SYLLABUS

SOFTWARE CONSTRUCTION

FORMAT OF THE COURSE

Two different modes of delivery:

- Section A (Synchronous mode): Synchronous lectures will be provided on Tuesdays 1:00pm to 2:30pm and on Thursdays 11:30am to 1:00pm.

- Section B (Inverted mode): Assigned readings and videos will be provided each week that you can study and then come to the Q/A sections on Wednesdays 4:00pm to 5:30pm and Fridays 2:30pm to 4:00pm.

- You can choose to follow any of the above modes as long as you are registered in the course.

- Synchronous and Inverted (Q/A) classes will be via Zoom.

INTERACTIONS DURING THE LECTURES

If you have a question

- Raise your hand or write in the chat

If I ask everyone a question

- Raise your hand if you want to answer, See how:
  https://www.youtube.com/watch?v=-WyIuYzB2qE

I will monitor chat messages and hand raises during the lectures to the best I can.

EVALUATION SCHEME

Assignments (4)	**25%**
Labs (7)	**15%**
Midterm Exam	**20%**
Final Exam	**40%**

Midterm exam will be on Saturday March 5th from 5pm to 6:30pm. PLEASE MARK YOUR CALENDAR NOW!

The schedules for the labs and assignments as well as the mark breakdowns for the labs and assignments are provided on BrightSpace.

COURSE INFORMATION

Instructor: Shiva Nejati

E-mail: snejati@uottawa.ca

We will use BrightSpace for all the course modules, discussion boards, announcements, assignments, labs and exams.

LABS

TAs will use Zoom for lab sessions

- During the lab time slots, your TA is available to help you with the lab work and answer your questions.

You have to submit the lab work by the given deadlines

- For the small labs (with 1% mark), you only need to capture your work in some files (e.g., .pdf) and submit the files on BrightSpace. For example, you do your work on paper and take a photo of your work or you use a tool and capture a screen shot of your work.

- For the big labs with 3%, you will have to submit a report.

LABS

Labs will be done in a group of two (but you can do them individually as well).

Frist lab will start in the week of Jan 24th (week 3).

GETTING SUPPORT

- **We will be using a discussion board as our main discussion tool**

- **Find the link to the discussion board on BrightSpace under the Table of Content**

- **Students participation and peer-collaboration highly encouraged!**

ASSIGNMENTS

Four assignments

- Assignment 1 (Behavioural modeling + Petri Nets, 6%)

- Assignment 2 (Lexical Analysis, 6%)

- Assignment 3 (Parsing, 6%)

- Assignment 4 (concurrency, 7%)

The deadlines are posted on BrightSpace

PLAGIARISM

Plagiarism is a serious academic offence that will not be tolerated.

Note that the person providing solutions to be copied is also committing an offence as they are an active participant in the plagiarism.

The person copying and the person copied from will be reprimanded equally according to the regulations set by the University of Ottawa.

Please refer to this link for more information:

https://www.uottawa.ca/vice-president-academic/academic-regulations-explained/academic-fraud

POLICY ON LATE ASSIGNMENTS/LABS

You have 2 days of lateness for assignments that you can use throughout the term

- These are TWO days for the term. Not for each assignment!

Each day the assignment is late consumes one day of lateness

For example,

- You can be 2 days late on assignment A1, or
- One day late on A1, and one day late on A3, or
- You can hand all of the assignments on time ☺

POLICY ON LATE ASSIGNMENTS/LABS

After having used your two days, late assignments are accepted for a maximum of 24 hours and they will receive a 10% penalty.

Late lab reports are accepted for a maximum of 24 hours and they will receive a 10% penalty.

BOOKS

Good news!

- You do no have to buy any books
- All the relevant book chapters will be posted online

COURSE OBJECTIVES

Specification and design of software applications using behavioral modeling techniques

Definition of computer languages by grammars and automata; design and implementation of lexical and syntactic analysers

Design, verification and implementation of programs with concurrency and synchronization problems

IS THIS COURSE FOR ME?

The course mixes three important parts

- Behavioural modeling
- How to build compilers and how to use regular expressions
- Basic concepts of concurrency and Java concurrency programing

Enough background?

- Know some UML and software modeling
- Know Java
- Knowledge of discrete mathematics

MAJOR COURSE TOPICS

Section 1: Introduction and Behavioral Modeling

- Introduction to software development processes
    - Waterfall model
    - Iterative (or incremental) model
    - Agile model
- Requirements modeling
    - *Domain analysis*
    - *UML Use case models*
- Behavioral modeling
    - UML activity diagrams (very useful to model concurrent behavior)
    - UML state machines (model the behavior of a single object)
    - Petri nets
    - Specification and Description Language (SDL)

MAJOR COURSE TOPICS

Section 2: Compilers, formal languages and grammars

- Lexical analysis (convert a sequence of characters into a sequence of tokens)
  - Formal languages
  - Regular expressions (method to describe strings)
  - Deterministic and Non-deterministic Finite Automata
- Syntax analysis
  - Context-free grammar (describes the syntax of a programming language)
  - Syntax trees
  - Parsers

MAJOR COURSE TOPICS

Section 3: Concurrency

- Logical and physical concurrency
- Mutual exclusion for access to shared resources
- Concurrency and Java programing
- Inter-process communication
- Process scheduling

ABOUT ME

- PhD from University of Toronto — 2008

- Scientist at Simula Lab, Norway (2009 - 2012)

- Scientist/Professor at SnT interdisciplinary Centre in Luxembourg (2012 -- 2019)

- Professor at uOttawa (2020 - …)

- Research Interests

  - Software Testing and Verification

  - Cyber Physical Systems

  - Requirements Engineering

  - Formal Methods

CONTACTS

- **Emails:**

  - **Identify yourself**
  - **Originated from your uOttawa email address, or**
  - **Signed with your full name and student ID**
  - **Start Subject of email with [SEG2106]**

- **Use the class forum**

THANK YOU!

QUESTIONS?