

SEG2105. Introduction to Software Engineering

Assignment 3 - Part 2 (50 points)

Fall 2016

Assignment due: October 30 2016 by 11h59pm (2.5% of final mark).

This is an individual assignment. You must work strictly alone on this.

In this assignment you will be creating UML diagrams with the USE tool, a UML-based specification environment.

The USE tool can be downloaded at:

<https://sourceforge.net/projects/useocl/>

The USE documentation can be found at:

<http://www.db.informatik.uni-bremen.de/projects/USE/use-documentation.pdf>

More information about how to use the tool can be found in my Website at:

<http://cserg0.site.uottawa.ca/seg/bin/view/SEG2105/Assignment3>

INSTRUCTIONS:

1. **Create a UML class diagram for system described below using the USE tool (25 points).** Show all attributes and associations. Make sure you include the correct multiplicity.
2. **Create a UML object diagram for the types in your class diagram using the USE tool (15 points).** You will need to set some of the attributes of the types. Create a set of objects allowing you to test the OCL constraints of question 3.
3. **Create the following OCL invariants and check on the object diagram you have specified using the USE tool (10 points).** **Note:** Even if your multiplicities allow you to constraint the model, you still need to specify the OCL constraints.
 - A department must have at least one or more programs associated.
 - The year of a course must be 1,2,3,4.
 - The code of a course must not be empty.
 - Two courses with the same course code cannot exist for the same program version.
 - The University must offer at least one program.
4. **Determine all the operations needed to implement 5 different responsibilities** – specifying in which classes they belong and all collaborations. You don't need to implement them, just describe them (as shown in the textbook, pages 213-214).

What to submit:

- Model_XXXXXX.use: This is the USE file containing your model (XXXXXX is your student number).
- Objects_XXXXXX.cmd. This is a file containing your object diagram.
- **Document** with class diagram for question 1, object diagram for question 2, OCL constraints of question 3 and list of operations of question 4. Include the assumptions you have made.

Include all the files in zip file named after your student number as follows:
SEG2105_A3p2_XXXXXX.zip.

System specification:

A university has a set of programs, identified by a **program code**. Each program is offered by one or more **departments**, and also has a **title**, a **discipline** and a **description**.

A **discipline** (e.g. Software Engineering) has a **code** and a **description**.

A **program** consists of:

- A set of required courses
- A set of elective groups
- A number of other free electives (simply an integer).
- A set of options

An elective group is described to students in the following manner: 'Chose n out of the following list of courses' (where n is some integer). Each course in the list can be an individual course, or 'any year-x course in discipline d', where x is a number between 1 and 4.

Options are just little programs so they have the same information as a program. Different programs can share the same options.

A course has a title, a year, a code, a description, prerequisites and mutually-exclusive courses.

The prerequisites are described in a similar manner as the elective group, so they can be individual courses, or 'n year-x courses in discipline d'. Prerequisites can also be linked with 'and' or 'or' (which can be nested). So for example: (SEG100 or SEG101) and (CSI105 or (CSI102 and CSI103))

Mutually exclusive courses are just simple list of courses.

A program has a series of versions. Within each version any of the above can change, except the program code. A version has a start date (when it becomes the requirements for new students).