COLLEGE OF DESIGN, CONSTRUCTION AND PLANNING UNIVERSITY OF FLORIDA

COURSE TITLE: Fundamentals of Industrialized Construction

COURSE NUMBER: BCN2314

TERM: Fall 2025

NUMBER OF CREDIT HOURS: 3

CLASS LOCATION: TBD

INSTRUCTIONAL METHODS: The class meets for three lecture hours per week.

CLASS MEETING TIMES: Mondays/Wednesdays/Fridays, Period 8 (3:00 PM - 3:50 PM), RNK 220

INSTRUCTOR: Dr. Aladdin Alwisy, aalwisy@dcp.ufl.edu, RNK 311

OFFICE HOURS:

Location: RNK 311

Date and Time: (TBD)

By Appointment:

Email aalwisy@ufl.edu. The subject line should read BCN2314 APPOINTMENT REQUEST-<your name>.

Please provide a brief description of what you want to discuss. Also please suggest one or two alternate times for scheduling other student requests. I will send you an e-mail about the appointed time.

COURSE DESCRIPTION:

This course will introduce students to the fundamentals of industrialized construction as an innovative construction process. The course will start by describing the three main stages of industrialized construction, namely, preconstruction, offsite manufacturing, and onsite assembly. In addition, the definition of industrialized construction subsystems, including modular, panelized, and manufactured construction will be presented. The course will also highlight examples of the construction systems used in industrialized construction including combustible (i.e., wood), and noncombustible (i.e., Steel and Concrete) modular structures, timber panels, steel panels, concrete panels, and masonry panels. The impact of industrialized construction on traditional project delivery methods and the key project participants will be discussed as well, specifically design-built and design-bid-built. Finally, a high-level description of the advanced technologies and emerging trends, specifically Industry 4.0, utilized during the design, manufacturing, and installation of construction systems will be presented. The students will (1) acquire the essential knowledge of design for manufacturing and assembly in industrialized construction, (2) understand the guiding design principles of prefabricated MEP assemblies, (3) gain first-hand experience in manufacturing technologies and onsite collaboration strategies, and (4) explore the future of construction prefabrication and 3D printing.

COURSE OBJECTIVES:

- Analyze the different tasks, processes, prefabrication levels, and installation strategies followed during the three stages of industrialized construction.
- Understand collaboration strategies among the key project participants in construction prefabrication during the different types of project delivery methods.
- Understand the key criteria of a good design for architectural, structural, and MEP assemblies.
- Evaluate the state-of-the-art and state-of-the-practice technologies for offsite manufacturing and onsite assembly.
- Understand advanced construction technologies, including artificial intelligence, and digital tools, and their applications in the construction industry.
- Develop students' skills in integrating and applying emerging technologies, such as building information modeling (BIM), robotics, in construction planning, management, and execution.
- Understand sustainable construction practices and encourage them to incorporate these methods into their projects, contributing to a more environmentally responsible construction industry.

ATTENDANCE POLICY:

Attendance and participation in the class activities are required. Attendance and participation grade will be computed in proportion to the number of presences on the days the rolls were taken and participation on a given topic in the class forum. Requirements for class attendance and make-up quizzes, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

ACCOMMODATING STUDENTS WITH DISABILITIES:

Students requesting accommodation for disabilities must first register with the Dean of Students Office (https://disability.ufl.edu/). 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.

REQUIRED TEXTBOOK:

Design in Modular Construction, Mark Lawson, Ray Ogden, Chris Goodier; Prefab Architecture: A Guide to Modular Design and Construction, Ryan E. Smith, James Timberlake; Components and Systems: Modular Construction – Design, Structure, New Technologies, Gerald Staib , Andreas Dörrhöfer and Markus Rosenthal.

ACADEMIC MISCONDUCT:

UF students are bound by The Honor Pledge which states "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Conduct Code specifies a number of behaviors that are in violation of this code and the possible sanctions. See the UF Conduct Code website, Conduct Code Process | SCCR for more information. If you have any questions or concerns, please consult with the instructor or TAs in this class.

COURSE GRADING:

In-class assignments are group assignments that must be solved during the class (lab sessions) by everyone in the group.

Attendance grade will be computed in proportion to the number of presences on the days the rolls were taken and participation grade is based on responding to a given discussion topic in the class forum.

Individual and group assignments will be given that covers topics that were discussed in that module. Specific evaluation criteria will be provided for each assignment.

A final group project will be assigned that requires implementing existing AI algorithms in a project in the built environment, to facilitate planning, design and construction strategies.

GRADING POLICIES:

Assignment	**Points**
Module Assignments	300
Course Project	300
Quizzes	300
Attendance and Participation	100
Total	**1000**

Grade Scale: Divide the total points you earn by **the total possible points**. Grades will be given according to the following scale. **Decimal points will not be Rounded**. For instance, **89.99% is still considered as B+.**

Name	Range	
A	100%	to 93%
A-	< 93%	to 90%
B+	< 90%	to 87%
B	< 87%	to 84%
B-	< 84%	to 80%
C+	< 80%	to 77%
C	< 77%	to 74%
C-	< 74%	to 70%
D+	< 70%	to 67%
D	< 67%	to 64%
D-	< 64%	to 61%
E	< 61%	to 0%

GRADING POLICY:

UF policy on grading may be found at the following link: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/

COURSE EVALUATIONS:

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/ .

MATERIALS AND SUPPLIES FEE:

N/A

CLASS DEMEANOR/EXPECTATIONS:

Students should be respectful to faculty and other students throughout the classroom experience. Cellphones should not be visible during the class period. Laptops/Ipads should only be open if actively being used for note taking. The use of such devices are at the discretion of the faculty.

IN-CLASS RECORDINGS:

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal education use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor. A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by an instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class, or between a student and the faculty or guest lecturer during a class session. Publication without permission from the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

CAMPUS RESOURCES:

Health and Wellness

U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit U Matter, We Care website to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: Visit the Counseling and Wellness Center website or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the Student Health Care Center website.

University Police Department: Visit UF Police Department website or call 352-392-1111 (or 9-1-1 for emergencies).

UF Health Shands Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; Visit the UF Health Emergency Room and Trauma Center website.

GatorWell Health Promotion Services: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the GatorWell website or call 352-273- 4450.

Academic Resources:

E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at helpdesk@ufl.edu.

Career Connections Center: Reitz Union Suite 1300, 352-392- 1601. Career assistance and counseling services.

Library Support: Various ways to receive assistance with respect to using the libraries or finding resources. Call 866-281-6309 or email ask@ufl.libanswers.com for more information.

Teaching Center: 1317 Turlington Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.

Writing Studio: Daytime (9:30am-3:30pm): 2215 Turlington Hall, 352-846-1138 | Evening (5:00pm-7:00pm): 1545 W University Avenue (Library West, Rm. 339). Help brainstorming, formatting, and writing papers.

Academic Complaints: Office of the Ombuds; Visit the Complaint Portal webpage for more information.

Enrollment Management Complaints (Registrar, Financial Aid, Admissions): View the Student Complaint Procedure webpage for more information.

WEEKLY COURSE SCHEDULE:

Module	Topic	Class Content
Week 1	**Industrialized Construction Fundamentals**	**Introduction to Industrialized Construction stages, Modular Construction, Panelized Construction, and Manufactured Homes.**
		Reading references: • *Industrialized and Automated Building Systems: A Managerial Approach - Abraham Warszawski: Chaper3* • *Design in Modular Construction- Mark Lawson, Ray Ogden, Chris Goodier: Chapter 17 Factory production of modules*
Week 2		**Panelized Construction**
		Reading references: • *Modularization the fine art of offsite preassembly for capital projects-Michael Kluck and Jin Ouk Choi: Chapter 10* • *Modular Building Institute's 2018 Permanent Modular Construction Report: Chapter Frequently Asked Questions*
Week 3		**Manufactured Homes and Modular Construction**
		Reading references: • COMPONENTS AND SYSTEMS, Staib Dörrhöfer Rosenthal: Part C Panel system • **Myths, Misperceptions, and Prospects for Modular Construction**
Week 4		**Module Assignment 1**
		Reading references: • *Introduction to Manufactured Construction- Fourth Student Edition August 2017, Authors:Charles J. Kibert, Abdol R. Chini, Shabnam Rumpf-Monadizadeh William Masters: Module 3 The Production Environment* • ***Future of work in Industrialized Construction***

Week 5	**Offsite Design and Construction Digitalization Technologies**	**Introduction to Building Information Modeling for Industrialized Construction**
		Reading references: • **AutoCAD for Beginners - Full University Course** • **Off-site construction: where the BIM vision is becoming reality**
Week 6		**Design for Manufacturing and Assembly (DfMA) for Panelization of Industrialized Construction & MEPs** **Introduction to Virtual/Augmented Reality in the Design of Industrialized Construction**
		Reading references: • **Introduction to Design for Manufacturing (DfMA)** • **Practical Use of Immersive BIM for Design and Construction**
Week 7		**Lean Manufacturing; Production Line Simulation; Cloud-based collaboration (Forge); Digital Twins**
		Reading references: • Vicente A. Gonzalez, Farook Hamzeh, Luis Fernando Alarcon - Lean Construction 4.0_ Driving a Digital Revolution of Production Management in the AEC Industry-Routledge (2022)—*Part 2 Chapter3* • *Nick T. Thomopoulos - Assembly Line Planning and Control-Springer International Publishing (2014)-Chapter 2.*
Week 8		**Module Assignment 2**
		Reading references: • (Industrial Innovation) Lincoln H. Forbes, Syed M. Ahmed - Modern Construction_ Lean Project Delivery and Integrated Practices (Industrial Innovation) -CRC Press (2010)—*Chapter1~5* • *(AnyLogic North America) ANDREI BORSHCHEV - The Big Book of Simulation Modeling Multimethod Modeling with Anylogic6 (2013)-Chapter1~3*

Week 9	**Construction Automation & Robotics**	**Industrial Robotics for Assembly-based Manufacturing**
		Reading references: • Robotics in assembly‐based industrialized construction: a narrative review and a look forward. • Behnam M. Tehrani1 · Samer BuHamdan2 · Aladdin Alwisy1
Week 10	**Construction Automation & Robotics**	**Collaborative Robotics for Human-Robot Collaboration**
		Reading references: • Automation and Collaborative Robotics: A Guide to the Future of Work - Peter Matthews, Steven Greenspan • **Using Forge Toward Human-Robot Collaboration in Architecture**
Week 11		**Module Assignment 3**
		Reading references: • *Frontiers in Robotics and Electromechanics--Andrey Ronzhin Viacheslav Pshikhopov Editors* • **Using Revit, Point Layout, and a Robotic Total Station for Construction Layout**
Week 12	**Advanced Construction Materials and Techniques**	**Innovative construction materials and their properties**
		Reading references: • *Opportunities* **and Risks of Material Innovation in a Developing Construction Industry** • **The Kendeda Building for Innovative Sustainable Design**
Week 13		**3D printing in construction**
		Reading references: • *3D Concrete Printing Technology Construction and Building Applications-Edited by JAY G. SANJAYAN: Chapter 1~2* • *3D Printing of Concrete State of the Art and Challenges of the Digital Construction Revolution-Arnaud Perrot: Chapter 1*
Week 14		**Sustainable construction practices and materials**
		Reading references:

		• *Fundamentals* of Innovative Sustainable Homes Design and Construction By Avi Friedman: Chapter 1~2, 7, 8 • **BIM Tools for Sustainable Buildings and Infrastructure**
Week 15		**Course Project**

Disclaimer: This syllabus represents the 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.