Course Assessment Report

Course Number: EE491

Course Title: Performance of Power Systems

Semester Offered: Fall 2008

Instructor Name: Mani V. Venkatasubramanian

I. List of Assessment Outcomes from the course syllabus.

A. Ability to apply knowledge of mathematics, science and engineering.
C. Ability to design a system, component, or process to meet desired needs.
G. Ability to communicate effectively in written and oral formats.

II. List of Course Topics from the course syllabus.

1) Review of power system components and analysis.
3) State Estimation.
4) Generator modeling.
5) Generator controls and inter-area exchange.
6) Economic operation, hydrothermal coordination.
8) Introduction to power system security

III. Course Assessment Summary Table: at least one row of the table should be devoted to each of the checked outcomes in part I. The measures shown with bold emphasis will be used for this course as examples in Outcome Assessment folders.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Topics</th>
<th>Medium</th>
<th>Specific Measures</th>
<th>Weight in course</th>
<th>Instructor’s assessment/comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1-3, 5-8</td>
<td>Homeworks</td>
<td><strong>Homeworks 1-8</strong></td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exams</td>
<td><strong>Midterms 1 and 2, Final Exam</strong></td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>2,5,6</td>
<td>Projects</td>
<td><strong>Projects 1-2</strong></td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>2,4,7</td>
<td>Projects</td>
<td><strong>Projects 1-2</strong></td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>
IV. Qualitative Assessment of Student Performance: using the table 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.

Outcome A. Ability to apply knowledge of mathematics, science and engineering:

All the homeworks in the EE491 course related to this outcome. The student average in the class was 7.4 out of 10 that showed that the students did well in most of the homework problems. The class averages in Midterm 1, Midterm 2 and Final examination were 74, 87 and 74 respectively out of 100 that again showed a good performance by the class in applying the concepts to the power engineering problems.

A majority of the students in the class however, lacked adequate understanding of phasors even at the end of the course. In the first midterm, about three fourth of the class incorrectly answered a basic question on how to derive phasors from sinusoidal signals and on how to calculate real and reactive power components. This instructor then subsequently re-explained the concept in class and told the students the same question would be repeated in the final exam. Irreceptive, about half the class could not answer the same problem in the final exam. While the performance was better in the final compared to the first midterm, most of the students should know the phasor concept very well at the end of this concept. It appears that the students lack adequate preparation on phasors, transmission line models, and complex power calculations from previous core classes including EE 261, EE 361 and EE 362. Subsequently, the instructor has provided the feedback to the instructors of the three courses EE 261, EE 361 and EE362, and they have agreed to address these concepts in more depth in future offerings.

On a related note, about half the class could not write the correct integrals and derivatives of sine and cosine functions, which is bothersome at the senior level.

Outcome C: Ability to design a system, component, or process to meet desired needs:

The EE491 class includes the topics of power-flow analysis, and stability analysis which address Outcome C. These topics were assessed in Projects 1 and 2 that were both offered as Take-Home examinations. The student averages were consistently high at 87 and 94 in projects 1 and 2 respectively. This showed that the students learnt the outcome well. About one third of the class showed inefficient programming skills especially in Project 1. Some students took the trouble of cutting and pasting fifty lines of code five times rather than writing a simple while loop or for loop in the code. By the time of second project, the coding skills appeared to have improved somewhat. It is recommended that the students are exposed to more programming assignments as part of the 300-level EE courses in preparation for the senior level EE courses.

Outcome G: Ability to communicate effectively in written and oral formats:

EE491 included two projects. Both projects required the students to carry out power-flow analysis (Project 1) and stability analysis (Project 2) on test power systems, and the students needed to prepare written reports. The student averages in the two projects were 87 and 94 respectively, which showed an excellent performance by the students. On a more general note, the students in this class were particularly reticent compared to previous batches of students and appeared hesitant to provide any verbal feedback during the lectures.

OVERALL AVERAGE AND GRADES REPORTED

The overall average for the course was 79% for the 17 students enrolled in the course.

The number of students at the different grade levels were as follows:

A (3), A-(1), B+(2), B(3), B-(2), C+(3), C(3), C-(0), D+(0), D(0), F(0)

FINAL OBSERVATION

Analysis of the grade distribution shows that only a few of the students did very well in the course. Majority of the 17 students received either B or C grades. The level of student interest in the course was surprisingly low in spite of being a senior design class. For instance, only five students attended a guest lecture by an invited industry speaker in the class which was disappointing. No students showed up in the instructor office hours for
most of the semester. The apparent lack of student interest in the class was especially puzzling to this instructor since many students mentioned that they wanted to pursue careers in power industry when they graduate.