: CMPS455 SPECIAL PROJECTS

Independent project implemented under the guidance of a member of the Computer Science faculty.

Prerequisite: Senior standing with a minimum of 21 semester hours in Computer Science and Departmental Permission Only

Textbook: Not Needed

Credit Hours: 3

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Course Goals:

- a. Outcomes of Instruction
 - i. Students should understand ...
 - (1) Students should be able to produce documents that are documented and formatted according to standard guidelines for academic writing, including those by the Graduate School of Southern University.
 - (2) Students should be able to conduct research systematically, and communicate their ideas at every stage of the research process clearly and comprehensively. Peer presentations are expected, and feedback evaluated.
 - (3) Finally, students should present their research findings in a properly formatted document.
- b. Student outcomes addressed by the course
 - i. Student outcomes

CMPS 394– Mobile Deployment

CATALOG DESCRIPTION: CMPS394 Mobile Deployment

Introduce the concepts involved in Mobile Server Development, deployment and other inter-related dependencies that a server environment may require. Discussions around application development and deployment, communication methods, data exchange standards, logging, analytics, infrastructure concepts, troubleshooting, and interfacing with back-end systems will be discussed. Where applicable, there will be a call out difference between consumer infrastructure, enterprise infrastructure, and a discussion around using MBAAS (Mobile Back-end As a Service).

Prerequisites: 393 Mobile Client – there are a lot of dependencies that will be used in this course that the 393 course sets up.

Credit Hours: 3.0

Intended Audience: Computer Science Majors

Conceptual Framework: This course unites both the design and implementation aspects of mobile deployment.

Course Resources:

Textbook: Joyce Farrell. *Java Programming*. 7th edition. Cengage Learning. ISBN-10:1285081951.

General Reading Sources:

- Ken Arnold, James Gosling, and David Holmes. *The Java™ Programming Language*. 3rd edition, 2000. Addison-Wesley.
- Paul S. Wang. *Java with Object-Oriented Programming*. 2nd edition, 2003. Brooks-Cole.
- **Websites:** <http://java.sun.com/>

Course Goals, Objectives, and Learning Outcomes:

Goals: The general goals of the course are to:

- (1) Develop fundamental knowledge of mobile deployment
- (2) Prepare student to be knowledgeable and skillful in mobile deployment.

Objectives and Learning Outcomes: Upon completing the course, students should be able to:

- (1) Have the knowledge of Mobile Server development / deployment concepts
- (2) Have the ability handle issues of inter-system communications, and deploy back end services for consumption by front end
- (3) be able to handle issues in mobile server development, deployment and other interrelated dependences, application development and deployment, communication methods, data exchange standards, logging, analytics, infrastructure concepts, troubleshooting, and interfacing with back-end systems.

Learning Outcomes

Each graduate by the time of graduation will demonstrate:

- A. an ability to apply knowledge of computing and mathematics appropriate to the discipline,
- B. an ability to analyze a problem, identify and define the computing requirements appropriate to its solution,
- C. an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs,
- D. an ability to function effectively on teams to accomplish a common goal,
- E. an understanding of professional, ethical, legal, security and social issues and responsibilities,
- F. an ability to communicate effectively with a range of audiences,
- G. an ability to analyze the local and global impact of computing on individuals, organizations, and society,
- H. recognition of the need for and an ability to engage in continuing professional development,
- I. an ability to use current techniques, skills, and tools necessary for computing practice.

Weekly Course Schedule

Sample Schedule:

Note:

- Assumptions: 13 week semester. 3 hour course.
- For Android Exposure, Students will have access to Android tablets or phones. Will also need access to Development environments in a connected state to the internet.
- For IOS exposure, Students will have access to a recent IOS device (iPod Touch, iPhone, iPad) and to a recent Mac Platform (Mac Mini, iMac, Intel i5, and i7) with Xcode installed. Will also need access to Development environments in a connected state to the internet.
- There is an opportunity to either take the course and make all students responsible for their own work – or to have the students work in SMALL teams (2-3 folks).
- THOUGHT: most of the “server side class” could be done using a Raspberry Pi 2 or some similar cheap SBC that runs linux – that would help remove a lot of issues with remote servers / services for deployment, and the students can do this anywhere by just connecting their workstation to the same network as the R-PI.

Week 1 – Refresh of Mobile ecosystem

- Introductions, Syllabus, Performance Expectations.
- Mobile ecosystem overview, identify major components
- More details of internet infrastructure
- Start talking about Web Servers and how they are used, configured, deployed.
- Application servers, DB Servers, other Internet infrastructure components

Week 2 – Mobile Server architecture

- Specific instances /case studies of existing products – Apache Web Server, NGINX, etc., Application Servers (TOMCAT, Websphere), commercially available packages (ecommerce solutions, LAMP stacks, etc.)
- Relationships of “Mobile Application Servers” to the omnichannel experience (the companies web sites, email communications, branding, transaction sites, and now bringing Mobile into the picture)
- Deep dive on Web Servers (HTTP, HTTPS)

- Deep dive on Web Servers (HTTP, HTTPS) #2 – Certificates, Encryption, Ports, HTTP headers, commands, response codes
- Debugging and testing HTTP communications (lecture and LAB). Client side endpoint testing, proxy server testing (closer to the server side)
- Refresher on HTML,

Week 3 – Mobile Data

- Build up the mobile data picture; call out where the data comes from to provide a complete information set to deliver the content to the device. Discuss Content Delivery networks, Caching servers, matching issues of demand and scale for mobile information. Discuss data formats (data type field in the HTTP header, TYPE tag), XML, Binary data, Base 64 encode / decode, JSON data structures.
- RESTful calls / systems. Expose frameworks that support this from a middleware perspective (EG: ROR)
- Discuss Server based logging – Web Server Logs, Application Server Logs, Application Specific Logging, other methods of user interaction data tracking (external JS “bugs”, Omniture, Core Metrics, etc.)
- Lab: Work on calls to a server, provide a WebServices (REST) framework for the following: Create an item, Delete an Item, Modify an Item, Get an Item, Get a list (range), get a data set back
- Use logs to trace your specific calls on the server (a group server can be used to show the intermixing of data in the logs, etc.)

Week 4 – Mobile Specific Server issues.

- Push Notifications, URL redirects, Browser / app agent detection, App upgrade issues, Property files
- Mobile application Deployments, Enterprise App Stores, Mobile Device Management, Identity and Access control issues
- Deployment options – commercial services that can be used... MBAAS, Roll your own, etc.

Week 5 – Deployment issues

- DevOps 1 – Flow from Client, to developer, to SCM repo, to build infrastructure, to artifactory. Continuous Integration. Bug tracking, feedback, iterations, agile, scrum
- DevOps 2 – Flow from Artifactory to infrastructure. Cover configuration management, Continuous deployment tools and processes. Server Monitoring, Logs, events, triggers, code progression through environments (dev, test, integration, QA, Stage, Prod)
- Lab – CI / CD tools (Jenkins, Chef, Puppet, etc.)

Week 6 – Summarize / Review of the complete Mobile Deployment Picture / process

- Review of Internet architecture, components, reasons on why certain things are in place. Case Studies on small, medium, large, international deployed solutions.
- Review of “how a web server works” – HTTP, HTTPS, connections to application servers, etc.
- LAB: Start to sketch out a mobile back end service project (proposal, thoughts around what data would be needed / used. users, use cases, etc. Suggestion: use a pre-cooked mobile app (source code needed) that already has the majority of the framework in place for reaching out to a mobile server)
- Review of Mobile specific deployment issues, Devops (CI/CD) responsibilities.
- Lab: Start to define the API map for the calls that will be used for the front end service.
- Class Presentation and review of the Design Artifacts.

Week 7 (MID TERMS) Review

- Mid Term
- LAB: Get accounts set up on all systems, set up servers, set up SCM, set up Jenkins. (Use Git or GitHub to check in your code to manage versions)

Week 8 – Mobile Server Project Week 1 – Setup, Design

- Define Sprints, Teams, Goals, Requirements
- Check out code for mobile client app
- Start repo for mobile server app (can start from Skeleton if it makes sense to)
- Finish API specs / docs. Put docs into a static website format for reference and updating as you build / update the site.
- Start with CREATE REST verb (POST). Be able to write content to the persistent store. Validate data.
- Next: READ verb (GET)
- Next: Update Verb (PUT)
- Next: Delete (DELETE)
- Go through several examples of all
- Talk about data collections (lists, series of records)
- Validate server is functional, is collecting data, is sending data, is logging actions.

Week 9 – Mobile Server Project Week 2 – Develop, Debug

- Implement first object C/R/U/D calls, validate client / server interactions. Deploy to server and validate.
- As code is being developed, check it into the repo, trigger a build from the repo and have Jenkins report on success / fail of build.
- Bring in Chef to deploy the developed code to the servers.
- Implement second object C/R/U/D calls, validate client / server interactions. Deploy to server and validate.
- Implement third object C/R/U/D calls, validate client / server interactions. Deploy to server and validate.

Week 10 – Mobile Server Project Week 3 – Develop, Debug

- Refine / refactor any server side logic to take into account issues of boundaries (cant delete a record that does not exist, return N number of records on a call, adjust N for issues of optimization)
- Do peer review of code (pass code from team a to team b, have them review and implement a call ... validate that all specified instances return as expected.
- Finalize all calls, implement Push Notifications

Week 11 – Mobile Server Project Week 4 – Develop, Debug, INTEGRATION

- Validate all calls are interacting with Client. All server calls should be stable. Optional: Have mobile client grab content from a foreign server as well as local server to provide a mashup in the client. Refactor this code to do the same in the Server (let the server do the work, let the client only request, display, and “field form” the data.
- Exercise: Refactor the code that was written into RUBY
- Exercise: Refactor the code that was written into Node.js

Week 12 – Testing, Deployment, Validation

- Exercise: Refactor the code that was written into Java
- Validation of bugs, correction of bugs, implementation of code.
- Validation of bugs, correction of bugs, implementation of code.

Week 13 – Summary, Wrap-ups, Open items

- Peer Review of code.
- Team Demonstration of functioning application, discovery of lessons learned, issues seen and overcome.
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Week 14 (FINALS)

- Finals

Evaluation of Students

Projects	60%
Midterm	20%
Final	20%
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TOTAL	100%

Grading

The grading scale is:

90% -- 100%	A
80% -- 89%	B
70% -- 79%	C
60% -- 69%	D
0% -- 59%	F

Academic Dishonesty

The University defines academic dishonesty in two categories—premeditated and unpremeditated fraudulent behavior. Premeditated fraud is defined as conscious, pre-planned, deliberate cheating with materials prepared in advance. For more information please see www.subr.edu

ADA Compliance

Southern University does not discriminate on the basis of disability in the recruitment and admission of students, in the recruitment and employment of faculty and staff, or in the operation of any of its programs and activities, as specified by federal laws and regulations. The designated coordinator for Compliance with Section 504 of the Rehabilitation Act of 1073, as amended, is Patricia Hebert; Coordinator of Student Services is located in Room 246 Augustus Blanks Hall, (225)771-3950.

CMPS 370 – OBJECT-ORIENTED PROGRAMMING

CATALOG DESCRIPTION: CMPS370 OBJECT-ORIENTED PROGRAMMING

This course will introduce the student to the concepts underlying object-oriented programming. It reviews pointers, procedures and structures in C. It introduces the concept of classes and objects for problem analysis, design and solution. It covers the ANSI standard of C++, syntax and implementation aspects with a wide range of class definitions and object manipulations. Some commercially available C++ program developments will also be discussed.

Prerequisites: *CMPS 201 and admission to the department.*

Credit Hours: 3.0

Textbook: (Recommended) Java Programming, 2016 (8th edition), Joyce Farrell, published by Cengage Learning, ISBN: 13: 978-1-285-85691-9, 2016.

Educational Objectives:

Educational objective related to this course is to provide students a solid background in good object-oriented programming techniques and introduces terminology using clear, familiar language. It will train students in business problem solving and Java object-oriented programming.

Student Learning Outcomes:

Students will understand concepts used in object-oriented programming, know how to modify and create simple Java programs and have the tools to create more complex examples, and possess a fundamental knowledge of object-oriented programming, which will serve you well in advanced Java courses or in studying other objectoriented languages such as C++, C#, and Visual Basic.

Evaluation of Students

Projects	30%
Midterm	35%
Final	35%
TOTAL	
	100%

Grading

The grading scale is:

90% -- 100%	A
80% -- 89%	B
70% -- 79%	C
60% -- 69%	D
0% -- 59%	F

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