UNIVERSITY OF LIVERPOOL

in partnership with LAUREATE ONLINE EDUCATION

Module Manager: Dr. Yanguo Jing

Object Oriented Programming in Java

Module Syllabus

Module description

This module investigates aspects of the many uses of modern object-oriented programming language - Java language.

Module aims

This module is intended to provide students with the opportunity to:

- Develop practical experience in implementing software with a modern object-oriented programming language - Java;
- Acquire skills that will be useful in interpreting customer requirements from a programmer's perspective;
- Gain critical insights that will be helpful in maintaining software applications after production;
- Develop a good understanding of programming techniques involved in creating GUI (graphical user interface) Java applications and more advanced features of Java programming such as multithreading.

Module topics include:

- Installing the Java environment
- Classes and objects
- Data types
- Type conversions
- Data structure
- Selection
- Loops
- Object interaction
- Library classes
- Classes design
- Inheritance
- Polymorphism
- Application design
- Multithreading
- Exception Handling
- Arrays
- Mulithreading

Last update: November 12, 2012

Module learning outcomes

The specific aims of this module are to ensure that the student can:

- Demonstrate a critical awareness of the concepts and terminology of object-oriented programming;
- Construct well-structured, syntactically correct program source code and associated documentation;
- Employ, from various viewpoints, specification and design solutions from requirements;
- Demonstrate critical awareness in applying suitable testing to assess program correctness;
- Critically appraise the use of data types appropriate for specific kinds of information.

Learning Resources

Lecture notes

Each week's theme is made up of several topics. These are introduced and explained in turn in the lecture notes.

Required text(s) and software

Java: How to Program, H.M.Deitel & P.J. Deitel - 8th Edition, ISBN: 0136053068

--Or--

Java: How to Program, H.M.Deitel & P.J. Deitel - 9th Edition, ISBN: 0-13-257566-3

Note: Reading list is provided for edition 9th in this syllabus, there is a parallel reading list if you have the 8th edition.

Software Installations

You must install the JDK prior to beginning this course. It can be found at http://www.oracle.com/technetwork/java/javase/downloads/index.html. An installation 'cheat sheet' is provided in week 1 that will help you install the JDK. The chapter "before you start" in your textbook will also help you in this process. We will not use any IDE in this class, simple text editors such as textpad (www.textpad.com) and notepad++ (http://notepad-plus-plus.org/) will be used.

Module readings

Students are provided with weekly reading assignments, which can be found in each weekly Learning Resources section in the classroom.

Students are encouraged to make use of related academic and professional journals to supplement the module materials and to assist in the preparation of assignments. Many of these serials can be accessed through the University of Liverpool electronic library resources at http://www.liv.ac.uk/library/ohecampus/index.htm.

Recommended Prior Knowledge

It is recommended that you have basic knowledge of object orientation and simple programming. No programming background is required. Students have found it useful to take the Java pre-module prior to this module if you have never programmed before.

Concluding Remarks

By the end of this module, I hope you will have learned some of Java's power and flexibility features. I also hope you will understand the concepts behind the language.

Java is a large, robust language, and I hope our brief exploration will have made you want to experiment further with the ideas and techniques that we have discussed.

As programming and programming languages continue to evolve, you will find that the concepts of OOP which you have learned here will allow you great flexibility as you continue to program, and combined with the Java language, it will provide you with opportunities for many interesting and exciting new developments in the future.

Overview of Module Work

Students are required to submit:

- Individual Discussion Questions answers in Weeks 1–8
- 3–5 meaningful Discussion Question Follow-on postings in response to fellow student submissions in Weeks 1–8
- Hand-in Assignments in Weeks 1–8

Discussion Questions

You must submit your initial response to the Discussion Questions by the end of Day 4 (Sunday). A typical answer should have about 500 words, but it is the quality of the answer that matters, not the number of words. Answers will be submitted to the weekly Discussion Board, as well as to the Turnitin link.

Following the 3 out of 7 days rule, you are required to participate with follow-on postings to your peers' answers, making 3–5 substantial Discussion Question follow-on postings in addition to your initial response for each Discussion Question by the end of Day 7 (Wednesday). The follow-ons are not submitted to the Turnitin link. Your total Discussion Board participation must occur on at least 3 individual days during each week. Follow-on postings should be significant contributions to the Discussion. You may wish to respond to your colleagues' postings in one or more of the following ways:

- Share an insight from having read your colleague's posting.
- Offer and support an opinion or suggestion.
- Validate an idea with your own experience.
- Expand on the ideas in your colleague's posting.

Hand-in Assignments

You must submit your answer to the Hand-in Assignment by the end of Day 7 (Wednesday). A typical answer should have between 750 and 1,000 words, but it is once again the *quality* of the answer that matters, not the number of words. Answers will be submitted to the specified Turnitin or Assignments links (as appropriate) and are not to be posted in the module Discussion Board.

For both the Discussion Questions and the Hand-in Assignments, satisfactory answers will demonstrate clear understanding of the topics and issues related to the assignment. Good answers will explain the reasons in more depth. Excellent answers will raise appropriate critical questions. Answers that demonstrate only a partial grasp of what is important in the context of the assignment will be considered unsatisfactory, which will probably lower the grade.

Assessment

The tables below outline the mandatory contribution in each category and the range of grades scales that applies to each component.

	Week								Cases	Weight
	1	2	3	4	5	6	7	8		%
DQ Initial Response	X	X	X	X	X	X	X	X	8	15
DQ Follow-on	X	X	X	X	X	X	X	X	8	15
Hand-in Assignments	X	X	X	X	X	X	X	X	8	70

For general information on assessment and grading, please consult the Student Handbook section pertaining to Grading at http://success.ohecampus.com/index.php?mod=dcp&act=navigationindex&navigationid=3691

Syllabus by Week

Week 1

Introduction to Java

Topics

This week we will look at the origins of Java and the concept of Object-Oriented Programming (OOP), the terminology involved (objects, classes and inheritance, fields, methods, constructors, method calls etc.), and we will look at our first Java program. We will also look at the most simple of all Java GUI interfaces, the JOptionPane.

Resources

- Week 1 Lecture Notes
- Chapter 1 in the textbook – 1.9, 1.10
- Chapter 2 in the textbook – 2.1–2.3
- Chapter 3 in the textbook – 3.1–3.5, 3.10
- Chapter 11 in the textbook – 11.1, 11.2

Self-study

- Read Lecture Notes for each topic
- Read the textbook selections indicated under each topic
- Review additional materials for the week as necessary

Discussion Questions

- Submit your response to the Turnitin link and also post it on the Discussion Board
- Review responses by other students and make 3–5 meaningful comments

Hand-in Assignment

- Submit your work to the weekly Assignments Turnitin link

Week 2

Data, Type Conversion and Methods

Topics

This week will begin with a look at the nature of data in Java programs and how to introduce data into Java programs (declaration, assignment and initialization), data types, and most importantly data input (we do output in Week 1). We will also look at wrapper classes. Next, we will examine the role of methods within a program and discuss how to move data from one place to another within the code

Resources

- Week 2 Lecture Notes
- Chapter 2 in the textbook – 2.5-2.8
- Chapter 3 in the textbook – 3.3-3.5, 3.6-3.9
- Chapter 14 in the textbook – 14.2
- Chapter 29 in the textbook – 29.1-29.3
- Chapter G in the textbook – G.1- G.3

Self-study

- Read the Lecture Notes for each topic
- Read the textbook selections indicated under each topic
- Review additional materials for the week as necessary

Discussion Questions

- Submit your response to the Turnitin link and also post it on the Discussion Board
- Review responses by other students and make 3–5 meaningful comments

Hand-in Assignment

- Submit your work to the weekly Assignments link

Week 3

Control Statements

Topics

By now we now have a good grounding in the concept of OOP and the basics needed to write Java programs. However, so far our programs are all very straightforward with a single flow of control path passing through them. This week we will see how we can introduce branches into this flow of control path so that we can have several paths going through a program, providing the user with options and choices in how the program progresses. We will also look at repetition and repetitive commands.

Resources

- Week 3 Lecture Notes
- Chapter 4 in the textbook – 4.1-4.7, 4.10-4.13
- Chapter 5 in the textbook – 5.1-5.9

Self-study

- Read the Lecture Notes for each topic
- Read the textbook selections indicated under each topic
- Review additional materials for the week as necessary

Discussion Questions

- Submit your response to the Turnitin link and also post it on the Discussion Board
- Review responses by other students and make 3–5 meaningful comments

Hand-in Assignment

- Submit your work to the weekly Assignments link

Week 4

Advanced Methods, Math Class and basic GUI

Topics

We will continue working with methods so that we are able to manipulate data around our programs with ease. In addition, we will have a quick overview of the arithmetic operators and look at the Math class. Until now, we have been using the simplest graphic element, JOptionPane, in order to interact with our users. However, to create more robust programs, we will now introduce some of the basic graphic elements such as buttons, frames, text boxes, etc., so that we can begin to develop our applications further.

Resources

- Week 4 Lecture Notes
- Chapter 6 in the textbook – 6.1-6.5, 6.8, 6.11, 6.12
- Chapter 11 in the textbook – 11.3-11.11, 11.13, 11.17

Self-study

- Read the Lecture Notes for each topic
- Read the textbook selections indicated under each topic
- Review additional materials for the week as necessary

Discussion Questions

- Submit your response to the Turnitin link and also post it on the Discussion Board
- Review responses by other students and make 3–5 meaningful comments

Hand-in Assignment

- Submit your work to the weekly Assignments link

Week 5

Advanced OOP and Exception Handling

Topics

This week we will look at some more advanced concepts of OOP such as inheritance, polymorphism and encapsulation. We will also introduce exception handling which will be used to make our programs more robust.

Resources

- Week 5 Lecture Notes
- Chapter 9 in the textbook – 9.1-9.5
- Chapter 10 in the textbook – 10.1-10.6
- Chapter 13 in the textbook – 13.1-13.7

Self-study

- Read the Lecture Notes for each topic
- Read the textbook selections indicated under each topic
- Review additional materials for the week as necessary

Discussion Questions

- Submit your response to the Turnitin link and also post it on the Discussion Board
- Review responses by other students and make 3–5 meaningful comments

Hand-in Assignment

- Submit your work to the weekly Assignments link

Week 6

Arrays and Data Structures

Topics

With what we now know, we can write fairly sophisticated programs comprised of many methods and interacting classes. Individual methods may perform simple arithmetic tasks, define alternative paths through the flow of control, or cause a sequence of statements to be repeated many times. What holds us back now is the nature of the data items we are working with. These are all scalar, and what we would like to do is to be able to use more complicated data structures. This week, we concentrate on a particular kind of higher-level data structure known as an array. This will prepare us to begin moving data back and forth from a database next week.

Resources

- Week 6 Lecture Notes
- Chapter 7 in the textbook – 7.1-7.7
- Chapter 17 in the textbook – 17.5-17.9

Self-study

- Read the Lecture Notes for each topic
- Read the textbook selections indicated under each topic
- Review additional materials for the week as necessary

Discussion Questions

- Submit your response to the Turnitin link and also post it on the Discussion Board
- Review responses by other students and make 3–5 meaningful comments

Hand-in Assignment

- Submit your work to the weekly Assignments link

Week 7

Multithreading

Topics

This week, we will explore one of Java's more useful features – multithreading. We will examine the usefulness of multithreaded programs and see how Java's APIs allow multithreading to occur in applications. We will also investigate multithreading in GUI programs so that our applications are able to handle concurrent tasks.

Resources

- Week 7 Lecture Notes
- Chapter 23 in the textbook – 23.1-23.5, 23.10-23.13

Self-study

- Read the Lecture Notes for each topic
- Read the textbook selections indicated under each topic
- Review additional materials for the week as necessary

Discussion Questions

- Submit your response to the Turnitin link and also post it on the Discussion Board
- Review responses by other students and make 3–5 meaningful comments

Hand-in Assignment

- Submit your work to the weekly Assignments link

Week 8

Advanced GUI and Quality Control

Topics

These week's topics will expose us to some of the more complex graphic elements that we can use to enhance our applications. In addition, we will discuss application testing and quality control, and we will examine factors that contribute to successful program design and deployment.

Resources

- Week 8 Lecture Notes
- Chapter 22 in the textbook – 22.1-22.5, 22.8

Self-study

- Read the Lecture Notes for each topic
- Review additional materials for the week as necessary

Discussion Questions

- Submit your response to the Turnitin link and also post it on the Discussion Board
- Review responses by other students and make 3–5 meaningful comments

Hand-in Assignment

- Submit your work to the weekly Assignments link