3D GEOSPATIAL URBAN MODELING & VISUALIZATION

3 Credit Hours, Spring 2026

URP6280/URP4230
Section 18C8 - Class # 19328 (Graduate)
Section 23GA - Class # 19265 (Undergraduate)
Section 18C7 - Class # 19327 (Graduate URP online degree)
Section 18DD - Class # 19329 (GIS certificate)

INSTRUCTOR

- **Instructor**: Zhaoxi Zhang, Ph.D.
- **Email address**: zhang.zhaoxi@ufl.edu
- **Office hours**: By appointment (email communication through the Canvas).
- **Office location**: College of Design, Construction and Planning, Room 450
- **Telephone number**: +1 6466839346
- **Personal Zoom meeting**：https://ufl.zoom.us/j/5817264276

CLASS MEETING TIME & PLACE

- **Date and Time:** Wednesday, 12:50 PM - 3:50 PM
- **On-campus students:** Matherly Hall, 0406 room
- **Online programs:** Zoom will be provided, and recordings will be available on Canvas.

COURSE INFORMATION

Course Description:

This course aims to make students more effective at communicating planning and design concepts graphically through 3D geospatial urban modeling and visualization. To fulfil this objective, the course consists of two integrated parts: (1) practical instruction in methods and techniques for creating high-quality 3D urban models, analyses and presentation graphics; and (2) a final project applying and extending these skills to a real urban redevelopment scenario.

Part I Geo-Visualization and Design: focuses on skill-building through instruction and practice. It provides step-by-step instruction on the methods and techniques needed to develop the skills to create high-quality 3-dimensional urban models. Through structured lectures, demonstrations, and hands-on exercises, students learn the core workflows for 3D geospatial modeling, visualization, and communication, and complete a sequence of assignments that progressively strengthen their technical and graphic capabilities.

Part II Gulf-Focused Geo-Design for Urban Resilience: emphasizes application through a final project. Students will work on a comprehensive final project that synthesizes the tools, methods, and

design-thinking introduced in Part I. This year, the course is supported by the Gulf South Studio (GSS) Program and will contribute to Resilient Urban Design as part of the GSS initiative, supported by the National Academies of Sciences, Engineering, and Medicine (NASEM) Gulf Research Program. Using a real-world urban scenario (e.g., Gulf area), students will develop a 3D modeling-and-visualization product and present their work as a coherent planning/design proposal, demonstrating both technical proficiency and the ability to communicate urban ideas clearly and convincingly.

Prerequisite Knowledge and Skills: None

Course Purpose:

The purpose of the course is to teach students a variety of methods and techniques to interactively model and visualize physical urban environments in three dimensions through a hands-on approach using computer software. Students will acquire the skills to rapidly construct 3D models of urban settings to conduct analysis, generate conceptual plans and designs, and prepare high-quality renderings and presentations. This year, the course will further emphasize resilient urban design by using these modeling and visualization workflows to support place-based exploration of urban risk and adaptation. Students will learn how 2D/3D geospatial representations can be used to evaluate vulnerability, environmental risks (e.g., flooding), communicate resilient design strategies, and compare alternative interventions across scenarios and time.

Course Goals/Objectives:

By the end of this course, students will:

- Develop 3D geospatial models of urban environments and produce high-quality visualizations, renderings, and drawings.
- Use 3D urban models to support spatial analysis, scenario planning, and the communication of conceptual plans and design proposals.
- Apply appropriate digital workflows and software tools to integrate, manage, and visualize urban data across scales and over time.
- Demonstrate research and critical evaluation skills relevant to urban and regional planning using quantitative and visual evidence.
- Use modeling and visualization to support resilient urban design under different future conditions.
- Collaborate effectively in teams and communicate findings and proposals clearly and professionally through well-structured presentations and a final project deliverable.

Student learning outcomes (SLOs):

Students taking this course will (1) gain an understanding of the key concepts and workflows in 3D geospatial urban modeling and visualization for planning and design, (2) strengthen critical thinking and systems thinking regarding planning and design, (3) enhance 3D modeling, visual communication, and graphical presentation skills through hands-on software-based exercises, (4) learn practical methods to rapidly construct and iterate urban models in order to support analysis, scenario comparison, and concept development, (5) apply modeling and visualization techniques to planning challenges, (6) develop professional presentation and team collaboration skills through a final project and peer critique. Furthermore, these skills will help students to develop the design literacy necessary to collaborate with other professionals in the design field (landscape architects and architects). Each student's work will be reviewed based upon the department's student learning outcomes as those relate to urban design theories. More details can be found at the end of this syllabus.

COURSE WEBSITE

All materials will be posted on Canvas, eLearning website. Canvas could be accessed at: https://elearning.ufl.edu. For any assistance with eLearning website, contact UF Computing Help Desk (http://helpdesk.ufl.edu/).

COURSE COMMUNICATIONS

- In person or online by appointment, email communication through Canvas. All email communication should be through Canvas. Use UF email address only if you have an emergency and/or are unable to access the Canvas email.
- Zoom link: https://ufl.zoom.us/j/5817264276

COURSE MATERIALS

No required text. All material will be posted on the Canvas, eLearning website. The Canvas could be accessed at: https://elearning.ufl.edu.For any assistance with eLearning website, contact UF Computing Help Desk (http://helpdesk.ufl.edu/).

ADDITIONAL RESOURCES

Computer and Software:

Each student is required to have a computer. Additionally, since this course uses a variety of 3D applications, each computer should meet or exceed the specification below.

- **We recommend using Microsoft Windows OS due to the compatibility issue of ArcGIS Pro and CityEngine.**
- System requirement for ArcGIS pro
- System requirement for CityEngine

The following software is expected to be used in this class for lectures, assignments, and final projects. Please install these software programs accordingly. Please visit and review "Getting Started" page in the Canvas website for further instructions.

- **ArcGIS Pro**:

  Resource Center: https://www.esri.com/en-us/arcgis/products/arcgis-pro/resources/arcgis-pro-resources

  Help: http://pro.arcgis.com/en/pro-app/help/main/welcome-to-the-arcgis-pro-app-help.htm
- **CityEngine**:

  Overview: http://www.esri.com/software/cityengine

  Tutorial: https://doc.arcgis.com/en/cityengine/2024.0/tutorials/introduction-to-the-cityengine-tutorials.htm

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.

Web Resources

- University of Florida (Library homepage): http://cms.uflib.ufl.edu/
- Urban & Regional Planning (Library homepage): https://guides.uflib.ufl.edu/URP
- VPN connection (Off campus access): https://it.ufl.edu/get-help/infrastructure/network-infrastructure/vpn/
- Suggested rendering program
  - Lumion: https://lumion.com/educational-licenses.html
- Game Engine
  - Unreal: https://www.unrealengine.com/en-US/
  - Unity: https://unity.com/
- 3D modeling software
  - SketchUp: http://www.sketchup.com/
  - SketchUp Resources: http://www.sketchupschool.com/

*Some software is also available in UF Apps (https://apps.ufl.edu). For any assistance with UF Apps, contact UF Computing Help Desk (https://it.ufl.edu/helpdesk/).

TEACHING PHILOSOPHY

In this course, I view teaching as a collaborative effort between the instructor and students, where mutual support, curiosity, and open dialogue are essential to growth. I encourage students to take an active role in their learning by reviewing assigned readings before class, engaging fully in in-class exercises and discussions, and thoughtfully completing homework assignments.

A minimum grade of B is required for general education credit. Achieving an "A" in this course requires more than just meeting minimum expectations. It reflects **high-quality performance**, **depth of understanding**, and the ability to **synthesize ideas into practical solutions or design actions**. I value initiative, critical thinking, and creativity—skills that are central to both academic and professional success in urban design.

Learning is a sustainable process - it evolves as we interact with the world around us. You learn as you go along. The most important things are maintaining an open mindset and your enthusiasm.

INSTRUCTIONAL METHODS

The course objectives will be achieved through **lectures, visual media/essay assignments, readings, case studies, design practices and class presentations** as well as class discussions. All assignments, including the final project will have a weight in the final grade. Submitted assignments are required to meet scheduled deadlines and delivery dates. The evaluation and grading of assignments will include willingness to conduct effective and meaningful research, exploration of design options and alternatives, development and depth of visualization methods and techniques, and the ability to work independently.

Attendance Policy (total 10 points):

Students are responsible for satisfying all academic objectives as defined by the instructor. Absences count from the first class meeting. In general, acceptable reasons for absence from or failure to participate in class 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) must be excused. Other reasons also may be approved.
Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence.

Students cannot participate in classes unless they are registered officially or approved to audit with evidence of having paid audit fees. The Office of the University Registrar provides official class rolls to instructors.

If a student does not participate in at least one of the first two class meetings of a course or laboratory in which they are registered, and he or she has not contacted the department to indicate his or her intent, the student can be dropped from the course. Students must not assume that they will be dropped, however. The department will notify students if they have been dropped from a course or laboratory.
The university recognizes the right of the individual professor to make attendance mandatory. After due warning, professors can prohibit further attendance and subsequently assign a failing grade for excessive absences.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:
https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

Assignments (total 60 points):

- There will be 7 assignments in the Part 1 (45 points). Each assignment is designed to help students review the concepts covered in the previous weeks. Assignment 1 to 7 are individual work.
    - Assignment #1: Explore examples of 3D modeling and visualization (5 points)
    - Assignment #2: Creating and Visualizing 3D Feature class in ArcGIS Pro (6 points)
    - Assignment #3: Terrain Dataset (7 points)
    - Assignment #4: 3D Analysis & Animation (7 points)
    - Assignment #5: Getting to Know CityEngine (6 points)
    - Assignment #6: Complete Street in CityEngine (7 points)
    - Assignment #7: Modeling in CityEngine (7 points)

- Another 3 assignments in the Part 2 (15 points). Students will work in groups for the design practices. The assignments are intended to help them document and reflect on their design process. Specific requirements for the design drafts will be provided at the start of the project.

    - Assignment #8: Model Draft 1 (5 points)
    - Assignment #9: Model Draft 2 (5 points)
    - Assignment #10: Model Draft 3 (5 points)

Evaluations (total 30 points):

- There will be two evaluations to assess students' learning. Students are required to submit their models or slides after presentation. Failure to present or to submit the required materials will result in a 10-point deduction. Specific requirements for the presentations will be provided later on Canvas.
    - Mid-evaluation: Case studies - workshop (10 points)
    - Final evaluation: Presentation - final design projects (20 points)

Collective Meetings:

- As the course is supported by the Gulf South Studio (GSS) Program and will contribute to the GSS initiative on Resilient Urban Design, supported by the National Academies of Sciences, Engineering, and Medicine (NASEM) Gulf Research Program. Students enrolled in the courses should participate in three events over the Spring 2026 semester: 1) kickoff meeting in January (TBD), 2) mid-semester invited lecture(s) (TBD), and 3) final presentations (TBD). With these meetings, we want to build a broader student body engaged in this work, and to support dialogue across students' disciplines. Once the time has been decided, students will receive the announcement in Canvas.

Submission (Assignments, Exercises, and Projects):

- Unless otherwise arranged, the submission link in Canvas is the only accepted method of submission. Each assignment, exercise, and project will have its own submission link and

should be submitted in a PDF format. Assignments must be submitted to Canvas by 11:59 pm on the day before the class to be counted on time unless otherwise specified. *Oral presentations and reports are due the day of the presentation.* Deadline extension will not be granted without prior approval by the instructor. Please use the following naming convention when submitting files:

Lastname_ Assignment_number#_YYYY_MM_DD

Student Workload

The federal definition of the credit hour as the equivalent to one hour of in-person instruction and at least two hours of out-of-class work per week in a 15-week semester. This course is 3 credit courses, so it requires nine hours per week. Please use the following tables as reference to manage your engagement time.

Work	**Hours/week**
Lectures or talk	1-1.5 hours
In-class exercise	1-1.5 hours
Reading per week	1 hour
Assignment	2-2.5 hours
Mid evaluation	1 hours
Final evaluation	1.5 hours
In total	7.5–9 hours

Late Submissions and Make-up policy:

- Late Submissions will lead to point reduction. For assignments/project submitted late *there will be a 2-point deduction for each day late for the first two days following the due date.* The assignment will not be accepted after two days late and a grade of 0(zero) will be issued. Exceptions could be made for extraordinary circumstances consistent with university policies
- Students with a valid reason will be permitted to submit assignments late, provided they present a suitable justification. However, it is essential for students to adhere to the designated deadlines for both presentation and submission of assignments; failure to do so will result in a deduction of grades.

Grading of Assignments

The grade for this course will be determined according to the following formula:

	Assignments/Activities	% of Final Grade
Participation (10%)	Attendance (Class participation)	10%
Skill building (55%)	Assignments from Part 1	45%
	Mid-Term Exam: Case studies	10%
Design Practice (35%)	Assignments from Part 2	15%
	Final Exam: Design project	20%

UF Grading scale:

Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	WF	I	NG	S/U
Range	>92	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	<60				

Non-Punitive Grades (not counted in GPA)

- W Withdrew
- U Unsatisfactory
- H Deferred
- N No grade reported
- I Incomplete

Failing Grades (counted in GPA)

- E Failure
- WF Withdrew failing
- NG No grade reported
- I Incomplete

UF POLICIES

Academic policies and campus resources

For any needs, students can find the access to academic policies and resource through this website: https://syllabus.ufl.edu/syllabus-policy/uf-syllabus-policy-links/

Class attendance

Requirements for class attendance and make-up exams, assignments, and other work in the course are consistent with university policies. See UF Academic Regulations and Policies for more information regarding the University Attendance Policies.

University Policy on Accommodating Students with Disabilities

Students with disabilities who experience learning barriers and would like to request

academic accommodations should connect with the Disability Resource Center. See the "Get Started With the DRC" webpage on the Disability Resource Center site. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Grading policies

Information on current UF grading policies for assigning grade points. This may be achieved by including a link to the University grades and grading policies.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online. Students can complete evaluations in three ways:

The email they receive from GatorEvals

Their Canvas course menu under GatorEvals

The central portal at https://my-ufl.bluera.com

Guidance on how to provide constructive feedback is available at https://gatorevals.aa.ufl.edu/students/ . Students will be notified when the evaluation period opens. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/ .

The University's Honesty Policy regarding cheating, plagiarism, etc.

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 for more information. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Netiquette: Communication Courtesy

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats to meet UF's policy.

In-class Recoding

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 deliver 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 presentation 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 of 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.

Generative AI tool

NaviGator AI (Available to UF Students, Faculty, and Staff) allows you to use different Large Language Models (LLMs) with your own dataset. You can use AI to discover trends and patterns, look for insights, and produce reports based on your data. UF provides this service to allow you to analyze your documents using different language models while keeping those documents secure within UF servers and contracted vendors. At this time, UF does not permit the usage of restricted or sensitive data with this service. Users only have access to their own datasets and conversation history. When interacting with the language models hosted by vendors, your messages and subsets of your documents will be sent to an LLM instance provided by Microsoft or Google. All data handled in this fashion is covered by our existing agreements with Microsoft and Google. None of this data contributes to training the large language model. No data is retained after deletion. If you have uploaded a file by accident, deleting the file or conversation will completely remove it from the system. Accessing Navigator AI off-campus does require a UF Gatorlink VPN Service: https://it.ufl.edu/ai/uf-navigator-ai/

When using AI tools, please review responses for factual accuracy, as these tools have been known to assert incorrect facts. AI is permitted on some assignments as long as the AI tool is cited in the APA style. If AI is prohibited for a particular assignment, this will be clearly stated. Students are personally responsible for submitted assignment content and quiz answers, and any violations of plagiarism or dishonesty will be handled in accordance with UF's policies.

GETTING HELP:

For issues with technical difficulties for the Canvas, please contact the UF Computing Help Desk

at:

- http://helpdesk.ufl.edu/
- helpdesk@ufl.edu
- (352) 392-4357 - select option 2

Any requests for make-up due to technical issues **MUST** be accompanied by the ticket number received from helpdesk when the problem was reported to them. The ticket number will document the time and date of the problem. You **MUST** e-mail your instructor within 24 hours of the technical difficulty if you wish to request a make- up.

Academic Resources

- 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.
- Academic Resources: 1317 Turlington Hall, Call 352-392-2010, or to make a private appointment: 352- 392-6420. Email contact: teaching-center@ufl.edu. 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.
- UF Student Success Initiative: Visit https://studentsuccess.ufl.edu/ for resources that support your success as a UF student.

Campus Health and Wellness Resources

UF Whole Gator Resources: Visit https://one.uf.edu/whole-gator/discover for resources that are designed to help you thrive physically, mentally, and emotionally at UF.

TENTATIVE COURSE SCHEDULE:

Topics and Assignments

Week/ Date	Topic	Lecture	Assignment Due
Week 1 Wed 01/14	**Kick-off**	1. Introductions 2. Course and Syllabus review 3. Understand the learning objectives and expectations for the course.	Complete the pre-course survey before kick-off meeting
Week 2 Wed 01/22	*Module 1:* **Introduction to 3D Modeling and Visualization**	1. The significance of 3D modeling in contemporary urban planning and design. 2. Comprehend and develop the ability to illustrate 3D modeling and visualization.	**#1 Assignment**
Week 3, Wed 01/28	*Module 2:* **3D Modeling in ArcGIS Pro**	1. Basic GIS data types and storage. 2. 3D GIS data and attribution using 3D visualization in GIS. 3. Import file into GIS 3D database. 4. Additional options for visualizing 3D data in GIS.	**Due: #1** **#2 Assignment**
Week 4, Wed 02/04	*Module 3:* **Terrain Modeling in ArcGIS Pro**	1. Understand surface models: raster, triangulated irregular network (TIN), terrain datasets, and LAS datasets. 2. LAS dataset and explore the Lidar data. 3. Create a terrain from Lidar data. 4. Create a terrain from DEM data. 5. Obtain building height information from LAS data.	**Due: #2** **#3 Assignment**
Week 5, Wed 02/11	*Module 4:* **3D analysis & Animation in ArcGIS Pro**	1. Operate 3D analysis in GIS Pro: visibility, viewshed, shadow and skyline analysis. 2. Create animations.	**Due: #3** **#4 Assignment**
Week 6, Wed 02/18	*Module 5:* **CityEngine Introduction**	1. CityEngine interface and functions. 2. Develop basic skills in using CityEngine. 3. Understand CGA (computer generated architecture) rules. 4. Share CityEngine project.	**Due: #4** **#5 Assignment**
Week 7, Wed 02/25	*Module 6:* **Complete Streets Modeling**	1. Understand the structure of Complete Streets Rules and Building Generating Rules. 2. Apply CGA rules to street segments and building footprints. 3. Design complete streets and its surrounding context including buildings.	**Due: #5** **#6 Assignment**
Week 8, Wed 03/04	*Module 7* **Resilient Environment Modeling**	1. Visualize flooding. 2. Use CityEngine to generate and compare resilient design alternatives. 3. Model resilience strategies.	**Due: #6** **#7 Assignment**

Week 9, Wed 03/11	*Mid-evaluation*	Workshop	**Due: #7**
Spring break			
Week 10, 03/25	*Final project Concept Review*	1. Site analysis and design objectives 2. Site visit if time and budget allow	**#8 Assignment**
Week 11, 04/01	*Final project Design Draft 1*	1. Design and modeling 2. Resilient Urban Design Approach	**Due: #8** **#9 Assignment**
Week 12, 04/08	*Final project Design Draft 2*	1. Design and modeling 2. Resilient Urban Design Approach	**Due: #9** **#10 Assignment**
Week 13, 04/15	*Design Draft 3 and 3D Model Review*	1. Design and modeling 2. Resilient Urban Design Approach	**Due: #10** **#Final submission**
Week 14, 04/22	*Final presentation*	Group presentation	
Week 15, 04/29	*Exhibition and submission*		**Last date for submission is May 1st.**

*This schedule is subject to change, and any updates will be posted on Canvas.

Student learning outcomes

MURP Course SLOs	Class sections	Assessment Instrument	Students' learning
4.A Guiding Values			
1. Equity, Diversity, Social Justice, and Inclusion	Final Design Project	**Assignment #8, #9, #10**	Consider how vulnerable populations and communities are affected by urban design in the face of climate change challenges.
2. Sustainability, Resilience, and Climate Justice	**Model 7**: Resilient Environment Modeling	**Assignment #7**	
3. Professional Ethics and Responsibility			
4.B.1 General Planning Knowledge in Global Context			
a. Planning History and Theory	Final Design Project	**Assignment #8, #9, #10**	Familiarize students with the design process, demonstrating how to apply fundamental knowledge, theories, and skills to develop urban projects in practice.
b. Planning Law and Institutions			
c. Urban and Regional Development	**Module 1:** Introduction to 3D Modeling and Visualization **Module 6**: Complete Streets Modeling Final Design Project	**Assignment #1** **Assignment #6** **Assignment #8, #9, #10**	Strengthen critical thinking and systems thinking in spatial problem-solving and urban design.
4.B.2 Skills and Tools for Planning Practice			
a. Planning Process and Engagement	Final Design Project	**Assignment #8, #9, #10**	Learn practical methods to rapidly construct and iterate urban models to support analysis, scenario comparison, and concept development.
b. Analytical Skills and Tools	**Module 2:** 3D Modeling in ArcGIS Pro **Module 3:** Terrain Modeling in ArcGIS Pro **Module 4:** 3D analysis & Animation in ArcGIS Pro **Module 5:**	**Assignment #2, #3, #4, #5**	Gain an understanding of the key concepts and workflows in 3D geospatial urban modeling and visualization for planning and design. Enhance 3D modeling, visual communication, and graphical presentation skills through hands-on software-based exercises.

MURP Course SLOs	Class sections	Assessment Instrument	Students' learning
	CityEngine Introduction		Apply modeling and visualization techniques to planning challenges.
c. Professional, Communication, and Leadership Skills	Group discussion and design teamwork	**Mid-evaluation** **Final design project.**	Develop practical presentation and team collaboration skills.

* The rubric was shared with students together with each assessment and used for students to understand the key criteria and expectations.