CMPS 161
Algorithm Design and Implementation I
Fall 2008

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Office Hours: T, TH 12:15PM - 03:30PM, 06:15PM - 06:45PM


Course Description: Credit 3 hours. Prerequisite: Mathematics 161 or 165 or permission of the Department Head. Basic concepts of computer programming, problem solving, algorithm development, and program coding using a high-level, block structured language. Credit may be given for both Computer Science 110 and 161.

Minimum Topics:

- Fundamental programming constructs: Syntax and semantics of a higher-level language; variables, types, expressions, and assignment; simple I/O; conditional and iterative control structures; functions and parameter passing; structured decomposition
- Algorithms and problem-solving: Problem-solving strategies; the role of algorithms in the problem-solving process; implementation strategies for algorithms; debugging strategies; the concept and properties of algorithms
- Fundamental data structures: Primitive types; single-dimension and multiple-dimension arrays; strings and string processing
- Machine level representation of data: Bits, bytes and words; numeric data representation; representation of character data
- Human-computer interaction: Introduction to design issues
- Software development methodology: Fundamental design concepts and principles; structured design; testing and debugging strategies; test-case design; programming environments; testing and debugging tools

Learning Objectives: Students will be able to:

- Analyze and explain the behavior of simple programs involving the fundamental programming constructs covered by this unit.
- Modify and expand short programs that use standard conditional and iterative control structures and functions.
- Design, implement, test, and debug a program that uses each of the following fundamental programming constructs: basic computation, simple I/O, standard conditional and iterative structures, and the definition of functions.
- Choose appropriate conditional and iteration constructs for a given programming task.
- Apply the techniques of structured (functional) decomposition to break a program into smaller pieces.
- Describe the mechanics of parameter passing.
- Create algorithms for solving simple problems.
- Use pseudo code or a programming language to implement, test, and debug algorithms for solving simple problems.
- Describe some strategies that are useful in debugging.
- Discuss the representation and use of primitive data types and built-in data structures.
- Discuss the declaration, representation, and simple use (such as concatenation) of strings.
• Describe how scalars, strings, and arrays are allocated and used in memory.
• Write programs that use arrays (single-dimension and multi-dimension) and strings.
• Choose the appropriate data structure for modeling a given problem.
• Describe the ranges and memory requirements of different primitive data types
• Describe the internal representation of characters and strings for textual data
• Compare and contrast compiled and interpreted execution models, outlining the relative merits of each.
• Describe the phases of program translation from source code to executable code and the files produced by these phases.
• Identify and describe the properties of a variable such as its associated address, value, scope, persistence, and size.
• Discuss type incompatibility.
• Demonstrate the difference between call-by-value and call-by-reference parameter passing.
• Defend the importance of abstractions, especially with respect to programming-in-the-large.
• Discuss the properties of good software design.
• Select and apply appropriate design patterns in the construction of a software application.
• Demonstrate the capability to use a range of software tools in support of the development of a software product of medium size.

Course Learning Outcomes and Evaluation:
• An ability to apply knowledge of computing and mathematics appropriate to the discipline
  o Justification: Students learn fundamental programming constructs such as sequence, selection, iteration and abstraction (use of methods), as well as fundamental data structures such as primitive types and arrays.
• An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
  o Justification: Students learn to analyze a program through successive refinement and top-down design, to divide large problems into smaller ones, and to determine the data objects and tools that will be needed to solve a problem.
• An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs
  o Justification: Students design, implement, and test several programs in this course to meet the instructor's specifications.
• An ability to function effectively on teams to accomplish a common goal
  o Justification: Students work in a team in the first problem-solving assignment.
• An understanding of professional, ethical and social responsibilities
  o Justification: Students understand their ethical responsibility to perform their own work on assignments and tests.
• An ability to use current techniques, skills, and tools necessary for computing practice
  o Justification: Students learn to use the JGrasp integrated development environment, along with the current version of the Java JDK.
**Schedule (Tentative):**

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<td>08/25</td>
<td>Chap01: Introduction to Computers, Programs, and Java</td>
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<td>3</td>
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<td>Chap01: Introduction to Computers, Programs, and Java</td>
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<td>Chap02: Primitive Data Types and Operations</td>
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<td>10/06</td>
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<td>17</td>
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<td>Final Exams</td>
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**10/24/2008:** Last day to withdraw or resign from the University  
**12/15/2008:** Last day to return rental textbooks without a fine

**Grading Policy:**

- Programs/Homework/Quizzes: 30%  
- Tests: 40%  
- Final Examinations: 30%

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

**Attendance Policy:**  
Attendance is mandatory for all sessions of this course. Absences will be excused only with a valid written excuse, such as from a physician.  
[http://www2.selu.edu/Academics/Depts/FacSen/attendencepolicy.pdf](http://www2.selu.edu/Academics/Depts/FacSen/attendencepolicy.pdf)

**Program/Homework:**  
Programs/Homework will be collected periodically. Selected problems will be graded.  
*No late Programs / homework* will be accepted.

**Quizzes:**  
There will be a number of quizzes during this term. *No makeup quizzes* will be given.

**Examinations:**  
There will be two tests and a final examination. *No makeup examinations* will be given.  
If you miss an examination with an excused absence, your grade for this missed examination will be replaced by your final examination. In the case of illness, doctor’s excuse is needed. If your absence is unexcused, you will receive a grade of zero on the examination you missed.

**Academic Dishonesty:**  
Cases involving alleged academic dishonesty will be dealt with according to established university policies. Classroom behavior that is determined inappropriate and cannot be resolved by the student and the faculty member may be referred for administrative or disciplinary review. Cheating on examinations, plagiarism, improper acknowledgment of sources in essays and the use of a single essay or paper in more than one course without permission are considered very serious offenses and shall be grounds for disciplinary action. Additional information about the Code of Student Conduct may be found at:  
[http://www.selu.edu/admin/jud_affairs/assets/code_conduct.pdf](http://www.selu.edu/admin/jud_affairs/assets/code_conduct.pdf)

**ADA Accommodation:**  
If you are a qualified student with a disability seeking accommodations under the Americans with Disabilities Act, you are required to self-identify with the Office of Disability Services, Room 203, Student Union. No accommodations will be granted without documentation from the Office of Disability Services.
**Classroom Decorum:** Free discussion, inquiry, and expression are encouraged in this class. Classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of students to benefit from the instructor is not acceptable. Examples include routinely entering class late or departing early; use of beepers, cellular telephones, or other electronic devices; repeatedly talking in class without being recognized; talking while others are speaking; or arguing in a way that is perceived as “crossing the civility line.”

In the event of a situation where a student legitimately needs to carry a beeper or cellular telephone to class, prior notice and approval of the instructor is required.

The office/classroom is not a place for children and neither employees nor students are to bring their family members for day care or baby sitting. If children require care, then the employee/student is expected to provide that care in an environment other than Southeastern office/classroom space.