UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
COURSE OUTLINE

1. **Course:** CPSC 501: Advanced Programming Techniques
Lecture Sections:
L01, TR 15:30-16:45, SA 106, Leonard Manzara, ICT 703, 220-3518, manzara@cpsc.ucalgary.ca
Office Hours: MWF 11:00-12:00

Course Website: D2L

Computer Science Department Office, ICT 602, 220-6015, cpsc@cpsc.ucalgary.ca

2. **Prerequisites:** CPSC 349 or 449
(http://www.ucalgary.ca/pubs/calendar/current/computer-science.html#3620)

3. **Grading:** The University policy on grading and related matters is described in sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Assignments	50%
Midterm Exam	25%
(In Class Thursday November 3rd, 2016)	
Final Exam	25%

This course **will** have a Registrar's Scheduled Final Exam.

Special Regulations affecting the Final Grade: Each of the above components will be given a percentage grade. The final grade will be calculated using the weights given above and then converted to a final letter grade using the table given below. **To achieve an overall grade of C- or better in the course, you must achieve a minimum grade of C- or better in the final exam and complete all assignments.**

4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar. Section 3.6. It is the student's responsibility to familiarize theirself with these regulations. See also Section E.6 of the University calendar.

5. **Scheduled Out-of-Class Activities:** REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME ACTIVITY. If you have a clash with this out-of-class activity, please inform your instructor as soon as possible so that alternative assignments can be arranged.

6. **Course Materials:**
Refactoring, Martin Fowler, Addison-Wesley (required)
Java Reflection in Action, Forman & Forman, Manning Publications (req)

Online Course Components:
See D2L

7. **Examination Policy:** Open book, no electronic aids of any kind are permitted. Students should also read the Calendar, Section G, on examinations.

8. **Approved Mandatory and Optional Course Supplemental Fees:** None.

9. **Writing across the Curriculum Statement:** In this course, the quality of the student's writing in the weighted components of the course will be a factor in the evaluation of these components. See also Section E.2 of the University Calendar.

10. **Human Studies Statement:** Students will be expected to participate as subjects or participants in projects. See also Section E.5 of the University Calendar.

11. **OTHER IMPORTANT INFORMATION FOR STUDENTS:**

a) **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offense that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K, Student Misconduct to inform yourself of definitions, processes and penalties.

b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points which can be found in each classroom and building.

c) **Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf. Students needing an Accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Computer Science.

d) **Safewalk:** Campus Security will escort individuals day or night (http://www.ucalgary.ca/security/safewalk/). Call 403-220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also http://www.ucalgary.ca/secretariat/privacy

f) **Student Union Information:** VP Academic (403) 220-3911 suvpaca@ucalgary.ca SU Faculty Rep (403) 220-3913 science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca, Student Ombuds Office: (403) 220-6420 ombuds@ucalgary.ca, http://ucalgary.ca/provost/students/ombuds

g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend your cell phone should be turned off unless instructed otherwise. All communications with other individuals via laptop computers, cell phones or other devices connectable to the internet in not allowed during class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

h) **U.S.R.I.:** At the University of Calgary feedback provided by students through the Universal Student ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference – please participate in USRI surveys.

Department Approval____Date__________________________

Associate Dean’s Approval for
out of regular class-time activity: __________________________________Date:_________________________

Associate Dean’s Approval for
Alternate final examination
arrangements:__________________________Date:___________________________

A signed copy of this document is kept on file in the Computer Science main Office ICT 602

CPSC 501 Percentage to Letter Grade Conversion Table

A+	95-100
A	90-95
A-	85-90
B+	80-85
B	75-80
B-	70-75
C+	65-70
C	60-65
C-	55-60
D+	50-55
D	45-50
F	0-45

CPSC 501 Syllabus

Refactoring

- Basic Concepts
- Software Tools
  - Version Control
  - Unit Testing
  - Refactoring Browsers
- Refactoring Principles
- When to Refactor
- Catalog of Refactorings

Reflection

- Basic Concepts
- Basic Mechanisms in Java
- Reflective Serialization
- Dynamic Loading
- Reflective Deserialization
- Dynamic Proxies (if time permits)

Optimizing Software Performance

- General Guidelines
- Measuring Performance
- Algorithm-Based Optimization
- Compiler-Level Optimization
- Code Tuning

Digital Signal Processing

- Sampling
- Spectral Analysis
  - Discrete Fourier Transform (DFT)
  - Fast Fourier Transform (FFT)
  - Windowing
- Convolution
  - Time-Domain Convolution
  - Frequency-Domain Convolution

Learning Outcomes:

By the end of the course: students will:

- By the end of this course, students should be able to optimize a computationally expensive digital signal-processing program, and create a report that describes the process they went through to accomplish this.
- By the end of this course, students should be able to explain the techniques used to optimize software performance, including how to measure performance gains.
- By the end of this course, students should be able to refactor object-oriented code using a disciplined process that uses version control and unit testing.
- By the end of this course, students should be able to design and implement a program that does reflection serialization and deserialization using the reflection API of the Java programming language.
- By the end of this course, students should be able to explain the concepts of code refactoring, including how refactoring improves the design of software systems.
- By the end of this course, students should be able to describe the basic concepts of reflection as embodied in modern programming languages.
- By the end of this course, students should be able to create a program that does object introspection using the reflective capabilities of the Java programming language.