

Southwest Texas Junior College  
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## ENGR 2304

### Programming for Engineers

#### Course Description

ENGR 2304 - Programming for Engineers - 3 sem. hrs. (2-3-0) 1102015207  
Introduction to computer programming. Emphasis on the fundamentals of structured design, development, testing, implementation, and documentation. Includes coverage of language syntax, data and file structures, input/output devices, and disks/files. Two lecture and three laboratory hours per week. TSI Requirement: M3; R2; W1. Prerequisite: None Lab Fee: \$24

#### Course Focus

Java as a programming language will be used to solve engineering and scientific problems.

#### Textbook and Readings

Lewis, John and Loftus, William. Java Software Solutions - Foundations of Program Design. Sixth Edition. Boston: Pearson-Addison Wesley, 2008.

#### Technology Requirements

Students will be expected to have an email address, be able to access the Internet, use a word processor to create documents, and install and use JBuilder 2005 on a Windows 98, XP, 2000 computer with 100 Mbytes available disk space.

#### General Education Core Outcomes

This course is part of the college's general education core curriculum. The outcomes noted with an asterisk (\*) below are addressed in the course.

1. Read, summarize, and critically interpret written materials.
2. Identify, assess, and critically evaluate questions, problems and competing ideas and perspectives.
3. Communicate effectively both in oral and written form.
4. Work collaboratively as well as independently; demonstrate competent team and interpersonal skills.
5. Reason quantitatively as well as verbally.
- \* 6. Demonstrate competency in the application and use of technology.
7. Apply the scientific method to the process of evaluating reported research findings and to problem solving.
8. Value artistic expression.
9. Demonstrate an understanding of the ethics, values, behaviors, and viewpoints of people from diverse cultural backgrounds.

- \* 10. Identify, retrieve, summarize, and critically interpret information from electronic and text media.
- 11. Recognize broad historical, cultural, social, political and scientific perspectives.
- 12. Seek and engage in health, wellness and lifelong learning experiences.

### Course Outcomes

The following course outcomes will be addressed in this course:

- 1. Apply a systematic approach to problem solving and algorithm design.
- 2. Use data forms, variables and expressions in program design.
- 3. Apply the concepts of modular programming including object-oriented design.
- 4. Apply the concepts of structured design including sequence, selection, and repetition.
- 5. Apply recursive techniques to solve programming problems.
- 6. Use arrays, class libraries, and dynamic structures in your programs to store and work with data.
- 7. Create, test, debug, and document programs.
- 8. Demonstrate the ethical responsibilities associated with data and information processing.

### Student Objectives

In order to complete this course, the student must be able to:

- 1. attend class regularly
- 2. demonstrate responsibility
- 3. describe the purpose of a programming language
- 4. review the history of JAVA
- 5. identify the characteristics of JAVA
- 6. describe the relationship between JAVA and the World Wide Web
- 7. list the JAVA development tools
- 8. install JBuilder
- 9. identify the main elements of the AppBrowser window
- 10. create a sample JBuilder project
- 11. create a sample JAVA program (27-35)
- 12. compile a sample JAVA program
- 13. execute a sample JAVA program
- 14. identify the main terms associated with object oriented programs
- 15. discuss programming style and structure
- 16. describe problem solving with computer algorithms (44)
- 17. list the basic terms of an object oriented programming (45-48)
- 18. describe basic problem solving using object programming (45-48)
- 19. distinguish between syntax and semantics (41-42)
- 20. list basic error types (42-43)
- 21. describe JAVA identifiers (31)
- 22. describe JAVA primitive data types (73-77)
- 23. describe JAVA literals (73-77)
- 24. describe JAVA variables (69-72)
- 25. use assignment statements (69-72)
- 26. describe JAVA constants (73)
- 27. use print and println methods (62-64)
- 28. use JAVA operators (77-85)
- 29. create JAVA expressions (77-85)
- 30. apply rules of operand evaluation order, operator

- precedence, and operator associativity (77-85)
- 31. convert between data types (85-88)
- 32. use an interactive program (Scanner class) (88-92)
- 33. use proper naming conventions
- 34. describe the alias concept (116-118)
- 35. use the String class (118-121)
- 36. describe a Java library and package (121-122)
- 37. use the import declaration (122-124)
- 38. apply the Random class (124-127)
- 39. apply the Math class (127-131)
- 40. format output using the format classes and printf method (130-135)
- 41. use enumerated variable types (135-138)
- 42. describe the anatomy of a class (156-161)
- 43. define instantiate, encapsulate, visibility modifier, accessor, and mutator (161-166)
- 44. describe the anatomy of a method (166-167)
- 45. use the "return" statement (167-169)
- 46. define formal parameters, actual parameters (arguments) (169)
- 47. describe the local data concept (170)
- 48. describe a constructor (175)
- 49. describe structure programming and its purpose
- 50. list the three basic sequence control structures
- 51. use simple sequence structure
- 52. describe basic selection (control) structure and its purpose
- 53. describe Boolean expressions (202-203)
- 54. identify and use equality, relational, and logical operators (203-209)
- 55. use simple if structure (207-209)
- 56. use ifelse structure (209-217)
- 57. use ifelse if structure
- 58. identify and use the conditional operator (217-218)
- 59. nest if statements (218-220)
- 60. use switch structure (223-227)
- 61. use the while loop (227-237)
- 62. use the break and continue key words (237-238)
- 63. use the dowhile loop (242-245)
- 64. use the for loop (245-249)
- 65. compare iterative techniques (251)
- 66. overload a method (328-333)
- 67. declare an array (370-373)
- 68. Use an initializer list (379-380)
- 69. process an array
- 70. pass an array to a method
- 71. copy an array
- 72. use a two-dimensional array (398-403)
- 73. sort an array
- 74. search an array

### **Student Contributions**

Each student is expected to study at least twelve hours per week, which includes review of online materials, research and readings on class related topics, completion of assignments, and preparation for exams.

### **Course Evaluation**

Your performance will be evaluated by satisfactory mastery of the outcomes listed above. The point system below will be used to determine your grade:

Homework assignments 200 points  
Mid-term exam 100 points  
Final exam (Comprehensive) 200 points

The following point ranges will determine your final grade:

A 450-500  
B 400-449  
C 350-399  
D 300-349  
F 299 or less

### **Course Policies**

Plagiarism, the representation of someone else's work as your own, or cheating on an examination will not be tolerated. Either case will result in a grade of zero on the work or examination in question. Two or more infractions will be reported to the Dean of Instructional Services for disciplinary action.

### **Americans with Disabilities Act (ADA) Statement**

Any student with a documented disability needing academic adjustments is requested to speak directly to the Counseling Department (see below) as early in the semester (preferable within the first week) as possible. All discussions will remain confidential.

Crystal City Idalia De La Cruz (830/374-2828)  
Del Rio Marilyn Casson (830 775-1560)  
Eagle Pass Brenda Hoffman (830/758-4102)  
Uvalde Melissa Deleon (830/591-7352)

### **Class Schedule**

The class meets Tuesday-Thursday mornings from 8:00 to 8:50 AM. Labs are arranged on your own time and completed via WebCT.

### **Office Hours**

8:00 AM to 5:00 PM Monday through Friday.

Created: 2009-2010 Revised: 01/17/2010 Section: Spring 2010