



South Portland, Maine 04106

## Computer and Information Sciences

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**Title: Principles of Computer Science**

**Instructor: Keith Sawyer**

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**Credit Hours: 4**

**Phone: 207-831-8640**

**Total Contact Hours: 60**

**Contact: use Discord, text, or email**

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### Course Syllabus Spring 2022

#### Course Description

This course will teach you how to design and write computer algorithms to solve a variety of problems using the Java programming language. Algorithms will be implemented as programs in Java. Topics include primitive data types and operations in Java, three types of control statements, methods, arrays and introduction of object-oriented concepts such as classes and encapsulation. Most of these topics are designed to provide students with tools that are useful when encountering computers in today's workplace. Furthermore, they are designed to enhance problem-solving and logical reasoning abilities.

**Prerequisite:** Successful completion of MATH 050 or higher or placement into a math course at or above MATH 145

#### Course Objectives

Students completing this course will be able to solve computable problems using the Java programming language.

Upon successful completion of this course, the student will be able to:

- Create variables to hold values during program execution.
- Demonstrate the ability to create functions to perform specialized tasks needed to solve problems.
- Describe number systems and representation of data in the computer.
- Demonstrate the ability to correctly sequence operations to solve computable problems.
- Demonstrate the ability to correctly use loops and decision structures.
- Demonstrate an ability to use arrays to solve appropriate problems.
- Design and code solutions to computable problems using an appropriate computer language.
- Troubleshoot programs of their own and those provided by the instructor for debugging purposes.
- Implement non-recursive algorithms in Java

## Topical Outline of Instruction

1. Introduction to Java
2. Variables / Assignments
3. Branches
4. Loops
5. Arrays
6. User-Defined Methods
7. Objects and Classes
8. Input / Output

## Learning Outcomes from ACM IEEE Computing Curriculum 2003

- Classify common input validation errors, and write correct input validation code. [Usage]
- Design and implement a class. [Usage]
- For both a primitive and a compound type, informally describe the values that have that type. [Familiarity]
- Discuss the importance of algorithms in the problem-solving process. [Familiarity]
- Discuss how a problem may be solved by multiple algorithms, each with different properties. [Familiarity]
- Create algorithms for solving simple problems. [Usage]
- Use a programming language to implement, test, and debug algorithms for solving simple problems. [Usage]
- Implement, test, and debug simple recursive functions and procedures. [Usage]
- Analyze and explain the behavior of simple programs involving the fundamental programming constructs variables, expressions, assignments, I/O, control constructs, functions, parameter passing, and recursion. [Assessment]
- Identify and describe uses of primitive data types. [Familiarity]
- Write programs that use primitive data types. [Usage]
- Modify and expand short programs that use standard conditional and iterative control structures and functions. [Usage]
- 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, the definition of functions, and parameter passing. [Usage]
- Write a program that uses file I/O to provide persistence across multiple executions. [Usage]
- Choose appropriate conditional and iteration constructs for a given programming task. [Assessment]
- Describe the concept of recursion and give examples of its use. [Familiarity]
- Identify the base case and the general case of a recursively-defined problem.
- Trace the execution of a variety of code segments and write summaries of their computations. [Assessment]
- Explain why the creation of correct program components is important in the production of high-quality software. [Familiarity]
- Identify common coding errors that lead to insecure programs (e.g., buffer overflows, memory leaks, malicious code) and apply strategies for avoiding such errors. [Usage]

- Apply a variety of strategies to the testing and debugging of simple programs. [Usage]
- Construct, execute, and debug programs using a modern IDE and associated tools such as unit testing tools and visual debuggers. [Usage]

### **Course Requirements**

Students will create 6 individual programming projects, take 2 tests, and complete a comprehensive final examination. Projects will involve computation, manipulation of data as well as searching and sorting arrays. Students should expect to spend 8-10 hours per week outside of class working on projects, homework and course preparation. There are Participation Exercises and Challenge Exercises in the zyBook chapters. These are due each week. These are completed online in the zyBook. Use the links in Brightspace to connect your work with the gradebook.

There are laboratory assignments that review chapter content, due most weeks. These are completed online in the class zyBook. Use the links in Brightspace to connect your work with the gradebook. Reading and exercises prepare students for the labs. The labs prepare the student for the projects. A full understanding of the projects prepares the student for exams.

### **Student Evaluation and Grading**

2 in-class tests	30%
6 projects	20%
Attendance	5%
Discussions	5%
Exercises & Labs	15%
Final Exam (comprehensive)	25%

### **Late Assignments**

There is a 5% penalty for each day that a project is submitted past the due date, up to a maximum penalty of 40%. Once graded, projects may be corrected and re-submitted and an average of the two grades will be applied.

### **Text, Tools and / or Supplies**

Online textbook at zybooks.com. See Brightspace for the code you will need to access the zyBook. You will need to create an account on zybooks.com. Then subscribe using the link in Brightspace. That will link your work to the gradebook.

You should have a notebook for taking notes and a writing instrument. It is strongly recommended that the student have a USB drive to store backup copies of all programming assignments.

### **Attendance Policy**

Attendance on time for each class is expected. Students missing 3 consecutive meetings without communicating with the instructor will be dropped from the course. Students missing a total of 6 class meetings (the equivalent of 3 weeks of the course) and having a failing grade will be dropped from the course. If you are dropped, you should withdraw from the course before the last day to withdraw to prevent the 'AF' from becoming an 'F'.

If the South Portland campus is closed on a class day the class will still be held via Zoom but attendance will be optional. Students will be expected to watch the video recording of the class as soon as possible. Due dates for project and other assignments will not be changed.

### **End-of-Course Evaluation**

Students complete evaluations for each course attended at SMCC. Evaluations are submitted online and can be accessed through the student portal. Students can access the course evaluations beginning one week before the end of classes. The deadline for submission of evaluations occurs Monday at 5 p.m. following the last day of the class. You will receive an e-mail to your student e-mail account when course evaluations are available.

### **ADA Statement**

Southern Maine Community College is an equal opportunity/affirmative action institution and employer. For more information, please call (207) 741-5798. If you have a disabling condition and wish to request accommodations in order to have reasonable access to the programs and services offered by SMCC, you must register with the Disability Services Coordinator, Sandra Lynham, who can be reached at 741-5923. Further information about services for students with disabilities and the accommodation process is available upon request at this number. Course policies about online testing are modified to suit each individual's accommodations.

### **The Learning Commons:**

The library, tutoring and writing centers, and reference/research assistance (typically located on the second floor of South Portland's Campus Center and in the Midcoast's LL Bean Learning Commons and Health Science Center) will be fully available online during the fall 2020 semester.

Here you can find free academic support through individually scheduled and drop in, online tutoring. You can also find information literacy/research librarians, and professional academic strategy/planning mentoring online. While the physical space of the Learning Commons will not be available at this time, we can also work with you to set up zoom classrooms for small group study. Services are offered by appointment or as drop-in assistance.

To access services:

- Visit My Learning in My Maine Guide or
- Select the "tutoring needed" button if it appears inside your Brightspace course.

Whether On Site or Online, students have consistently reported that the Learning Commons is a friendly, risk-free, and helpful place to seek academic support. It has also been shown that those who make use of the Learning Commons do better in a course than those who do not. We strongly encourage you to take advantage of this valuable and enjoyable resource.

### **SMCC Pay-for-Print Policy**

Each semester students receive a \$20 printing credit. The balance resets at the end of the semester and any remaining credits are removed. The College's pay-for-print system monitors printing on all printers (including those in general access labs, library printers, Tutoring Services, Campus Center Lounge and technology labs). Be sure to log OUT of the system when you've finished your printing, to prevent unauthorized access to your account. Students can check the number of pages they have printed by using the Printing Balance tool available on SMCC computers (located in the lower right corner of the screen, near the clock). Departments with work study students who need to print documents for the department should contact the Help Desk at 741-5696 to have a special account set up. To find ways to reduce your printing charges, please go to the IT Help tab on My SMCC. If you have questions about the pay-for-printing policy or your printing charges, please contact the Help Desk at 741-5696 or send an e-mail to [helpdesk@smccme.edu](mailto:helpdesk@smccme.edu).

### **Refunds**

Print jobs are eligible for a refund in the event of mechanical or electronic error on the part of the printer, print server, or software used to submit the job. Jobs are not eligible for a refund in cases where the job was not set up correctly, was submitted multiple times, or the student is not satisfied with the result. To request a refund, please bring the offending print to the IT Department in the basement of the Ross Technology Center. Refunds will be granted in the form of a credit to the student's account.

### **Add-Drop Policy**

Students who drop a course during the one-week "add/drop" period in the fall and spring semesters and the first three days of summer sessions receive a 100% refund of the tuition and associated fees for that course. Please note any course that meets for less than the traditional semester length, i.e., 15 weeks, has a pro-rated add/drop period. There is no refund for non-attendance.

### **Withdrawal Policy**

A student may withdraw from a course only during the semester in which s/he is registered for that course. The withdrawal period is the second through twelfth week of the Fall and Spring semesters and the second through ninth week of twelve-week Summer courses. This period is pro-rated for shorter-length courses, usually 75 percent of course meeting times; please check with the Registration Office. To withdraw from a course, a student must complete and submit the appropriate course withdrawal form, available at the Registration Office. This process must be completed either in person or by using SMCC e-mail accounts.

## **Plagiarism Statement**

If an instructor suspects that a student has knowingly committed a violation defined in the Maine Community College System Policy on Student Grade Appeals and Academic Misconduct, the instructor has the authority to review the alleged misconduct and determine the grade that the student should receive for the assignment and the course. The instructor may assign a failing grade for the assignment or course and may require the student to complete additional work for the course. The instructor may consult with the department chair and/or the College's chief academic officer prior to making such decisions. If a student seeks to challenge an instructor's determination, the student should submit a grade appeal. Grade appeal forms are available in the Advising Office on the South Portland Campus or in the administrative offices in the Learning Commons on the Midcoast Campus. An instructor may also refer the matter to the College's disciplinary officer for review under the procedures of the MCCS Student Code of Conduct