

Faculty of Science

**CSCI 6100G – Advanced Topics in Software Design  
(Applications of Artificial Intelligence to Software Engineering)**

Course outline for Fall 2017

**1. Course Details & Important Dates\***

Course Type	Day	Time	Location
Lecture	Tues.	11:10am – 2:00pm	ERC1054

\* for other important dates go to: [www.uoit.ca](http://www.uoit.ca) >Current Students >Important Dates and Deadlines

**2. Instructor Contact Information**

Instructor Name	Office	Email
Dr. Jeremy S. Bradbury	UA4016	jeremy.bradbury@uoit.ca
Office Hours: Tues. 2:00pm-3:00pm, or by appointment.		

**3. Course Description**

**CSCI 6100G – Advanced Topics in Software Design.** This course covers one or more advanced topics in software design that are not currently covered by the other courses in the program. This course is aimed at senior graduate students who have already taken one or more courses in this field. The instructor determines the topics that are covered in a particular year and they could change from one year to another. Topics are determined by the instructor before the start of the course. A detailed description of the course content will be posted before the start of term.  
Credit hours: 3

**5. Course Design**

The course is an advanced topics course and will focus on applications of Artificial Intelligence (machine learning, meta-heuristic search) to solve Software Engineering problems. In addition, we will discuss the underlying themes of automation in software development and how AI can be used to assist software developers (not just replace them). The format of the course will be a combination of:

- Lectures on AI methods and Software Engineering problems
- Group paper discussions on fundamental issues related to AI and Software Engineering
- Student presentations on relevant state-of-the-art research in the Software Engineering literature

## 6. Outline of Topics in the Course

<p>Relationship between Artificial Intelligence (AI) &amp; Software Engineering (SE)</p> <ul style="list-style-type: none"><li>• How can AI improve SE?</li><li>• How can SE improve AI?</li></ul> <p>Machine Learning (ML) methods including:</p> <ul style="list-style-type: none"><li>• Supervised learning (e.g., Support Vector Machine, Random Forest)</li><li>• Unsupervised learning (e.g., K-means Clustering, Neural Networks)</li><li>• Semi-supervised learning</li><li>• Deep learning</li></ul> <p>Meta-Heuristic Search techniques including:</p> <ul style="list-style-type: none"><li>• Hill climbing</li><li>• Simulated annealing</li><li>• Particle swarm optimization</li><li>• Ant colony optimization</li><li>• Genetic algorithms</li><li>• Evolutionary computation</li></ul> <p>Application of ML &amp; Meta-Heuristic Search to areas of Software Engineering including:</p> <ul style="list-style-type: none"><li>• Software testing &amp; analysis</li><li>• Program generation &amp; repair</li><li>• Program comprehension</li><li>• Software mining</li><li>• Requirements analysis</li></ul>
---

## 7. Required Texts/Readings

<p><i>Online Resources.</i> Online articles and websites will be used in place of a textbook. Links to all online resources will be posted on the course website.</p>
---

## 8. Evaluation Method

Presentations (6-8)	55%
Project	45%

## 9. Assignments and Tests

The schedule for course deliverables is as follows:

- Presentations (approximately every two weeks throughout the course)
- Project (proposal due late October, final project deliverables due early December)

## 10. Students with Disabilities

Accommodating students with disabilities at UOIT is a responsibility shared among various partners: the students themselves, SAS staff and faculty members. To ensure that disability-related concerns are properly addressed during this course, students with documented disabilities and who may require assistance to participate in this class are encouraged to speak with me as soon as possible. **Students who suspect they have a disability that may affect their participation in this course are advised to go to Student Accessibility Services (SAS) as soon as possible.** Maintaining communication and working collaboratively with SAS and faculty members will ensure you have the greatest chance of academic success.

Students taking courses on the North Campus Location can visit Student Accessibility Services in the U5 Building located in the Student Life Suite

Students taking courses on the Downtown Oshawa Campus Location can visit Student Accessibility Services in the 61 Charles St. Building, 2<sup>nd</sup> Floor, Room DTA 225 in the Student Life Suite.

Disability-related support and accommodation support is available for students with mental health, physical, mobility, sensory, medical, cognitive, or learning challenges. Office hours are 8:30am-4:30pm, Mon-Fri. For more information on services provided, you can visit the SAS website at <http://uoit.ca/studentaccessibility>

Students may contact Student Accessibility Services by calling 905-721-3266, or email [studentaccessibility@uoit.ca](mailto:studentaccessibility@uoit.ca)

Students who require the use of the Test Centre to write tests, midterms, or quizzes MUST register online using the SAS test/exam sign-up module, found here [www.uoit.ca/SASexams](http://www.uoit.ca/SASexams). Students must sign up for tests, midterms or quizzes AT LEAST seven (7) days before the date of the test.

Students must register for final exams by the registration deadline, which is typically 2 weeks prior to the start of the final examination period. SAS will notify students of the registration deadline date.

## 12. Academic Integrity

Students and faculty at UOIT share an important responsibility to maintain the integrity of the teaching and learning relationship. This relationship is characterized by honesty, fairness and mutual respect for the aim and principles of the pursuit of education. Academic misconduct impedes the activities of the university community and is punishable by appropriate disciplinary action.

Students are expected to be familiar with and abide by UOIT's regulations on Academic Conduct (Section 5.15 of the Academic Calendar) which sets out the kinds of actions that constitute academic misconduct, including plagiarism, copying or allowing one's own work to be copied, use of unauthorized aids in examinations and tests, submitting work prepared in collaboration with another student when such collaboration has not been authorized, among other academic offences. The regulations also describe the procedures for dealing with allegations, and the sanctions for any finding of academic misconduct, which can range from a resubmission of work to a failing grade to permanent expulsion from the university. A lack of familiarity with UOIT's regulations on academic conduct does not constitute a defense against its application.

Further information about academic misconduct can be found in the Academic Integrity link on your laptop. Extra support services are available to all UOIT students in academic development, study skills, counseling, and peer mentorship. More information on student support services can be found in the Academic Calendar (Section 8).

## 15. Freedom of Information and Protection of Privacy Act

The following is an important notice regarding the process for submitting course assignments, quizzes and other evaluative material in your courses in the Faculty of Science.

As you may know, UOIT is governed by the *Freedom of Information and Protection of Privacy Act* ("FIPPA"). In addition to providing a mechanism for requesting records held by the university, this legislation also requires that UOIT not disclose the personal information of its students without their consent.

FIPPA's definition of "personal information" includes, among other things, documents that contain both your name and your Banner ID. For example, this could include graded test papers or assignments. To ensure that your rights to privacy are protected, the Faculty of Science encourages you to use only your Banner ID on assignments or test papers being submitted for grading. This policy is intended to prevent the inadvertent disclosure of your information where graded papers are returned to groups of students at the same time. If you still wish to write both your name and your Banner ID on your tests and assignments, please be advised that UOIT will interpret this as an implied consent to the disclosure of your personal information in the normal course of returning graded materials to students.

If you have any questions or concerns relating to the new policy or the issue of implied consent addressed above, please contact [accessandprivacy@uoit.ca](mailto:accessandprivacy@uoit.ca)

## 16. Course Evaluations

Student evaluation of teaching is a highly valued and helpful mechanism for monitoring the quality of UOIT's programs and instructional effectiveness. To that end, course evaluations are administered by an external company in an online, anonymous process during the last few weeks of classes. Students are encouraged to participate actively in this process and will be notified of the dates. Notifications about course evaluations will be sent via e-mail, and posted on Blackboard, Weekly News and signage around the campus.