



**Classes:** 12:20 pm – 1:50 pm Mondays and Wednesdays  
Room: PF 2140

**Instructor:** Prof. Mauricio Soto-Rubio  
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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 creative potential in architecture. 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 through 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 – January 13th & 15th:** Seminar Introduction. History of tensile membrane structures. Basic design principles. Introduction of design exercise.

**Week 2- January 20th & 22nd:** Detailing - Deskcrits

**Week 3 - January 27th & 29th:** Materials - Deskcrits

**Week 4 - February 3rd & 5th:** 1st Review - Fabrication and Installation of tensile membrane structures.

**Week 5 - February 10th & 12th:** Digital form-finding techniques.

**Week 6 - February 17th & 19th:** No Class. Reading Week.

**Week 7 February 24<sup>th</sup> and 26<sup>th</sup>:** Digital form-finding techniques.

**Week 8 March 2<sup>nd</sup> and 4<sup>th</sup>:** Digital form-finding techniques.

**Week 9 March 9<sup>th</sup> and 11<sup>th</sup>:** No class. SAPL Block Week.

**Week 9 March 16<sup>th</sup> and 18<sup>th</sup>:** 2nd Review. Inflatable membrane structures

**Week 10 March 23<sup>rd</sup> & 25<sup>th</sup>:** Design pathology - Deskcrits

**Week 11- March 30<sup>th</sup> & April 1<sup>st</sup>:** Deskcrits

**Week 12 – April 6<sup>th</sup>:** *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 "B-" 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 on Media and Recording in Learning Environments**

#### **Part 1**

University Calendar: <https://www.ucalgary.ca/pubs/calendar/current/e-6.html>

Recording of lectures (other than audio recordings that are pre-arranged as part of an authorized accommodation) is not permitted.

Students may not record any portion of a lecture, class discussion or course-related learning activity without the prior and explicit written permission of the course instructor or authorization from Student Accessibility Services. For any other use, whether by duplication, transcription, publication, sale or transfer of recordings, written approval must be obtained from the instructor for the specific use proposed. Any use other than that described above constitutes academic misconduct and may result in suspension or expulsion.

#### **Part 2**

The instructor may use media recordings to capture the delivery of a lecture.

The instructor will notify all students and guests in the class that the event is being recorded. If a student or guest wants to take steps to protect privacy, and does not want to be recorded, the instructor will provide the individual (s) with an alternative means of participating and asking questions (e.g., passing written notes with questions). Students cannot be penalized for choosing not to be recorded in situations where participation is part of the course. Students must be offered other ways of earning participation credit that do not involve recording.

Any video-recording would be intended to only capture the instructor and the front of the classroom. Students/other participants would not necessarily be visible on video recordings.

## University of Calgary Policies and Supports

### **ACADEMIC ACCOMMODATION**

Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit [www.ucalgary.ca/access/](http://www.ucalgary.ca/access/). Students who require an accommodation in relation to their coursework based on a protected ground other than disability should communicate this need in writing to their Instructor. The full policy on Student Accommodations is available at <http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf>.

### **ACADEMIC MISCONDUCT**

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, (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. Any suspicion of plagiarism will be reported to the Dean, and dealt with as per the regulations in the University of Calgary Graduate Calendar.

For information on academic misconduct and its consequences, please see the University of Calgary Calendar at <http://www.ucalgary.ca/pubs/calendar/current/k.html>

### **COPYRIGHT LEGISLATION:**

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright ([www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf](http://www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf)) and requirements of the copyright act (<https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html>) to ensure they are aware of the consequences of unauthorized sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy.

### **FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY**

Student information will be collected in accordance with typical (or usual) classroom practice. Students' assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by the faculty at the University of Calgary.

### **UNIVERSITY STUDENT APPEALS OFFICE:**

If a student has a concern about the course, academic matter, or a grade that they have been assigned, they must first communicate this concern with the instructor. If the concern cannot be resolved with the instructor, the student can proceed with an academic appeal, which normally begins with the Faculty. <https://ucalgary.ca/student-appeals/>

**More student support and resources (e.g. safety and wellness) can be found here:**

<https://www.ucalgary.ca/registrar/registration/course-outlines>