

## School of Computing and Information Sciences

**Course Title:** Computer Programming III

**Date:** 2/12/2018

**Course Number:** COP 4338

**Number of Credits:** 3

<b>Subject Area:</b> Programming	<b>Subject Area Coordinator:</b> Tim Downey <b>email:</b> downeyt@cs.fiu.edu
<b>Catalog Description:</b> Programming in C and advanced programming in Unix environments, including multiprocessing and multithreading. This course will have additional fees.	
<b>Textbook:</b> <i>The C Programming Language</i> (Kernighan and Ritchie), Prentice-Hall, 1988. ISBN: 0131103628.	
<b>References:</b>	
<b>Prerequisites Courses:</b> None	
<b>Corequisites Courses:</b> <i>COP-3530 Data Structures</i>	

**Type:** Required

**Prerequisites Topics:**

- Significant programming experience in a modern programming language
- From COP3337: Master arrays and multidimensional arrays ~~Basic~~ knowledge of UNIX systems

**Course Outcomes:**

- O1. Master C basic types, arrays, and pointers
- O2. Be familiar with the UNIX development environment, using utilities such as Makefiles, gcc, and gdb
- O3. Master standard Input/Output
- O4. Be familiar with process address spaces: Data, Heap, Code, and Stack
- O5. Master dynamic memory management
- O6. Master multithreading and synchronization
- O7. Master writing program solutions to problems using the above features

**School of Computing and Information Sciences**  
**COP 4338**  
**Programming III**

**Relationship between Course Outcomes and Program Outcomes**

<b>BS in CS: Program Outcomes</b>	<b>Course Outcomes</b>
a) Demonstrate proficiency in the foundation areas of Computer Science including mathematics, discrete structures, logic and the theory of algorithms	
b) Demonstrate proficiency in various areas of Computer Science including data structures and algorithms, concepts of programming languages and computer systems.	1-7
c) Demonstrate proficiency in problem solving and application of software engineering techniques	7
d) Demonstrate mastery of at least one modern programming language and proficiency in at least one other.	1-7
e) Demonstrate understanding of the social and ethical concerns of the practicing computer scientist.	
f) Demonstrate the ability to work cooperatively in teams.	
g) Demonstrate effective communication skills.	

**Assessment Plan for the Course & how Data in the Course are used to assess Program 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:  
<http://www.cis.fiu.edu/programs/undergrad/cs/assessment/>

**School of Computing and Information Sciences**  
**COP 4338**  
**Programming III**

**Outline**

<b>Topic</b>	<b>Number of Lecture Hours</b>	<b>Outcome</b>
<ul style="list-style-type: none"> <li>• <b>C</b> <ul style="list-style-type: none"> <li>○ Basic types</li> <li>○ Type conversions and casting</li> <li>○ Pointers and Arrays</li> <li>○ Standard I/O</li> </ul> </li> </ul>	6	O1, O2, & O3
<ul style="list-style-type: none"> <li>• <b>UNIX</b> <ul style="list-style-type: none"> <li>○ Basic command line interface</li> <li>○ Makefiles and gdb</li> </ul> </li> </ul>	2	O2
<ul style="list-style-type: none"> <li>• <b>File I/O</b> <ul style="list-style-type: none"> <li>○ Parsing</li> <li>○ Formatted I/O for file data</li> </ul> </li> </ul>	2	O3
<ul style="list-style-type: none"> <li>• <b>Process Address Spaces</b> <ul style="list-style-type: none"> <li>○ Memory segments</li> <li>○ Static vs dynamic segments</li> <li>○ Segment scopes</li> </ul> </li> </ul>	2	O4
<ul style="list-style-type: none"> <li>• <b>Concurrency</b> <ul style="list-style-type: none"> <li>○ Multiprocessing and IPC</li> <li>○ Multithreading and synchronization</li> </ul> </li> </ul>	5	O6
<ul style="list-style-type: none"> <li>• <b>Dynamic memory management</b> <ul style="list-style-type: none"> <li>○ Pointers</li> <li>○ Memory allocation and deallocation</li> </ul> </li> </ul>	3	O5
<ul style="list-style-type: none"> <li>• <b>Optional topics</b> <ul style="list-style-type: none"> <li>○ Sorting</li> <li>○ Memory allocator</li> <li>○ Socket programming</li> <li>○ System calls</li> <li>○ Parallel programming</li> </ul> </li> </ul>	5	

**School of Computing and Information Sciences**  
**COP 4338**  
**Programming III**

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

<b>Outcome</b>	<b>Number of Weeks</b>
O1 & O2	2
O1 & O3	2
O3 & O5	3
O4 & O5	3
O6	2

**Oral and Written Communication:**

None

**Social and Ethical Implications of Computing Topics:**

None

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

<b>Topic</b>	<b>Core Hours</b>	<b>Advanced Hours</b>
Algorithms:		0.5
Software Design:		1.5
Computer Organization and Architecture:		0.5
Data Structures:		1
Concepts of Programming Languages:		1.0

**Theoretical Contents:** None

**School of Computing and Information Sciences**  
**COP 4338**  
**Programming III**

**Problem Analysis Experiences**

6 Programming Assignments

**Solution Design Experiences**

6 Programming Assignments

**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>
OS 3	Concurrency (multiprocessing and multithreading)	5
OS 5	Memory management	5
OS 8	File systems and I/O	2
PF 3	Fundamental data structures	1

---

<sup>1</sup>See [http://www.acm.org/education/curric\\_vols/cc2001.pdf](http://www.acm.org/education/curric_vols/cc2001.pdf) Chapter 5 for a description of Computer Science Knowledge units