



University of Manitoba
Faculty of Agricultural & Food Sciences
Department of Biosystems Engineering

Basic Course Information

Course No. BIOE 4700 **Course Title** Alternative Building Design
Academic Session Fall 2018 **Credit Hours** 4

Course Description

BIOE 4700 Alternative Building Design: Involves students in the design of structures using alternative building materials and systems. This course will provide students with experience in the design of structures that utilize natural and green building techniques and materials. These include strawbale, stackwall, earth construction, timber frame, solar, embodied energy and foundation design. Hands-on labs provide experience with materials and end use. A term project allows students to bring various aspects together into a house design. Prerequisites: BIOE 3590 (or 034.359) or CIVL 3770 (or 023.377).

CRN Number 17367
Classroom Location E2-164 EITC
Class Schedule M W F 9:30 TO 10:20
Lab Location E2-365 EITC
Lab Schedule Wednesday 2:30 to 4:30 PM

Department office location Rm E2-376 EITC
Department Phone No. 204-474-6033

Instructor Information

Instructor Dr. Kris J. Dick, P.Eng. (Associate Professor)
I am flexible with being addressed as Dr. Dick,
Professor Dick or Kris
Department Biosystems Engineering
Office Location Rm E1-344EITC
Office Phone No. 204.474.6457
Email Kristopher.Dick@umanitoba.ca
Office Hours By appointment

Teaching Assistant (if applicable) TBA
TA Office Hours and Location

General Course Information

In an age of climate change, depleting resources and overall concern for our impact on the environment the use of alternative building strategies is finding a place in the built environment. This course will provide students with an overview of various alternative or non-conventional building techniques. This will include such approaches as strawbale, stackwall, earth construction, hempcrete and the use of locally available materials. A key component of sustainable building is the energy use associated with heating and cooling along with the embodied energy associated with various materials.

How this course fits into the curriculum.

This course is intended for senior students in Biosystems and Civil Engineering. This course will provide the student with the opportunity to use skills from other courses plus the concepts learned in this course to gain an understanding of sustainable building strategies. For Biosystems Engineering students this course is required for the Sustainable Buildings Specialization in their program

Course Goals

This course will provide students with design and hands-on experience in the design of structures that utilize various alternative building systems. Students will get hands-on experience with various natural building materials such as straw, straw-light clay, cob, earth building and stackwall. Differentiation is made between so-called “green” building and “natural” building. The intent of this course will be to explore natural building techniques, the principles of which can be utilized in more conventional building systems. Overall objectives of this course are to provide students with:

- Design strategies for various natural building techniques
- A working understanding of rating systems for sustainable design
- Hands on experience with selected natural building techniques
- Design project that incorporates structural and building envelope design in conjunction with a rating system evaluation

Textbook, Readings, Materials

There will not be a required text for this course. Notes and reference documents will be provided during the course and posted on UM Learn.

Using Copyrighted Material

Please respect copyright. We will use copyrighted content in this course. The content used is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission.

Recording Class Lectures

Dr. Dick and the University of Manitoba hold copyright over the course materials, presentations and lectures that form part of this course. No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without permission from Dr. Dick. Course materials (both paper and digital) are for the participant’s private study and research.

Course Technology

As a courtesy to both the instructor and your classmates, use of cell phones is not permitted during class time. Please remember to switch your cell phone to vibrate mode to avoid interruptions. Laptops may be used during lectures only for the purpose of taking notes. Course materials will be available through UM Learn.

Class Communication

The University requires all students to activate an official University email account. For full details of the Electronic Communication with Students please visit:

http://umanitoba.ca/admin/governance/media/Electronic_Communication_with_Students_Policy_-_2014_06_05.pdf

Please note that all communication between you as a student and your instructors/TAs must comply with the electronic communication with student policy (http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html). You are required to obtain and use your U of M email account for all communication between yourself and the university.

Expectations: You Can Expect Me To Do

Learning is most effective when both the teacher and the student are engaged in the subject material. The role of the teacher, therefore, is to create an environment that facilitates student engagement and learning. In this course the majority of the information will be presented in lectures, in addition to labs and tours. The in class experience is enhanced with discussion in class.

Expectations: What I Expect You To Do

Attendance is expected, and on time, for all scheduled lectures and labs. If you must be absent, please extend the courtesy of sending an e-mail notifying of your absence. To benefit the most from this class, you must be willing to participate in class discussions.

Academic Integrity:

Plagiarism or any other form of cheating in examinations, term tests or academic work is subject to serious academic penalty. Cheating in examinations or tests may take the form of copying from another student or bringing unauthorized materials into the exam room. Exam cheating can also include exam impersonation. A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty. Students should acquaint themselves with the University's policy on plagiarism, cheating, exam impersonation and duplicate submission. Electronic detection tools may be used to screen assignments in cases of suspected plagiarism.

Referencing Style

Students are expected to follow the CSBE reference style when citing references in course assignments. The ***Biosystems Engineering Citation Guide – CSBE Style*** is available through UM Learn. Please refer to this guide to ensure that you follow the correct referencing style.

Students Accessibility Services

Student Accessibility Services

If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

Student Accessibility Services <http://umanitoba.ca/student/saa/accessibility/>

Course Evaluation Methods

The course provides design strategies for natural and green building strategies. Assignments and labs will reflect various aspects of design. All assignments must be submitted to pass the course. The following is the mark breakdown.

Activity	Percent
Weekly Design Assignments and Labs	20
Mid Term Test	10
Design Project	30
Final Exam	40
<hr/>	<hr/>
Total	100

Assignment Descriptions

Assignments and Labs (20%) – Students will be expected to complete assignments and labs on various aspects of alternative building systems. There will be assignments on loads, foundation design, energy analysis, thermal analysis. Labs on earth, hempcrete and tours will require individual reports.

Mid Term Test (10%) – Students will be evaluated on the first portion of the course with one midterm test. The material to be covered in the midterm will be discussed in class.

Design Project (30%) – Students will work in teams on the design of a residential structure using alternative methods. A rubric for the format, evaluation and presentation will be distributed later in the class. This will be a group report.

Final Examination (40%) – Students will be evaluated on the various design principles, methods and materials. The final exam will focus more on the course materials presented after the midterm.

Assignment Grading Times

The last date for Voluntary Withdrawal (VW) from the course is November 19, 2018. Students can expect to receive grades for some assignments prior to the VW date. Grades for the design project and some labs will not be available until the end of the term.

Assignment Extension and Late Submission Policy

Deadlines are a reality in the world of engineering; we expect assignments to be completed on time. Assignments submitted after the due date will be docked 10% per day. All assignments must be submitted to pass the course. There will be no “make-up” midterms; students who miss a midterm with a reasonable explanation will have the value of the final examination increased by the appropriate percentage.

Important Dates / Schedule

The following are milestone dates for the Fall 2018 term:

<i>Item</i>	<i>Date</i>
Thanksgiving Day	Monday, October 8
Mid Term Test	Wednesday, October 31
Remembrance Day	Monday, November 12
Fall Break	November 13-16
Voluntary Withdrawal	Monday, November 19
Project Presentation	Wednesday, December 5
Report Due	Friday, December 7

**Department of Biosystems Engineering
BIOE 4700 Alternative Building Design**

Learning Outcomes

At the conclusion of this course, the student should be able to:

1. Explain the use of natural and green materials for use in building construction.
2. Analyze natural building systems with respect to loads, heat transfer, embodied energy and carbon and appropriate end use.
3. Use standards and research documents in the design of natural building systems.
4. Design and evaluate the use natural and alternative systems in various building applications.
5. Summarize the design of a residential structure using natural materials in a formal report and oral presentation.
6. Apply what was learned in the classroom to various applications of natural materials in practice.

Learning Outcome	Attribute*											
	KB	PA	IN	DE	ET	IT	CS	PR	IE	EE	EP	LL
1	D											
2		D							D			
3		D	D	D								
4				D								
5				D		D	D				D	
6				D								

***CEAB Graduate Attributes**

- KB** A knowledge base for engineering
- PA** Problem analysis
- IN** Investigation
- DE** Design
- ET** Use of engineering tools
- IT** Individual and team work
- CS** Communication skills
- PR** Professionalism
- IE** Impact of engineering on society/ environment
- EE** Ethics and equity
- EP** Economics and project management
- LL** Life-long learning

****Expected Level of**

- Development**
- I** - Introductory
 - D** - Developing
 - A** - Advanced