Western University - Faculty of Engineering  
Department of Civil and Environmental Engineering  

CEE 3328b – Appropriate Technology for International Development  
Course Outline 2020/21

This course introduces students to the background, conceptual underpinnings, and practical implementation aspects of Appropriate Technology for the purposes of sustainable development. As part of a series of courses in the Structural Engineering and International Development, and Environmental Engineering and International Development programs, the goal of this course is to equip civil engineering students with the skills to successfully undertake challenges in developing countries, countries in transition, and at-need communities in developed countries. The general objectives are for the student to become able to:

- Develop a knowledge base in the background of the appropriate technology movement, identifying its motivation, principles, and evolution.
- Formulate specific engineering challenges existing in developing regions and demonstrate appreciation for the region-specific context of proposed appropriate technology solutions.
- Identify how the standard engineering design process needs to accommodate appropriate technology principles and projects.
- Develop a knowledge base in key fields where technology, appropriately applied, can significantly impact development including water and wastewater treatment, solid waste management, construction, communication, and energy supply.
- Design solutions to open-ended engineering problems in the context of appropriate technology.
- Improve written and oral communication skills associated with complex engineering and development concepts by undertaking individual written compositions, participating in interactive discussions, and presenting projects both orally and in written form.
- Demonstrate professionalism by understanding the roles and responsibilities of the professional engineering in society.
- Appreciate the importance of economics, business practices, and politics in successfully implementing appropriate technology.
- Demonstrate the ability to make life-long learning a priority by managing and taking responsibility for one’s own learning and bringing additional educational resources to the group.

Calendar Copy:  
The course will introduce the concept of appropriate technology in the context of international development to students. It will examine the application of technologies to critical human needs in development, such as housing, transportation, provision of safe water and sanitation, waste management, and energy (0.5 course).

Prerequisites: Admission to the Environmental Engineering with International Development Option or Structural Engineering with International Development Option.
Antirequisite: None

Note: It is the student's responsibility to ensure that all Prerequisite 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 Antirequisite. The student may be dropped from the course or not given credit for the course towards their degree if they violate the Prerequisite or Antirequisite conditions.

Contact Hours:
3 lecture hours per week; Attendance at the lectures is mandatory. Lectures will be delivered synchronously but through the term students will also be required to asynchronously watch some pre-recorded videos posted to the course OWL site.

2 tutorial hours per week; Attendance at tutorial session is not mandatory. This session is used for teams to work on the final group design project.

Instructor:
Dr. Clare Robinson, SEB 3041
crobinson@eng.uwo.ca

Textbook:
Mastering the Machine Revisited: Poverty, Aid and Technology [Paperback], Ian Smillie (Author), Publisher: Stylus Publishing, LLC (Dec 1 2000). (Purchase of textbook is required)

Other References:

Additional reading material will be provided through the course website.

Computing:
Written assignments must be submitted as word processed documents in WORD or PDF formats. All assignments will be submitted via the OWL course website using TURNITIN.

Units:
SI units will be used in lectures and examinations

Course Style:
The pedagogical model is collaborative learning, so the classes will be based mostly on discussions and case studies rather than lectures. Students are expected to come to class prepared to discuss the weekly readings. The course instructor and teaching assistant will provide mentorship and guidance for the students to undertake individual and collective learning processes focused on achieving the course objectives. A substantial reading list will be employed
that will provide material for digestion, synthesis, and reflection in individual written assignments and group discussions in class. Students will research topics and present their findings to the class. Guest speakers will provide case studies that illustrate practical applications of the topic material.

**Specific Learning Objectives:**
By the end of the course, the student should be able to articulate his/her own learning with respect to these key points aligned with the course’s specific learning objectives [Graduate Attribute]:
- Describe several contexts in which appropriate technology (AT) could be successfully applied.
- Identify the key features of a region that must be considered for successful application of AT.
- Demonstrate knowledge of the birth and evolution of the AT movement.
- Summarize the key aspects of AT projects that are successful.
- Summarize the key features of AT projects that have failed (better named Inappropriate Technology).
- Describe promising/successful AT approaches in the areas of water, sanitation, agriculture, construction and energy
- Reflect on how your understanding of AT evolved via the research and readings undertaken during the course.
- Generate a diverse set of candidate engineering design solutions in the context of appropriate technology. [D2]
- Design solutions to open-ended engineering problems in the context of appropriate technology.
- Demonstrate ability to analyse the interactions of engineering with economic, social, health, safety, legal and cultural aspects of society. [IESE 1]

**General Learning Objectives:**

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<tr>
<th>E=Evaluate, T=Teach, I=Introduce</th>
<th>Knowledge Base</th>
<th>Engineering Tools</th>
<th>Impact on Society</th>
<th>T</th>
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<td>Problem Analysis</td>
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<td>Team Work</td>
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<td>Investigation</td>
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<td>Professionalism</td>
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**Evaluation:**
The final course mark will be determined as follows:
- Reflection Papers 15%
- Class and Online Contributions 15%
- Team Debate 5%
- Individual Assignment 10%
- Group Project 20%
- Final Exam 35%

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Total 100%
Note:  (a) **Students must pass the final examination to pass this course.** Students who fail the final examination will be assigned the aggregate mark, as determined above, or 48%, whichever is less.

(b) **Students must turn in all assignments and achieve a passing grade in this component, to pass this course.** Students who do not satisfy this requirement will be assigned 48% or the aggregate mark, whichever is less.

(c) **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 and laboratories cannot be resubmitted.

(d) Should any of the classes conflict with a religious holiday that a student wishes to observe, the student must inform the instructor of the conflict no later than two weeks before the scheduled class. (For further information on Accommodations for Religious Holidays see http://www.uwo.ca/univsec/handbook/appeals/accommodation_religious.pdf)

1. **Examinations**
   The final examination will be Open Book and held during the regular examination period.

2. **Assignments**
   **Reflection Papers**
   A reflection paper is due at 10am before the Thursday lecture during which the weekly readings will be discussed. The objectives of these papers are to:
   1. help facilitators guide class discussion,
   2. develop your writing and analysis skills, and
   3. ensure good preparedness for class.

   Your paper needs to cover only two topics. First, you should start with how the week’s reading sheds light on the theory or application of appropriate technology. Second, you should offer your ‘reflections’ on any part of the readings. What excited you? What did not resonate? What confused you? Did it evoke other learnings or experiences? I encourage you to be thoughtful and provocative and flex your creative writing skills.

   Reflection papers will fail if:
   1. they are late or missing;
   2. they do not demonstrate that you completed the readings;
   3. they show a lack of insight into the readings, or are poorly written.

   Even if you have to miss a class, you will be required to submit a reflection paper.

   The reflection paper cannot exceed one page, single spaced, 12 point, Times New Roman, 1 inch margins. It is very important to stay in these constraints. Please ensure your name appears on the upper right hand side of the paper (ideally as a header). Submit the reflection papers through OWL via the TURNITIN facility.
Each week in class the reading assignment for the next week will be identified and the reflection paper from the previous week will be returned. A reflection paper will not be due in weeks when there is a different deliverable due (e.g., project). This will be made clear on the course website. Unless otherwise specified, a reflection paper is due each week.

*Class Contributions*
As this is a collaborative style course, you are expected to contribute to the class discussions and the learning of the class. In order to do so, you must prepare the readings carefully. During class, you must listen actively to the class conversation, ask questions of your classmates, offer insights, and contribute meaningfully. It also means that you are respectful of your classmates and their opinions, are punctual and attentive, and do not engage in negative or disruptive behaviours.

It is important to discriminate between class participation and contribution. Class participation focuses on you, whereas class contributions focus on the benefits you accrue to the class. You must engage with the class process in order to contribute to the collective learning of the class. Each student is expected to participate and contribute each week.

*Debates*
Team debates will be held in Weeks 7-9. You will be assigned to a team and will be provided an argument to debate. Further details will be provided in class.

*3. Projects*
There will be one individual project. This will be handed out in Week 2 and due in Week 5.

There will be one group project. This will be handed out in Week 6 and due in Week 13. Further details will be provided in class.

*4. Use of English*
In accordance with Senate and Faculty Policy, students may be penalised up to 10% of the marks on all assignments, tests, and examinations for the 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.

**Plagiarism:**
Students must write their essays, assignments and examinations in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar).

The University of Western Ontario uses software for plagiarism checking. Students are required to submit their work in electronic form to Turnitin.com for plagiarism checking (accessible through the course website).
**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 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. Late comers may be asked to wait outside the classroom until being invited in by the Instructor. 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.

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).
**Consultation:**
Students are encouraged to discuss problems with their teaching assistant and/or instructor in tutorial sessions. Individual consultation can be arranged by appointment with the instructor and/or teaching assistant.

**Course breakdown:**
Engineering Science = 45% = 22.68 AUs
Engineering Design = 30% = 15.12 AUs
Complementary Studies = 25% = 12.6 AUs

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