Course outline

(75 hours) 2-3-3

420-D04-SU

Object-oriented programming I (Java I)

AEC Programming, Networks and Security (LEA.5F)

AEC Programming and Web Technologies (LEA.5G)

AEC Video Game Programming (LEA.CU)

***Competencies***

* 016T – Use an object-oriented development approach

***General objectives***

* Become familiar with Java, an object-oriented language
* Develop Java applications in console mode and in graphical mode
* Develop Java applets
* Learn the basic classes used in Java
* Apply the theoretical principles of network applications

***Specific objectives***

* Know Java’s syntax
* Use Java’s development tools
* Create applications and applets in Java
* Create graphical user interfaces with the help of Java’s graphical classes
* Manage the behavior of graphical components with the help of layouts
* Understand the principles of event handling, and learn to handle events occurring on graphical components
* Understand the principles of streams, and use streams to access files
* Manipulate threads (sub-processes)
* Understand the principles of communication via sockets, and create a program that uses Java sockets to communicate over a network

#### *Detailed content*

##### Module 1 – Introduction

Presentation of the language

History

Particularities

The functioning of a Java application (JRE, JVM, JDK)

Installation of the development environment

Basic syntax

##### Module 2 – Object-oriented programming

Generalities

Definition of a class

Instance variables and class variables

Definition of a method

Overloading methods

Access modifiers

Constructors

Inheritance

Interfaces

##### Module 3 – Graphical user interfaces

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Swing

Frames and panels

Swing components

Containers and layout managers

Events

Applets

Custom event listeners

##### Module 4 – Data structures

The ArrayList class

The HashTable class

Other types of collections

Sorting collections

**Module 5** – **Error handling**

Exceptions

The **try … catch … finally** structure and the **throw** statement

##### Module 6 – Files

The FileReader and FileWriter classes

The BufferedReader and PrintWriter classes

**Module 7** – **Threads**

The Thread class

Creating and starting a Thread

Critical sections

Sleep, interrupt, wait, notify

**Module 8** – **Network communications**

The ServerSocket and Socket classes

Creating of a server waiting for a connection

Creating of a client connecting to a server

Communicating via a network connection

***Formative evaluation***

Exercises and laboratories in class

***Summative evaluation***

Exercises and homework 10 %

Practical project 20 %

Evaluation 1 15 %

Evaluation 2 15 %

Final exam 40 %

*It is mandatory to obtain at least 50% on the exams for the practical projects to be graded.*

*The practical projects must be done in teams of 2 or 3.*

*In order for the final exam grades to be considered, the practical projects must be submitted* ***before*** *the final exams.*

***Methodology***

Lectures

Laboratories in class

Practical projects

***References***

Flanagan, David, *Java in a Nutshell*, O’Reilly, 1997, 2nd edition

LEMAY, Laura, *Java 1.1 In 21 Days, Teach Yourself 2/E*, Sams Publishing 1997

HOSTMAN, Cay S. et Gary Cornell, *Core Java 1.1, volume I and II*, Prentice Hall, 1998

LEWIS, John et William Loftus, *Java Software Solutions*, Addison Wesley, 1998

**Resources available online:**

Java™ Platform, Standard Edition 7  
API Specification

<https://docs.oracle.com/javase/8/docs/api/>

CAMPIONE, Mary et Kathy Wlarath, *The Java Tutorial*

<https://docs.oracle.com/javase/tutorial/index.html>

Official tutorial by Sun/Oracle. Good reference and well made.

ECKEL, Bruce. *Thinking in Java*

[www.bruceeckel.com](http://www.bruceeckel.com)

This book is a gem and is helpful for mastering well the concepts of object-oriented programming. The complete book is available online in pdf format.

Oracle Technology Network for Java Developers  
<https://www.oracle.com/technetwork/java/index.html>

Developer.com, the mega site for everything in software development and IT, with articles, tutorials, news, discussions, etc. Be sure to check out this website.

<http://www.developer.com>

**Standards of l’Institut supérieur d’informatique**

With the aim of ensuring a high quality of education and maintaining the smooth operation of our facilities, the following rules are applied:

Absences and lateness:

If you miss more than 20% of class time for a course, you will expose yourself to a failing grade for the course, without the right to take a supplemental examination.

If you are absent on the day of an examination, you will receive 0% for this examination. Only the directors can authorize you to retake the examination on another day. A doctor’s note is not necessarily a sufficient justification. Each case will be assessed on its own merits and a minimum fee of $25 will be applied.

If you are late to class, you may be refused access to the class until the break.

Examinations:

For courses involving practical projects and examinations, you must achieve at least 50% on the examinations in order for the practical projects to be graded.

The corrected examinations will be temporarily handed back to the students for consultation, and subsequently collected again by the instructor for archiving.

During examinations:

* It is forbidden to leave the classroom under any circumstances. If a student leaves the classroom, they must hand in their examination to the instructor, who will consider their examination to be finished.
* No documents, bags, or briefcases can be on the desks. Each student must be sure to clear their desk before the beginning of the examination. The instructor will ensure the application of this standard.
* The use of electronic devices, cell phones, or other devices is forbidden. Any violation of this standard will result in the immediate termination of the examination for the student.

Practical projects:

The practical projects must necessarily be done in teams of 2 or 3 people. A minimum of 5 hours could be added to the course hours for the practical projects; attendance during these periods is mandatory. In order for the final examination grade to be considered, the practical projects must be submitted before the final examination. The practical projects will be presented to the group by the instructor during the period following the examination.

Grade review:

As specified in our PIEA (Politique institutionnelle d’évaluation des apprentissages), approved by the MEES (Ministère de l’Éducation et de l'Enseignement supérieur), if you wish to have a grade reviewed, you must submit a grade review request to the directors within ten (10) working days after the grades are submitted to the students or posted on the school’s intranet.

Supplemental examinations:

You will be entitled to a supplemental examination for a course only if:

1. you achieved a grade of at least 45% on all of the evaluations for the course,
2. you were absent for less than 20% of the class time for the course,
3. you submitted all examinations and practical projects for the course,
4. you pay a minimum fee of $25.

If these four conditions are not met, you will need to retake the course.

A supplemental examination replaces the regular examinations for the course. A grade of at least 50% must be obtained on the supplemental examination in order for the practical project to be considered.

Following a supplemental examination, the maximum final grade for the course will be 60%.

Prerequisites:

In order to have access to the final projects and internships, you must have successfully completed all of the courses in the program. Tuition fees must be fully paid before the internships.

Withdrawal:

In order to withdraw from courses, a written withdrawal request must be submitted to the admissions office. The withdrawal will take effect on the date that the request is received. If the request is received within the first ten (10) working days of a semester, the courses for this semester will be cancelled in your transcript (but not the tuition fees); furthermore, you will receive no financial assistance and no failing grades for the semester. However, after this period, you will receive financial assistance for the semester, if applicable, and your transcript will display the grades accumulated up until the date of withdrawal.

Food:

It is strictly forbidden to drink, eat, or smoke outside of areas specifically reserved for these activities.

Cell phones and laptops:

It is required to turn off your cell phone when you enter the college. It is forbidden to bring your own personal laptop to the college.