420-D04-SU

Object-oriented programming I: Java I

AEC Programming, Networks and Security
AEC Programming and Web Technologies
AEC Video Game Programming

Competencies

016T – Use an object-oriented development approach

General objectives

- Become familiar with Java, an object-oriented language
- Develop both console applications and graphical applications in Java
- 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 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
- 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 Java language
- History of Java
- Particularities of Java and comparison with C++
- The functioning of a Java application (JVM, JRE, JDK)
- Installing the development environment
- Basic syntax

Module 2 – Object-oriented programming

- Generalities
- Class definitions
- Access modifiers
- Instance variables and static variables
- Instance methods and static methods
- Method definitions
- Overloading methods
- Constructors
- Inheritance
- Polymorphism
- Abstract methods
- Abstract classes
- Interfaces

Module 3 – Graphical user interfaces

- Swing
- Frames and panels
- Swing components
- Containers and layout managers
- Event listeners
- Custom event listeners

Module 4 – Data structures

- The `ArrayList` class
- The `Hashtable` class
- Other types of collections
- Sorting collections

Module 5 – Exception handling

- Exceptions
- Throwing exceptions with `throw`
- Catching exceptions with `try/catch/finally`
- Checked exceptions and unchecked exceptions
- Declaring checked exceptions with `throws`

Module 6 – Input/output streams

- `FileReader` and `FileWriter` classes
- `BufferedReader` and `PrintWriter` classes
- `ObjectInputStream` and `ObjectOutputStream` classes
- `Serializable` interface and serialization

Module 7 – Threads

- `Thread` class and `Runnable` interface
- Creating and starting a thread
- Critical sections
- Thread interference
- Syncronization
- `sleep`, `interrupt`, `wait`, `notify`

Module 8 – Network communication

- `ServerSocket` and `Socket` classes
- Creating of a server that waits for a connection
- Creating of a client that connects to a server
- Communicating via a network connection using streams

Methodology

Class lectures
Laboratories in class
Practical project

Formative assessment

Exercises and laboratories in class

Summative assessment

- Exercises   10 %
- Practical project   20 %
- Quiz 1   15 %
- Quiz 2   15%
- Final exam   40 %

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:

a)   you achieved a grade of at least 45% on all of the evaluations for the course,

b)   you were absent for less than 20% of the class time for the course,

c)   you submitted all examinations and practical projects for the course,

d)   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.