Environmental Design Architecture **EVDS 697.85**
Tensile Membrane Structures Seminar **Fall 2016**

Classes:	*12:30 pm – 1:50 pm Mondays and Wednesdays* *Room: PF 3160*
Instructor:	*Prof. Mauricio Soto-Rubio* *mauricio.sotorubio@ucalgary.ca* *PF 4148* *Tel. 408.220.5507* *Office hours: Wednesdays 2:00 pm – 3 pm by appointment*

Introduction

This seminar explores the design of tensile membrane structures and their potential to address contemporary environmental issues. Through lectures and practical exercises, students learn basic design principles, become familiar with digital and physical form-finding techniques, understand detailing, manufacturing and installation procedures, as well as the potential and limitation of the different materials typically used in this type of constructions.

Objectives

1. To learn the fundamental principles related with the design, manufacturing, engineering, and installation of tensile membrane structures.
2. To develop the necessary skills to design tensile membrane structures including digital and physical form-finding techniques
3. To become familiar with contemporary materials commonly used in tensile membrane structures.

Teaching Approach

Course topics are presented mainly though lectures. Weekly required readings, discussions of student work, and videos supplement the material presented in lectures. In addition, students are required to individually develop an architectural project related with membrane structures in order to demonstrate their understanding of this kind of building technology.

Content:

Week 1 - **September 7***:* Seminar Introduction

Week 2**- September 14**: History of tensile membrane structures. Basic design principles. Introduction of design exercise.

Week 3 - September 21: Detailing.

Week 4 - **September 28:** Materials.

Week 5 - October 5: Physical form-finding exercises.

Week 6 - October 12: *Block week (no class)*

Week 7 **October 19:** Fabrication and Installation of tensile membrane structures.

Week 8 October 26: *No class.*

Week 9 November 2: Cable-Net Structures. Deployable tensile membrane structures.

Week 10 November 7 & 9: Digital form-finding techniques.

Week 11- November 16: Inflatable membrane structures.

Week 12 - **November 23:** Design pathology.

Week 13 - **November 30:** *Final design review.*

Means of Evaluation

The seminar includes a design exercise to be developed individually. Desk Crits, class pin-ups, and presentations are the essential components of this seminar's evaluation. Since architecture is a visual medium, this means having new and thoughtful visual work (drawings, models) each class session. If the instructor comes to you for a desk crit and find you have no significant new visual work (a scribble in your sketch book does not count), we will move on to the next student. For desk crits of digital drawings and models, students should have a printout of the material at their desk ready to go at the time of the critique.

The grading of the exercise will follow the following guidelines: Adequacy of overall form (20%), physical form-finding models (20%), details (20%), patterns (20%), Digital form-finding (20%).

Grading Scale

Final grades will be reported as letter grades, with the final grade calculated according to the 4-point range.

Grade	Grade Point Value	4-Point Range	Percent	Description
A+	4.00	4.00	95-100	Outstanding - evaluated by instructor
A	4.00	3.85-4.00	90-94.99	Excellent - superior performance showing comprehensive understanding of the subject matter
A-	3.70	3.50-3.84	85-89.99	Very good performance
B+	3.30	3.15-3.49	80-84.99	Good performance
B	3.00	2.85-3.14	75-79.99	Satisfactory performance
B-	2.70	2.50-2.84	70-74.99	Minimum pass for students in the Faculty of Graduate Studies
C+	2.30	2.15-2.49	65-69.99	All final grades below B- are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements.
C	2.00	1.85-2.14	60-64.99	
C-	1.70	1.50-1.84	55-59.99	
D+	1.30	1.15-1.49	50-54.99	
D	1.00	0.50-1.14	45-49.99	
F	0.00	0-0.49	0-44.99	

Notes:

- A student who receives a "C+" or lower in any one course will be required to withdraw regardless of their grade point average (GPA) unless the program recommends otherwise. If the program permits the student to retake a failed course, the second grade will replace the initial grade in the calculation of the GPA, and both grades will appear on the transcript.

Recommended textbooks:

-Otto, Frei, & Rasch, Bodo, Finding Form, (1995, Edition Axel Menges)

-Otto, F. (2005). Frei Otto: complete works: lightweight construction, natural design. W. Nerdinger (Ed.). Birkhäuser.

-DETAIL, Review of Architecture, Plastics and Membranes Manual, (2010, Birkhauser, Basel, Switzerland)

Course Website

DLS will be utilized as the primary communication tool for this course. The course website will contain updated information regarding both project and homework assignments as well as required and recommended readings and references. It is the responsibility of students to ensure that they are registered for the course and that their e-mail contact information is up-to-date with the university.

Special Budgetary Requirements

There are no special budgetary requirements for this course.

Notes:

1. Written work, term assignments and other course related work may only be submitted by e-mail if prior permission to do so has been obtained from the course instructor. Submissions must come from an official University of Calgary (ucalgary) email account.

2. Academic Accommodations. Students who require an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to their Instructor or the designated contact person in EVDS, Jennifer Taillefer (jtaillef@ucalgary.ca). Students who require an accommodation unrelated to their coursework or the requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Vice-Provost (Student Experience). For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/

3. Plagiarism - Plagiarism involves submitting or presenting work in a course as if it were the student's own work done expressly for that particular course when, in fact, it is not. Most commonly plagiarism exists when:(a) the work submitted or presented was done, in whole or in part, by an individual other than the one submitting or presenting the work (this includes having another impersonate the student or otherwise substituting the work of another for one's own in an examination or test),(b) parts of the work are taken from another source without reference to the original author,(c) the whole work (e.g., an essay) is copied from another source, and/or,(d) a student submits or presents work in one course which has also been submitted in another course(although it may be completely original with that student) without the knowledge of or prior agreement of the instructor involved. While it is recognized that scholarly work often involves reference to the ideas, data and conclusions of other scholars, intellectual honesty requires that such references be explicitly and clearly noted. Plagiarism is an extremely serious academic offence. It is recognized that clause (d) does not prevent a graduate student incorporating work previously done by him or her in a thesis. Any suspicion of plagiarism will be reported to the Dean, and dealt with as per the regulations in the University of Calgary Graduate Calendar.

4. Information regarding the Freedom of Information and Protection of Privacy Act (http://www.ucalgary.ca/secretariat/privacy) and how this impacts the receipt and delivery of course material

5. Emergency Evacuation/Assembly Points (http://www.ucalgary.ca/emergencyplan/assemblypoints)
6. Safewalk information (http://www.ucalgary.ca/security/safewalk)

7. Contact Info for: Student Union (https://www.su.ucalgary.ca/contact/); Graduate Student representative(http://www.ucalgary.ca/gsa/) and Student Ombudsman's Office (http://www.ucalgary.ca/ombuds/).