

**Florida International University
College of Engineering and Computing
COURSE SYLLABUS**

**Developments in Construction Technology—90227 BCN 6916 U01
S2021
Professor: Robert H. Hacker**

Office: MARC 3rd Flr	Office Hours: After class
Phone: 305-742-8222	TA:
E-mail: rhacker@fiu.edu	EA: khermant@fiu.edu

COURSE DESCRIPTION

“The ability to perceive or think differently is more important than the knowledge gained.”
David Bohm

In the 20th century the unregulated industries, such as retail, media and communications, were disrupted. In the 21st century the industries to be disrupted will be the regulated ones—education, healthcare and construction to cite three. This course explores the anticipated disruption in the construction industry.

This disruption is further complicated by several major factors to be explored in the course. Firstly, we are at the beginning of a new, 4th Industrial Revolution where Artificial Intelligence, Cloud Computing and IoT will create a technology paradigm to transform every commercial and social system. Secondly, according to BCG “every enterprise is finding that its space for business as usual is increasingly constrained by the planet’s environmental limits, by broader social and economic needs, and by rising stakeholder demands.” Lastly, the UN estimates that the urban population will increase from 55 percent today to 68 percent and over 7 billion people in 2050, which will require design, engineering and materials yet to be developed.

All of these factors contribute to an increasingly complicated situation that calls for unprecedented levels of creativity, invention and innovation. The frameworks to fully understand these processes will also be explored in the course.

Genius is expected.

COURSE OBJECTIVES

- For students to learn the processes of creativity, invention and innovation
- For students to explore the difficult problems of cities and climate change and apply human-centric, holistic approaches to decision making and problem resolution
- For students to understand how 21st century technologies, and especially artificial intelligence, are going to affect engineering and construction
- For students to realize that they have the capability to take on much bigger challenges in their lives

LEARNING OUTCOMES

- The ability to apply new frameworks to address problems
- The ability to solve new problems using frameworks
- The ability to apply PESTEL(E) analysis to holistic problem solving
- The ability to construct a multi-perspective analysis of issues in engineering

Student Learning Outcomes will be measured based on the weekly assignments, the course project and classroom participation.

COURSE PRE-REQUISITES / CO-REQUISITES

None.

TEXTBOOKS & OTHER REQUIRED MATERIAL

Required Texts:

1. The Systems View of Life by Fritjof Capra
2. The New Science of Cities by Michael Batty

The books are available from most on-line websites for books. Any edition in any format is suitable.

There is a reading list of recent articles that supplements the books in this course. Students are expected to prepare these articles for short presentations in class. The article reading list schedule is available at this link.

<https://www.dropbox.com/s/5lcd7msv0m2l44l/DCT%20Reading%20List%20F2021.xlsx?dl=0>

COURSE PROCEDURES/METHODOLOGY

The first half of each class is devoted to books or readings. Students will present most readings. The second half of each class is devoted to weekly presentations of their progress on the course project. The course project is done in teams of 2-4 students, depending on class size. Each week the students advance the project, reflecting the previous week's comments from the professor. The final presentation is 50% of the course grade.

The course project is to develop an innovative, engineering solution to a significant environmental problem in a city setting. The student must present a tangible solution that can be expressed in terms of matter, energy or information, but a prototype is not expected. The students are encouraged to start by understanding the problem from the user perspective and then consider solutions. The students will use PESTEL(E) analysis or systems thinking approaches to demonstrate a holistic approach to the outcome.

Grade will be determined based on in class presentations of books and readings, quality of classroom participation, class attendance and a course project. Percentages are shown below.

Weekly quotes	10%
Weekly class presentations	20%
Course project	50%
Class participation	20%
Total	100%

One assignment will be identified to add to the student's portfolio

CLASS or PROFESSOR POLICIES

The overarching purpose of the course is for the students to develop new ways of thinking about problem solving, design, engineering, the environment and business responsibility to humanity.

Very active role in class discussion is expected and required.

GRADING STANDARDS/PERFORMANCE MEASURES

Grading will be on a curve, based on grades for attendance, class participation, presentations and the project. Two class absences will result in a grade reduction

FIU/CEC POLICIES

The FIU Academic Pledge

As a student of this university:

- I will be honest in my academic endeavors.
- I will not represent someone else's work as my own.
- I will not cheat, nor will I aid in another's cheating.

Intellectual Honesty Statement

Students at Florida International University are expected to adhere to the highest standards of integrity in every aspect of their lives. Honesty in academic matters is part of this obligation. Academic Integrity is the adherence to those special values regarding life and work in an academic community. Any act or omission by a student which violates this concept of academic integrity and undermines the academic mission of the University, shall be defined as academic misconduct and shall be subject to the procedures and penalties mandated by the University and the School of Hospitality and Tourism Management.

Misconduct Statement

Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook.

Misconduct includes: Cheating – The unauthorized use of books, notes, aids, electronic sources; or assistance from another person with respect to examinations, course assignments, field service reports, class recitations; or the unauthorized possession of examination papers or course materials, whether originally authorized or not. Plagiarism – The use and appropriation of another's work without any indication of the source and the representation of such work as the student's own. Any student who fails to

give credit for ideas, expressions or materials taken from another source, including internet sources, is responsible for plagiarism.

Academic Misconduct Procedures and Penalties

Please refer to the following documents for additional information:

- FIU Code of Academic Integrity – <http://integrity.fiu.edu/>
- FIU Student Handbook – <https://studentaffairs.fiu.edu/about/student-handbook/index.php>

Cell Phones

Cell phones and beepers are prohibited during class.

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**DCT Reading List
F2021**

		Date Presented	
<u>Class</u>	<u>Topic</u>	<u>Article(s)</u>	<u>Book Reading(s)</u>
August 23, 2021	Introduction	N/A	N/A
August 30, 2021	No class		
September 6, 2021	Innovation	https://experiencinginformation.com/2012/06/03/clarifying-innovation-four-zones-of-innovation/ https://www.ideou.com/pages/design-thinking?utm_campaign=7.2-best-damn-resources-2021-feb&utm_medium=email&_hsmi=110359049&_hsenc=p2ANqtz_ZOZqmZo2nf74VZzjqSo5_9xqmQTvfWWtXw8BB2iwlAfjDi4c6zyUaQ8QWl1BhzYKs_rF9FMgOyCuW6MHSiOTqGPi6g&utm_source=hubspot#process	SVL Intro, 1,
September 13, 2021	Design Thinking		SVL 4-5
September 20, 2021	Krebs Creativity Cycle	https://jods.mitpress.mit.edu/pub/ageofentanglement/release/1 https://www.bcg.com/publications/2021/keys-to-being-a-leader-in-sustainable-business-model-innovation	SVL 6-8
September 27, 2021	Environmental Sustainability		SVL 16-18
October 4, 2021	Cities	https://www.dropbox.com/s/9clx3penw7vqir3/CB-Insights_What-Are-Smart-Cities.pdf?dl=0 http://www3.weforum.org/docs/WEF_Shaping_the_Future_of_Construction_full_report_.pdf	NSC Preamble, 1-2
October 11, 2021	Construction		NSC 3-5
October 18, 2021	MID-TERM PPTS		
October 25, 2021	PESTEL(E)	https://www.business-to-you.com/scanning-the-environment-pestel-analysis/	NSC 6-7
November 1, 2021	4IR Technologies & Paradigms	https://opensustain.tech/ https://www.mckinsey.com/business-functions/operations/our-insights/artificial-intelligence-construction-technologies-next-frontier	NSC 9-11
November 8, 2021	Construction Technologies		NSC 13, Conclusion
November 15, 2021	Business Model Evolution	https://www.bcg.com/publications/2021/keys-to-being-a-leader-in-sustainable-business-model-innovation https://link.springer.com/content/pdf/10.1007/s12210-020-00972-0.pdf	
November 22, 2021	Complexity		
November 29, 2021	FINAL PPTS		
	SVL	The Systems View of Life—Introduction,1,4-8,16-18	
	NSC	The New Science of Cities—Preamble,1-7,9-11,13, Conclusion	
PROBLEMS TANGIBLE		FOOD, WATER, HEALTH, ENERGY, ENVIRONMENT MATTER, ENERGY, INFORMATION	