

SCIT

School of Computing and Information Technology

Spring 2020

CSIT121/821 — Programming Fundamentals

Assignment 3 (10 marks)

Due Time and Date:

Due by Sunday 8th November 2020 10 pm

General Requirements:

- You should create your programs with good programming style and form using proper blank spaces, indentation and braces to make your code easy to read and understand;
- You should create identifiers with sensible names;
- You should make comments to describe your code segments where they are necessary for readers to understand what your code intends to achieve.
- Logical structures and statements are properly used for specific purposes.
- Read the assignment specification carefully, and make sure that you follow whatever directed in this assignment. In every assignment that you will submit in this subject, you must put the following information in the header of your program:

```
/*-----  
My name:  
My student number:  
My course code: CSIT121  
My email address:  
Assignment number: 3  
-----*/
```

Objectives

This assignment requires you to write a program that designs and creates the graphic user interface (GUI) for the student enrolment system by using Java Swing.

Background

Assignment 3 is based on the Assignments 1&2 (please see Moodle for Assignment 1&2's solutions). Please refer to A1's description for the Bachelor of Computer Science course structure and A2's description for the Master of Computer Science course structure.

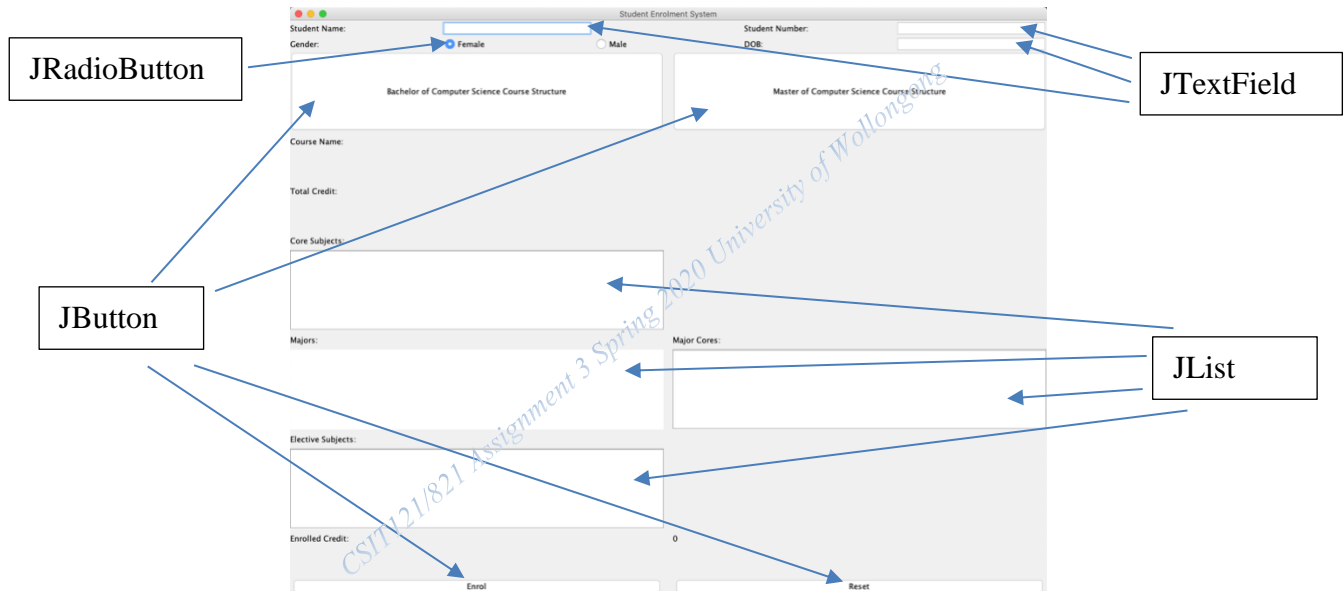
You are required to design, implement and test a student system with GUI to 1) load BCS or MCS course structure via the Java ObjectInputStream; 2) to enrol one student into either the Bachelor of Computer Science course or the Master of Computer Science; and 3) to save the student enrolment information into a text file. The detailed steps are as follows:

1. Upgrade your UML diagram.

You should upgrade your existing UML diagram for Assignment 3 by considering the new GUI class (named SEFrame extending JFrame).

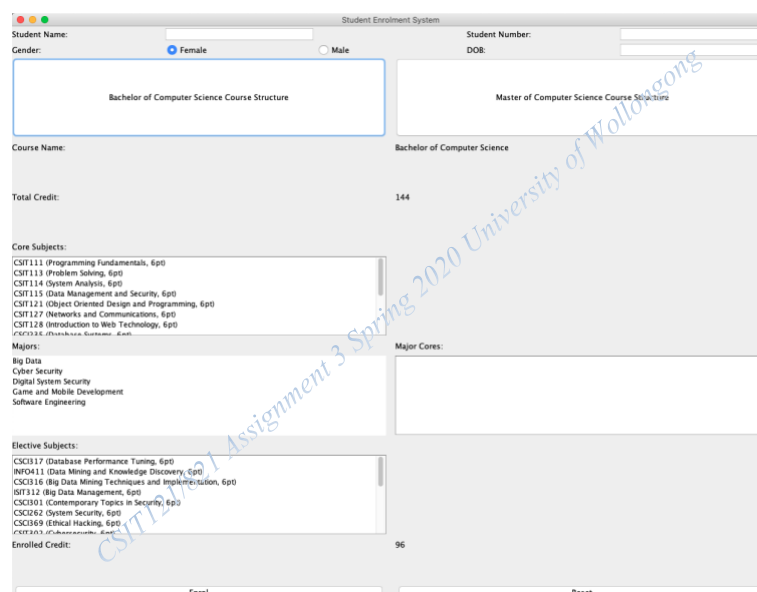
2. Design a GUI.

The SEFrame class shall contain some basic Swing components such as JLabel, JTextField, JButton, JList and etc. With the new GUI, a user shall able to input his/her personal information, to select a course (either BCS or MCS), to select a major within the course and to select some elective subjects to complete the enrolment. An example of the GUI is displayed as follows. You can either use this GUI layout or design your own GUI.



3. Load BCS or MCS course structure via Java ObjectInputStream

The Java ObjectInputStream shall be used to load either BCS ("bcs.ser") or MCS ("mcs.ser") course structure to the system. The given "bcs.ser" and "mcs.ser" files are generated based on A2's solutions. If you make any modification of A2's classes, you shall create new "bcs.ser" and "mcs.ser" files by using the Lab5's program. The given example shows the BCS or MCS course structure after clicking the "Bachelor of Computer Science Course Structure" or the "Master of Computer Science Course Structure" button.



(by clicking the "Bachelor of Computer Science Course Structure" button)

(by clicking the “Master of Computer Science Course Structure” button)

4. Select a major for a course.

After a course structure is loaded.

- The system shall automatically enroll all core subjects and update the total enrolled credits (96 cp for BCS, 54 cp for MCS).
- To allow the user to select a major and show the major core subjects. The system shall automatically update the total enrolled credits after the user selects a major (enrolling the user to all major core subjects automatically). The user is only allowed to select ONE major. For example, in MCS, if the user selects the Intelligent System Major or the Machine Learning and Big Data Major, the three major core subjects shall be displayed on the right side and the enrolled total credits shall be updated automatically. The elective subject list shall also be updated automatically by removing the selected major’s core subjects.

(by clicking the Intelligent System Major)

(by clicking the Machine Learning and Big Data Major)

5. Select elective subjects

The user shall be able to select elective subjects from the list. The user can make multiple selection and the system shall automatically update the total enrolled credits. For example, the user can select the top three subjects from the elective subject list which make the total enrolled credits to 90 cp.

(by clicking the top three elective subjects)

6. Enroll the student and create the enrolment record as a text file (“studentName_courseName.txt”)

The user can click the “Enrol” button anytime to complete the enrolment. By clicking the “Enrol” button, the system will do the following things automatically.

- The system will check whether the user’s personal information is provided and valid by using the exception handling (please see Lab 4’s solution). The student’s name must be a string, the student number must be an int. The DOB must be a string, use the format “dd/mm/yyyy” and the date must exist. If any information is not provided or invalid, a pop-up window will alert the mistakes and ask the user to complete/correct the inputs.

Student Enrolment System

Student Name: Gender: ☒ Female ☐ Male Student Number: DOB:

Bachelor of Computer Science Course Structure

Master of Computer Science Course Structure

Course Name:

Total Credit:

Core Subjects:

- CSCB14 (IT Project Management, 6pt)
- CSCB51 (Advanced Programming, 6pt)
- CSCB01 (Algorithms and Data Structures, 6pt)
- CSCB31 (Database Systems, 6pt)
- MTS9102 (Corporate Network Management, 6pt)
- CST940 (Research Methodology, 6pt)
- CSC920 (Contemporary Topics in Computer Science, 6pt)
- CSC945 (Advanced Network Security, 6pt)

Majors:

Intelligent System

Machine Learning and Big Data

Network and Information Security

Software Engineering

Elective Subjects:

- CSCB62 (System Security, 6pt)
- CST826 (Human Computer Interaction, 6pt)
- RT925 (Strategic Network Design, 6pt)
- CSC964 (Computational Intelligence, 6pt)
- CSC924 (Reasoning and Learning, 6pt)
- CSC944 (Perception and Planning, 6pt)
- CSC964 (Advanced Network Security, 6pt)
- MTS9102 (Corporate Network Management, 6pt)

Enrolled Credit: 90

Enroll Reset

Validation Checking

java.util.InputMismatchException: Student name is not inputted.

(The exception for not inputting the student name)

Student Enrolment System

Student Name: Bob Gender: ☒ Female ☐ Male Student Number: DOB:

Bachelor of Computer Science Course Structure

Master of Computer Science Course Structure

Course Name:

Total Credit:

Core Subjects:

- CSCB14 (IT Project Management, 6pt)
- CSCB51 (Advanced Programming, 6pt)
- CSCB01 (Algorithms and Data Structures, 6pt)
- CSCB31 (Database Systems, 6pt)
- MTS9102 (Corporate Network Management, 6pt)
- CST940 (Research Methodology, 6pt)
- CSC920 (Contemporary Topics in Computer Science, 6pt)
- CSC945 (Advanced Network Security, 6pt)

Majors:

Intelligent System

Machine Learning and Big Data

Network and Information Security

Software Engineering

Elective Subjects:

- CSCB62 (System Security, 6pt)
- CST826 (Human Computer Interaction, 6pt)
- RT925 (Strategic Network Design, 6pt)
- CSC964 (Computational Intelligence, 6pt)
- CSC924 (Reasoning and Learning, 6pt)
- CSC944 (Perception and Planning, 6pt)
- CSC964 (Advanced Network Security, 6pt)
- MTS9102 (Corporate Network Management, 6pt)

Enrolled Credit: 90

Enroll Reset

Validation Checking

java.util.InputMismatchException: Student number is not inputted.

(The exception for not inputting the student number)

Student Enrolment System

Student Name: Bob Gender: ☒ Female ☐ Male Student Number: number123 DOB:

Bachelor of Computer Science Course Structure

Master of Computer Science Course Structure

Course Name:

Total Credit:

Core Subjects:

- CSCB14 (IT Project Management, 6pt)
- CSCB51 (Advanced Programming, 6pt)
- CSCB01 (Algorithms and Data Structures, 6pt)
- CSCB31 (Database Systems, 6pt)
- MTS9102 (Corporate Network Management, 6pt)
- CST940 (Research Methodology, 6pt)
- CSC920 (Contemporary Topics in Computer Science, 6pt)
- CSC945 (Advanced Network Security, 6pt)

Majors:

Intelligent System

Machine Learning and Big Data

Network and Information Security

Software Engineering

Elective Subjects:

- CSCB62 (System Security, 6pt)
- CST826 (Human Computer Interaction, 6pt)
- RT925 (Strategic Network Design, 6pt)
- CSC964 (Computational Intelligence, 6pt)
- CSC924 (Reasoning and Learning, 6pt)
- CSC944 (Perception and Planning, 6pt)
- CSC964 (Advanced Network Security, 6pt)
- MTS9102 (Corporate Network Management, 6pt)

Enrolled Credit: 90

Enroll Reset

Validation Checking

java.lang.NumberFormatException: For input string: "number123"

(The exception for inputting a wrong student number)

Student Enrolment System

Student Name: Bob
Gender: ☒ Female ☐ Male

Student Number: 1234567
DOB:

Bachelor of Computer Science Course Structure

Master of Computer Science Course Structure

Course Name: Master of Computer Science

Total Credit: 96

Core Subjects:

- CSC814 (IT Project Management, 6pt)
- CSC851 (Advanced Programming, 6pt)
- CSC803 (Algorithms and Data Structures, 6pt)
- CSC835 (Database Systems, 6pt)
- MTS9302 (Corporate Network Management, 6pt)
- CST940 (Research Methodology, 6pt)
- CSC920 (Contemporary Topics in Computer Science, 6pt)
- CSC968 (Advanced Network Security, 6pt)
- WOL915 (Introduction to Professional Practice, 6pt)

Majors:

- Intelligent System
- Machine Learning and Big Data
- Network and Information Security
- Software Engineering

Elective Subjects:

- CSC862 (System Security, 6pt)
- CST826 (Human Computer Interaction, 1pt)
- BIT925 (Strategic Network Design, 6pt)
- CSC964 (Computational Intelligence, 6pt)
- CSC924 (Reasoning and Learning, 6pt)
- CSC944 (Perception and Planning, 6pt)
- CSC968 (Advanced Network Security, 6pt)
- WOL915 (Introduction to Professional Practice, 6pt)

Enrolled Credit: 90

Enrol Reset

Validation Checking

java.util.InputMismatchException: Student DOB is not inputted.

OK

Major Cores:

- CSC933 (Machine Learning Algorithms and Applications, 6pt)
- CSC935 (Computer Vision Algorithms and Systems, 6pt)
- CSC946 (Big Data Analytics, 6pt)

(The exception for not inputting the DOB)

Student Enrolment System

Student Name: Bob
Gender: ☒ Female ☐ Male

Student Number: 1234567
DOB: 30-02-1999

Bachelor of Computer Science Course Structure

Master of Computer Science Course Structure

Course Name: Master of Computer Science

Total Credit: 96

Core Subjects:

- CSC814 (IT Project Management, 6pt)
- CSC851 (Advanced Programming, 6pt)
- CSC803 (Algorithms and Data Structures, 6pt)
- CSC835 (Database Systems, 6pt)
- MTS9302 (Corporate Network Management, 6pt)
- CST940 (Research Methodology, 6pt)
- CSC920 (Contemporary Topics in Computer Science, 6pt)
- CSC968 (Advanced Network Security, 6pt)
- WOL915 (Introduction to Professional Practice, 6pt)

Majors:

- Intelligent System
- Machine Learning and Big Data
- Network and Information Security
- Software Engineering

Elective Subjects:

- CSC862 (System Security, 6pt)
- CST826 (Human Computer Interaction, 1pt)
- BIT925 (Strategic Network Design, 6pt)
- CSC964 (Computational Intelligence, 6pt)
- CSC924 (Reasoning and Learning, 6pt)
- CSC944 (Perception and Planning, 6pt)
- CSC968 (Advanced Network Security, 6pt)
- WOL915 (Introduction to Professional Practice, 6pt)

Enrolled Credit: 90

Enrol Reset

Validation Checking

DOBException: The DOB format is wrong: 30-02-1999

OK

Major Cores:

- CSC933 (Machine Learning Algorithms and Applications, 6pt)
- CSC935 (Computer Vision Algorithms and Systems, 6pt)
- CSC946 (Big Data Analytics, 6pt)

(The exception for using a wrong DOB format “30-02-1999”)

Student Enrolment System

Student Name: Bob
Gender: ☒ Female ☐ Male

Student Number: 1234567
DOB: 30/02/1999

Bachelor of Computer Science Course Structure

Master of Computer Science Course Structure

Course Name: Master of Computer Science

Total Credit: 96

Core Subjects:

- CSC814 (IT Project Management, 6pt)
- CSC851 (Advanced Programming, 6pt)
- CSC803 (Algorithms and Data Structures, 6pt)
- CSC835 (Database Systems, 6pt)
- MTS9302 (Corporate Network Management, 6pt)
- CST940 (Research Methodology, 6pt)
- CSC920 (Contemporary Topics in Computer Science, 6pt)
- CSC968 (Advanced Network Security, 6pt)
- WOL915 (Introduction to Professional Practice, 6pt)

Majors:

- Intelligent System
- Machine Learning and Big Data
- Network and Information Security
- Software Engineering

Elective Subjects:

- CSC862 (System Security, 6pt)
- CST826 (Human Computer Interaction, 1pt)
- BIT925 (Strategic Network Design, 6pt)
- CSC964 (Computational Intelligence, 6pt)
- CSC924 (Reasoning and Learning, 6pt)
- CSC944 (Perception and Planning, 6pt)
- CSC968 (Advanced Network Security, 6pt)
- WOL915 (Introduction to Professional Practice, 6pt)

Enrolled Credit: 90

Enrol Reset

Validation Checking

java.util.InputMismatchException: The input date does not exist.

OK

Major Cores:

- CSC933 (Machine Learning Algorithms and Applications, 6pt)
- CSC935 (Computer Vision Algorithms and Systems, 6pt)
- CSC946 (Big Data Analytics, 6pt)

(The exception for inputting an invalid DOB “30/02/1999”)

- ii. The system will automatically check whether the user enrolls sufficient credits for the course. For BCS, the minimal requirement is 144 cp. For MCS, the minimal requirement is 96 cp. If not, the system will handle this as an exception and show a pop-up window to alert the user to enroll some extra subjects to reach the minimal requirement.

The screenshot shows the 'Student Enrolment System' interface. The student's name is 'Bob', gender is 'Female', student number is '1234567', and DOB is '28/02/1999'. The course selected is 'Master of Computer Science'. The total credit is 96. The core subjects listed are: CSC814 (IT Project Management, 6pt), CSC851 (Advanced Programming, 6pt), CSC803 (Algorithms and Data Structures, 6pt), CSC835 (Database Systems, 6pt), MTS9102 (Corporate Network Management, 6pt), CST940 (Research Methodology, 6pt), CSC920 (Contemporary Topics in Computer Science, 6pt), and CSC905 (Advanced Research, 12pt). The major core subjects are: CSC933 (Machine Learning Algorithms and Applications, 6pt), CSC935 (Computer Vision Algorithms and Systems, 6pt), and CSC946 (Big Data Analytics, 6pt). The elective subjects listed are: CSC862 (System Security, 6pt), CST826 (Human Computer Interaction, 6pt), IST925 (Strategic Network Design, 6pt), CSC964 (Computational Intelligence, 6pt), CSC924 (Reasoning and Learning, 6pt), CSC944 (Perception and Planning, 6pt), CSC968 (Advanced Network Security, 6pt), and MDS913 (Mathematical Foundations, 6pt). The enrolled credit is 90. A pop-up window titled 'Enrolment Checking' displays the error message: 'java.util.InputMismatchException: Please enrol 1 more subjects.' with an 'OK' button.

(The exception for not selecting sufficient subjects)

- iii. When the user's personal information is completed and valid and the user selects sufficient subjects (the user can enroll more subjects than the minimal requirement), the system will complete the course enrolment (with a pop-up window) and create a text file to keep the enrolment record. The text file's name must be "studentName_courseName.txt".

The screenshot shows the 'Student Enrolment System' interface with the same student information and course selection as the previous screenshot. The total credit is 96. The core subjects and major core subjects are the same. The elective subjects listed are: CSC862 (System Security, 6pt), CST826 (Human Computer Interaction, 6pt), IST925 (Strategic Network Design, 6pt), CSC964 (Computational Intelligence, 6pt), CSC924 (Reasoning and Learning, 6pt), CSC944 (Perception and Planning, 6pt), CSC968 (Advanced Network Security, 6pt), and MDS913 (Mathematical Foundations, 6pt). The enrolled credit is 102. A pop-up window titled 'Save Enrolment Record' displays the message: 'The student's enrolment record is saved.' with an 'OK' button.

(The user enrolls MCS course successfully)

```

1 Student: Bob (1234567, Male, 28/02/1999)
2
3 Course Name: Master of Computer Science (ACTIVE)
4
5 Cores:
6 CSCI814 (IT Project Management, 6pt)
7 CSCI851 (Advanced Programming, 6pt)
8 CSCI803 (Algorithms and Data Structures, 6pt)
9 CSCI835 (Database Systems, 6pt)
10 MTS9302 (Corporate Network Management, 6pt)
11 CSIT940 (Research Methodology, 6pt)
12 CSCI920 (Contemporary Topics in Computer Science, 6pt)
13 CSCI992 (Professional Project, 12pt)
14
15 Major: Machine Learning and Big Data
16 CSCI933 (Machine Learning Algorithms and Applications, 6pt)
17 CSCI935 (Computer Vision Algorithms and Systems, 6pt)
18 CSCI946 (Big Data Analytics, 6pt)
19
20 Electives:
21 CSCI862 (System Security, 6pt)
22 CSIT826 (Human Computer Interaction, 6pt)
23 ISIT925 (Strategic Network Design, 6pt)
24 CSCI964 (Computational Intelligence, 6pt)
25 CSCI924 (Reasoning and Learning, 6pt)
26
27 Total Enrolled Credit: 102pt
28
29 Expected Master Graduation: Spring/2022
30
31

```

(The enrollment record is kept by a text file, named “studentName_courseName.txt”. The expected graduation date can be specified manually in the program.)

7. Reset the system

The user shall able to click the “Reset” button to reset all inputs, course structure, user’s selection and the total enrolled credit anytime.

The screenshot shows a web-based form titled "Student Enrolment System". The form contains several sections: "Student Information" (Name, Gender, Student Number, DOB), "Course Information" (Course Name, Total Credit), "Subjects" (Core Subjects, Majors, Major Cores, Elective Subjects), and "Enrolled Credit". At the bottom right, there is a "Reset" button. A small dialog box titled "System Reset" is open, showing a message "The system is reset." and an "OK" button.

(The reset button is clicked)

Tasks (10 marks)

Task 1 (2 marks): Update the UML class diagram by adding the SEFrame class. Complete the GUI design and implementation.

Task 2 (6 marks): Implement the system according to the specified steps. The program shall

- be consistent with the UML class diagram;
- follow the conventions for naming all classes, variables, and methods;
- provide sufficient comments;
- use proper blank spaces, indentation and braces to make your code easy to read and understand;
- follow the steps specified above to enrol one student into either the Bachelor of Computer Science course or Master of Computer Science course;
- be able to load BCS or MCS course structure via Java ObjectInputStream;
- be able to response to user's selection;
- be able to automatically update the enrolled total credits and calculate the remaining elective subject number for the minimal credit points requirement;
- be able to do the validation checking and handle the exceptions;
- be able to create a text file to keep the user's enrolment record;
- be able to reset the system anytime.

Task 3 (2 marks): Compilation and test.

- You shall compile and test your program by using two different cases. The first testing case must enrol a student (bob) to the Bachelor of Computer Science course and the second testing case must enrol another student (Amy) to the Master of Computer Science course.
- You shall also test the exception handling of your program.
- Please carefully compile and test your program and make sure your program can pass the compilation by using "javac" command. Please do not define the package in your program (a special alert for students who use IDE to complete the assignment).

Submission:

- Please submit your solution to Moodle (Assignment 3). Email submission is not accepted.
- Please submit an **individual PDF document (SEFrame.pdf)**, **a Java program (SEFrame.java)** **and both 'bcs.ser' and 'mcs.ser' files.**
- The SEFrame.java shall **contain all classes** of the system. The Java program's name must be **SEFrame.java**.
- The PDF document shall contain 1) the UML class diagram; 2) the GUI design and explanations; 3) the snapshots clearly shows the compilation and the execution of your program with the two testing cases (including all the exception handling); 4) the content of the student enrolment record txt files.
- Please DO NOT include the java code in the PDF document.

NOTES:

Enquiries about the marks can only be made within a maximum of 1 week after the assignment results are published. After 1 week the marks cannot be changed.

Mark deductions: compilation errors, incorrect result, program is not up to spec, poor comments, poor indentation, meaningless identifiers, required numeric constants are not defined, the program uses approaches which has not been covered in the lectures. The deductions here are merely a guide. Marks may also be deducted for other mistakes and poor practices.