University at Buffalo

CIE 500: OpenBridge Designer for NYSDOT

Fall, 2026
3 Credits
Asynchronous Lectures
Synchronous Live Recitations, Th 1-2:30pm

Instructor
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Office Location & Hours
Online, by appointment

Course Description

The purpose of this course is to provide the core fundamentals in modeling and detailing different types of bridges using Bentley's OpenBridge Designer (OBD) and OpenBridge Modeler (OBM) software version 2026 and prepare students for future bridge model-based contract projects by NYSDOT.

This course will support the geometric modeling of bridges, its parametric superstructure, substructure and earthwork modeling to the Level of Development (LOD) required per NYSDOT Design-Bid-Build contracts and apply practical workarounds to overcome OpenBridge Designer shortcomings to meet NYSDOT bridge design standards.

Topics include NYSDOT bridge design controls and criteria; geometric design using horizontal and vertical alignments; application of bridge templates for decks, beams, and piers; generation of geometry and quantity reports; plan sheet production; preliminary design integration between OpenBridge Modeler and LEAP; reinforcement modeling and bar list development; and IFC export.

No prior knowledge of this software is necessary.

Learning Outcomes

Outcome	Method of Assessment
Develop detailed bridge models and contract documents applying engineering concepts.	Homework, Final Project
Fundamental understanding of OpenBridge Designer and OpenBridge Modeler software for NYSDOT projects	Homework, Final Project
Understanding of OBD & OBM capabilities and limitations	Homework, Final Project

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

- Fundamental concepts of bridge design using Bentley's OpenBridge Designer.
- Develop bridge project-specific templates.
- Model different types of bridges.
- Produce typical sheet drawing sheets.
- Core fundamentals in modeling and detailing
- Parametric superstructure, substructure & earthwork modeling (to LOD required per NYSDOT Design-Bid-Build contracts)
- Practical workarounds to overcome OBM limitations to meet NYSDOT standards
- Link OBM to LEAP for preliminary design
- Rebar modeling & bar list creation
- Plans production utilizing model-centric workflow
- Export to .IFC
- General knowledge of OBM capabilities

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, OpenBridge Designer assignments based on the software lecture material, a midterm project assessment review, 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%

OpenBridge Designer Assignments: OpenBridge Designer 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 OpenBridge. 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

OpenBridge 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 over the course of the semester to develop multiple bridge alternatives for a given site, evaluate these alternatives, and select and develop a detailed plan for one of the bridge models. 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 and Presentation

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 bridge alternatives being considered, how these alternatives will be evaluated, and what design specifications are being considered for implementation.

Design project final report and presentation: 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	Topic	Assignments Given	Assignments Due
Week 1	Workspace and basic tools. Navigating the interface. Software Overview: OpenBridge Designer and OpenBridge Modeler. Semester Project outline.	Assignment 1	
Week 2	Review the bridge libraries and templates. Import, manipulate and visualize geometry and terrain models. Using the bridge wizard for conceptual design. Set up a new bridge model, support lines, deck, barriers and approach slabs. NYSDOT Bridge Manual.	Assignment 2	Assignment 1
Week 3	Define the bridge superstructure. Deck placement and manipulation. Define a beam layout. Place beams, diaphragms/cross frames. Define the substructure (piers and abutments) and bearings.	Assignment 3	Assignment 2
Week 4	Edit and customize the substructure elements.	Assignment 4	Assignment 3
Week 5	Bridge element manipulations and updates. Properties review	Assignment 5	Assignment 4
Week 6	Report generation and quantities. Bentley OpenBridge Basic Accreditation assessment.	Assignment 6 Semester Project	Assignment 5
Week 7	Drawing production tools. Use of models. Section callouts, dimensioning, file referencing. Generate plans.		Assignment 6
Week 8	Rebar modeling for the bridge substructure elements.	Assignment 7	
Week 9	Custom Rebar modeling and plans production		Project Update
Week 10	Rebar quantities	Assignment 8	Assignment 7
Week 11	Earthwork modeling and calculation (1).	Assignment 9	Assignment 8
Week 12	Earthwork modeling and calculation (2)	Assignment 10	Assignment 9
Week 13	Interoperability with LEAP Concrete and LEAP Steel for preliminary bridge design. IFC and exporting bridge models.		Assignment 10
Week 14	Final Project submission and presentations (1).		Final Project Due
Week 15	Final Project submission and presentations (2).		

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 accommodation 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.

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 accommodation, 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 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.