DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING
LAFAYETTE COLLEGE

CE472 CAPSTONE DESIGN I – STRUCTURAL-FOCUSED PROJECT SYLLABUS

Meeting times: Lecture: AEC 327, 2:10-2:50 MWF (see schedule provided in this handout)
Group project meetings: To be scheduled on MT(W) of week 3, 4, 5 and 6 of the project

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Office Hours: MW 3:00-4:30 PM, T 2:30-4:30

Required Text: ***Structural-Focused Project Criteria and Specifications (handed out in-class on 10/10/12)***

1. Overview:

Working in teams, students will specify all of the steel (sizes, locations, dimensions) and concrete foundation elements for a outdoor steel overlook structure that will provide a view to the south of Easton and beyond from Lafayette's campus. The design must satisfy the current International Building Code requirements, considering gravity (dead), occupancy (live), snow, and wind loads, and additional architectural constraints. The site itself consists of two parts: the region that extends over the steep hillside that will contain the actual overlook portion of the structure and the region that is the fairly flat ground above the hillside that will contain the non-overlook structural elements. The non-overlook elements will probably include most of the structural elements that serve to support the overlook portion of the structure. Though the building's budget is not large, the College would like the inside to have striking visual appeal, if economically feasible. Therefore, designs satisfying the stated project requirements should also give balanced consideration for aesthetics and cost. The project involves developing conceptual designs, performing detailed design of a structure to meet safety and serviceability requirements, investigating LEED certification criteria, and considering cost and aesthetic requirements (the structural steel will be exposed to view). For further details on the project, refer to the Structural-Focused Project Criteria and Specifications document.

2. Design Competition Criteria

On Friday, Nov. 16th each group will present its design to the class. After the presentations, each student will be given the opportunity to vote the top three individual and team designs. A student may not vote their own design.
The criteria for judging include

- The design should offer the best blend of economy and aesthetics. This is a matter of judgment. The "best" design may be beautiful & expensive, ugly & cheap, or anything in-between. It is up to each design team to argue the strengths of their design. It is up to the peer-judges to determine the design that offers striking visual appeal with a modest price.
- The design should be detailed and correct. Peer-judges shouldl discredit designs that appear to have omitted important design requirements or other considerations.

The voting procedure will award three points for a first-place vote, two points for a second-place vote, and one-point for a third place vote. The individuals and design teams with the top three vote tallies will be declared the winners of the design competition and their designs will be publicly displayed on the third floor of AEC.

3. Project Meetings

Four team project meetings will be held at times scheduled outside of the class time on Mondays and Tuesdays. The focus of the meetings is not just on technical issues, but on tracking the progress of the project, including noting tasks completed, tasks that are behind schedule, and revising the schedule as needed. Each meeting will begin with a review of the progress the group has made since the last meeting based on what was planned (according to the group task memo from the previous meeting). If a task has been completed, we will quickly review the major results. Next, the project tasks and deliverables of the next time period will be discussed and assigned to the primary person in-charge. The results of the discussion will be summarized by a team task memo that will be circulated to all team members ASAP after the meeting. The task memos also will be submitted in an appendix of the final design report.

4. Project Memos, Tasks, and Deliverables

A project task is an identified piece of design, analytical, or investigative work that needs to be completed. Each project task will take more than a couple of hours of time and should result in some physical deliverable. Example deliverables include a SAP analysis, an as-built drawing of a floor system, specification sheet, synopsis of a literature search, column design calculations, cost of steel calculation, etc. In all cases, the deliverable product is transmitted to the group with an attached cover memo. The purpose of the cover memo is to make every engineer's efforts on the project a matter of official public record and accessible to the entire project team, while also keeping the team members updated on progress being made. In some cases, the memo itself may be the deliverable (ex. the task was to go to a local design firm and gather information concerning footing construction). In that case, the memo may simply state that a visit was made and serves to provide a summary of the information collected.

5. Primary Person(s) In-Charge (PPI), Checkers, and Contributors

Every page in the final report presenting calculations and drawings must have the primary person(s) in-charge (PPI) written in the top left corner. This is the person who actually did the calculations or analysis on that page. For standard engineering hand-calculations, only *one person* is considered to be the PPI. A *second person* should be listed as the "checker", on the top right corner of the page. In very rare circumstances, others may be listed on the top right corner as "contributors" to that page. For computer-based work, such as spreadsheets or SAP2000, two people may be listed on the top left as the PPI, if applicable (this is because two people often work well together on computer models, etc.), while a third person should still be listed as the checker on the top right.

6. The Importance of Checkers and Checking

In structural and geotechnical design offices, every calculation page has a responsible person (the PPI) who did the calculations, as well as a person (the checker) who checked the calculations. This system is essential because it is the main mechanism of assuring accuracy and catching mistakes early enough to be corrected. In this project, every page of calculations and analysis results must be checked by a team member. This job should not be taken lightly; if a calculation or analysis result is found by Prof. Raich to be incorrect, the checker will be held responsible and this will be reflected in the checker's grade for the project.

7. Individual Grades

The work conducted for the project will be performed primarily in teams. However, the grades of each student in a team will not necessarily be the same. Each student's grade will be based on the following:

1. (35%) Team Report Grade. All individuals on the team will receive the same grade for this portion. This team grade covers all of the report, with the exception of the Conceptual Designs, which are grades awarded to each individual (see #2, below). The report (see Structural-Focused Project Document, section 8) will be graded based on the technical accuracy of the calculations contained, the clarity of communication and presentation, the completeness of the analysis and design, and the overall quality of the design.
2. (10%) Student Conceptual Design. Each student on the team is responsible for developing a unique conceptual design, consisting of neatly-drawn sketches on engineering paper, a written description of design concept, and a AutoCAD, Sketch-up, or fly-through model of their outdoor overlook structure design. These conceptual designs will be included in the team report, but the team, at large, will not receive grades for each.
3. (35%) Individual's Contribution to the Report. The individual's contribution to the report will be primarily based on the work associated with them. For example, if a person is repeatedly listed as PPI on many important parts of the report, while also contributing elsewhere, this person will receive a high grade. On the other hand, if a person's name rarely appears in the report or is only the PPI for less important parts, a lower grade will be assigned. However, it is often the case that an individual works diligently on some important aspect of the project, even though it does not lead to a concrete deliverable in the report. *This will be taken into consideration using the work log*, which is described in section 7 of this document, and also *using the team task memos*, which identify the tasks that each student was assigned.
4. (10%) Group Presentation Grade. All individuals on the team will receive the same grade for this portion. Presentations are expected to be engaging and convincing overviews of the project's major decisions and design elements. The presentations should provide a convincing argument that the design provides an excellent blend of design performance, economy and aesthetics.
5. (10%) Individual Presentation Grade. Each individual is expected to contribute to the presentation.

8. Work Log

For the reasons described in previous sections, each student must maintain a daily work log, listing the work they did on the project. These work logs can simply be written on a sheet of paper or tracked using Excel, but they must be kept up-to-date everyday and they must be brought to each project meeting. The log should be a table containing the following information at a minimum: date, time spent, description of activity, deliverable that resulted (if applicable). Copies of all of the group's individual work logs will be attached to the final report in an appendix, along with the design memos submitted with each project deliverable the student worked on.

8. Final Report Requirements (see Structural-Focused Project Criteria and Specifications document)

A final design report will be prepared by each group. The design report, consisting of all of the written documentation for the project, will be submitted on **Thursday, November 15th by 5 pm**. The specific requirements of the final design package are discussed in the Structural-Focused Project Criteria and Specifications document.

9. Tentative Class Schedule and Meeting Schedule

DATE	DAY	LOCATION	TOPIC
10/10	WED	AEC 327	INTRODUCTION TO PROJECT
10/12	FRI	AEC 327	STRUCTURAL SYSTEMS & CONCEPTUAL DESIGN PROCESS DEFINITION OF TASKS & SCHEDULING
10/15	MON	AEC 327	IN-CLASS – DESIGN CONCEPTS, IBC CODE & WONDERS OF ASCE 7–SNOW LOADS
10/17	WED	LAB	SAP MODELING CLASS - GROUP A & NO CLASS FOR GROUP B
10/19	FRI	LAB	SAP MODELING CLASS - GROUP B & NO CLASS FOR GROUP A
10/22 & 10/23	MON/TUES	AEC 322	1ST PROJECT TEAM REVIEW MEETING – 20 MINUTES – SCHEDULED W/ PROF. RAICH OUTSIDE OF CLASS TIME
10/22	MON	AEC 327	IN-CLASS – WONDERS OF ASCE 7 – WIND LOADS
10/24	WED	LAB	SAP MODELING CLASS – GROUP A & NO CLASS FOR GROUP B
10/26	FRI	LAB	SAP MODELING CLASS – GROUP B & NO CLASS FOR GROUP A
10/29& 10/30	MON/TUES	AEC 322	2ND PROJECT TEAM REVIEW MEETING – 20 MINUTES – SCHEDULED W/ PROF. RAICH OUTSIDE OF CLASS TIME
10/29	MON	AEC 327	IN-CLASS – STEEL BEAM & COLUMN DESIGN
10/31	WED	AEC 327	IN-CLASS – FOUNDATION & FOOTING DESIGN
11/2	FRI	AEC 327	SAP MODELING CLASS – GROUP A & B AS NEEDED
11/5& 11/6	MON/TUES	AEC 322	3RD PROJECT TEAM REVIEW MEETING – 20 MINUTES – SCHEDULED W/ PROF. RAICH OUTSIDE OF CLASS TIME
11/5	MON	AEC 327	IN-CLASS - WORK SESSION
11/7	WED	AEC 327	IN-CLASS - WORK SESSION
11/9	FRI		NO CLASS
11/12 & 11/13	MON/TUES	AEC 322	4TH PROJECT TEAM REVIEW MEETING – 20 MINUTES – SCHEDULED W/ PROF. RAICH OUTSIDE OF CLASS TIME
11/12	MON	AEC 327	NO CLASS
11/14	WED	AEC 327	NO CLASS
11/15	**THURS**	**AEC 322**	**FINAL DESIGN REPORT DUE BY 5:00 PM TO PROF. RAICH'S OFFICE**
11/16	**FRI**	**AEC 327**	**IN-CLASS GROUP PRESENTATIONS – GROUP TIMES TBD**

10. PROJECT GRADE SCALE:

Grade	**%**
A	92 to 100%
A-	90 to 91.99%
B+	88 to 89.99%
B	82 to 87.99%
B-	80 to 81.99%
C	70 to 79.99%
D	65 to 69.99%
F	< 65%