Course Resources

Lambert, Ken, and Martin Osborne. <u>Fundamentals of Java, AP Computer Science Essentials for the</u> <u>A and AB Exams</u>. 3rd ed. Boston: Course Technology, 2007.

Henrickson, Poul, Kolling, Michael, Greenfoot, University of Kent, www.Greenfoot.org

Parlente, Nick www.JavaBat.com Interactive learn Java website

College Board. AP GridWorld Case Study. New York: College Entrance Examination Board, 2007.

Barnes, David J., Kolling, Michael J., Objects First with BlueJ

Course Planner [C2]

The resources list includes the following text references: www.Greenfoot.org (Greenfoot), <u>Fundamentals of Java</u> (FJ) and <u>Objects First with BlueJ</u> (OFBJ), GridWorld Case Study (GW).







C6 The course teaches students to code fluently in an object oriented paradigm using JAVA. The course teaches students how to use standard JAVA library classes

C3 The course teaches students to design and implement computerbased solutions to problems in a variety of application areas



C5 The course teaches students to develop and select appropriate algorithms and data structures to solve problems

C4 The course teaches students to use and implement commonly used algorithms and data structures

Unit				
(weeks)	Title, Topics and Student Objectives	Resources, Assignments and Strategies	Date(s)	
1	GreenFoot (Introduces objects)	Resource: GreenFoot tutorials and GreenFoot		Notes: GreenFoot
(0-3)		GreenFoot introduction video; create new		Learning by coding, running,
		scenario video; making things move video		modifying and seeing the results
	Topics [C3]			graphically is the essence of
	Objects	_		GreenFoot.
	Classes	Assessments:		
	Methods	Create Wombats, Leaf objects in GreenFoot		Try to bring what you learn
	Looping	Use World, Actor, <u>GreenFoot</u> Image class		visually in <u>GreenFoot</u> into your
	Conditionals	Create a new Rock class		programming when using an
	Class template	Make Wombats act; invoke Wombat methods		Integrated Development
	a	Add a turn_random method to Wombats		Environment like <u>Blue</u> or
	Objectives:	Use loops to make Wombats continue, repeat		JCreator
	vvrite and use simple classes with	Use conditionals to make decisions		
	GreenFoot Wombat, Crab, Space	Repeat process with Crab, Space Invaders		Acquire an intuitive or gut
	Invaders scenarios	scenarios		teeling for objects, classes,
	Learn the basics of conditionals and			methods, looping and
	looping			conditionals using GreenFoot
				Quiz on Objects Classes
				Methode
				methoda

2	Java Rasia	Bassurasi E.I. Chantara 1.3	Natao
4	Java Dasics	E Droiget 1.1 Ovitical Thinking	notes.
(4)	Tanias (C2)(C4)	FJ Project 1-1 Childai Thinking	Deed abortors 1 and 2
	Topics [C5][C4]	FJ Chapter 2 Review,	Read chapters 1 and 2
	Computer basics	FJ pg 162-163	
	Java basics	Javabat	Programming is different than
	Using compiler and IDEs	-	learning English or History; it is
	Input and Output	Assessments:	more like learning math. You will
	String basics	Labs: Project 2-3 Kilometers to nautical miles,	learn more by trying to create
		Project 2-5 Momentum. Create a new class	programs that put into
	Objectives:	<u>ConvertCtoF</u> that inputs a Celsius temp and	application or use the concepts
	Understand terminology: CPU, system	outputs its Fahrenheit equivalent value, using	you are learning; do that at
	and application software, LAN, WAN,	the Convert class (pg 42) as starting point.	much as you can.
	hard disk, CD-ROM, USB Flash Drives		
	Computer Ethics: paying for intellectual	Strategies:	Try to absorb the terminology as
	property	_	you are introduced to it and use
	Understand terminology: compiler, IDE,	Scenario: Computer ethics and paying for	it, rather than after the fact
	JVM	intellectual property. Class is given the	memorization.
	Edit, compile, and run simple programs	opportunity to decide how best to copyright and	
	in JAVA	to protect a simple computer game scenario	Solve at least 2 String examples
	Understand different compile time errors.	they created using GreenFoot.	at JavaBat.
	runtime errors, and logic errors.	Assign a lot	
	Use Scanner class	of small programs that illustrate different types	Complete the assigned Labs
	Use output with System out using print	of input and output. Practice with Strings at	
	and printin	JavaBat	
	Practice Strings interactively at Javahat		Ouiz Chanter 1
	r rachee eninge interactively at <u>eavabat</u>		a and a constant
			Quiz Chapter 2
			Star Onaptor 2

Unit				
(weeks)	Title, Topics and Student Objectives	Resources, Assignments and Strategies	Date(s)	
3	Defining Variables, Arithmetic	Resource: FJ: Lesson 3		Notes:
(5-6)	Expressions			Read chapter 3
		-		
	Topics [C3][C4][C5][C6]	Assessments:		Using JCreator, run the Income
	Using and understanding variables	Case Study 1: Income Tax Calculator		Tax Calculator
	Comments	Projects: 3-1 Area Cube; 3-2 Sphere; 3-3		
	Arithmetic expressions in JAVA	Kinetic energy; 3-4 Weekly Pay; 3-5 Overtime;		Do Exercise 3.2 (1-25) and
	programs	Example 3.6 (pg 97)		Exercise 3.3
	Representing numbers in different bases			
	String expressions and methods	Strategies:		Use the student data files to run
	GUI panels	Students need practice using different types,		Case Study 1; Complete the
		double and int in mathematical operations.		assigned Labs.
	Objectives:			
	Understand terminology: comments,	Present a lot of small program examples in		Page 92; play with panels.
	variables, constants, reserved words,	which they have to find errors.		Create some GUL panels by
	literals			making JAVA Classes
	Declare and initialize variables and	Learn basic Graphics and GUIS		
	constants in JAVA			Quiz: mathematical
	Understand mathematical expressions in			expressions; operator
	JAVA and operator precedence			precedence, ranges of numeric
	Use casting to make data more accurate			types and assignment operator
	Understand finite numbers; range of			Outer 00 maint muie (hans die m
	integers, real, float			Quiz: 80 point quiz (based on
	Use assignment operator correctly			exercise 3.2)

4	Conditionals and Looping	Resource: F.J. Chapter 4	Notes:
(7-10)	contained and Looping	GreenFoot Breakout: Pong:	
. ,	Topics [C3][C6]	Wombat; Crab scenarios	Read all of chapter 4, trying to
	if, else, while, for loops	JavaBat	create short working classes
	-		from the examples you discover
	Objectives:	Assessments:	in the book. Consider the shorter
	Understand terminology: control	Labs:Projects Triangle 4-2; Telephone Call 4-3;	examples as pieces of a larger
	statements, counter, infinite loop,	Population growth 4-6	puzzle, pieces you will need for
	iteration, nested loops, logical operators,		the Projects.
	truth tables	Strategies:	
	Construct syntactically correct loops and		Learn both the uses and
	conditional statements	Students need practice writing different types of	terminology of loops
	Understand the different loop errors and	loops.	
	debugging techniques (nand tracing and	Interactively	Complete the Projects (Labs)
	lextra print statements)	practice writing loops at Javabat	Leore to unite Jeans interactively
	more repuet and responsive	Make	Learn to write hoops interactively
	Construct truth tables	Breakout and Bong	loone: colve at least 2 new
	Be able to calculate statement execution.	Dieakodt and <u>rong</u>	nrohleme that use loons
	counts_iterations?		problems that ase loops.
			Loops at work. Test Breakout
			and Pong using GreenFoot.
			Modify the loops and watch the
			results!
			Quiz 80 point quiz on loops.
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Unit				
weeks)	Title, Topics and Student Objectives	Resources, Assignments and Strategies	Date(s)	
5	Introduction to Classes and OOP	Resource: FJ: Chapter 5	(-)	Notes:
(11-12)		FJ: Chapter 5 Review (pg 195)		Carefully read chapter 5 with an
	Topics [C4][C5][C6]	GreenFoot MBS scenarios;		eye to the terminology
	Creating and using classes	Moon scenario		surrounding JAVA classes.
	Explore <u>GreenFoot</u> MBS scenarios			
		Assessments:		
	Objectives:	Add new classes and methods to MBS		Do Exercise 5.2 (1-11); Exercise
	Understand terminology: constructor,	simulations in <u>GreenFoot</u>		5.4; Exercise 5.5
	accessors, mutator, instance variable,			
	encapsulation, information hiding,	Labs: Case Study 1 Student Test Scores;		Tinker with, modify, and take
	procedural abstraction	Proj 5-4 Add Dice class to Lucky Sevens;		apart the Marine Biology Case
	Understanding the difference between	Proj 5-5 BankAccount or 5-6 Library		Study scenarios in GreenFoot,
	public and private access in a class			learning to identify the parts of a
	Use and comprehend the DecimalFormat	Strategies:		Class and basics of OOP.
	class and the Random class	o:		
	write classes from scratch, choosing	Give students classes to complete in which		Case Study 1 as a class
	appropriate data representation	they are given a description and they must		Consulate the Dusients
	Understand now to declare a method and	choose appropriate representation for that		Complete the Projects
	declare parameters in that method	class.		Individualiy
	onderstand the use of preconditions,	Litiliza the interactivity and graphics conchilition		Complete chanter 5 Bayiow
	decigning methods	of GreenEest to colidify understanding of IAVA		Complete chapter 5 Review
	uesigning memous Understand scone, lifetime	classes using three scenarios based on the		Quiz Chapter 5 (based on Ch 5
	onderstand scope, metime	Marine Biology Case Study		Poviow)
		limanne bloidy Case bludy		(townerw)
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6	More on Control Statements	Resource: FJ: Chapter 6	Notes:
(13)		FJ: Chapter 7	Do Exercise 6.1 (examples 1-2
	Topics [C3][C6]	<u>JavaBat</u>	truth tables); Exercise 6.2, test
	Understanding truth tables		data if statements; Exercise 6.3
	Creating and evaluating Boolean	Assessments:	Exercise 6.4 nested ifs;
	expressions	Labs: Case Study 1 Compute Weekly Pay;	Exercise 6.5 output nested ifs;
	Nested and extended if statements	Case Study 2 Fibonacci Numbers	writing nested if code <u>seq.;</u>
	Improving User interface		Exercise 6.7, writing assertions
		Strategies:	
	Objectives:		Begin Case Study 1 as a class;
	Construct complex Boolean expressions	Give students the chance to solve larger	complete Case Study 2
	using logical operators	problems that use nested loops	individually
	Understand the logic of nested if		
	statements and extended if statements	More loops at JavaBat	construct Boolean expressions
	Learn to create menu driven programs		at JavaBat and work with nested
			if statements; at least 2
			Quiz: Chapter 6 quiz
			Skim Chapter 7 and try out the
			examples in the student data
	<u>l</u>		files

11				
Unit (weeks)	Title Tonics and Student Objectives	Resources Assignments and Strategies	Date(s)	
7	Arrays	Resource: E.I: Chanter 9	Date(s)	Notes on Chanter 9 Arrays
(14)	Topics	JavaBat		Read Chapter 9 a section at a
1.17	[C4][C5][C6]			time; then try:
	Declaring and initializing arrays	Assessments:		
	Manipulating arrays with loops	Labs: Case Study Test Scores Using Arrays		Do Exercise 9.2 Ex. 1
	Creating parallel arrays	Proj 9-1 create arrays oddList, evenList or		Exercise 9.3 Ex 1-4
		<u>Proj</u> 9-2 array <u>averageDoubles;</u> <u>Proj</u> 9-7		Exercise 9.4 Ex 3
	Objectives:	magicSquare array or pennyPinch array Proj		
	Understand terminology: array element	9-10		From the student data files, run
	index, logical size, physical size, parallel	o		Ex 9.1 and 9.2 on pg 315-316;
	arrays	Strategies:		
	Declare one-dimensional arrays in JAVA	Students need practice with loops that work		Complete Exercise 9.7 Ex 3
	Use Initializer lists when declaring arrays	with data in arrays		Exercise 9.9 Ex 1
	indovoc	Students need to be able to move around an		From student data filos, run
	lies noveled and logical size of an array	array using indexes properly		Case Study Test Scores Heing
	together to guarantee they do not go	anay using indexes properly		Arrays
	hevond the bounds of their array			- 11030
	Understand advantages of parallel arrays			Do Review Questions page 344
	Learn to use arrays of primitive data			Choose only two of the four
	types as well as arrays of objects			Projects and write a working
	Únderstand when to úse array or			JAVA program.
	ArrayList			
				Practice solving array problems
				at <u>JavaBat;</u> at least 3 new ones.

8 (15-16)	Arrays Continued	Resource: FJ:Chapter 11-1 to 11-5	Notes: Run code example 11.1 and
(10.10)	Topics [C4][C5][C6]	Assessments:	example 11.2 using strings:
	Common String methods	Labs: Run most of the code examples and do	check for code to run them in
	Searching and Sorting	most of the exercises up through section 5	student data files
	bubble, Selection, Insertion sort		
	Sequential and Binary searches	Strategies:	Do Exercise 11.1 and Exercise
	merge sorts		11.2; complete Exercise 11.3
		Give students examples with which to run	
	Objectives:	through the examples of key concepts of the	Run code example 11.3
		chapter.	selection, bubble, insertion sorts
	VVrite a method for searching an array		and code example 11.4 insertion
	Perform insertions and deletions at given	Utilize the interactivity and audio -visual	and removal of array elements.
	positions in arrays	capabilities of GreenFoot to solidify	
	Trace through sorting and searching	Understanding of JAVA classes using Turtle	Complete Exercise 11.4 and
	algorithms and understand time	Graphics and Shapes scenarios	Exercise 11.5 Arrays of Objects
	constraints of each Understand the elections helping each of		Thu aching a fau have arrest
	Understand the algorithms benind each of the following ecorobing and certing		a lew more array
	tochniques; hubble, celection and		they are once you haven't
	incartion corte: conjunctial coarch and		already tackled
	hinary search		ancady tackied.
	Understand the time efficiency of each		
	Learn to choose the best search or sort		
	method for each problem		
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Unit			D • • • •	
(weeks)	Title, Topics and Student Objectives	Resources, Assignments and Strategies	Date(s)	
9	More on Classes	Resource: FJ: Chapter 10		Notes:
(17-19)		Lambert Turtle Graphics		Use Lambert Turtle Graphics to
	Topics [C4][C5][C6]	GreenFoot Turtle Graphics;		explore programming examples
	polymorphism	Shapes; Piano; animation scenarios		using polymorphism,
	Inheritance			inheritance, abstract classes
	Abstract class	•		
	Class static method	Assessments:		Read chapter 10, completing the
	Class static variable	Labs:		following exercises; Do Exercise
	Interfaces	o		10.1; interfaces – complete
	super	Strategies:		Exercise 10.3; write an
				Interface, do Exercise 10.4;
	Objectives:	Give students examples with which to run		Exercise 10.5 on class
	know when to use static variables and	through the examples of key concepts of the		nierarchies; experiment with
	Indexetend lave interferee	cnapter.		animation scenario in Green-oot
	onderstand Java Interlaces	I Itiliza tha interactivity and audia visual		to see super at work. Complete
	define and use methods that have pro	comphilition of Green Fact to colidify		exercise 10.0 and explore
	and next conditions: throw expentions	understanding of JAVA alegade using Turtle		abstract classes with Lambert
	and post conditions, throw exceptions	Crophice, Shappe, and Diana acaparias		10.9 on peromotoro: 10.9 pro
		Graphics, Shapes, and Fland Scenarios		and next conditions: 10.5 pre
				and post conditions, 10.10
				exceptions, do to.tt
				Experiment with Classes using
				niano and animation econorios
				in GreenFoot

10 (20-22)	ArrayList Topics [C4][C5][C6] Using <u>ArrayList</u> Searching and Sorting Strings	Resource: FJ: Chapter 11-6 to end <u>GreenFoot</u> Wombats scenario JavaBat Assessments: Chapter 11 Review; <u>Proj</u> 11-1; <u>Proj</u> 11-2; <u>Proj</u> 11-5; <u>Proj</u> 11-6; <u>Proj</u> 11-7	Notes: Do Chapter 11 Case Study: Building a Deck of Cards (check student data files for starting code) Do Chapter 11 Review
	Objectives: write methods for searching arrays understand why a sorted array is faster to search write insertion and removal methods Understand arrays of objects Perform simple operations with <u>ArrayList</u> class Learn more about String class	Strategies: Learn about all the different types of arrays by creating programs that use them. Modify Leaf <u>ArrayList</u> in <u>GreenFoot</u> Wombats	Do Proj 11-1 words in sentence; Proj 11-2 array 10 numbers; Proj 11-5 Game of War; Proj 11-6 Gui for War; Proj 11-7 Card Images Solve at a few more new array problems at JavaBat

11				
Unit (wooke)	Title Tenics and Student Objectives	Possuress Assignments and Strategies	Data(e)	
11	Pacureion Complexity	Resource: El: Chanter 12	Date(s)	Notes :
(23-24.)	Searching and Sorting	JavaBat		Notes .
(23-24)	Searching and Solding			Run code example 12:1 and
	Topics [C4][C5][C6]	Assessments:		12:2 (Check student data files)
	Binary Search	Labs: None		
	Big-O notation			Complete Exercise 12.1
	Infinite Recursion	Strategies:		Recursion and Exercise 12:2
	Merge Sort	-		recursive sum methods, O
	Quick Sort			methods; Complete Exercise
				12.4 <u>guicksort</u>
	Objectives:			
	Learn about binary searches and how to			Run Case Study Comparing Sort
	determine their efficiency			Algorithms
	The second se			Burner la succession de 12 de succ
	Experiment with different sort methods			Run code example 12.4; run
				example 12.5, run code
				Complete at least 3 new
				recursion problems at JavaBat

40	California (Dalatit)	Reserves Originally Orea Orada, Dest 1 and	
12	Gridworid (Part 1)	Resource: Gridworld Case Study, Part 1 and	
(25-27)		Part 2	
	Topics [C2][C3]C4][C5][C6]		
	Introduction to GridWorld Coco Study	Accorementer	
	introduction to Ongyvong Case Study	Assessments.	
	Attributes and behavior of actors		
	Define Bug variations		
	3	Strategies:	
	Oblight and the second	Saacyres	
	Objectives:		
	Observe and experiment with GridWorld		
	Explore Actor State and Behavior		
	Investigate methods of the Bug Class		
	Extending the Bug Class		
	Runner Classes		
	BoxBugRunner		

Unit				
(weeks)	Title, Topics and Student Objectives	Resources, Assignments and Strategies	Date(s)	
13	Gridworld (Part 2)	Resource: GridWorld Case Study Parts 3 and		Notes:
(28 - 29)		4		
	Topics [C2][C3][C4][C5][C6]			
	Classes and Interfaces	Assessments:		
	Interacting Objects			
	Objectives:	Strategies:		
	Learn about Classes and Interfaces using			
	GridVVorld			
	Use, understand Location class			
	Understand the Grid Interface			
	Getting to know the Actor class			
	Using the Critter Class			
	Understanding Critter benavior			
	Extending the Critter class			

14	Review Topics	Resource: Review Previous Free Response	Notes : Least and includes estimation in
(30-32)	Topics [C2][C3][C4][C5][C6] Review AP Computer Science A topics	JavaBat	Lambert book includes option in ExamView automated testing software to format quizzes and tests to appear as AP format.
	Objectives:		
	Continue exam preparation		Continue to practice and also ask students to complete practice tests without the computer, using paper and pencil.

Unit				
(weeks)	Title, Topics and Student Objectives	Resources. Assignments and Strategies	Date(s)	
15	Adventure Game	Resource: FJ: Chapter 13	(-)	Notes:
After	Create New GreenFoot Scenarios	GreenFoot		
AP				
Exam		Assessments:		
		Strategies		
		Sualegies.		
	l	l		1