EXPANDED COURSE DESCRIPTION
ELECTRICAL ENGINEERING AND COMPUTER SCIENCE
Lassonde School of Engineering
Electrical Engineering Computer Science
LE / EECS 2030 3.0 SECTION Z
ADVANCED OBJECT ORIENTED PROGRAMMING
FALL 2019 / WINTER 2020

Last Modified Date: 08/06/2019

COURSE CALENDAR DESCRIPTION
This course continues the separation of concern theme introduced in LE/EECS 1020 3.00 and LE/EECS1021 3.00. While 1020 and 1021 focuses on the client concern, this course focuses on the concern of the implementer. Hence, rather than using an API (Application Programming Interface) to build an application, the student is asked to implement a given API. Topics include implementing classes (non-utilities, delegation within the class definition, documentation and API generation, implementing contracts), aggregations (implementing aggregates versus compositions and implementing collections), inheritance hierarchies (attribute visibility, overriding methods, abstract classes versus interfaces, inner classes); applications of aggregation and inheritance in concurrent programming and event-driven programming; recursion; searching and sorting including quick and merge sorts); stacks and queues; linked lists; binary trees. Prerequisites: cumulative GPA of 4.50 or better over all major EECS courses (without second digit "5"); LE/EECS1021 3.00 or LE/EECS 1020 (prior to Fall 2015) 3.00 or LE/EECS1022 3.00 or LE/EECS 1720 3.00. Course credit exclusions: AP/ITEC 2620 3.00. Previously offered as: LE/EECS1030 3.00, LE/CSE 1030 3.00.

INSTRUCTOR(S)

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ADDITIONAL INFORMATION

COURSE DESCRIPTION
The study of computer vision, graphics and robotics requires background in the concept of continuous and discrete signals, filtering, and elementary linear systems theory. Discrete signals are obtained by sampling continuous signals. Starting with a continuous time signal, the students will understand the concept of a discrete time signal, the conditions under which a continuous signal is completely represented by its discrete version, and discuss the analysis and design of linear time-invariant systems. An accompanying lab will cover applications of the concepts covered in the lectures to practical problems such as speech and image processing. The topics include:

- **Review of Mathematical concepts**: periodicity, complex variables, even/odd symmetry, sinusoids, complex exponentials.
- **Signals and Systems**: continuous-time and discrete-time signals and systems, exponential and sinusoidal signals, unit impulse and unit step functions, basic system properties.
- **Linear Time-Invariant Systems**: the convolution sum and integral, properties of LTI systems.
- **Fourier series and Fourier Transform**: continuous-time Fourier representations, basic properties, focus on multiplication and modulation properties, and Parseval’s relation.
- **Differential Equations, Laplace Transform, Z-Transform**: analysis and solution of linear constant coefficient differential equations.
- **Filters and Sampling**: magnitude-phase representations of the Fourier transform, ideal frequency-selective filters, non-ideal filters, the sampling theorem, interpolation.
Three lecture hours and weekly (180-minutes) laboratory sessions. In-class quizzes and mid-term are integral parts of the assessment process in this course.

**COURSE LEARNING OUTCOMES (CLOS)**

Upon completion of the course, students are expected to develop their:
1. Explain how continuous and discrete-time signals can be represented in both time and frequency domains
2. Represent linear systems both as systems of differential/difference equations and in terms of frequency response
3. Describe and use the principles of linear time invariant systems and the properties of Fourier and Laplace transforms
4. Analyze the effects of discrete-time representation of continuous signals
5. Design, build and measure continuous and discrete time frequency selective filters

**TEXTBOOK**


**GRADING SCHEME**

- 5 Home Assignments – 10% (2% each)
- 5 Labs – 15% (3% each)
- Quiz #1 – 6%
- Quiz #2 – 6%
- Mid-term – 20%
- Class Participation – 3%
- Final Exam – 40%

**ACADEMIC INTEGRITY LINKS**

- Senate Policy on Academic Honesty - http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/
- Academic Integrity - http://lassonde.yorku.ca/academic-integrity

**STUDENT LINKS**

- Student Rights and Responsibilities - http://oscr.students.uit.yorku.ca/student-conduct
- Religious Observance - https://w2prod.sis.yorku.ca/Apps/WebObjects/cdm.woa/wa/regobs
- Student Accessibility Services (SAS) - https://accessibility.students.yorku.ca/
- York University’s Policies on Gender/LGBTQ+/Positive Space - http://rights.info.yorku.ca/lgbtq/

**LAND ACKNOWLEDGEMENT**

- We acknowledge our presence on the traditional territory of many Indigenous Nations. The area known as Tkaronto has been care taken by the Anishinabek Nation, the Haudenosaunee Confederacy, the Huron-Wendat, and the Métis. It is now home to many Indigenous Peoples. We acknowledge the current treaty holders, the Mississaugas of the New Credit First Nation. This territory is subject of the Dish With One Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region.
- The Indigenous Framework for York University: A Guide to Action can be found here: http://indigenous.info.yorku.ca/
• Meaning of a land acknowledgement: http://healthydebate.ca/opinions/indigenous-land-acknowledgements

Many courses utilize Moodle, York University’s course website system. If your course is using Moodle, click here to access it.

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