I. Assessment Outcomes from the Course Syllabus

- [X] (A) Ability to apply knowledge of mathematics, science and engineering.
- [ ] (B) Ability to design and conduct experiments as well as analyze and interpret data.
- [ ] (C) Ability to design a system, component, or process to meet desired needs.
- [ ] (D) Ability to function on multidisciplinary teams.
- [X] (E) Ability to identify, formulate, and solve engineering problems.
- [ ] (F) An understanding of professional and ethical responsibility.
- [ ] (G) Ability to communicate effectively in written and oral formats.
- [ ] (H) A broad education necessary to understand the impact of engineering solutions in global, economic, and societal context.
- [ ] (I) Recognize the need for, and have the ability to engage in life long learning.
- [ ] (J) Have a broad education and knowledge of contemporary issues.
- [ ] (K) Ability to use techniques, skills and modern engineering tools necessary for engineering practices.

II. List of Course Topics from the Course Syllabus

1. Introduction to electromagnetics
2. Transmission lines
3. Vector analysis.
4. Electrostatics.
5. Magnetostatics.
6. Time varying fields and Maxwell’s equations.

III. Course Assessment Summary Table: one row of the table should be devoted to each of the checked outcomes in part I.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Topics</th>
<th>Specific Measures (Samples should be available in the course materials file for inspection.)</th>
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</thead>
</table>
IV. Using the table as a guide, for each outcome summarize your evaluation of the students' achievement of that outcome; cite student performance on the identified measures as evidence to support your conclusions.

(A) Ability to apply knowledge of mathematics, science and engineering.

(E) Ability to identify, formulate, and solve engineering problems.

The entire course involves extensive application of mathematics to solve the problems in homework assignments and exams. This proved to be a very challenging issue to most students due to their weak mathematical skills. Topic 6 was not fully covered due to lack of time. Covering of transmission lines in detail and the need to go repeatedly over all the mathematical steps in the class did leave enough time to cover topic 6.

Students were allowed to collaborate on the homework for discussion purposes only and the grading was strict to discourage students from copying from each other. Several students had perfect scores in their homework assignments from the textbook, but failed to solve them in the exams. One student who had high score on homework failed the course. Therefore, homework is not a good metric to measure student’s understanding of the subject.

V. Qualitative Assessment of Student Performance: using the arguments above and other data support the claim that students who completed this course with a grade of C or better have achieved each of the intended outcomes of this course.

This course had a high attrition rate and students who passed demonstrated good mathematical skills and the understanding of the concepts discussed in class. Even though many students believed they understood the concepts discussed in class, the weak mathematical skills of some students resulted in poor test and homework scores. Overall students had to demonstrate understanding of the concepts combined with good mathematical skills on the tests. The assessment materials collected for the course demonstrate this case. Therefore, all the tests and homework assignments serve as an assessment of ABET (A) and (E).

The average test scores, including those students who later on failed the course, were T1=70, T2=62.4, T3=61.6, Final =90.5 (out of 150). The final had, as part of the exam, a somewhat standardized true-false, fill-in the blank and multiple choice portion with 75 questions (for 75 points). The average on this was 44.3 which is in line with the performance of the students in previous years. The rest of the exam was worth was worth 75 points and had the same format as the previous exams (a student provides answers to word problems). The average was 46.5 (61.6%). This average is lower than one would like. However, because many problems are tailored to be solved in short time using a specific law, if a student uses a different one, he can lose the whole problem and not earn any credit for his work. The test scores also indicate that students can more easily master material on transmission lines compared to material on electro- and magneto-statics.
VI. Concerns: state any concerns you may hold about this class – were the students adequately prepared coming into it? Are there topics or outcomes where (some) students were weak after completing the course? Other concerns? Were there any comments on students’ course evaluations that should be addressed in future instances of the course? This section is very important for improving our program: it provides critical input to the curriculum committee for identifying areas requiring attention.

A major concern is the weak mathematical skills of the students. To compensate for this, more class time was used to go over the mathematical steps repeatedly for each example or derivation. Additionally, the material appeared to be abstract for most of the students due to the heavy use of mathematics. This was specially challenging for students with weak mathematical skills.

The basic competency test (BCT) which is administered outside normal class hours and grading system forced the students to review and practice some of the math skills in order to pass the test. This proved to be useful in measuring their preparation in basic math skills.

Very few students made use of the office hours and tutorial sessions run by the TA.

The text book by Ulaby was not very helpful as it lacked examples specially in electro- and magneto-statics. Furthermore, it does not follow the standard notations for the cylindrical and spherical coordinates. It provides a good coverage of the transmission lines.

Signature ______________________ Date: 5/5/07

Please email a copy of the completed form to Patricia Arnold, patricia@eeecs.wsu.edu and deliver a signed hardcopy to her mailbox.