

3D Geospatial Urban Modeling & Visualization

University of Florida
College of Design, Construction, and Planning
Department of Urban and Regional Planning

Course Objective & Program:

The objective of this course is to teach students a variety of methods and techniques to interactively model and visualize physical urban environments in two, three and four dimensions through a hands-on approach using computer software. Students will acquire the skills to rapidly construct 3D models of urban settings in order to conduct analysis, generate conceptual plans and designs, and prepare high-quality renderings and presentations. The primary objective of the course aims to prepare students to more be effective in graphically communicating concepts and ideas pertaining to the planning and design of cities.

The course will be divided into two parts: (1) general instruction of methods and techniques for developing the skills to create high-quality 3-dimensional models and presentations, and (2) a final design project. The first part of the semester will engage students in a hands-on approach to physical design by developing a broad range of technical skills using a variety of software packages including, Google SketchUp, ESRI ArcGIS, and Adobe Photoshop. The skills acquired during this portion of the semester will then be utilized in a final design project, whereby teams of students will be required to propose an intervention strategy for redeveloping an urban setting and apply/extend the acquired skills.

Topical Outline:

3D Modeling Fundamentals (applied using SketchUp)

- General 3D modeling behavior, techniques, and vocabulary
- Developing the 3D mindset within the 2D modeling realm
- Building 3D models for urban design applications
- Visualization using orthographic and perspective projections
- Model organization and optimization (3D layering systems)
- 3D libraries and components
- Materials application and texture mapping
- Applying design styles to enhance visualization of 3D models
- Basic model walkthroughs, flyovers, and animations

3D Modeling in GIS (applied using ArcGIS and Sketchup)

- Creating and editing GIS data layers
- Data storage using a personal geodatabase
- Creating 3D features (symbols) for use in ArcGIS
- Data exchange between SketchUp and ArcGIS
- Applying 3D symbology and annotations in ArcGIS

Model Integration, Analysis and Visualization

- Conceptual modeling, massing, and volume generation
- Building & Visualizing 3D models with Google Earth & Building Maker
- Simulating urban settings using site characterization techniques
- Developing high-resolution photorealistic renderings
- Creating and delivering high-quality presentations

Image Editing:

- (Re)formatting digital imagery
- Perspective correction, cropping, cleaning, masking, and scaling digital imagery
- Creating composited imagery (preparing before and after scenarios using digital media)
- Advanced 3D visualization techniques (lens blurring, macro perspectives)

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Course Information:

Instructor:	Iilir Bejleri, Ph.D, Associate Professor; iilir@ufl.edu , 392-0997ext.432; ARCH #454
Assistant:	TBD
Office hours:	TBD
Class meeting times:	Fridays 8:30am to 11:30am
Classroom:	Arch 439
Credits:	Three credits
Prerequisites:	URP6270 or with Instructor's permission (GIS knowledge preferred, not required)
Attendance:	Mandatory, on time (see Expectations, Evaluation, and Grading section)
Field visits:	Mandatory (Some assignments and the final project will require travel)
References & Resources:	See References & Resources section for text references and web, computer, & software resources
Materials:	Digital camera
Course format:	All material will be posted on the Sakai, e-Learning system. System entry & support can be accessed at: https://lss.at.ufl.edu/ .
Class mailing list:	FALL-8986-L@lists.ufl.edu

Expectations, Evaluation, & Grading:

The assignments and the final project will be graded based on the pertinence, content, and creativity of the student's work and evidence supporting the successful completion of assigned tasks. Submitted assignments are required to meet scheduled deadlines and delivery dates. Evaluation and grading for the class has been divided into three primary parts:

Attendance/Participation – 20% (10% Attendance, 10% Participation): Class attendance is mandatory and should be respected. If it is imperative that if you miss class for any reason, please make arrangements with the instructor to be excused prior to the class period. Two or more unexcused absences will result in a reduction of one grade point off the final grade. While in class, participation is required. Participation includes playing an active role during lectures and class discussions, and displaying equal engagement with team members during collaborative assignments. Participation will be graded in two ways: by the instructor and through peer performance review.

Assignments – 45%: Assignments serve as building blocks for the development of high-quality models. A masterful understanding of the concepts, skills, and knowledge of these assignments will successfully contribute to your ability to produce successful plans, designs, and presentations. Evaluation and grading of assignments will include clear identification and presence of all required modeling elements, development and depth of techniques used throughout the modeling task, and level of creativity utilized in the modeling task.

Final Project – 35%: The final design project will transpire over the course of approximately eight weeks, whereby teams of students will chose a project area (approved by the instructor), and propose a redevelopment strategy using the skills and knowledge garnered throughout the course of the semester. Students will generate an intervention strategy by building a working 3D model. The modeling strategies developed during the final project phase will be evaluated and graded based on the willingness to conduct effective and meaningful research, sound exploration of design options and alternatives, development and depth of visualization methods and techniques, the capacity to work individually and collaborate within a team, as well as the complexity, creativity, and depth of your final designs, and execution of the final presentation.

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University of Florida grading scale

Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	WF	I	NG	S-U
% Range	>93	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	<60				
Grade Point	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	.67	0	0	0	0	0

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

Academic Honesty

Student Honor Code and Academic Honesty: Students must follow the University's policy regarding cheating and the use of copyrighted materials. Please consult the graduate catalog or visit <http://www.dso.ufl.edu/stg/> for more information.

Disabilities

Accommodation for students with disabilities: Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

College of Design, Construction and Planning – Spray Painting Policy:

Spray painting, or the use of any other sort of aerosol spray, is not allowed in the Architecture Building, Rinker Hall and in Fine Arts C, except within the spray booth found in Room 211 of Fine Arts C. Students found in violation of this policy will be referred to the Dean of Students for disciplinary action.

References & Resources:

Readings will be required throughout the course of the semester. Required readings and other multimedia materials will be made available for students through the Architecture and Fine Arts Library (Located on second floor of Fine Arts building A) and the University of Florida CIRCA Architecture Lab (Located on first floor of the Architecture building – ARCH 116).

Recommended Text References

- A. Chopra, A. (2007), *Google SketchUp for Dummies* (John Wiley & Sons, Inc.).
(e-Book can be found at: <http://www.uflib.ufl.edu/>)
- B. Tal, D. (2009). *SketchUp for Site Design: A Guide to Modeling Site Plans, Terrain and Architecture* (John Wiley & Sons, Inc.)
- C. T. Ormsby, E. Napoleon, R. Burke, L. Feaster, & C. Groessl (2008), *Getting to Know ArcGIS, Second Edition, Updated for ArcGIS 9.3* (ESRI Press)
- D. M. Carmona, T. Heath, T. Oc, & S. Tiesdell (2003), *Public Places Urban Spaces: The Dimensions of Urban Design* (Architectural Press)

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Web ResourcesGIS instruction, GIS data, and Aerial imagery

- ESRI ArcGIS (Introducing ArcCatalog): http://www.esri.com/flashmedia/arcviewhowtos/Introducing_ArcCatalog.html
- ESRI ArcGIS (Introducing ArcMap): http://www.esri.com/flashmedia/arcviewhowtos/Introducing_ArcMap.html
- Florida Geographic Data Library (FGDL): <http://www.fgdl.org/>
- Land Boundary Information System (LABINS): <http://data.labins.org/2003/>

Google software

- Google SketchUp: <http://sketchup.google.com/>
- Google Earth: <http://www.google.com/earth/index.html>
- Go-2-School (SketchUp and Google Earth resources): <http://www.go-2-school.com/>

High-resolution photorealistic rendering (within SketchUp interface)

- Podium: <http://www.supplugins.com/>
- Indigo Renderer: <http://www.indigorenderer.com/>
- LightUp for SketchUp: <http://www.light-up.co.uk/>
- IRender nXt (Windows only): <http://irendernxt.com/main>
- Shaderlight (Windows only): <http://www.artvps.com/>
- Twilight Render (Windows only): <http://twilightrender.com/>
- V-Ray (Windows only): http://software.asgvis.com/index.php?option=com_content&view=frontpage&Itemid=28

High-resolution photorealistic rendering (outside of SketchUp interface)

- Autodesk 3D Studio Max/VIZ
- 3DPaintBrush (Window only): <http://www.3dpaintbrush.com/>
- Artlantis: <http://www.artlantis.com/>
- Maxwell Render: <http://maxwellrender.com/>
- Kerkythea: <http://www.kerkythea.net/joomla/index.php>

UF Libraries and Labs (links and web addresses to facilitate your access)

- University of Florida (Library homepage): <http://www.uflib.ufl.edu>
- University of Florida Architecture & Fine Arts Library: <http://www.uflib.ufl.edu/afa/>
- University of Florida (Course Reserves): <https://ares.uflib.ufl.edu>
- Library Tools and Mobile Apps (smart phones, RSS feeds, etc.): <http://www.uflib.ufl.edu/tools>
- University of Florida (Architecture CIRCA computer lab): <https://labs.at.ufl.edu/architecture.php>

Computer & Software Resources**1. Sakai (e-Learning)**

This course will be taught in the classroom during most of the sessions. Lab/assistance sessions will be taught online via live web-conferencing such as Gotomeeting or some other system. The course will be supplemented with online support provided by e-Learning in Sakai. The Sakai system will be used to post all course materials (e.g., lectures, course documents such as assignments, required readings, grades, and other materials). Sakai can be accessed at <http://lss.at.ufl.edu>

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2. Class Share disk location

Each student is allocated a personal folder (under **Students**) on the department's K: drive. This folder can be used to store material used during the duration of the course.

The **Share** folder is for sharing files among students. Make sure that you have a copy of files in your personal folder before sharing them on the Share folder. The files placed on the Share folder are not protected.

The **Instructor** folder is for the instructor to post information for students. The information on Instructor is read-only. Copy any desired files from Instructor into your personal folder.

3. Class Share disk access

The Class Share files (located on the K: drive) can be accessed by mapping any of your free computer drives to <\\dcp-file-01.ad.ufl.edu\Classes>. For access outside UF network you need to establish a VPN connection prior accessing this path. Information about VPN can be found at http://net-services.ufl.edu/provided_services/vpn/anyconnect/

Note: The data files access should not be confused with access to the software. No software is available for remote access.

4. Web-Conferencing / Online Assistance

Help with homework and project assignments will be provided in the classroom and through real-time web-conferencing using GotoMeeting software. The instructor will provide the link to the students at the meeting time. Additionally, Google Talk will be used for online office hours to communicate with the instructor. Students are required to have a Google account to use Google talk. Instructor's Google talk id is ilir.bejleri@gmail.com.

To communicate via audio with the instructor during the online hours students can use microphone and speakers on your computer or telephone. The use of a headset is recommended for best audio quality.

5. Software Requirements / Recommendations

All students are required to have a personal laptop computer in order to conduct work and participate during class. The following list identifies required and recommended software applications that should be installed on machines being used by students enrolled in this course:

- **Required:** Google SketchUp & Google Earth (free downloads), MS PowerPoint, and ArcGIS (students will be issued an evaluation copy in class)
- **Recommended:** Adobe Photoshop (also available in CIRCA Architecture Lab – Located on first floor of the Architecture building – ARCH 116)

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Tentative Course Schedule:

WEEK	TOPIC	IN-CLASS EXERCISE	ASSIGNMENT	
			Due	Assigned
1	<ul style="list-style-type: none"> Course Overview Introduction to 3D modeling Basics of modeling with SketchUp 			Skills Survey & Free model
2	<ul style="list-style-type: none"> Advanced SketchUp functionality (Ruby scripts) Process-based modeling 	Advanced Site Plan model	Skills Survey & Free model	Detailed Site Plan model (phase 1)
3	<ul style="list-style-type: none"> Creating doors and windows Creating site furnishings 	Complete Site Furnishings	Detailed Site Plan model (phase 1)	Add Architectural Detail and Site Furnishings (phase 2)
4	<ul style="list-style-type: none"> Interactive model presentation (walkthrough tools, styles, shadows, scenes, animations) 	Begin Assignment work	Architectural Detail & Site Furnishings (phase 2)	Create Styles, Scenes & Animation (phase 3)
5	<ul style="list-style-type: none"> Texture mapping, Image correction, and basic Photorealistic 3D Rendering 	Image correction	Styles, Scenes & Animation (phase 3)	Image correction & Texture map
6	<ul style="list-style-type: none"> Photo Match and Composited images 	Composited images	Image correction & Texture map	Composited image
7	<ul style="list-style-type: none"> Geospatial modeling with Geographic Information Systems (GIS) 	TBD	Composited image	TBD
8	<ul style="list-style-type: none"> Geospatial modeling using Google Earth & Building Maker) Sandbox tools Introduction and discussion of final project 	TBD	TBD	Project work (Investigate potential project sites and precedent cases)
9	<ul style="list-style-type: none"> Project work 	TBD	Present potential project locations and precedent cases	Existing as-built models (flatwork base, building massing, and volumes)
10	<ul style="list-style-type: none"> Project work 	Existing as-built models	Existing as-built models	Wrap-up existing models, begin Proposed modeling
11	<ul style="list-style-type: none"> Project work 	Proposed modeling (Flatwork base, massing, volumes)	Proposed modeling (progress review)	Proposed modeling
12	<ul style="list-style-type: none"> Project work 	Proposed modeling (Architectural detail and site furniture)	Proposed modeling (progress review)	Proposed modeling
13	<ul style="list-style-type: none"> Project work 	Proposed modeling (Composited imagery, etc.)	Proposed modeling (progress review)	Proposed modeling
14	<ul style="list-style-type: none"> Project work 	Presentation development	Proposed modeling (progress review)	Final adjustments
15	Final Project presentations			
16	Final Review: Reflect on presentation comments/discussions (by appointment)			
17	All project work due			