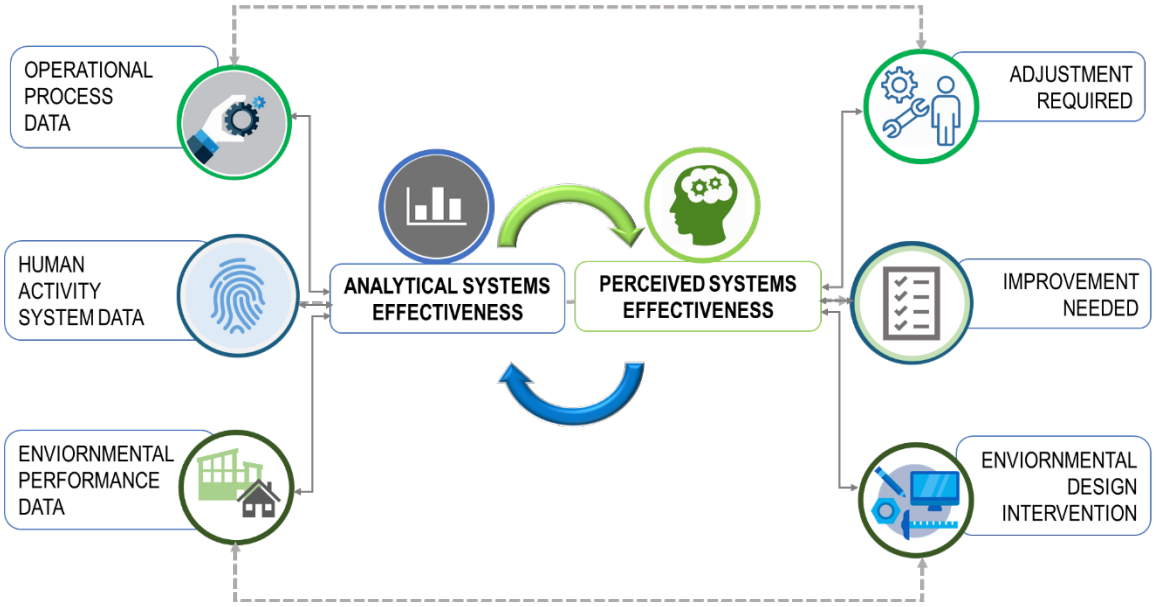
DCP6931| 3 Credits
Data Science for Interior-Environment Research & Design
| Spring 2023 | 100% F2F

Instructor:	**Lisa Platt, Ph.D., CSSBB, EDAC, LEED AP BD+C** Assistant Professor Interior Design | FIBER Research Faculty College of Design, Construction, and Planning (DCP) | University of Florida
Office Correspondence:	Phone: 352-294- 3387 OR 352-294-1435 **Messaging through Canvas is preferred** Alternatives: lisaplatt@ufl.edu
Course Time & Location:	**Monday** | Period 3 | 9:35 AM - 10:25 AM| Rinker, Room 230
	Wednesday | Period 3- 4| 9:35 AM - 11:30 AM| Rinker, Room 230
Course Co/Prerequisite:	Enrollment is limited to DCP Graduate students
Final Exam Schedule:	N/A
Office hours:	**Office hours:** M&W | 11:00am-12:00pm or by appointment
Course Website:	https://ufl.instructure.com/courses/447714 for modules, announcements, assignments, discussions, lecture slides, readings, and grades

Interior Environment Analysis through Data Science

Using mixed methods for performance research is valuable for measuring the true effectiveness of interior environment design. Knowing how to correctly apply context appropriate logic models and interpret quantitative analysis outcomes is essential for exploring the relationships between human factors and the environments we inhabit. This methodology allows for unbiased and objective inquiry, which can improve the validity of inferences drawn from an investigation of complex spaces supporting both individual occupants and human activity systems.



Course Description

The purpose of this course is to help build student understanding and intuition regarding the use of computational analysis and design-thinking techniques for assessing human-centered interior environments. It focuses on methods for evaluating socioecological models, operational performance, and context-specific critical incident data for supporting performance research regarding the interior environments that humans live, work, and learn. It also provides a basis for linking quantitative research methods to standard industry practices such as Interior Architectural Programming, Life Cycle Cost Analysis, and Post Occupancy Evaluations. Furthermore, it will allow students to gain confidence in using Python, a platform commonly used for AI tools and techniques, as a vehicle for analyzing information and visualizing outcomes.

Course prerequisite

Graduate standing in DCP program or related discipline

Learning Objectives

This course's objective is to facilitate students' learning and confidence in using Data Science techniques to analyze and predict human response to the built interior environment. Knowledge and skill transfer objectives include sourcing and preparing data for analysis, establishing theoretical frameworks for inquiry, and developing approaches for interior environment performance evaluation. This effort will be accomplished through asynchronous home preparation, in-class discussions, videos, online engagement, and individual assignments.

Student tasks will include:

- Sourcing and leveraging relevant data from accessible information repositories
- Identifying theoretical Human Factors frameworks to support research that is grounded in established constructs.
- Using inferential statistics within the context of a Machine Learning platform (i.e. Python)
- Developing predictive models to communicate potential design performance

Required Text/Reading:

- Dylan Penny, 2020 ***"Python for Data Science"***
- Weekly readings assigned under each module on Canvas e- Learning portal.

Optional Text/Informational Content:

- Medium "**Toward Data Science**." https://towardsdatascience.com/
- Bulmer M.G., 1979 ***"Principles of Statistics"***

Other Resources:

- Scikit-Learn user guide: https://scikit-learn.org/stable/user_guide.html#
- Python.org: https://www.python.org/about/help/
- Real Python: https://realpython.com/
- Machine Learning Mastery: https://machinelearningmastery.com/dimensionality-reduction-for-machine-learning/
- GitHub https://github.com/topics

Students expected to complete readings as advance preparation for class discussion and exercise.

Required Software:

- Microsoft Word or Google Docs
- Microsoft Excel or Google Sheets
- Jupyter Notebooks

Course Format

Approach: The course approach is to use actual data sets for analysis using an open source data analysis platform. Python Jupyter Notebook will be used for this course to evaluate instructor provided and student developed data sources relevant to evaluating interior environment performance.

Delivery Method: Lectures, discussions, hands on experience, guest speakers, independent work, assignments, and final presentation.

Course Website: https://ufl.instructure.com/courses/447714 : This course's e-learning on Canvas site will contain all course materials, including readings, lecture slides, assignment instructions and announcements. Course materials will be posted on Canvas in accordance with class schedule and will be updated if necessary.

Communication: Outside of class, messaging through the CANVAS course site or via email at lisaplatt@ufl.edu is the best and preferred method of communication.

Paperless Activities and Assignments:

E-learning on Canvas will be the central location for all course communication, discussion, announcements, submitted assignments, and presentation material.

Students are responsible for:

- ✓ Checking e-learning on Canvas for the material and presentations that will be covered weekly.
- ✓ Setting up and checking your Canvas messaging to receive class announcements from e-learning.
- ✓ Submitting electronic assignments/papers/presentations/videos through Canvas.

Class Protocols

- ❖ Reading material: **Students must complete the reading before each class.**
- ❖ Students attend class prepared for active participation and discussion. A quality learning experience in this course relies heavily on interaction and exchange of ideas related to the sustainable built environment.
- ❖ **Students should plan to bring your computer to every class for coursework.**
- ❖ Using the computer in class for non-class related work is not acceptable.
- ❖ Cell phones use and texting during class is not allowed. In addition, leaving the class to take calls is not allowed except for an emergency.
- ❖ Attendance is required. Only excused absences can be made up. Excused absences include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, and professional conferences), military obligation, severe weather conditions, religious holidays, and participation in official university activities such as music performances, athletic competition or debate. Absences from class for court-imposed legal obligations (e.g., jury duty or subpoena) is excused. Absences must be properly documented, for example with a doctor's note.
- ❖ All assignments, credit submission, and presentations must be turned in on time; projects or assignments may be turned in early. If you will not be in class to turn the assignment in, even if it is an excused absence (e.g. studio field trip), you must turn the assignment in early. Any assignment turned in after it is due will incur a 10% from grade deduction for every day late (*e.g. assignment due Tuesday at 11:59 om turned in at 12:00 am Wednesday counts as a full day late*).
- ❖ Requirements for class conduct and attendance in this course are consistent with university policies that can be found in the online catalog at:
  - https://gradcatalog.ufl.edu/graduate/regulations/

Exams

There will be no formal Quizzes of Exams delivered in this course. Module based assignments and the Final project will determine individual student grades.

Grading

Assignments	Instruction	Weight	Due date
Class Participation & Attendance	Individually based. Read assigned reading, attend class, and participate in discussions.	20%	On Canvas. Refer to schedule.
Module Assignments	Individually based. Complete assignment as instructed	20%	On Canvas. Refer to schedule.
Final Presentation	Individually based as assigned.	30%	On Canvas. Refer to schedule.
Final project	**Final Applied Data Science Project**	30%	**April 19, 2022 at 11:59 pm**

Grade Scale

Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Numeric Grade	93-100	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	0-59
Quality Points	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.67	0.0

See the following link to UF's grade policy:
http://graduateschool.ufl.edu/media/graduate-school/pdf-files/handbook.pdf

Online 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 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/

Disclaimer

This syllabus represents our current plans and objectives. As we go through the semester, those plans may need to change depending on unforeseen scheduling issues. Such changes, communicated clearly, are not unusual and should be expected.

Weekly Class Schedule

Week	*Class #*	Dates	Topic/Activity	Assignment Given
1	**MODULE 1: Course Introduction**			
	1	1/9/23	Introduction to the course; Review of syllabus, schedule, grading, and resources	CANVAS: Introduction and Software Installation Assignment **Due 1/11/23**

	2	1/11/23	Understanding Data Science	**Reading Assignment 1** (*Textbook Chapter 1*)
2	**MODULE 2: Developing Data Aligned Research Questions**			
		1/16/23	Holiday No Class	
	3	1/18/23	Sourcing data & using logic models	**Assignment 1:** Identification of data repositories and description for use. **Due 1/24/23**
3	4	1/23/23	Descriptive Properties of Distributions	**Reading Assignment 2** (*Principles of Statistics* Chapter 3 posted by Instructor)
	5	1/25/23	Descriptive Statistics & Expected Values	**Reading Assignment 3** (*Principles of Statistics* Chapter 4&5 posted by Instructor)
4	**MODULE 3: Creating Human Factors Analysis Frameworks**			
	6	1/30/23	Human Factors Models for Error Reduction	**Reading Assignment 4-***Reading to be posted by instructor*
	7	2/1/23	Understanding "Interiority" and Models for Analyzing Cognitive Ergonomics	**Assignment 2:** Identification of relevant frameworks and description for use with relevant data. **Due 2/14/23**
5	8	2/6/23	Models for Analyzing Physical Ergonomics and Life safety Risks	**Reading Assignment 5-***Reading to be posted by instructor*
	9	2/8/23	Considering Organizational & Social Factors in Analysis	**Reading Assignment 6-***Reading to be posted by instructor*
6	**MODULE 4: Using Inferential Statistics for Interior Environment Performance Evaluation**			
	10	2/13/23	Fundamentals of Probability in Data Science	**Reading Assignment 7:** *RealPython- The Pandas DataFrame: Make Working With Data Delightful*
	11	2/15/23	Types of probability Distributions	**Assignment 3:** Identification of inferential analysis approaches and description for use. **Due 2/28/23**
7	12	2/20/23	Inferential Statistics	**Reading Assignment 8-** (*Textbook Chapter 3*)
	13	2/22/23	Data Exploration	**Reading Assignment 9-**(*Textbook Chapter 4*)
8	**MODULE 5: Fundamentals of Machine Learning**			
	14	2/27/23	Preprocessing data and feature scaling	**Reading Assignment 10-**(*Textbook Chapter 2*)
	15	3/1/23	Supervised and Unsupervised Learning	**Assignment 4:** Select Machine Learning approaches and description for proposed use (*to include coded script*). **Due 3/7/23**
9	16	3/6/23	Data Science Algorithms and Models	**Reading Assignment 11-**(*Textbook Chapter 5*)

	17	3/8/23	Evaluating data relationships	**Reading Assignment 12-**(*Textbook Chapter 9*)
10		3/13/23	No Class. Spring Break	
		3/15/23	No Class. Spring Break	
11	**MODULE 6: Developing Predictive Models for Evaluating Human Response to Interior Environment**			
	18	3/20/23	Classification Algorithm Overview	**Reading Assignment 13-** *Machine Learning Mastery "Introduction to Dimensionality Reduction for Machine Learning"*
	19	3/22/23	Logistic Regression	**Assignment 5:** Select Machine Learning Predictive Modeling method and description for proposed use (*to include coded script*). **Due 3/28/23**
12	**20**	3/27/23	Linear Regression	**Reading Assignment 14-***Reading to be posted by instructor*
	21	3/29/23	Data dimensionality reduction (PCA)	**Reading Assignment 15-***Reading to be posted by instructor*
13	**MODULE 7: Generating Visualizations for Improved Data Literacy**			
	22	4/3/23	Introduction to scikit-learn and Seaborn; Visualization techniques for Descriptive Statistics	**Reading Assignment 16-** *scikit learn User's Guide: Linear Models; Seaborn: Visualizing regression models*
	23	4/5/23	Introduction to Classification Algorithms	**Assignment 6:** Select Machine Learning Visualization and description for proposed use (*to include coded script*). **Due 4/4/23**
14	**24**	4/10/23	Creating visualizations for improved decision support	**DRAFT of FINAL** Applied Data Science for Interior-Environment Research & Design Analysis (*to include coded script*). **Due 4/11/23**
	25	4/12/23	Visualization techniques for Inferential Statistics	**FINAL:** Work on Final Report Due **4/26/23 and Presentation**
15	**MODULE 8: Student Presentations and Review**			
	26	4/17/23	Final Project Presentations	Student Presentations and Peer Review
	27	4/19/23	Final Project Presentations	Student Presentations and Peer Review
16	**28**	4/24/23	Final Project Presentations	Student Presentations and Peer Review

HEALTH SAFETY

In response to COVID-19, the following practices are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to further the health and safety of ourselves, our neighbors, and our loved ones.

- If you are not vaccinated, get vaccinated. Vaccines are readily available at no cost and have been demonstrated to be safe and effective against the COVID-19 virus and Influenza. Visit this link for details on where to get your shot, including options that do not require an appointment: https://shcc.ufl.edu/services/primary-care/immunizations/
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus. UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the UF Health Screen, Test & Protect website for more information.
    - Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work.
    - If you are withheld from campus by the Department of Health through Screen, Test & Protect you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.

COURSE POLICIES

Academic Integrity:

All students at the University of Florida are expected to adhere fully to University of Florida Student Honor Code, view at: http://www.dso.ufl.edu/sccr/honorcodes/honorcode.php. The Honor Code outlines the expectations for student conduct in regard to academic honesty. All students should review this policy to understand the range and scope of the standards and the seriousness of any infractions of the code. The policy places full responsibility on students to know and adhere to these standards for academic integrity. All examinations, quizzes, design projects, and assignments in the Department of Interior Design are subject to this policy. Maintaining strict academic integrity is a priority of the Department of Interior Design and all instructors will fully enforce the UF Honor Code in their studios and classes. A strict adherence to the Honor Code is expected by the University of Florida and reflects the ethical standards of the interior design profession.

Attendance & Participation:
Attendance is essential to the learning process. Students must be on time for each class session and present for the entire class to be marked present. The instructor must be notified in advance of any necessary absence in person or by email. Two absences will be tolerated without penalty. Each additional absence will result in the reduction of a course grade by one letter grade. More than six absences will automatically result in failing the course.

Classroom Climate:
Equitable participation in this class requires the use of inclusive language, methods, and materials. Students are expected to use inclusive language in written and oral work, and to respect diversity in viewpoints expressed by others. Students are also encouraged to identify language, methods, and materials used in this course that do not contribute to an inclusive classroom climate.

Laptops, Cell Phones, Tablets:

Students may bring mobile devices to class and use them during the period ***for course-related purposes only***. Students are not permitted for use during quizzes.

STUDENT IT SUPPORT SERVICES

For any technical issues you encounter with your course please contact the UF computing Help Desk at 342-392-HELP (4357), select option 2. For Help Desk hours visit: Information Technology–UF Computing Help Desk (http://helpdesk.ufl.edu).

Project Due Dates:
All assignments - completed or incomplete - must be turned in on the due date and will be graded as they stand. No projects will be accepted late. The right to make an exception will be reserved only in extreme cases (due to emergencies). In such cases, the instructor must be notified in advance by email. For the exception case, a delay of over one week will not be accepted.

Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies that can be found at
https://catalog.ufl.edu/ugrad/1516/regulations/info/attendance.aspx

Special Accommodations:
Students requesting classroom accommodation must first register with the Disability Resource Center at University of Florida Dean of Students Office, see
http://www.dso.ufl.edu/drc/getstarted.php.The Dean of Students Office will review the case and, if appropriate, provide documentation to the student who must then provide this documentation to the instructor when requesting an accommodation.

Student Work:
The Department of Interior Design reserves the right to retain any student work completed in the curriculum for accreditation purposes.

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, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/

SOFTWARE USE

All faculty, staff, and students at the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

STUDENT PRIVACY FOR ONLINE COURSES

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see:
http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html

Our class sessions may be audio visually recorded for students in the class to refer and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

CAMPUS RESOURCES:

Writing Studio

The writing studio is committed to helping University of Florida students meet their academic and professional goals by becoming better writers. Visit the writing studio online at http://writing.ufl.edu/writing-studio/ or in 302 Tigert Hall for one-on-one consultations and workshops.

Mental Health, Safety and Wellbeing

U Matter, We Care:
If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.
Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.
Sexual Assault Recovery Services (SARS)
Student Health Care Center, 392-1161.
University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Academic Resources

E-learning technical suppor*t*, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.
Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. https://www.crc.ufl.edu/.
Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.
Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.
Student Complaints Campus*:* https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.
On-Line Students Complaints*:* http://www.distance.ufl.edu/student-complaint-process.