ILLINOIS VALLEY COMMUNITY COLLEGE

COURSE OUTLINE

DIVISION: Workforce Development

COURSE: CSI 2011; Computer Science II

Date: 02/02/2017

Credit Hours: 4

Prerequisite(s): CSI 1011

Delivery Method:	☒ **Lecture**	**3 Contact Hours (1 contact = 1 credit hour)**
	☐ **Seminar**	**0 Contact Hours (1 contact = 1 credit hour)**
	☒ **Lab**	**2 Contact Hours (2-3 contact = 1 credit hour)**
	☐ **Clinical**	**0 Contact Hours (3 contact = 1 credit hour)**
	☐ **Online**	
	☒ **Blended**	

Offered: ☐ **Fall** ☒ **Spring** ☐ **Summer**

IAI Equivalent –***Only for Transfer Courses***-go to *http://www.itransfer.org*: CS 912

CATALOG DESCRIPTION:
This is the second course in a sequence of courses for computer science majors. This course covers the design, coding, and implementation of larger projects involving multiple objects/classes using inheritance, generics and interfaces. Topics include: data structures (stacks, queues, lists, iterators, trees, heaps), recursion, algorithm efficiency, sorts, and some GUI programming. This course is equivalent to IAI CSI 912. Lecture: 3 hours; Lab: 2 hours.

GENERAL EDUCATION GOALS ADDRESSED

[See last page for Course Competency/Assessment Methods Matrix.]

Upon completion of the course, the student will be able:

[Choose up to three goals that will be formally assessed in this course.]

☒ To apply analytical and problem solving skills to personal, social, and professional issues and situations.

☐ To communicate successfully, both orally and in writing, to a variety of audiences.

☐ To construct a critical awareness of and appreciate diversity.

☒ To understand and use technology effectively and to understand its impact on the individual and society.

☐ To develop interpersonal capacity.

☐ To recognize what it means to act ethically and responsibly as an individual and as a member of society.

☐ To recognize what it means to develop and maintain a healthy lifestyle in terms of mind, body, and spirit.

☐ To connect learning to life.

EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

[Outcomes related to course specific goals. See last page for more information.]

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

1. Analyze and explain the benefits and costs of using data structures (Big Oh notation)
2. Understand when to use data structures and which data structure is best in which application/scenario
3. Use data structures in coding programs
4. Identify situations where using recursion is appropriate and code simple recursive procedures
5. Analyze, understand, code, and compare different sorting algorithms

Outcome 1 – Students will be able to analyze and explain the benefits and costs of using data structures (Big Oh notation)

1.a Students will be able to discuss the goals of software development with respect to efficiency

1.b Students will learn about growth functions and Big-Oh notation.

1.c Students will use practical coding examples to simulate Big-Oh algorithms.

Outcome 2 – Students will be able to understand when to use data structures and which data structure is best in which application/scenario

2.a Students will learn about stack collections and when it is applicable to use stacks

2.b Students will learn about linked lists and when it is applicable to use linked lists

2.e Students will learn about queues and when it is applicable to use queues

2.f Students will learn about iterators and how they interact with the data structure classes

2.j Students will learn about all types of trees and when it is applicable to use trees

2.k Students will learn about heaps and when it’s applicable to use heaps

Outcome 3 – Students will be able to use data structures in coding programs

3.a Students will code using the Java Stack class

3.b Students will code using only arrays/ArrayLists

3.c Students will code using the Java LinkedList class

3.d Students will learn about Queues in the Java API (interfaces)

3.e Students will code Iterator and Iterable interfaces when using other data collections

3.f Students will code using binary trees

3.g Students will create a heap structure from scratch using an array as a data structure

Outcome 4 – Students will be able to identify situations where using recursion is appropriate and code simple recursive procedures

4.a Students will learn the underlying concepts of recursion

4.b Students will learn when recursion should and should not be used

4.c Students will use recursion to solve a problem

Outcome 5 – Students will be able to analyze, understand, code, and compare different sorting algorithms

5.a Students will re-visit the linear search and binary search algorithms.

5.b Students will examine several different sort algorithms

5.c Students will discuss the complexity of different sort algorithms

MAPPING LEARNING OUTCOMES TO GENERAL EDUCATION GOALS

[For each of the goals selected above, indicate which outcomes align with the goal.]

Goals	Outcomes
First Goal	
To apply analytical and problem solving skills to personal, social, and professional issues and situations	Outcome 1-5 - all
Second Goal	
To understand and use technology effectively and to understand its impact on the individual and society	Outcome 1-5 – all

COURSE TOPICS AND CONTENT REQUIREMENTS~~:~~

INSTRUCTIONAL METHODS:

- Lecture
- Lab
- Programming Assignments
- Group coding project
- Tests

INSTRUCTIONAL MATERIALS:

Java Software Structures, Designing and Using Data Structures 4e, Lewis and Chase
JGrasp and/or Eclipse IDE
Java SDK – latest version
Computers for the students to work on in lab time

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

Students are expected to:

1. Read assigned material from book and select Internet sites
2. Watch videos when assigned on key topics that show coding techniques
3. Code, compile, test, and document programming assignments individually
4. Ask questions in class and lab to further his/her understanding of the topic

Grading Scale:
A= 90-100
B= 80-89
C= 70-79
D= 60-69
F= 0-59

There will be two exams, midterm and final. Exams are worth 30% of overall weight. There will be 8-10 programming assignments varying in point value. Classroom activities may be used to increase participation and understanding. Classroom activities and programming assignments are worth 70% of the overall weight.

OTHER REFERENCES

- Java Programming: From Problem Analysis To Program Design 5e, D.S. Malik
- Big Java Early Objects 6e, Horstmann

Course Competency/Assessment Methods Matrix

(Dept/# Course Name)	**Assessment Options**																															
For each competency/outcome place an “X” below the method of assessment to be used.	**Assessment of Student Learning**	Article Review	Case Studies	Group Projects	Lab Work	Oral Presentations	Pre-Post Tests	Quizzes	Written Exams	Artifact Self Reflection of Growth	Capstone Projects	Comprehensive Written Exit Exam	Course Embedded Questions	Multi-Media Projects	Observation	Writing Samples	Portfolio Evaluation	Real World Projects	Reflective Journals	Applied Application (skills) Test	Oral Exit Interviews	Accreditation Reviews/Reports	Advisory Council Feedback	Employer Surveys	Graduate Surveys	Internship/Practicum /Site Supervisor Evaluation	Licensing Exam	In Class Feedback	Simulation	Interview	Written Report	Assignment
Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.	**Direct/ Indirect**	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	I	I	I	I	D	D						
Analyze and explain the benefits and costs of using data structures (Big Oh notation)	**D**							X	X																			X				X
Students will be able to understand when to use data structures and which data structure is best in which application/scenario	**D**			X	X			X	X																			X				X
Students will be able to use data structures in coding programs	**D**			X	X			X	X																			X				X
(Dept/# Course Name)	**Assessment Options**																															

For each competency/outcome place an “X” below the method of assessment to be used.	**Assessment of Student Learning**	Article Review	Case Studies	Group Projects	Lab Work	Oral Presentations	Pre-Post Tests	Quizzes	Written Exams	Artifact Self Reflection of Growth	Capstone Projects	Comprehensive Written Exit Exam	Course Embedded Questions	Multi-Media Projects	Observation	Writing Samples	Portfolio Evaluation	Real World Projects	Reflective Journals	Applied Application (skills) Test	Oral Exit Interviews	Accreditation Reviews/Reports	Advisory Council Feedback	Employer Surveys	Graduate Surveys	Internship/Practicum /Site Supervisor Evaluation	Licensing Exam	In Class Feedback	Simulation	Interview	Written Report	Assignment
Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.	**Direct/ Indirect**	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	I	I	I	I	D	D						
Students will be able to identify situations where using recursion is appropriate and code simple recursive procedures	D							X	X																			X				X
Students will be able to analyze, understand, code, and compare different sorting algorithms	D				X			X	X																			X				X