Cities are complex dynamical systems, which pose extraordinary challenges to the humanity in the future. Therefore, more and more cities are committed to promote, elaborate and put into action strategies to increase urban resilience and sustainability consistent with the economic costs to provide urban quality and therefore to raise quality of life standards. This interdisciplinary course focuses on “urban sustainability” and “urban resilience”. Historically the sustainability science and resilience theory have been developed separately, though occasionally the terms have been used interchangeably. In this course, we discuss whether resilience and sustainability should be combined.

Topics
1. City, a complex human and natural system
2. Urban sustainability
3. Urban resilience
4. A complementary approach

Calendar Copy:
A first course in Urban Physics focused on urban resilience and urban sustainability. The relation/opposition of these two notions are discussed.

Prerequisites:
None

Antirequisites:
None

Note: It is the student's responsibility to ensure that all Prerequisite and Corequisite conditions are met or that special permission to waive these requirements has been granted by the Faculty. It is also the student's responsibility to ensure that they have not taken a course listed as an Anti-requisite. The student may be dropped from the course or not given credit for the course towards their degree if they violate the Prerequisite, Corequisite or Anti-requisite conditions.

Contact Hours:
3 lecture hours/week;
Lectures will be delivered asynchronously through pre-recorded videos posted to the course OWL site.
Lectures will be organized into learning modules (lessons) which students should review on a weekly basis.
Review of lecture material and self-study should take approximately 6 hours per week.

2 tutorial hours/week.
A 2-hour tutorial session will be delivered synchronously through Zoom each week during the scheduled tutorial hours. Tutorials are mandatory students seeking assistance with assignments or clarification on lecture material are strongly encouraged to attend. The link to the Zoom meeting will be posted to OWL.
Instructor:
Dr. Hassan Peerhossaini, hpeerhos@uwo.ca
Administrative Assistant : Sandra McKay (smckay@uwo.ca)

Textbook:
There is no textbook for the course; various papers in the scientific, engineering and social science
literature will be used. The course material is cumulative; therefore, you should review lectures and
readings weekly - do not expect success if you only study and practice before exams.
A non-exhaustive sample of suggested readings for the course is listed below:

Other References:
Principles of ecosystem stewardship: resilience-based natural resource management in a changing
world.
Springer, New York,
New York, USA.

Our common future: report of the 1987
World Commission on Environment and Development. Oxford
University Press, Oxford, UK.

Morphological and climate balance: Proposal for a method to analyze neighborhood urban forms
by way of densification
Martina Pacificia et al.
Sustainable Cities & Society 35 (2017) 145-156

Resilience thinking integrating resilience, adaptability and transformability.
Folke, C., S. R. et al.

Urban policies and sustainable energy management
Fabrizio Cumo, et al.
Sustainable Cities & Society 4 (2014) 29-34

Prospects for transdisciplinary
Julie Thompson Klein
Futures 36 (2004) 515–526

On the use of numerical modelling for near-field pollutant dispersion
in urban environments _ A review
M. Lateb et al.
Environmental Pollution 208 (2016) 271e283

Sustainable and Smart Cities
M.E. Khan
The World Bank
Sustainable Development Network
Urban and Disaster Risk Management Department
May 2014

Tipping Toward Sustainability: Emerging Pathways of Transformation
Frances Westley, et al.
AMBIÖ (2011) 40:762–780

Clarifying the new interpretations of the concept of sustainable building
Umberto Berardi
Sustainable Cities & Society 8 (2013) 72-78

Should sustainability and resilience be combined or remain distinct pursuits?
Charles L. Redman
Ecology and Society 19(2)-2014: 37

Agency, capacity, and resilience to environmental change: lessons from human development, well-being, and disasters.
Brown, K., and E. Westaway

Cooper, J., and P. Sheets, eds. 2012.
Surviving sudden environmental change: answers from archaeology.
University Press of Colorado, Boulder, Colorado, USA.

Units:
Both SI and FPS unit systems may be used in lectures, tutorials and examinations.

Specific Learning Objectives:

1. At the end of topic 1 (City, a complex system of human and natural system), the student should be able to define “city” as a complex system with its principal parameters and the interaction between human and its natural environment.
2. At the end of topic 2 (Urban sustainability), the student should know the notion of sustainability and can give some examples in the context of “city”.
3. At the end of topic 3 (Urban resilience), the student should know the notion of urban resilience and can give some examples in the context of “city”.
4. At the end of topic 4 (A complementary approach), the student should be able to point out contradictions between sustainability and resilience and the ways that these two notions could be (or not) reconciled.

The instructor may expand, or revise material presented in the course as appropriate.

General Learning Objectives:

E=Evaluate, T=Teach, I=Introduce; (I) = Introduction, (D) = Developing, (A) = Advanced level
<table>
<thead>
<tr>
<th>Knowledge Base</th>
<th>T</th>
<th>Engineering Tools</th>
<th>I</th>
<th>Impact on Society</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Analysis</td>
<td>T</td>
<td>Teamwork</td>
<td></td>
<td>Ethics and Equity</td>
<td></td>
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<tr>
<td>Investigation</td>
<td></td>
<td>Communication</td>
<td>I</td>
<td>Economics and Project Management</td>
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<tr>
<td>Design</td>
<td></td>
<td>Professionalism</td>
<td></td>
<td>Life-Long Learning</td>
<td></td>
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</tbody>
</table>
**Evaluation:**
The final mark will be determined as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Assignments</td>
<td>40%</td>
</tr>
<tr>
<td>Project (based on formal final report and oral presentation)</td>
<td>50%</td>
</tr>
<tr>
<td>Participation in tutorials assessed by tracking presence</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

Note: **Students must pass the final evaluation to pass this course. Students who fail the final evaluation will be assigned the aggregate mark, as determined above, or 48%, whichever is less. Students who have failed this course previously must repeat all components of the course. No special permissions will be granted enabling a student to retain assignment or test marks from previous years. Previously completed assignments cannot be resubmitted.**

1. **Assignments:**
Assignments will be given on OWL. Assignments are to be submitted prior to the due date to OWL. Late assignments will be assessed a penalty of 10% per day, to a maximum of 4 days, after which they will receive a mark of zero. Extensions are to be negotiated with the course instructor, not the teaching assistants.

2. **Use of English:**
In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for improper use of English. Additionally, poorly written work with the exception of the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

**Cheating:**
University policy states that cheating is a scholastic offence. The commission of a scholastic offence is attended by academic penalties that might include expulsion from the program. If you are caught cheating, there will be no second warning.

For more information on scholastic offenses, please see:
http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_undergrad.pdf

**Attendance:**
Any student who, in the opinion of the instructor, is absent too frequently from class, laboratory, or tutorial periods will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular final examination in the course.

**Accessibility:**
Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

**Conduct:**
Students are expected to arrive at lectures on time, and to conduct themselves during class in a professional and respectful manner that is not disruptive to others. Please turn off your cell phone before coming to a class, tutorial, quiz or exam. On the premises of the University or at a University-sponsored program, students must abide by the Student Code of Conduct:
http://www.uwo.ca/univsec/board/code.pdf

**Sickness and Other Problems:**
Students should immediately consult with the Instructor or Department Chair if they have any problems that could affect their performance in the course. Where appropriate, the problems should be documented (see attached). The student should seek advice from the Instructor or Department Chair regarding how best to deal with the problem. Failure to notify the Instructor or Department Chair immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

Students that are in emotional/mental distress should refer to Mental Health@Western
http://www.uwo.ca/uwocom/mentalhealth/ for a complete list of options about how to obtain help

For more information concerning medical accommodations, please see:
http://www.uwo.ca/univsec/handbook/appeals/accommodation_medical.pdf

**Notice:**
Students are responsible for regularly checking their email, course website (https://owl.uwo.ca) and notices posted outside the Civil and Environmental Engineering Department Office

**Consultation:**
Students are encouraged to discuss problems with their teaching assistant and/or the Instructor in tutorial sessions. Office hours will be arranged for the students to see the Instructor and teaching assistants. Other individual consultation can be arranged by appointment with the instructor.

**Course Breakdown:** (Values given in accreditation units)
Engineering Science = 100%

The attached document “INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED” is part of this course outline.