**Northeastern University**

**Department of Civil and Environmental Engineering**

Instructor’s Assessment

CIVE 2320 Structural Analysis 1

**Semester / Year:** Fall / 2013 **Instructor: A.T. Myers Date: 02/11/2014**

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.*

Note that this was my first time teaching this course.

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| 1. | Incorporation of two in-class lab demos on buckling and bending. These seemed to be popular and effective. |
| 2. | Introduction of conceptual warm-up questions to start class and encourage participation. |
| 3. | Update of course notes, homeworks and exams. |

**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. | Focus less on derivatives. Add more examples. | By far the most common comment. In this case, I disagree with the students and think that focusing class time on derivations while reserving recitations and homeworks for practice with numerical examples is an optimal approach. In the future, I will better coordinate with recitation instructor so that there is more consistency between lecture and recitation. |
| 2. | Use a textbook. | I made the textbook optional and rarely emphasize it, and, in hindsight, this was a mistake. While I’ve found this approach works well for older UG and G classes, for this level, the foundation of a textbook is important. |
| 3. | Separate into two courses: mechanics and structures. | I completely agree. I think that the topics covered in this course are fairly incoherent, which makes it difficult for the instructor and the students. |

**3. Student questionnaire summary**

*Omit – does not apply.*

**4. Grade Summary**

All of my exams started with several shower answer conceptual questions, followed by one or detailed numerical questions. Most of the weight of the exams was tied to the numerical questions, which tested many topics, thus greater weight on achievement percentage should be placed on the numerical questions.

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| **Exam 1 question #** | **Topic** | **Average score** (0 to 100) | **% students with adequate achievement** | **Comment on any item with poor achievement** |
| M1.1 | Mohr’s Circle | 93% | 94% | Easy short answer question. |
| M1.2 | 2D Deformation | 58% | 48% | Short answer question. This was intentionally designed as a tricky question to separate A students. |
| M1.3 | Bending Theory | 67% | 62% | Short answer question. |
| M1.4 | Composites | 61% | 91% | Short answer question. ~40% of the points of this question were tied to the most challenging question on the exam, so although the average was low the % with adequate achievement was high. |
| M1.5 | Mohr’s Circle | 41% | 49% | Short answer question. This was intentionally designed as a tricky question to separate A students. |
| M1.6 | Beam Stress Analysis | 83% | 89% | **This was worth 60% of the exam** and tested many concepts. |

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| **Exam 2 question #** | **Topic** | **Average score** (0 to 100) | **% students with adequate achievement** | **Comment on any item with poor achievement** |
| M2.1 | Euler buckling | 78% | 79% | Short answer question. |
| M2.2 | Effective length | 69% | 72% | Short answer question. |
| M2.3 | Torsion | 54% | 62% | Short answer question which was intentionally designed to be tricky. |
| M2.4 | Euler buckling | 86% | 83% | **This was worth 30% of the exam** and tested several concepts. Students performed well. |
| M2.5 | Indeterminate torsion | 83% | 91% | **This was worth 40% of the exam** and tested several concepts. Student performed well. |

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| **Final exam question #** | **Topic** | **Average score** (0 to 100) | **% students with adequate achievement**  **(>70%)** | **Comment on any item with poor achievement** |
| F1. | Degree of static indeterminacy | 56% | 68% | Short answer question. |
| F2. | Mohr’s circle | 107% | 86% | Short answer question. Included a bonus. |
| F3. | Bending | 108% | 95% | Short answer question. Included a bonus. |
| F4. | Plane stress-strain | 87% | 97% | Short answer question. |
| F5. | Buckling | 77% | 92% | Short answer question. |
| F6. | Bending deflections | 65% | 79% | Short answer question. |
| F7. | Composite beam analysis | 67% | 59% | Short answer question. |
| F8. | Principle of virtual work | 66% | 62% | **This was worth 25% of the exam** and tested several concepts. Students performed a bit lower than I would have liked. |
| F9. | Flexibility method | 77% | 71% | **This was worth 25% of the exam** and tested several concepts. Students performed a bit lower than I would have liked. |

**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.* | 90% | Homework. Midterm 1. Final. | I emphasized Mohr’s circle since this was used throughout the class. I think most students understand this concept well. |
| 1. *Determine buckling loads for columns with different boundary conditions.* | 85% | Homework. Midterm 2. Final. | Students were assessed on conceptual understanding and on numerical implementation of buckling and most understood it. |
| 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.* | 80% | Homework. 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.* | 70% | Homework. Final exam. | Most students understood the process. Many made errors in execution. A few did not understand this topic at all. |
| 1. *Find the deflections at any location of indeterminate structural systems.* | 65% | Homework. Final exam. | Most students understood the process. Many made errors in execution. A few did not understand this topic at all. |
| 1. *Select a method of analysis based on the type of system, desired results, and underlying assumptions behind each technique.* | ? |  | In most cases, the homework and exam questions were testing a particular method of analysis and so the students didn’t have to select the method themselves. Because of this, I don’t really have an assessment of their ability to apply knowledge of this topic. Assessing this topic is an area for improvement next time I teach this class. However, understanding the underlying assumptions behind each technique was a major emphasis of my course so I’m confident that many students would be able to demonstrate this knowledge if given the opportunity. |
| 1. *Be able to verify the accuracy of computer output (advanced topic in structural analysis) using hand calculations.* | 85% | Homework.  Midterm 1. Midterm 2. Final. | Although we did not use any computer software explicitly, the entire course was focused on hand calculations which could be used as back-of-the-envelope checks of computer output. |

**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. | The following comment was made by Prof. Cranford and I am reiterating it here because I totally agree. The fact that the course requires two distinct textbooks is reflective of this problem.  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. I think we should develop an online tutorial that students are required to review before any class that depends on statics. In fact, I’m thinking of writing a proposal to the Provost’s office to make this tutorial. |
| 3. | Make sure the lectures and recitations are more compatible (e.g. use consistent variables and formulations). |
| 4. | Make more explicit use of the textbook. |