EXPANDED COURSE DESCRIPTION
ELECTRICAL ENGINEERING AND COMPUTER SCIENCE
Lassonde School of Engineering
Electrical Engineering Computer Science
LE / EECS 6432 3.0 SECTION A
ADAPTIVE SOFTWARE SYSTEMS
FALL 2018 / WINTER 2019
Last Modified Date: 08/20/2018

COURSE CALENDAR DESCRIPTION

Adaptive software systems are software systems that change their behaviour and structure to cope with changes in environment conditions or in user requirements. Adaptation includes self-optimization, self-protection, self-configuration and self-healing. This course covers basic and advanced concepts in engineering adaptive systems and has a special focus on self-optimization. It introduces the students to the mathematical foundations of adaptive systems including performance models, estimators for performance models, feedback loop architectures and strategies, and optimization.

INSTRUCTOR(S)

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<th>Name</th>
<th>Section / Format / Term</th>
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<td>Sec. A / LECT / F</td>
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ADDITIONAL INFORMATION

TOPICS AND CONCEPTS

Adaptive software systems change their behaviour and structure to cope with changes in environment conditions or in user requirements. New computing paradigms, such as cloud computing, big data and cyber-physical systems rely heavily on adaptation which includes self-optimization, self-protection, self-configuration and self-healing. This course covers basic and advanced concepts of engineering adaptive software systems and has a special focus on cloud, big data and elasticity in clouds. An elastic application will monitor itself and the cloud environment, analyze its behaviour, plan and execute a sequence of actions to adapt its structure and behaviour. The students will learn about the architecture and design of adaptive systems, their runtime models, implementation and validation.

The course consists of lecture presentations by instructor or invited guests, paper presentations by students and in class discussions. The topics covered by the course include:
1. Introduction to Adaptive Software
2. Requirements of Cyber-Physical Systems, Ultra Large Scale Systems, Internet of Things
3. Adaptive Architecture: Monitoring, Analysis, Planning, Execution
4. Software Defined Infrastructure: Cloud Computing, Big Data, Containers
5. Runtime Models for Elastic Applications: Machine Learning, Queuing, Control Theory Linear Models
6. Analysis and Planning
   • Searched Based, Proportional, Integrative, Derivative Controllers
   • Control Theory
7. Engineering Adaptive Applications
   • Policy Languages, Utility Functions
   • Case Studies

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
• Academic Accommodation for Students with Disabilities - http://secretariat-policies.info.yorku.ca/policies/academic-accommodation-for-students-with-disabilities-policy/
• Counselling and Disability Services - http://cds.info.yorku.ca/
• York University’s Policies on Sexual Violence - http://secretariat-policies.info.yorku.ca/policies/sexual-violence-policy-on/
• 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.
Moodle @ York University