CIE 500LEC ANG: Design with Open Roads

Spring, 2026
3 Credits
Asynchronous Lectures
Synchronous Live Recitations, Tu 1-2:30pm

Instructor
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Office Location & Hours
Ketter Hall 204D, by appointment

Course Description

The purpose of this course is to provide you with the technical skills needed to design roadways within Bentley's OpenRoads Designer software, the digital workflow and design platform adopted by the NYSDOT. This course will support the geometric design of roadways and utilities using NYSDOT's roadway design guidelines. More specific topics include: using NYSDOT roadway design controls and criteria; elements of design, including horizontal and vertical alignment; templates, superelevation, and cross section elements; management of stormwater; and planning for underground utilities. Basic knowledge of Bentley software and geometric design of roads is required for participation in this course.

Learning Outcomes

Outcome	Method of Assessment
Develop detailed roadway designs through the engineering design method.	Homework, Final Project
Identify elements that may be improved on existing roadway designs.	Homework, Final Project
Generate detailed plan sets for construction using NYSDOT roadway design standards.	Homework, Final Project

Upon successful completion of the course, students will be able to understand, practice, apply, design and/or excel in the following:

- Fundamental concepts in roadway design using Bentley's Open Roads Designer.
- Horizontal and vertical alignment (including sight distance), and combination of horizontal and vertical profiles.
- Cross section elements and template creation.
- Designing superelevation along horizontal curves.
- Subsurface Utility Design and Analysis (SUDA) in Open Roads.

Class Format

Asynchronous Lectures: Online hosted video tutorials made specifically for this course will be the primary delivery methods of learning materials so that students can revisit older

concepts with ease and follow along with instructions for completing homework assignments. These videos will be hosted on Youtube and organized into modules that match weekly learning objectives.

Synchronous Recitations: Recitations will be held virtually with the instructors over zoom. During these periods, instructors will provide guidance for completing class assignments, discuss the semester project, and offer dedicated time for groups to meet for completing the semester-long project.

Required Text(s) & Materials

You are required to visit Brightspace (UBLearns) on a regular basis to stay informed of all relevant course information.

Course Requirements & Grading Policy

Your progress toward an understanding of transportation infrastructure design will be evaluated via short online quizzes, class participation, homework assignments based on the lecture material, OpenRoads assignments based on the software lecture material, a midterm exam, and a semester project. There will be no final exam for this class; your semester report is designed to evaluate your understanding of the course content and application of the lecture material in a realistic, practical manner.

- Homework Assignments: 60% = 5% each × 12
- Semester Project 40%

OpenRoads Designer Assignments: OpenRoads assignments are typically due one week after each assignment date. Each assignment will ask you to utilize the tools learned during lecture to complete design tasks within OpenRoads. The content within these assignments is designed to guide you through the phases of your semester project and, on-the-whole, develop detailed, understandable, and thorough plan sets. Approximately 12 OpenRoads assignments will be distributed throughout the semester. Working in groups is encouraged for these assignments, though, each student is required to turn in their own completed problem set.

Semester Project: You will work alongside your randomly assigned team members over the course of the semester to develop multiple roadway corridor alternatives for a given site, evaluate these alternatives, and select and develop a detailed plan for one of the corridors. The design project will be split into two phases: a mid-semester preliminary report and a final design report. The design project offers you the opportunity to go through many of the steps engineers take in identifying, redesigning, proposing, and presenting their work in a practical scenario.

The semester project is 40% of your final grade and will be broken up by the following:

- 15% – Semester Project Preliminary Report
- 25% – Semester Project Final Report

Semester Project Preliminary Report: The interim report will be your effort in identifying what the purpose of the project is, the design challenges faced at the location of interest, what types of data are needed to carry out the project, and a detailed scope of the design project including in depth information regarding the corridor alternatives being

considered, how the alternatives will be evaluated, and what design considerations are being considered for implementation.

Design project final report: You will submit a final report that will be an amalgamation of all the work you've done throughout the semester and is quite similar in content and presentation to reports typically produced by engineers. Your report will include a comprehensive description of the project site, descriptions of the alternatives considered, detailed evaluation methodology, design components of the suggested alternative, analysis of available data, and final conclusions.

Grading Chart

The chart below is an example. Faculty may utilize other relevant grading schemes

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Letter Grade	Points	Letter Grade	Points	Letter Grade	Points
A	94-100 points	B-	80-82 points	D+	65-69 points
A-	90-93 points	C+	77-79 points	D	60-64 points
B+	87-89 points	C	73-76 points	F	< 60 points
B	83-86 points	C-	70-72 points		

Course Schedule

Week	Date	Topic	Assignments Given	Assignments Due
Week 1	**27-Jan**	Workspace and basic tools	Assignment 1	
Week 2	**3-Feb**	Import, manipulate, and visualize terrain surfaces	Assignment 2	Assignment 1
Week 3	**10-Feb**	Create & design horizontal alignments	Assignment 3	Assignment 2
Week 4	**17-Feb**	Develop and manipulate vertical alignments	Assignment 4	Assignment 3
Week 5	**24-Feb**	Utilizing template libraries & transitions	Assignment 5	Assignment 4
Week 6	**3-Mar**	Designing Templates	Assignment 6 Semester Project	Assignment 5
Week 7	**10-Mar**	Superelevation (segment) & Special Cases/Manipulation		Assignment 6

Spring Recess	**17-Mar**			
Week 8	**24-Mar**	Design review	Assignment 7	
Week 9	**31-Mar**	Project update		Project Update
Week 10	**7-Apr**	SUDA Stormwater Hydro Analysis (segment)	Assignment 8	Assignment 7
Week 11	**14-Apr**	SUDA Stormwater Design	Assignment 9	Assignment 8
Week 12	**21-Apr**	SUDA sewer, gas, water lines	Assignment 10	Assignment 9
Week 13	**28-Apr**	Analyze Utilities: Clash Detection		Assignment 10
Week 14	**5-May**	Post-Processing: Cross Sections + Corridor Report	Assignment 11	
Week 15	**12-May**	Generating 3D Model for Submission	Assignment 12	Assignment 11 & 12
Final Exam		No In-Class Exam		Semester Project

Academic Integrity

Academic integrity is critical to the learning process. It is your responsibility as a student to complete your work in an honest fashion, upholding the expectations your individual instructors have for you in this regard. The ultimate goal is to ensure that you learn the content in your courses in accordance with UB's academic integrity principles, regardless of whether instruction is in-person or remote. Thank you for upholding your own personal integrity and ensuring UB's tradition of academic excellence. The academic integrity policy is available at buffalo.edu/academic-integrity.

Accessibility Resources

If you have any disability which requires reasonable accommodations to enable you to participate in this course, please contact the Office of Accessibility Resources in 60 Capen Hall, 716-645-2608 and also the instructor of this course during the first week of class. The office will provide you with information and review appropriate arrangements for reasonable accommodations, which can be found on the web at: http://www.buffalo.edu/studentlife/who-we-are/departments/accessibility.html.

Optional Sections

Attendance Policy

Your attendance policy might include:

- Attendance issues related to religious observances.
- Athletic commitments.
- Family/work obligations.
- Course cancellation/emergency planning.
- Reference the university emergency webpage for cancellations/delays due to weather or other unforeseen events.

Instructor and Course Support Staff Information

The following can be included in this section:

- Relevant professional information and/or teaching philosophy.
- Roles and responsibilities of course support staff.

Lab Safety

This section could include guidelines for lab safety, including policies and procedures.

Protecting Course Materials Disclaimer

All materials prepared and/or assigned by me for this course are for the students' educational benefit. Other than for permitted collaborative work, students may not photograph, record, reproduce, transmit, distribute, upload, sell or exchange course materials, without my prior written permission. "Course materials" include, but are not limited to, all instructor-prepared and assigned materials, such as lectures; lecture notes; discussion prompts; study aids; tests and assignments; and presentation materials such as *PowerPoint* slides, *Prezi* slides, or transparencies; and course packets or handouts. Public distribution of such materials may also constitute copyright infringement in violation of federal or state law. Violation of this policy may additionally subject a student to a finding of "academic dishonesty" under the Academic Integrity Policy and/or disciplinary charges under the Student Code of Conduct.

Classroom Environment

Discussion of classroom expectations, including tardiness and/or use of cell phones and laptops, etc. *"In this section, you describe the strategies you will use to create a classroom or online course environment that aims to increase experiences of being respected, seen, represented and included.*

Critical Campus Resources

Counseling Services

Students may experience a range of issues that can cause barriers to learning or reduce their ability to participate in daily activities. These might include strained relationships, anxiety, high levels of stress, alcohol/drug problems, feeling down, health concerns or unwanted sexual experiences. Counseling, Health Services, and Health Promotion are here to help with these or other concerns. Students can learn more about these programs and services by contacting:

- **Counseling Services:** 120 Richmond Quad (North Campus), phone 716-645-2720 and 1st Floor Michael Hall (South Campus), phone: 716-829-5800

- **Student Health Services:** 4350 Maple Rd., Amherst, NY 14226, phone: 716-829-3316
- **Health Promotion**: 114 Student Union (North Campus), phone: 716-645-2837

Sexual Violence

UB is committed to providing a safe learning environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic and dating violence and stalking. If a student has experienced gender-based violence (i.e., intimate partner violence, attempted or completed sexual assault, harassment, coercion, stalking, etc.), UB has resources to help. This includes academic accommodations, health and counseling services, housing accommodations, helping with legal protective orders, and assistance with reporting the incident to police or other UB officials if the student so chooses. Contact UB's Title IX Coordinator at 716-645-2266 for more information. For confidential assistance, students may also contact a Crisis Services Campus Advocate at 716-796-4399.

Generative AI Tools (e.g., ChatGPT)

Faculty are encouraged to add a statement regarding the use of Generative AI tools, such as ChatGPT. When communicating expectations, faculty should avoid using any vague language, include specific parameters or limits, and engage in class discussion around which (if any) Generative AI tools students can use. Faculty may find it useful to name the non-generative AI Tools (such as EndNote, spellcheckers, PowerPoint Designer, etc.) that students are free to use. Consider drawing from the following example when developing language for your syllabus:

Prohibition example

Utilizing generative AI tools (such as ChatGPT) in this class is strictly forbidden. Any use of generative AI tools in this class will be considered a violation of UB's Academic Integrity policies. However, you are free to use AI tools that are not generative, such as spellcheckers and auto-annotation (e.g. EndNote), to assist in making your writing more professional. Please email me if you have any questions.

Limited use

If you intend to allow some use of generative AI tools, use the guiding principles from above: indicate the specific assignments where it is allowable (or not) and which specific tools are allowed.