



COURSE OUTLINE

Course identification

Name of programs – Codes:	COMPUTER SCIENCE TECHNOLOGY- PROGRAMMING (420.BP) INFORMATION TECHNOLOGY - PROGRAMMER-ANALYST (LEA.3Q)
Course title:	ADVANCED OBJECT ORIENTED PROGRAMMING
Course number:	420-PA3-AS
Total number of course hours:	75 Hours
Weighting:	2-3-2
Statement of the competencies – Codes:	Use an object-oriented development approach-00Q6 Interact in a professional setting-00SE

Contribution of the course in the program

Course position

This course is located in the third semester of the *Information Technology-Programmer-Analyst* (LEA.3Q) and in the fourth semester of the *Computer Science Technology- Programming* (420.BP) program. Its duration is 75 hours divided into 30 hours of theory and 45 hours of exercises plus approximately 30 hours of homework.

In both programs, this course completes and shares the development of the 00Q6 competency with *Object oriented Programming Concepts* (420-CT2-AS), given in the second semester for both programs. In both programs, this course completes and shares the development of the 00SE competency with *Algorithms and Programming* (420-AP1-AS), given in the first semester for both programs and also with *Internship* (420-SG4-AS) given in the fourth semester for LEA.3Q and *Workplace Integration:Programming* (420-EP6-AS) given in the sixth semester for 420.BP. In both programs, *Object oriented Programming Concepts* (420-CT2-AS) given in the second semester for both programs are prerequisite for this course.

In both programs this course is a prerequisite for *Android Mobile Development* (420-DA4-AS) given in the fourth semester for LEA.3Q and in the fifth semester for 420.BP. This course is also a prerequisite for *Internship* (420-SG4-AS) given in the fourth semester for LEA.3Q.

Scope of the course

During this course, the student is provided with advanced aspects of object-oriented programming using Java language. The student expands his knowledge and skills in object-oriented programming. He examines in-depth the concepts of classes and interfaces, learns about the different types of data representation in memory as well as data storage in files and databases. he practices the creation and

use of web interfaces, examines the Model-View-Controller architecture and learns how to create and use web services

Upon completion of this course, the student will be able to create and use classes and interfaces, go from the class diagram to java code and vice versa, and reuse the code using generic classes. He will be able to create derived classes and apply polymorphism efficiently. Also, the student will be able to identify and use the appropriate collection to solve real world problems, to read and write to text and binary files as well as manipulate data of Oracle database. Moreover he will be able to code using JSP to create web applications according to MVC design pattern architecture and to create and consume web services

Course components (objective and standard of the competencies)

Expected outcomes (achievement context of the competencies)

The achievement context of this competency will reflect the conditions as they occur in the following settings: academic, professional, work, or life environment.

Use an object-oriented development approach-00Q6

- Based on a problem
- Using nomenclature and coding rules

Interact in a professional setting-00SE

- In various types of work settings
- Using application programming and network management standards, methods and best practices
- Using laws, code of ethics and corporate policies

Throughout the course, you will engage in various learning situations/activities so that by the end of the course, you will have met the expected outcomes.

Elements and performance criteria

The elements of an objective formulated in terms of the competency specify its essential components. They include only what is necessary in order to understand and master the competency. If the competency is described as a process, the elements are the steps for execution.

The performance criteria are the specific pre-established requirements upon which you and your teacher can objectively judge your development of the targeted competency. They are part of the description of this competency. They are prescriptive.

Sometimes an element appears in more than one course. If this is the case, a number indicates its complexity level: level one (1) being the simplest, level two (2), average, and level three (3), advanced, at the ministerial level.

Below are the elements of the competencies and performance criteria for this course that are to be respected:

Competency: Use an object-oriented development approach-00Q6

General ministerial and institutional performance criteria:

- Critical thinking;
- Methodical, analytic and synthetic mind;
- Programming efficiency;
- Autonomy;

Elements of the competency 420.BP (4-5-6-7 only)	Performance criteria specific to each element
1. Analyze the problem.	1.1 Breakdown of the problem based on the requirements of an object-oriented approach 1.2 Proper identification of input and output data and the nature of the processes 1.3 Accurate identification of the classes to be modelled 1.4 Proper identification of the algorithms to be created
2. Model the classes.	2.1 Proper identification of class attributes and methods 2.2 Proper application of encapsulation and inheritance principles 2.3 Proper graphic representation of the classes and their relationships 2.4 Compliance with nomenclature rules
3. Produce the algorithms for the methods.	3.1 Appropriate identification of the operations necessary for each method 3.2 Proper identification of a logical sequence of operations 3.3 Appropriate verification of algorithm correctness 3.4 Accurate representation of algorithms
4. Create the graphic interface.	4.1 Appropriate choice of graphic elements for display and data input 4.2 Proper layout of graphic elements 4.3 Proper set-up of graphic elements
5. Program the classes.	5.1 Appropriate choice of instructions, types of primitive data and data structures 5.2 Logical organization of the instructions 5.3 Proper programming of messages to be displayed for the user 5.4 Proper integration of the classes into the program 5.5 Proper program performance 5.6 Compliance with the language syntax 5.7 Compliance with coding rules
6. Document the code.	6.1 Clear comments in the computer code 6.2 Clear record of the programming support documentation 6.3 Appropriate use of the documentation generators

7. Apply the procedure for managing versions of the programs.	7.1 Proper configuration of the version control system 7.2 Systematic submission of the modified code 7.3 Sound management of branches and conflicts
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<p>Competency: Interact in a professional setting-00SE</p> <p>General ministerial and institutional performance criteria:</p> <p>- Initiative.</p> <p>- Working in a team</p>	
<p>Elements of the competency</p> <p>420.BP (1 only)</p>	<p>Performance criteria specific to each element</p>
1. Establish professional relationships with users and clients.	1.1. Attitudes and behaviours that demonstrate the ability to listen 1.2. Adaptation of the level of language to the situation 1.3. Observance of rules of politeness and common courtesy 1.4. Observance of the client-based approach
2. Work within a multidisciplinary team.	2.1. Attitudes and behaviours that demonstrate respect, openness and a collaborative spirit 2.2. Effective communication with all team members 2.3. Proper performance of assigned tasks 2.4. Compliance with rules for optimal team function 2.5. Respect for the corporate culture 2.6. Compliance with application programming and network management standards, methods and best practices 2.7. Observance of the limits of the scope of professional intervention and respect for the expertise of team members in other occupations 2.8. Adherence to deadlines
3. Become familiar with the legal obligations and rules of professional ethics.	3.1. Accurate listing of the main offences and criminal acts in information technology 3.2. Accurate listing of the main breaches of intellectual property rights in information technology 3.3. Accurate assessment of the consequences of offences, criminal acts and breaches of intellectual property 3.4. Determination of the measures appropriate to the situation 3.5. Compliance with laws, codes of ethics and corporate policies

Course content/main themes

Listed below is the **essential** content to be covered in this course:

CLASSES AND OBJETS

Creating classes, type of attributes and methods, getters and setters, overloading and overriding methods, overriding toString and equals, relation between classes, inner classes, generic classes and methods.

SUB CLASSES INTERFACES

Creating and using subclasses, creating and using abstract classes, creating interfaces, difference between abstract class and interface, using usual interfaces.

COLLECTIONS AND MAPS

Types of collection (List, Queue, Set), creating and manipulating objects of the collection
Type de map (TreeMap, HashMap, LinkedHashMap), creating and manipulating objects of the map.

EXCEPTIONS

Creating exceptions, exception hierarchy, usual exceptions, exception handling, throwing exceptions,

FILES AND DATABASES.

Creating and managing text (xml, json) and binary files, using related methods and interfaces, creating and managing data stored in a database.

WEB AND WEBSERVICE

Web architecture, creating servlets and JSP pages, Manipulating data of Oracle database, using MVC layers, SOA architecture (Service oriented architecture), creating and using web service

Learning activities

Provided below are examples of learning activities that correspond to the competencies for this course. The learning activities are found in the course calendar that complements this course outline.

- Group discussions
 - Application exercises following teacher's demonstrations
 - Practical problem-solving exercises
 - Case study
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Terms for Evaluating Learning

The evaluation of your learning is based on two inseparable methods: formative evaluation and summative evaluation. These two evaluation types are formal. Detailed information on the evaluation schedule is found in the course calendar, under the "Formative and summative evaluation schedule" column.

Formative evaluation

Following a learning activity or learning period, time is set aside for introspection. You will determine what has been understood and achieved and seek to identify the nature and origin of weak areas. These designated periods consist of simple means: short tests, association games, logbooks, a portfolio, questions, creating of samples, etc.

Formative evaluation is frequent and covers as many aspects as possible. It takes place in class, individually or in groups, and leads to immediate decisions. **You are the one who assumes the bulk of the work during individual or group corrections, adjustments and other self-evaluation tasks. The purpose is not to determine grades.**

If you take the results of the formative evaluations seriously throughout the course, you will ensure preparedness for the summative evaluations. You will be able to make the necessary progress to acquire the targeted competency at the required level, according to the achievement context and pre-established performance criteria.

Below are some examples of formative evaluation methods that correspond to the targeted competencies for this course:

- Homework assignments and labs
- Scenario exercises
- Case study
- Teacher's feedback following students' application exercises

Summative evaluation

Summative evaluations are less frequent. They take place later on, towards the middle and end of the semester. This gives you the time to integrate your learning and to learn how to apply it to situations related to the targeted competency. The summative evaluation material is prepared by your teacher according to the description of the course's targeted competency: its elements, achievement context and performance criteria.

The work completed in summative evaluations is graded. The purpose is to determine what you have learned.

Below is the information on the summative evaluation schedule and details for this course, as well as the weighting of marks:

Evaluations	Weighting
Midterm evaluation	30%
Final project	30%
Final evaluation	40%
Total	100%

Institutional requirements

Student's commitment

By registering for this course, you commit to:

- *obtain the necessary course materials at the start of the semester;*
- *respect the copyright;*
- *participate in the learning activities, formative and summative evaluation activities outlined in the course calendar;*
- *complete the work assigned to you;*
- *submit the work on time.*

Teacher's commitment

Your teacher commits to:

- *create varied learning situations that enable you to put into practice the knowledge, actions and professional behaviour of the targeted competency;*
- *plan sufficient and appropriate formative evaluation activities, involving correction and improvement, that provide frequent feedback, allowing you to be well informed of your progress;*
- *provide summative evaluations that correspond to the course's targeted competency;*
- *evaluate work according to the applicable criteria, in a fair and equitable manner within a reasonable time.*

The Institutional Policy on Evaluating Learning (IPEL) is applied to all institutional programs. Listed below are a few of its clauses:

Written language (article 5.7)

The teacher is responsible for identifying spelling and grammar errors and for allocating the corresponding number of marks for any given summative evaluation.

Below is the % – based on language requirements – that can be attributed to each summative evaluation:

- up to 10 %

Class attendance (article 5.12)

Attendance and participation in classes and evaluations are mandatory for all students.

The teacher has the responsibility of monitoring attendance and of evaluating the reasons justifying student absences from classes.

A student whose absences exceed the allowable number for the course could be denied access to the final exam for that course.

Plagiarism and fraud (article 5.16)

Plagiarism, attempted plagiarism or complicity in plagiarism during an assignment or any evaluated task contravenes the rules. This includes (but is not limited to):

- *the whole or partial presentation (reference, paraphrase, summary, translation, insertion) of the work of another (text, illustration, film, music, etc. on paper or online) as one's own, or failing to cite a source;*
- *the use of another student's exam during an exam;*
- *the use of an assignment done for another course or a project already submitted in the past, which is passed off as an original work.*

Fraud, attempted fraud or complicity in fraud constitutes an infraction.

This includes (but is not limited to):

- *the possession or use of any unauthorized document, material or equipment during an exam, including the use of technological tools;*
- *the execution of an evaluated task by another person;*
- *the substitution for another person during an exam, assignment or any evaluated task;*
- *the possession of the questions or answers of the exam;*
- *the obtainment of any aid not authorized in advance by the teacher.*

Plagiarism, attempts at plagiarism or fraud, or collaboration in plagiarism or fraud are prohibited and considered serious offences. Thus, any instances of plagiarism or fraud will lead to a grade of '0' for the assignment in question. In addition, a note will be made in the student's file and the student will receive a written notice from his or her Program Directorate to that effect.

In the case of recidivism, in the same course or in another course, the student will be given a grade of '0' for the course in question. A second note is made in the student's file and the student will receive a summons from his or her Program Directorate. For a third offence, he or she may be expelled from the College.

Submission of work and tests (article 5.8)

All assignments must be submitted in class at the time designated by the teacher. Any late submissions result in a grade of zero (0).

Upon presentation of an official supporting document or valid reason for the absence, the student may request an extension from the teacher, who may accept or refuse the student's work and apply a penalty for the lateness.

Program Directorates do not accept student work. Assignments must be submitted directly to the teacher.

Rules and regulations to follow

Late arrivals

The teacher may refuse to admit to the classroom any student arriving late. A late arrival is considered an absence for that period.

Note: Students arriving late must recognize that the information they missed will not be repeated. Late students are therefore responsible for asking their peers about the material they missed. Arriving after the break, as well as leaving before the end of the class, may result in one or more hours of absence.

Eating and drinking in class

Eating and drinking are prohibited in the classrooms, locker rooms and Documentation Centre. Food may only be eaten in the cafeteria, vending machine areas and student lounges.

Mandatory course material

- Bring Your Own Device. 2017. <<http://www.lasallecollege.com/futur-students/bring-your-own-device>>

Bibliography for this course

Cay Horstmann, *Big Java: Early Objects, Enhanced eText, 7th Edition*, WILEY 2018

Academic Studies Directorate approval: *Signature and date of approval*
