**Northeastern University**

**Department of Civil and Environmental Engineering**

Instructor’s Assessment

CIVE 2320 Structural Analysis 1

**Semester / Year:** Spring / 2013 **Instructor: S.W. Cranford Date: 05/21/2013**

Expectations regarding this course assessment:

1. Before the start of the course, review the most recent instructor assessment for recommendations on how to improve the course.
2. Up to three exams may be used to assess student learning.
3. *Questions to be asked on the in-class evaluation:*  None.
4. This assessment form is based on the set of topics and learning outcomes listed in the course syllabus. Do not change this part of the syllabus without action from the discipline group. If there is a change, notify the Undergraduate Studies Committee so that this form can be modified.
5. Complete the form and save it as a Word document with filename like this: IAssess\_2320 \_2013\_Fall

**1. What course improvements did you make? How successful were they? Relate them to recommendations made in previous course assessments.** *Expand the table as necessary.*

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| 1. | Updated lecture notes and materials, including new examples from scratch. Complete set of lecture slides to companion on-board lecture notes. |
| 2. | Preparation of new homework problems from scratch, bonus homework to promote class participation. |
| 3. | Introduction of group assignments for final review, increasing participation, class interaction, and presentation skills. |

**2. Your response to student comments and/or TRACE evaluation:** *Respond to serious criticisms and suggestions. Expand table as necessary.*

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|  | **Student Comment** | **Your Comment(s)** |
| 1. | Lectures were too fast. | Slowed down my pace of presentation, included more examples, and reiterated previous material. The redundant repetitive routine! |
| 2. | Lecture slides were not interactive enough, boring, too complicated. | Initially lectured from slides (including examples). I transitioned to more board work to enhance class participation/interaction. |
| 3. | Showed too many proofs or derivations. | Students only wanted the “final formula” without an appreciation for the derivation. The common question was “Will we be tested on this?” I kept the key derivations (Euler buckling, for example) as they exemplify fundamental structural analysis, which the students may appreciate in later years. |
| 4. | Homeworks were too hard. | Initial homeworks had open-ended design questions; students wanted more “practical” problems to practice for midterms/final. Removed some design elements, but most homeworks were challenging (as was my intent). |

**3. Student questionnaire summary**

*Omit – does not apply.*

**4. Grade Summary**

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| **Exam 1 question #** | **Topic** | **Average score** (0 to 100) | **% students with adequate achievement**  **(>70%)** | **Comment on any item with poor achievement** |
| M1.1 | Composite beam sections; beam stress analysis | 88% | 96% | Students performed well on this question. |
| M1.2 | Non-linear torsion | 81% | 82% | Most students performed well on this question. A little confusion between the concepts of “torque” and “stress”; non-linear concepts OK. |
| M1.3 | Beam stress analysis; Mohr’s circle | 81% | 78% | Students had difficulty solving for beam reactions, incorrect moment and shear diagrams; left this problem (worth 50%) for last and ran out of time, omitted the Mohr’s circle part. |

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| **Exam 2 question #** | **Topic** | **Average score** (0 to 100) | **% students with adequate achievement**  **(>70%)** | **Comment on any item with poor achievement** |
| M2.1 | Euler buckling | 71% | 58% | Two major issues:   1. Problem was formulated in such a way that the students needed to solve a quadratic equation. Many students did not recognize this. 2. Many students did not understand the difference between “strong axis” and “weak axis” for bending/buckling. |
| M2.2 | Beam deflection (double integration method) | 83% | 86% | Students performed well. Some difficulty with reactions/moment diagrams. Main concept (double integration) was OK. |
| M2.3 | Approximate frame analysis | 83% | 91% | Students performed will. Most straight-forward problem on the midterm. |

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| **Final exam 3 question #** | **Topic** | **Average score** (0 to 100) | **% students with adequate achievement**  **(>70%)** | **Comment on any item with poor achievement** |
| F1. | 6 short answer questions:   1. Mohr’s circle 2. Approximate analysis 3. Shear/moment diagrams 4. Euler-Bernoulli Beams 5. Principal stresses 6. Boundary conditions | 62% | 31% | While students could solve numerical problems, they had trouble explaining the concepts behind the problems.  Most students did poorly on this section.  In their defense, they did not have similar questions on the midterm to “study”. |
| F2. | Virtual work; buckling | 64% | 42% | We mostly used virtual work to solve for indeterminate problems, the problem here was determinate, which seemed to throw off the bulk of the class. Also, major errors solving for reactions and attaining correct moment distributions. |
| F3. | Flexibility method; stress analysis; Mohr’s circle | 68% | 46% | Most set up solution correctly, incorrect use of (given) beam equations. Stress analysis and Mohr’s circle OK. |
| F4. | Moment distribution; composite section | 74% | 65% |  |

**5. Here are the topics listed on your syllabus.** Based on your grade summaries, report the fraction of students that showed ability to apply knowledge and to identify, formulate, and solve problems. In the column “Basis for assessment” report the particular item(s) in the grade summary that support this assessment; or if the topic is not covered in the grade summary, state the basis of your assessment.

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| **Topic** | **Percentage of students showing ability to apply knowledge and solve problems** | **Basis for assessment** | **Comments** |
| 1. *Calculate axial, normal, and shear stresses on elements at various orientations.* | 75% | Midterm 1, Homework assessment, Final Exam | As this was taught in the first half of the course, it was reiterated throughout. Most students comfortable with the concept. |
| 1. *Determine buckling loads for columns with different boundary conditions.* | 70% | Midterm 2, Homework assessment, Final Exam | Able to differentiate boundary conditions if they are clearly marked; unable to interpret conditions which are not “recognized” or in a table. |
| 1. *Find the deflections (using differential equations, moment area, or virtual work) at any location of determinate structural systems such as beams, frames, and trusses.* | 65% | Midterm 2, Homework assessment, Final Exam | Comfortable with the process, errors in implementation. |
| 1. *Analyze (using moment distribution and the flexibility method) indeterminate structural systems to find both reaction and internal forces.* | 65% | Homework assessments and Final Exam | Comfortable with the process, errors in implementation. |
| 1. *Find the deflections at any location of indeterminate structural systems.* | 60% | Homework assessments and Final Exam | Unless it was a “familiar structure”, many students would have difficulty. |
| 1. *Select a method of analysis based on the type of system, desired results, and underlying assumptions behind each technique.* | 60% | Homework assessments | Students had no interest in “underlying assumptions”; only wanted “example cases”. |
| 1. *Be able to verify the accuracy of computer output (advanced topic in structural analysis) using hand calculations.* | 55% | Homework assessments and Final Exam | I do not think the students appreciated why we were learning such techniques. Only wanted “the answer”. Was difficult to motivate even the simpler “approximate analysis” techniques. |

**6. Assessment of Program-Level Outcomes not covered in Topic Assessment**

*Omit – does not apply.*

**7. Recommendations for improving this course.** Expand the table as needed.

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| 1. | This course should encompass LESS material. There is a disconnect between the beginning (mechanics) of the course and the latter half (structures). While some mechanics topics are good (i.e., principal stresses), others have no reason to be in a structural analysis class (i.e., torsion). |
| 2. | A refresher on basic statics knowledge (solving for reactions, moments, shear, etc.) should be required. Many of the students have trouble with this basic knowledge, making more complex problems near impossible to cover in class. |
| 3. | Preparation of consistent course material between professors/semesters beyond the recommended texts. |