

# *Environmental* DESIGN

architecture + landscape architecture + planning

## Faculty of Environmental Design EVDS 683.1 Building Information Modeling

University of Calgary / Faculty of Environmental Design

Advanced Special Topics in Environmental Design

EVDS 683.1 H (1.5, 1.5T)

**Mahdiar Ghaffarian**

**Winter 2018**

ghaffarm@ucalgary.ca

PF 2100, hours by appointment

### Introduction

This course explores the Building Information Model (BIM) as a both form and process involving generation and management of digital virtual representation(s) of a building design. The resulting building information model becomes a shared resource to support decision-making about a building design from earliest conceptual stages, through design development, analysis, fabrication, and construction. The BIM itself can carry through into its operational life. BIM is introduced as an enabling technological platform that can relate to integrated project delivery (IPD).

BIM encourages all professionals, firms and organizations in a construction project work cooperatively to create better buildings, faster delivery times, lower costs, and maintaining scope while reducing litigation and conflict. This can form the basis of a more effective project process for the entire team.

### Objectives

Students will learn about the essential concepts and methods associated with executing BIM projects, the various ways in which BIM has been used currently in the building industry, and its broader implications for the profession. Also, students will acquire practical skills in using Revit (and related tools), software made by Autodesk, which is widely used in the industry today. Although we are focusing on the Autodesk platforms, the underlying concepts are applicable to BIM projects regardless of technical platform.

The Class will also examine the relationship between disciplines in the 3D / BIM environment and how to maximize these relationships at a project level. In the class, we will explore the various technical means of allowing teams to work efficiently together and how to focus those efforts for positive project results.

We will look closely at the transformation from a Conceptual Design Model to a constructible building design and explore the variety of means, using REVIT tools and methods, such as parametric and adaptive components to achieve complete designs. We will explore the opportunities for data connectivity for better decision making.

1. Understand REVIT concepts that are related to executing BIM Projects.
2. Convert an existing Design project to REVIT LOD 300 Model
3. Understand Data relationship to BIM Projects
4. Gain an appreciation of Practice concepts of building construction and analysis.
5. Understand basic 3D coordination concepts using Navisworks.
6. Introductory understanding of important International Technical Standards.
7. Review of various sized BIM projects understanding the approach.

## Teaching Approach

The course will have both the seminar and the workshop format. Tuesday class meetings will be devoted mostly to lectures, discussions, and presentations; there will be a number of guest lectures throughout the term by leading professionals in the industry and EVDS Faculty members. Thursday meetings, in general, will consist of workshop/LAB time to cover various related tutorials, concept demonstrations, modeling techniques in Revit, and project related activities.

During the course, students will work on 2 practice projects and one final project with focus on critical thinking and development process. The goal is not only to teach BIM systems and softwares to the students, but also to explore how BIM can improve an architectural design project. Details of each project will be introduced to students as scheduled in the course content.

## Content: Topic Areas & Detailed Class Schedule

### Week 1

#### **Introduction to BIM**

Class 1 (January 09)

*Introduction to the course and introduction to BIM*

Class 2 (January 11)

*LAB - Introduction to Autodesk REVIT– Revit Essentials 1*

*Introduction to Course Projects, Beginning of Project 1*

### Week 2

#### **Creative BIM**

Class 1 (January 16)

*Creative BIM (Branko Kolarevic) \**

Class 2 (January 18)

*LAB - Revit Essentials 2*

### Week 3

#### **Model Organization**

Class 1 (January 23)

*Model Organization*

*Project Consultation*

Class 2 (January 25)

*LAB - Revit Essentials 3 + Work Flows*

### Week 4

#### **Advanced Concepts**

Class 1 (January 30)

*BIM Concepts and Methods + Advanced Massing*

*Project 1 Submission and Presentation*

Class 2 (February 01)

*LAB - Massing in Revit & Introduction to Dynamo*

*Introduction to Course Projects, Beginning of Project 2*

### Week 5

#### **Professional Practice**

Class 1 (February 06)

*From conceptual model to constructible building*

*Professional Practice & Project Coordination (Guest Lecture from MTa) \**

Class 2 (February 08)

*LAB - Revit Essentials 4 + Dynamo*

Week 6

**Adaptive Components**

Class 1 (February 13)

*Adaptive Components (Guest Lecture from IBI) \**

Class 2 (February 15)

*Project 2 Submission and Presentation*

*Introduction to Course Projects, Beginning of Project 3*

Week 7

**Block Week**

February 18 - 25

Week 8

**Parametric Design**

Class 1 (February 27)

*Families, Data and Dynamo*

*Project 3 Proposal Presentation*

Class 2 (March 01)

*LAB – Adaptive Components*

Week 9

**Data and Analysis**

Class 1 (March 06)

*Performance Analysis*

Class 2 (March 08)

*LAB – Families, Data and Analysis*

Week 10

**Production**

Class 1 (March 13)

*Fabrication and Construction (Guest Lecture from IBI) \**

Class 2 (March 15)

*LAB – Project Delivery and Presentation Techniques*

Week 11

**Project Development**

Class 1 (March 20)

*Project Development (+guest crit)*

Class 2 (March 22)

*Project Consultation*

Week 12

**Project Development**

Class 1 (March 27)

*Project Consultation*

Class 2 (March 29)

*Project Consultation*

Week 13

**Project Development**

Class 1 (April 03)

*Project Development (+guest crit)*

Class 2 (April 05)  
Project Consultation/ Project Presentation

Week 14

**Final Project Presentation**

Class 1 (April 10)  
Project Presentation

Class 2 (April 12)  
Project Presentation

\* Date of lectures by guest lecturers may change - to be confirmed

**Means of Evaluation**

The final grade will be based on the following:

Project 1 - BIM practice development	(15%)
Project 2 - BIM practice development	(15%)
Project 3 - BIM project's development	(25%)
Project 3 - outcome	(20%)
Project 3 - final presentation	(15%)
Participation in seminars and workshops	(10%)
Total	100%

**Grading Scale**

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.

## **Readings**

Required (and recommended) textbooks, readings, materials including electronic resources will be announced during the class.

## **Software Requirements**

Mandatory:

Autodesk Revit 2018

Autodesk Navis Works

Optional:

Etransmit Plugin

Dynamo

Rhino, Maya, Sketchup, Auto CAD, etc.

**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](mailto: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/](http://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/>).