# Course plan

(75 hours) 3-2-3

420-D01-SU

**Programming logic and techniques**

AEC Programming, NetworksandSecurity (LEA.5F)
AEC Programming and Web Technologies (LEA.5G)
AEC Video Game Programming (LEA.CU)

## *Competencies*

- 016W – Produce algorithms
  Required course: D01

## *General objectives*

- Become familiar with the concepts of information technology and with the programming profession
- Become acquainted with a methodology for problem solving and building algorithms

## *Specific objectives*

- Become familiar with the architecture of a computer
- Learn aboutthe work environment of a programmer
- Showcase acquired skills in a professional portfolio
- Recognize and manipulate different types of digital code
- Reviewconcepts of arithmetic and mathematics
- Learn a method for problem solving
- Produce system documentation
- Define the steps of solving computational problems
- Make pseudocode responding to the constraints of a problem to solve
- Use single, double, and mixed conditional structures
- Use repetition structures
- Learn methods of algorithm verification
- Apply programming standards
- Follow program specifications
- Simplify complex logical relationships

## *Content outline*

## MODULE 1 – WELCOME TO ISI

Introduction to the work environment at ISI

Basic usage of Windows 10

## MODULE 2 – COMPUTING CONCEPTS

### The internal components of a computer

Power supply unit
Motherboard
Processor (CPU)
Random access memory (RAM)
Hard disk drive (HDD) and/or solid-state drive (SSD)
Video card

### Peripheral devices external to a computer

Input devices (keyboard, mouse, etc.)
Output devices (monitor, speakers, printer, etc.)
Storage devices (USB flash drive, external hard drive, etc.)

### Resources

Units of measure (bits, bytes, hertz)
Random access memory (RAM)
Persistent mass storage
Computation time
Resource tradeoffs

## MODULE 3 – PROFESSIONS:PROGRAMMERS AND ANALYSTS

### Professions

Front-end developers
Back-end developers
Full-stack developers
Analysts

## MODULE 4 – TOOLS, PROGRAMMING WORK, AND ETHICS

### Tools

Integrated development environments (IDE)
Revision control systems: servers and clients
Database management systems:servers and clients
Project management tools
Graphics editors

### Programming work and ethics

Teamwork
Client/company relations
Respecting deadlines
Confidentiality of information
Hacking

## MODULE 5 – YOUR PORTFOLIO

### Preparation for employment

Project presentation tools and methods
Curriculum vitae (CV)
Social networks

## MODULE 6 – NUMBERS AND ARITHMETIC OPERATIONS

### Numbers

Natural numbers
Integers
Real numbers
Zero
Even and odd numbers
Prime numbers

### Basic arithmetic operations

Addition
Subtraction
Multiplication
Division
Modulo
Exponents
Order of operations
Evaluation of expressions

## MODULE 7 – NUMERAL SYSTEMS

### Numeral system bases

Binary
Decimal
Hexadecimal

### Conversions between bases

Decimal to binary
Binary to decimal
Decimal to hexadecimal
Hexadecimal to decimal

## MODULE 8 – INTRODUCTION TO ALGORITHMS IN PROGRAMMING

### The process of analysis for designing algorithms

Inputs
Outputs
Constants
Procedure

### Pseudocode

Variables, constants, data types
Declaration statements
Assignment statements
Assignment expressions (calculations, strings)
Writing/reading statements

## MODULE 9 – FORMULAS AND TYPES OF MATHEMATICAL ALGORITHMS

### Mathematical problem solving

Cross-multiplication
Proportionality
Inverse proportionality
Calculating averages
Calculating medians
Calculating percentages

## MODULE 10 – BOOLEAN ALGEBRA

### Concepts

Truth tables
Negation (NOT)
Conjunction (AND)
Disjunction (OR)
Mixed propositions
Propositions with three or more variables

## MODULE 11 – CONDITIONAL STATEMENTS

### Types of conditional statements

Simple
Double and multiple
Nested
Complex

### Algorithm validation techniques

Algorithm tracing
Trace tables
Verification test sets

## MODULE 12 – LOOPSAND ACCUMULATORS/COUNTERS

### Loops (repetition structures)

FOR...ENDFOR (JUMP)
WHILE...ENDWHILE
REPEAT...WHILE

### Concepts

Accumulators
Counters

### *Methodology*

Lecture courses
In-class laboratories
Practical projects

### *Formative evaluation*

In-class laboratories

### *Summative evaluation*

| | |
|---|---|
| Exercises | 10 % |
| Practical project 1 | 10 % |
| Practical project 2 | 20 % |
| Evaluation 1 | 10 % |
| Evaluation 2 | 10 % |
| Theoretical final exam | 20 % |
| Practical final exam | 20 % |

*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.*

# 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 supplementalexamination 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.