Course Details

BCN 4905 – Studies in Construction Information Systems
Credits: 3
Semester: Spring 2025
Lecture Time: Wednesdays 1:55 pm to 4:55 pm (Periods 7-9)
Room: RNK 106

Contact Information

Course Instructor: Dr. R. Raymond Issa
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Office Hours: By appointment

Lab Instructor: Isabelle Southern
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Course Expectations

Students are not expected to have any prior knowledge of the topics covered in this class.

Course Description

This course will explore the core principles and practices of Building Information Modeling (BIM) and Virtual Design and Construction (VDC). Students will also be introduced to Digital Twins (DTs) and advanced construction technologies. Additionally, the course will cover Machine Learning (ML) and its various applications.

Course Method

This course will employ both traditional and flipped classroom methods. Students are expected to complete any assigned work before the next class session (i.e., Wednesday). Each Wednesday, time will be allocated for questions, quizzes, and presentations. Additionally, students should engage in independent learning using the resources provided. The aim of this course is to enhance students' understanding of how cloud-connected tools, collaboration platforms, and advanced construction technologies can transform and improve the construction management process, ultimately supporting project and operational success. Instructional materials for this course consist of only those materials specifically reviewed, selected, and assigned by the instructor(s). The instructor(s) is only responsible for these instructional materials.

Course Objectives

In this course, students will gain an understanding of how advanced construction technologies can enhance performance and productivity in construction management. They will also develop a foundational knowledge of the facilities management, as well as implementing advanced analytics that can be utilized to streamline operations.

1. Master both basic and advanced modeling techniques in Revit.
2. Explore effective practices for implementing cloud-based BIM collaboration tools in construction.
3. Learn how to steer models between platforms to conform to interoperability standards.
4. Transform BIMs into DTs, creating dynamic, up-to-date models that reflect the current state of the building.
5. Gain a foundational understanding of Machine Learning and apply it to real-world scenarios.
6. Collaborate on a research-based project with other students.

Course Resources

1. All resources required for the class will be provided by the instructor on Canvas.
2. There are several well-produced series of tutorials online which students are highly encouraged to view and work with to further supplement course material.

Required Software

All the following software are installed in the computer labs. You are also required to install the software on your personal computers. Other software might be added during the semester.

1. Autodesk Software available through the Autodesk Education Community
   http://www.autodesk.com/education/home
   a. Create a free account, using your ufl.edu account, and download the following software,
      i. Revit 2024
      ii. Navisworks Manage 2024
2. Autodesk Tandem and Autodesk Construction Cloud Platform
   a. Access to the online platforms will be provided by the instructor at the start of the semester and will be removed following the end of the semester.
3. CMBuilder
   a. Cloud-based platform, access will be provided by the instructor. https://www.cmbuilder.io/
4. Programming and Game Engines
   a. Visual Studio Code
   b. Twinmotion (Epic Games)

CLASS POLICIES
Attendance
Attendance is voluntary. However, if you choose to attend, it is mandatory that you be on time

ACCESSING UNIVERSITY ACADEMIC POLICIES AND CAMPUS RESOURCES

To support consistent and accessible communication of university-wide student resources, please use this link to academic policies and campus resources: **https://go.ufl.edu/syllabuspolicies.**

Grading Criteria

Assignments

During the first half of the semester, the class is a series of workshops in which students are given several problem statements they are expected to solve using advanced construction technologies. Depending on the topic, the workshop can span over just one week or more. Students are expected to submit their assignments by the due date. **Failure to comply will result in 10 % of the assignment grade deducted for every day the assignment is late.** You can only submit up to three days late.

Quizzes

Some lectures do not have associated assignments. Instead, students will sit for small quizzes that ensure they watched all the lectures and read the provided resources.

Project

During the second half of the semester, students will be grouped in teams and supervised by doctoral students from the Rinker School. Each group will tackle a different project and present their findings at the end of the semester.

Grade Distribution

The grade of the class is computed based on the following table,

Description	Percentage of Final Grade
Assignments	45%
Quizzes	24%
Project	25%
Attendance	6%
Total	**100%**

GRADING SCALE:

Divide the total points you earn by **the total possible points**. Grades will be given according to the following scale:

A=93-100; A- =90-92.9; B+ =87-89.9; B=83-86.9; B- =80-82.9; C+ = 77-79.9; C=73-76.9; C-
=70-72.9; D+ =67-69.9; D=63-66.9; D- =60-62.9; E<60.

Week	Date	Course Topic	Assignment Due
MODULE 1: BUILDING INFORMATION MODELING			
1	1/14	**Course Overview:** • Syllabus and schedule review • Overview of the required software **Revit Overview:** • Revit Basics • Architectural Modeling: Placing and editing walls	
2	1/21	**Architectural Modeling in Revit:** • Placing and editing floors, shaft openings, and ceilings	**Assignment 1a:** Architectural Model
3	1/28	**Architectural Modeling in Revit:** • Placing and editing windows, doors, roofs, stairs, and ramps	**Assignment 1b:** Architectural Model
4	2/4	**MEP Modeling in Revit:** • MEP overview **Reality Capture** • Walkthrough (Twinmotion)	**Assignment 1c:** Architectural Model
MODULE 2: SIMULATION AND REALITY CAPTURE			
5	2/11	**Reality Capture** • Overview of current technologies • 4D Simulation (CMBuilder) **Project Initiation**	**Assignment 2:** Walkthrough
MODULE 3-4: Digital Twins and Machine Learning			
6	2/18	**Digital Twins** • Definition, maturity levels • Digital Twins and Facilities Management • Autodesk Tandem	**Assignment 3:** 4D Simulation
7	2/25	**Machine Learning** • Introduction, definition, key concepts and tools **Assignment 4** Q&A	
8	3/4	**Digital Twins** • Tandem Connect • APIs **Machine Learning** • Basic Application	**Assignment 4:** Status Twin

9	3/11	**Digital Twins** • FM Data Integration • ML Integration **Machine Learning** • Batch Learning • Online Learning	**Assignment 5:** ML
MODULE 5: PREDICTIVE TWINS - PROJECT			
10	3/25	**Project – Predictive Digital Twins** • Project Framework • Discussions	
11,12	4/1, 4/8	**Project** • Milestone tracking • Q&A	
13, 14	4/15, 4/22	**Final Presentation** • Class reflections • Project presentation	**Project**

**This syllabus represents our current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunities. Such changes, communicated clearly, are not unusual and should be expected.