

## Knight Foundation School of Computing and Information Sciences

**Course Title:** Capstone II

**Date:** 12/20/2022

**Course Number:** CIS 4951

**Number of Credits:** 2

<b>Subject Area:</b> Knowledge focus groups covered in the curriculum of the BS in Computer Science.	<b>Subject Area Coordinator:</b> Masoud Sadjadi <b>email:</b> <a href="mailto:sadjadi@fiu.edu">sadjadi@fiu.edu</a>
<b>Catalog Description:</b> Students work on faculty supervised projects in teams of up to 5 members to design and implement solutions to problems utilizing knowledge obtained across the spectrum of Computer Science courses.	
<b>Textbook:</b> No text book required	
<b>References:</b>	
<b>Prerequisites Courses:</b> <a href="#">CIS 3950</a> (Capstone I) and Senior standing.	
<b>Corequisites Courses:</b> None	

Type: Required (CS, CY, IT)

Topics:

- Software development process
- Basic project management concepts
- Domain specific knowledge (for project being developed)

Course Outcomes:

1. Mastery of problem formulation.
2. Demonstrate mastery of specifying the requirements of a problem.
3. Demonstrate mastery of designing the solution to a problem.
4. Demonstrate mastery of realizing the solution to a problem.
5. Demonstrate the ability to validate and evaluate the solution to a problem.
6. Demonstrate the ability to manage a semester long project.
7. Demonstrate the ability to work effectively in a project team.
8. Demonstrate the ability to think logically and critically when developing the solution to a given problem.
9. Demonstrate the ability to apply concepts learned in various courses when developing the solution to a given problem.
10. Demonstrate the ability to communicate the details of the technical solution through verbal and written modes.
11. Demonstrate the ability to incorporate ethical issues into the project development and documentation process.

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**Association between Student Outcomes and Course Outcomes**

<b>BS in Computing: Student Outcomes</b>	<b>Course Outcomes</b>
1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	1, 2
2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.	3, 4, 5
3) Communicate effectively in a variety of professional contexts.	10
4) Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.	11
5) Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.	6, 7
<b>Program Specific Student Outcomes</b>	
6) Apply computer science theory and software development fundamentals to produce computing-based solutions. [CS]	8, 9
6) Apply security principles and practices to maintain operations in the presence of risks and threats. [CY]	8, 9
6) Use systemic approaches to select, develop, apply, integrate, and administer secure computing technologies to accomplish user goals. [IT]	8, 9

**Assessment Plan for the Course and how Data in the Course are used to assess Student Outcomes**

Student and Instructor Course Outcome Surveys are administered at the conclusion of each offering, and are evaluated as described in the School's Assessment Plan:  
<https://abet.cis.fiu.edu/>

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**Outline**

<b>Topic</b>	<b>Number of Lecture Hours</b>	<b>Outcome</b>
<ul style="list-style-type: none"> <li>• Project management               <ul style="list-style-type: none"> <li>○ Organization</li> <li>○ Planning</li> <li>○ Monitoring</li> </ul> </li> </ul>	4	1, 2, 7, 8, 10, 11
<ul style="list-style-type: none"> <li>• Problem Formulation               <ul style="list-style-type: none"> <li>○ Motivation</li> <li>○ Problem feasibility</li> <li>○ Problem statement</li> </ul> </li> </ul>	4	1, 2, 7, 8, 10
<ul style="list-style-type: none"> <li>• Requirements Specification               <ul style="list-style-type: none"> <li>○ Domain analysis</li> <li>○ Objectives of the solution</li> <li>○ Validation adequacy criteria</li> </ul> </li> </ul>	4	1, 3, 7, 8, 9, 10, 11
<ul style="list-style-type: none"> <li>• Design               <ul style="list-style-type: none"> <li>○ Formulation of a plan to implement requirements</li> <li>○ Limits on scope of solution</li> </ul> </li> </ul>	4	1, 4, 6, 7, 8, 9, 10
<ul style="list-style-type: none"> <li>• Realization               <ul style="list-style-type: none"> <li>○ Realize solution from design</li> </ul> </li> </ul>	4	1, 5, 6, 7, 8, 9, 10
<ul style="list-style-type: none"> <li>• Validation/Evaluation               <ul style="list-style-type: none"> <li>○ Check solution against requirements using adequacy criteria</li> <li>○ Compare solution to alternative solutions.</li> </ul> </li> </ul>	4	1, 6, 7, 8, 9, 10

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**Course Outcomes Emphasized in Laboratory Projects / Assignments**

Outcome	Number of Weeks
1. Project Plan Outcomes: 1, 2, 7, 8, 10, 11	variable 1 - 3
2. Requirements Specification Outcomes: 1, 2, 7, 8, 10, 11	variable 1 - 3
3. Solution Design Outcomes: 1, 3, 7, 8, 9, 10	variable 1 - 3
4. Final System Project Outcomes: 1,2,3,4,5,6, 7, 8, 9, 10, 11	variable 1 - 3

**Oral and Written Communication:**

Written Reports		Oral Presentations	
Number Required	Approx. Number of pages	Number Required	Approx. Time for each
4 (Project Plan, Requirements Document, Design Document, Final Project Document)	Variable (1-30)	at least 3 no more than 5	15 minutes per group (5 minutes per student)

**Social and Ethical Implications of Computing Topics**

Topic	Class time	student performance measures
Intellectual property - Patents, trademarks, copyrights of other similar products, and licensing of final product		Written reports - Requirements document and Final Project Document.
Privacy - privacy protection		Written reports - Requirements document and Final Project Document.
Economic issues - pricing strategies		

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**Approximate number of credit hours devoted to fundamental CS topics**

Topic	Core Hours	Advanced Hours
<b>Algorithms:</b>		0.4
<b>Software Design:</b>		0.4
<b>Computer Organization and Architecture:</b>		0.4
<b>Data Structures:</b>		0.4
<b>Concepts of Programming Languages</b>		0.4

**Theoretical Contents**

Topic	Class time

**Problem Analysis Experiences**

Feasibility study of alternative solutions
Specifying the requirements for a problem
Analyzing the requirements of a problem

**Solution Design Experiences**

Designing the solution to a problem
Techniques to validate the problem solution

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**The Coverage of Knowledge Units within Computer Science Body of Knowledge<sup>1</sup>**

<b>Knowledge Unit</b>	<b>Topic</b>	<b>Lecture Hours</b>
AL	Algorithms and Complexity	variable (1-3)
AR	Architecture and Organization	variable (1-3)
IM	Information Management	variable (1-3)
<u>NC</u>	Net-Centric Computing	variable (1-3)
<u>OS</u>	Operating Systems	variable (1-3)
PL	Programming Languages	variable (1-3)
<u>SE</u>	Software Engineering	variable (1-3)
<u>SP</u>	Social and Professional Issues	variable (1-3)

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<sup>1</sup>See [https://www.acm.org/binaries/content/assets/education/cs2013\\_web\\_final.pdf](https://www.acm.org/binaries/content/assets/education/cs2013_web_final.pdf) for a description of Computer Science Knowledge units