

Summer 2020

## **CS 491-451: Computer Science Project**

Osama Eljabiri

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### **Recommended Citation**

Eljabiri, Osama, "CS 491-451: Computer Science Project" (2020). *Computer Science Syllabi*. 118.  
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**Senior Project Capstone Courses**  
**CS/IT491**  
**(Summer 2020)**

**Course Identification:**

**Course:** *Senior Project Capstone Course*

**Instructor:** Osama Eljabiri, PhD

**Office:** Room 4210 - GITC Building – 4<sup>th</sup> Floor (*N/A during campus closing*)

**Office Hours:** One hour before and after class via WebEx and non-stop support via Slack.

**Online help:** Virtual office via WebEx, Slack and email

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**Class Time/ Location:** <https://njit.webex.com/meet/oe2>

**Virtual Classroom System:** <http://MOODLE.njit.edu> and <http://canvas.njit.edu>

**1. 1. Course Information:**

**A. Course Number, Title, Credits**

CS/IT 491, Senior Capstone Project, 3 credits.

**B. Prerequisites**

Senior standing. An opportunity for students to integrate the knowledge and skills gained in previous information technology work into a real world team-based project. The project involves investigation of current literature as well as implementation of either a part of a large application or the whole of a small system.

**C. Course Description**

The CS/IT Capstone Project is intended to provide a real-world project-based learning experience for seniors in the computer science undergraduate degree. The overall objectives of this course are to investigate the nature and techniques of a business and computing development project. Projects are either provided by industry partners or proposed by students who wish to become entrepreneurs. Entrepreneurship projects (E-teams) are intended to build a foundation for real world businesses. Eteams' project proposals are reviewed by a panel of expert judges prior to approval. E-teams are mentored and evaluated by an entrepreneurship board of industry, university and alumni advisors. E-teams will carry out market research, target real world stakeholders and validate solutions using quantitative analysis based on customers' feedback via questionnaires.

The course involves business analysis, business modeling, project management, feasibility analysis, risk analysis, R&D, requirements engineering, system design, implementation, quality assurance, documentation and presentation of a real world business problem and solution. The course is interdisciplinary in nature where students use their collective knowledge in business and technology to provide creative solutions in collaboration with real world project stakeholders.

## 2. Course Features and Objectives:

### A- Features:

This course has unique features that are not currently offered through any other course on campus. These features are:

- It provides hands-on multidisciplinary real world experiences that integrate business applications with information technology areas such as multimedia and network security.
- It strengthens the 4-year college curriculum by enabling students to use what they learn collectively and creatively.
- It simulates the real-world environment internally in the structure of students' teams and course "virtual organization".
- It offers dynamic market-driven training that reflects hot topics highly demanded by industry but not usually covered through a static college curriculum.
- It enables students to master career-oriented skills such as leadership, presentation, entrepreneurship, social and communication skills.
- It shows how both IT and business knowledge are used to solve real-world IT problems.
- The experience gained working on such projects will make students more employable by industry including the ability of building businesses through the entrepreneurship track.

### B- Specific goals for the course

Students who complete this course successfully will have:

- Ability to breakdown complex problems into manageable pieces (using WBS and Gantt).
- Ability to identify project risks and suggest strategies to minimize them.
- Ability to define project stakeholders, scope & requirements (including the use of FDD).
- Ability to capture, map and visualize the design of the proposed solution identifying key components and their relationships (examples: class diagram, ERM, network diagram, system architecture, etc.)
- Ability to implement the solution successfully using software and/or hardware technologies or other project related tools (via prototypes).
- Ability to test (validate and verify) the quality of the executed solution using user feedback and other testing techniques.
- Ability to communicate a value proposition of the project to various stakeholders including the ability to explain, convince, engage and impress.
- Ability to organize the presentation in a meaningful and professional fashion including mastering personal and collaboration presentation skills.

Accordingly, the general outcomes of this course include:

- (a) An ability to apply knowledge of computing and mathematics appropriate to the discipline*
- (b) An ability to analyze a problem, and 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*
- (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.*
- (k) An ability to apply design and development principles in the construction of software systems of varying complexity.*

### 3. Course Details:

#### A. Course outline with approximate week-by-week schedule (subject to change if necessary)

SUMMER 2020 CAPSTONE SCHEDULE					
Date	Activities	Time	Location	Regular Class	Deliverables
Tuesday, May 19, 2020	Introduction to the capstone experience <b>Regular class</b>	4-5PM & 6-7PM	WebEx	<b>YES</b>	None
Tuesday, May 26, 2020	Capstone Industry <b>Regular class</b>	4-7PM	WebEx	<b>YES</b>	Online survey and NDA
Tuesday, June 2, 2020	First Sprint Presentation to sponsors <b>NO regular class</b>	Any time	Any where	NO class - Present to sponsor	<b>Progress report 1, Scope and Gantt</b>
Tuesday, June 9, 2020	Independent Team Work – <b>NO regular class</b>	Any time	Any where	NO class - Meet with your team	<b>Progress report 2</b>
Tuesday, June 16, 2020	Independent Team Work – <b>NO regular class</b>	Any time	Any where	NO class - Meet with your team	<b>Progress Report 3</b>
Tuesday, June 23, 2020	Second Sprint Presentation to sponsors <b>NO regular class</b>	Any time	Any where	NO class - Present to sponsor	<b>Progress Report 4</b>
Tuesday, June 30, 2020	Independent Team Work – <b>NO regular class</b>	Any time	Any where	NO class - Meet with your team	<b>Progress Report 5</b>
Tuesday, July 7, 2020	Third Sprint Presentation (pre-final) <b>(Virtual delivery)</b>	During the day until midnight	MOODLE	<b>Virtually Delivery</b>	Submit midterm MDDDE presentation via video and PPT
Tuesday, July 14, 2020	Independent Team Work – <b>NO regular class</b>	Any time	Any where	NO class - Meet with your team	<b>Progress Report 6</b>
Tuesday, July 21, 2020	Independent Team Work – <b>NO regular class</b>	Any time	Any where	NO class - Meet with your team	<b>Progress Report 7</b>

<b>Tuesday, July 28, 2020</b>	Final Presentations (4th Sprint) <b>Regular class</b>	4-7PM	<b>Via WebEx live</b>	<b>YES</b>	
<b>Sunday August 2, 2020</b>	Final report submission and Sponsor Evaluations - <b>NO regular class</b>	Any time	Any where	SUBMIT ON MOODLE	<b>Progress Report 8 (Final)</b>

## B. References

- Software Engineering: Theory and Practice, Second Edition by Shari Lawrence Pfleeger.
- Information Technology Project Management, Fourth Edition, Kathy Schwalbe, ISBN: 061921526-7 © 200.
- Modern Systems Analysis and Design by Jeffrey A. Hoffer, Joey F. George and Joseph S. Valacich, Third edition, Addison Wesley (*ISBN: 0-13-033990-3*)
- Software Engineering, Ian Sommerville, Addison-Wesley, 6th edition, 2005, ISBN 0- 201-39815X

## C. Number of hours of lecture, recitation, and laboratory

Students work on real-world entrepreneurial, industry sponsored or research development projects for the entire 9 weeks of the semester. The problem solving process is broken down into five “Sprints”. A sprint is a 2-3 week time-boxed duration or project phase that allows students and project’s stakeholders to manage change, risk and complexity and adapt to skillsets and project requirements through evolutionary prototyping. Lectures and training will include a comprehensive crash course in the few weeks and some on-demand training (when available) throughout the semester. Starting from the third or fourth week of the semester, students will be required to have frequent team meetings (at least once a week face to face) and frequent client meetings (at least once every two weeks). Additional hands-on training, project management training and laboratory hours will also be included.

## GRADING POLICIES

Your final grade in this course will be based on the percentage of points that you receive out of the total possible points for the course (1100). Grades will be determined according to the following scale:

<b>90% - 100%</b>	<b>A</b>
<b>85%- 89%</b>	<b>B+</b>
<b>80% - 84%</b>	<b>B</b>
<b>75%- 79%</b>	<b>C+</b>
<b>70% - 74%</b>	<b>C</b>
<b>60% - 69%</b>	<b>D</b>
<b>0% - 59%</b>	<b>F</b>

## Capstone Evaluation Criteria

Summer 2020

Criterion	Percentage	Explanation
Attendance	By deduction	3% deduction for every class absence
		3% deduction for each other group meeting absence
Sprint 3 (Pre-Final Presentation)	15% (150 points)	Virtual Midterm Presentation 5% of this grade is based on sponsor feedback
2 Sprints presentations to sponsors <b>Sprints 1 &amp; 2</b>	9 % (90 points)	2 x 45= 90 points (Sprint 2 and 4) – Verified by progress report submitted by team leader on MOODLE <b>Sprint 1 Deliverables: Signed scope document and Gantt Chart uploaded to MOODLE</b>
8 progress reports by PM	16% (160 points)	Weekly progress report submitted by PM only on Moodle to evaluate each team member
Final product <b>(Evaluated by Sponsor)</b>	Client Evaluation 30% (300 points)	Final working IT or software solution (Tested and installed,)
Final presentation <b>(evaluated by judges)</b>	20% (200 points)	Presented live via WebEx
Final Report <b>OR</b> Second Project	10% (100 points)	If you do two projects, a final report is not required from you
Extra Credits	<i>Up to (100 points)</i> <i>10%</i>	<ul style="list-style-type: none"> <li>• Leading a team successfully</li> <li>• Second project can give up to 10% extra credit in addition to waiving final report requirement.</li> <li>• Capstone CISCO POP program (only 16 seats max – only IT network security students)</li> </ul>
<b>Total</b> <b>Max</b>		<b>1000 points</b> <b>1100 points</b>

**Please note that:**

- Class attendance, and in-Class /online participation and collaboration is very important
- In-group participation and attendance is extremely significant in determining your final letter grade.

## Capstone project options include:

- Industry Projects.
- Entrepreneurship Teams (*usually not applicable in the summer version*).
- RWC developing, teaching and mentoring project tracks for MS/HS students.
- Executive Team Project (overall management of the capstone enterprise).
- CISCO Project of Projects (only for IT students in Network and information security concentration)

## Honors students:

To earn the honors-credit during the summer capstone experience, you need to do one of five options (based on availability and interest):

- 1- Become a project manager for an industry capstone team and lead it successfully.
- 2- Join two projects instead of one, which depends on availability.
- 3- Become a member of the coaching team to develop and teach a curriculum for HS students successfully.
- 4- Join the executive team of the YWCC capstone program (*extremely limited in space*).
- 5- Complete an advanced (very detailed) version of the final capstone report on your own.

## CISCO Project of Projects (maximum 3 teams of 4 people each)

The primary objective of the Cisco Project of Projects is to study for the Cisco Certified Network Associate (CCNA) 200-301 certificate as an independent student-led group of Information Technology students who are the Network and Information Security specialization through means of group study and projects. *Taking the CCNA 200-301 is optional and intended of the course or NJIT.* Students will apply the knowledge they learned into a single networking project/demonstration in groups of no more than 4 people. The independent networking project will apply all problem solving strategies & life cycle in the capstone industry projects and submit the same deliverables. Ideally, students will emerge from this Capstone project with their CCNA 200-301 and a technical networking project to add on their resume. Combined with the degree they are soon to be finishing, students who participate will have the upper hand when entering the workforce.

**Good Luck,**

Dr. Osama Eljabiri