Course Details

BCN 4905 – Studies in Construction Information Systems
Credits: 3
Semester: Spring 2024
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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E-mail: raymond-issa@ufl.edu
Office Hours: By appointment

Lab Instructor: Chady Elias/Ricardo Gallopp/Isabelle Southern
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Office Hours: By appointment

Course Expectations

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

Course Description

This course will cover the fundamental principles and practices of Building Information Modeling (BIM), as well as connected BIM (BIM plus the power of the cloud). The course will also expose students to Virtual Design and Construction (VDC) and advanced construction technologies. The course will also introduce virtual and augmented reality (VR and AR) and their applications in construction.

Course Method

This course will follow regular and flipped classroom methods. Students are expected to complete any required assignment before the following class session (i.e., Wednesday). Time will be provided during every Wednesday's session to answer questions, conduct quizzes, and/or give presentation. You are also expected to do additional learning on your own from the resources provided to you. The goal of this course is to develop the students' understanding of how cloud-connected tools, collaboration tools, and advanced construction technologies can transform and improve the construction management process to aid in project success.

Course Objectives

Through this course, students will develop the understanding of how advanced construction technologies can be used in construction management to improve the performance and productivity of the construction process. Additionally, a basic understanding of modern automation techniques and applications within the construction industry will be established.

1. Learn basic and advanced modeling techniques and family editing in Revit.
2. Understand 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. Convert BIMs into navigable VR and AR environments in game engines for visualization purposes using Oculus Rift and Microsoft HoloLens
5. Understand the basics of robotics that facilitate redesign and partial or full automation of construction processes.
6. Collaborate on a research-based project with other undergraduate and graduate 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
      iii. Autodesk Infraworks
      iv. Recap Pro 2024
2. Autodesk BIM 360 Platform and Tandem Digital Twins
   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. Synchro Pro
   a. Request a student version from https://www.synchroltd.com/about/university-program/
4. Programming and Game Engines
   a. Visual Studio
   b. Unity

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%**

This course is a graded course. Passing this class is based upon your participation in all workshops and your critical thinking ability to come up with solutions to the problems at stake. The letter grades will be computed according to the following scale:

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

Honors Policy

You are expected to follow the University Honors Policy when working on assignments, homework, projects, and exams. Please read and agree to this statement.

"I understand that the University of Florida expects its students to be honest in all of their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action, up to and including expulsion from the University."

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu/evals. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

UF Policies

University Policy on Accommodating Students with Disabilities: Students requesting accommodation for disabilities must first register with the Dean of Students Office (http://www.dso.ufl.edu/drc/). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive. Therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

University Policy on Academic Misconduct: Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at http://www.dso.ufl.edu/students.php.

Getting Help

For issues with technical difficulties for E-learning in Canvas, please contact the UF Help Desk at:
- Learning-support@ufl.edu
- (352) 392-HELP - select option 2
- https://lss.at.ufl.edu/help.shtml

Other resources are available at http://www.distance.ufl.edu/getting-help for:
- Counseling and Wellness resources
- Disability resources
- Resources for handling student concerns and complaints
- Library Help Desk support

Week	Date	Course Topic	Assignment Due
MODULE 1: BUILDING INFORMATION MODELING			
1	1/10	**Course Overview:** • Syllabus and schedule review • Overview of the required software **Revit Overview:** • Overview of architectural and structural modeling • Overview of project information and organization	
2	1/17	**Architectural Modeling in Revit:** • Placing and editing walls	
3	1/24	**Architectural Modeling in Revit:** • Placing and editing floors, shaft openings, and ceilings	**Assignment 1a:** Architectural Model
4	1/31	**Architectural Modeling in Revit:** • Placing and editing windows, doors, roofs, stairs, and ramps	**Assignment 1b:** Architectural Model
MODULE 2: SIMULATION AND REALITY CAPTURE			
5	2/7	**Animations** • Creating animations in Lumion	**Assignment 1c:** Architectural Model
6	2/14	**Animations** • Creating simulations in Navisworks and Synchro	**Assignment 2a:** Walkthrough
7	2/21	**Reality Capture** • Photogrammetry • Laser scanning	**Assignment 2b:** 4D Simulation
8	2/28	**Project Initiation** **Reality Capture** • Unmanned Aerial Systems/Drones	**Assignment 3:** Reality Capture
9	3/6	**Virtual Reality** • VR applications • VR with Oculus Rift **Augmented Reality** • AR Applications • AR with HoloLens	

MODULE 3: GENERATIVE DESIGN			
10	3/20	**Digital Twins** • Digital Twins Development • Cognitive Digital Twins	**Quiz 1:** VR and AR
MODULE 4: ROBOTICS AND AUTOMATION			
11	3/27	**Introduction** • Robotics and Automation in Construction • Applications **Autonomous Equipment** • Introduction • Applications **3D Printing** • Intro to additive manufacturing • Intro to 3D printing technologies and materials • Design and print using Fusion	**Quiz 2:** Digital Twins
MODULE 5: MODEL MANAGEMENT			
12	4/3	**Computer Science in Construction** • Application Programming Interface • Autodesk Forge	**Quiz 3:** Robotics and Automation
MODULE 6: PROJECT			
13	4/10	**Project Management:** • BIM360 • Coordination • Estimating	**Quiz 4:** Computer Science in Construction
14, 15	4/17, 4/24	**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 opportunity. Such changes, communicated clearly, are not unusual and should be expected.