

**THE UNIVERSITY OF WESTERN ONTARIO
FACULTY OF ENGINEERING
DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING**

**CEE3328b Appropriate Technologies for International Development
Course Outline – 2015-2016**

This course introduces and defines the concept of “appropriate technology” and traces its evolution over the last 10 years. Factors that have challenged the appropriate technologies movement are highlighted and emerging concepts such as designing for affordability and sustainability and exploiting the wealth in the bottom of the economic pyramid (BoP) are introduced. The status report on the United Nations MDG is reviewed and the 2030 Agenda for Sustainable Development is introduced. The course focuses on the need to develop environmentally sustainable and affordable technologies to meet the needs of the world’s economically poor (the nearly 4 billion people in the BoP). Attention is paid to critical human needs, such as housing, safe water, sanitation and wastewater management, and affordable energy.

The general objectives are for the student to be able to:

- Understand the United Nations Post 2015 Development Agenda and list the Sustainable Development Goals.
- Appreciate basic human needs in international development and identify the role of technology in meeting some of these needs
- Understand cultural sensitivities in applying technologies in developing countries
- Understand fundamental principles and theories underlying low-cost water and wastewater treatment, design and construction of sustainable sanitation systems, waste degradation and biodegradation, and energy supply
- Explore low cost housing construction methods and how to adapt them to developing countries and at-need communities in developing countries using local materials.
- Appreciate the challenges associated with financing sustainable waste management, water and sanitation provision in developing countries
- Develop out-of-the box solutions for providing alternative and cost-effective energy
- Improve communication and team skills by undertaking and submitting individual written assignments and making group presentations.
- Recognize the need for life-long learning by keeping abreast of emerging environmental issues and policies.

Prerequisite : Completion of the 2nd year of the Civil and Environmental Engineering and the Chemical and Biochemical Engineering Programs.

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 the **student’s responsibility** to ensure that he/she has 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 he or she violates the Prerequisite, Corerequisite or Antirequisite conditions.

Corequisite: None

Antirequisite: None

Contact Hours

3 lecture hours and 2 tutorial hours each week.

Required:

1. Instructor Course Notes and Assigned Reading Materials
 2. Transforming our world: the 2030 Agenda for Sustainable Development, United Nations Department of Economics & Social Affairs
(<https://sustainabledevelopment.un.org/post2015/transformingourworld>)
 3. Appropriate Technologies for Environmental Protection in the Developing World
Selected Papers from ERTEP 2007, July 17-19 2007, Ghana, Africa
Yanful, Ernest K. (Ed.)
2009, Approx. 300 p., Hardcover
ISBN: 978-1-4020-9138-4
3. Recommended Weekly Articles from Instructor

Instructor

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Topics and Specific Learning Objectives

Review of United Nations MDGs and 2030 Agenda for Sustainable Development (3 Lecture Hours and 2 Tutorial Hours). At the end of this section, the student should be able to:

- (a) Identify the key achievements of the MDGs and what they did not achieve.
- (b) List the objectives of the Post 2015 or 2030 Agenda for Sustainable Development
- (c) List the new 17 Sustainable Development Goals and the target areas for action (the 5 Ps)
- (d) Appreciate challenges involved in making technological interventions in development
- (e) Understand the meanings of “appropriate technology”, “adaptive technology” and “intermediate technology”

The World Economic Pyramid (3 Lecture Hours and 2 Tutorial Hours)

At the end of the section, the student should be able to:

- (a) Understand the concept of the world economic pyramid and the associated four tiers

- (b) Appreciate the importance of the geographical locations of the fourth or bottom tier of the Pyramid
- (c) Understand the implications of the size and purchasing power of the bottom or fourth tier of the Pyramid (BoP) in the development of technology
- (d) Understand the paradigm shift from appropriate technology to environmentally sustainable and extremely affordable technology in regards to the BoP.
- (e) Understand and be ready to implement the principles involved in the design cycle of sustainable and affordable technology: “from cradle to field”.

Low-cost wastewater treatment and ecological sanitation (10 Lecture Hours and 6 Tutorial Hours). At the end of this section, the student should be able to:

- (a) Understand basic principles underlying wastewater treatment
- (b) Compare and contrast decentralized small, individual wastewater treatment systems on the basis of economy and overall health impacts
- (d) Understand the design, operation and maintenance of waste stabilization ponds.
- (e) Understand the design and operation of bio-toilets
- (f) Design and recommend appropriate and environmentally sustainable sanitation systems

Energy for Development (3 Lecture Hours and 2 Tutorial Hours)

At the end of this section, the student should be able to:

- (a) Appreciate global energy consumption and trends
- (b) Understand the energy gap in developing countries (especially SubSaharan Africa)
- (b) Appreciate the importance and use of lower cost renewable energy for the BoP
- (c) Identify alternate supplies for electricity for the BoP
- (d) Design and test the feasibility of low cost briquette production from waste as a viable energy source
- (e) Discuss energy from waste options for developing countries.

Housing schemes in developing countries (3 Lecture Hours and 2 Tutorial Hours)

At the end of this section, the student should be able to:

- (a) Identify different housing schemes in developing countries
- (b) Discuss low cost housing design and construction methods for developing countries (focusing on the BoP).

Units

SI unit systems will be adopted in assignments, quizzes and examination.

Evaluation

Assignments:	15%
Tests	15%
Project Report and Presentation	20%
Final Examination	50%

A student must pass the final examination and submit all assignments to pass the course. A student who fails the final examination will be assigned the aggregate mark as determined above, or 48%, whichever is less.

Examination and Tests

Two 1-hour tests
One 3-hour final examination.

1. Tests are Closed Book. Only approved calculators are allowed, but NO communication devices or external sources of information, including mobile phone, laptop computer, iPad, iPod, Tablet, books, notes or crib sheets, are allowed.

2. **The Final Examination is Open Book.** Nonprogrammable calculators, books, notes or crib sheets are allowed, but NO communication devices (e.g. laptop computer, cell phone, iPod and iPad) are allowed.

Weekly Assignments

Due every Friday at 11:30 am

Cheating

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

Attendance

Any student who, in the opinion of the instructor, is absent too frequently from class or tutorial periods in the course, 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 final examination in the course.

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 final examinations 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.

Consultation Hours

Students are encouraged to discuss problems with the teaching assistant and/or instructor during tutorial sessions. Other individual consultation may be arranged by appointment.

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.

Sickness or other Problems¹

Students should immediately consult with the instructor or Associate Dean of Undergraduate Affairs 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 Associate Dean regarding how best to deal with the problem. Failure to notify the instructor or Associate Dean immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

Note

1) Students are responsible for regularly checking their e-mail and notices posted at the course OWL site and outside the Student Liaison Office EB2097, or the CEE Department Office, SEB 3005.

2) The attached document *Instructions for students unable to write tests or examinations or submit assignments as scheduled* is part of this course outline

CEAB Course Breakdown

Engineering Science = 30%: 15.3 AUs

Engineering Design = 25%: 12.75 AUs

Basic Science = 20%: 10 AUs

Complementary Studies = 25%: 12.75 AUs

Total = 50.8 AUs

General Learning Objectives

Knowledge Base	x	Individual Work	x	Ethics and Equity	x
Problem Analysis	x	Team Work	x	Economics and Project Management	x
Investigation		Communication	x	Life-Long Learning	x
Design	x	Professionalism	x		
Engineering Tools	x	Impact on Society and the Environment	x		

The document "*Instruction for students unable to write tests or examinations or submit assignments as scheduled*" IS ATTACHED AND IS PART OF THIS COURSE OUTLINE.

Professor E.K. Yanful
December 29, 2015

INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED

IF, ON MEDICAL OR COMPASSIONATE GROUNDS, YOU ARE UNABLE TO WRITE TERM TESTS OR FINAL EXAMINATIONS OR COMPLETE COURSE WORK BY THE DUE DATE, YOU SHOULD FOLLOW THE INSTRUCTIONS LISTED BELOW. YOU SHOULD UNDERSTAND THAT ACADEMIC ACCOMMODATION WILL NOT BE GRANTED AUTOMATICALLY ON REQUEST. YOU MUST DEMONSTRATE TO YOUR DEPARTMENT (OR THE UNDERGRADUATE SERVICES OFFICE) THAT THERE ARE COMPELLING MEDICAL OR COMPASSIONATE GROUNDS THAT CAN BE DOCUMENTED BEFORE ACADEMIC ACCOMMODATION WILL BE CONSIDERED. DIFFERENT REGULATIONS APPLY TO TERM TESTS, FINAL EXAMINATIONS AND LATE ASSIGNMENTS. READ THE INSTRUCTIONS CAREFULLY. (SEE THE 2015 UWO ACADEMIC CALENDAR).

A. GENERAL REGULATIONS & PROCEDURES

1. All first year students will report to the Undergraduate Services Office, SEB 2097, for all instances.
2. If you are an upper year student and you are missing a test/assignment/lab or exam that is worth MORE THAN 10% of your final grade, you will report to the Undergraduate Services Office, SEB 2097. Otherwise, you will report to your department office to request accommodation.
3. Check the course outline to see if the instructor has a policy for missed tests, examinations, late assignments or attendance.
4. Documentation must be provided as soon as possible. If no one is available in your Department office or the Undergraduate Services Office, leave a message clearly stating your name & student number and reason for your call. The department telephone numbers are given at the end of these instructions.
5. If you decide to write a test or an examination you should be prepared to accept the mark you earn. Rewriting tests or examinations or having the value of a test or examination reweighted on a retroactive basis is not permitted.

B. TERM TESTS

1. If you are in first year and you are unable to write a term test, contact the Undergraduate Services Office, SEB 2097 PRIOR to the scheduled date of the test.
2. If you are an upper year student and you are unable to write a term test, inform your instructor PRIOR to the scheduled date of the test. If the instructor is not available, leave a message for him/her at the department office. If the test is worth MORE THAN 10% of your final grade you will report to the Undergraduate Services Office, SEB 2097 to request accommodation. Otherwise, you will report to your department office to request accommodation.
3. Be prepared to provide supporting documentation to the Department Chair and/or the Undergraduate Services Office (see next page for information on documentation).
4. Discuss with the instructor if and when the test can be rescheduled. **N.B.** The approval of the Chair or the Undergraduate Services Office is required when rescheduling term tests.

C. FINAL EXAMINATIONS

1. If you are unable to write a final examination, contact the Undergraduate Services Office PRIOR TO THE SCHEDULED EXAMINATION TIME to request permission to write a Special Final Examination. If no one is available in the Undergraduate Services Office, leave a message clearly stating your name & student number.
2. Be prepared to provide the Undergraduate Services Office with supporting documentation (see next page for information on documentation) the next day, or as soon as possible (in cases where students are hospitalized). The following circumstances are not considered grounds for missing a final examination or requesting special examinations: common cold, sleeping in, misreading timetable and travel arrangements.
3. In order to receive permission to write a special examination, you must obtain the approval of the Chair of the Department **and** the Associate Dean and in order to apply you must sign a "Recommendation for a Special Examination Form" available in the Undergraduate Services Office. The Undergraduate Services Office will then notify the course instructor(s) and reschedule the examination on your behalf.

N.B. It is the student's responsibility to check the date, time and location of the special examination.

D. LATE ASSIGNMENTS

1. Advise the instructor if you are having problems completing the assignment on time (**prior** to the due date of the assignment).
2. Be prepared to provide documentation if requested by the instructor (see reverse side for information on documentation).
3. If you are granted an extension, establish a due date. The approval of the Chair of your Department (or the Associate Dean if you are in first year) is not required if assignments will be completed prior to the last day of classes.
4.
 - i) Extensions beyond the end of classes must have the consent of the instructor, the department Chair and the Associate Dean. Documentation is mandatory.
 - ii) A Recommendation of Incomplete Form must be filled out indicating the work to be completed and the date by which it is due. This form must be signed by the student, the instructor, the department Chair and the Associate Dean.

E. SHORT ABSENCES

If you miss a class due to a minor illness or other problems, check your course outlines for information regarding attendance requirements and make sure you are not missing a test or assignment. Cover any readings and arrange to borrow notes from a classmate.

F. EXTENDED ABSENCES

If you are absent more than one week or if you get too far behind to catch up, you should consider reducing your workload by dropping one or more courses. (Note drop deadlines listed below). You may want to seek advice from the academic counsellor in your Department or Ms. Karen Murray in the Undergraduate Services Office, if you are in first year.

G. DOCUMENTATION

If you consulted an off-campus doctor or Student Health Services regarding your illness or personal problem, **you must provide the doctor with a Student Medical Certificate** to complete at the time of your visit and then bring it to the Department (or the Undergraduate Services Office). **This note must contain the following information: severity of illness, effect on academic studies and duration of absence. Regular doctors notes will not be accepted; only the Student Medical Certificate will be accepted.**

In Case of Serious Illness of a Family Member: Provide a Student Medical Certificate to your family member's physician to complete and bring it to the Department (or the Undergraduate Services Office if you are in first year).

In Case of a Death: Obtain a copy of the death certificate or the notice provided by the funeral director's office. You must include your relationship to the deceased and bring it to the Department (or the Undergraduate Services Office if you are in first year).

For Other Extenuating Circumstances: If you are not sure what documentation to provide, ask the Departmental Office (or the Undergraduate Services Office if you are in first year) for direction.

Note: Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence (see below).

H. ACADEMIC CONCERNS

1. You need to know if your instructors have a policy on late penalties, missed tests, etc. This information may be included on the course outlines. If not, ask your instructor(s).
2. **You should also be aware of attendance requirements in some courses. You can be debarred from writing the final examination if your attendance is not satisfactory.**
3. If you are in academic difficulty, check out the minimum requirements for progression in the calendar. If in doubt, see your academic counsellor.

Calendar References: Check these regulations in your 2015 Western Academic Calendar available at www.westerncalendar.uwo.ca.

Absences Due to Illness: <http://www.westerncalendar.uwo.ca/2015/pg117.html>
Academic Accommodations for Students with Disabilities: <http://www.westerncalendar.uwo.ca/2015/pg118.html>
Academic Accommodations for Religious or Holy Days: <http://www.westerncalendar.uwo.ca/2015/pg118.html>
Course Withdrawals: <http://www.westerncalendar.uwo.ca/2015/pg157.html>
Examinations: <http://www.westerncalendar.uwo.ca/2015/pg129.html>
Scheduling of Term Assignments: <http://www.westerncalendar.uwo.ca/2015/pg97.html>
Scholastic Offences: <http://www.westerncalendar.uwo.ca/2015/pg113.html>
Student Medical Certificate: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf
Engineering Academic Regulations: <http://www.westerncalendar.uwo.ca/2015/pg1442.html>

Note: These instructions apply to all students registered in the Faculty of Engineering regardless of whether the courses are offered by the Faculty of Engineering or other faculties in the University.

Drop Deadlines:

First term half course (i.e. "A" or "F"):	November 5, 2015
Full courses and full-year half courses (i.e. "E", "Y" or no suffix):	November 30, 2015
Second term half or second term full course (i.e. "B" or "G"):	March 7, 2016

Contact Information:

Undergraduate Services Office:	SEB 2097	Telephone: (519) 661-2130	Fax: (519) 661-3757
Dept. of Chemical and Biochemical Engineering & Green Process Engineering:	TEB 477	Telephone: (519) 661-2131	Fax: (519) 661-3498
Dept. of Civil and Environmental Engineering:	SEB 3005	Telephone: (519) 661-2139	Fax: (519) 661-3779
Dept. of Electrical and Computer Engineering, Software Engineering & Mechatronics Engineering:	TEB 279	Telephone: (519) 661-3758	Fax: (519) 850-2436
Dept. of Mechanical and Materials Engineering:	SEB 3002	Telephone: (519) 661-4422	Fax: (519) 661-3020