Washington State University  
School of EECS  
Electrical Engineering Course Assessment Report

Course Number EE 362  
Course Title Power system laboratory  
Semester Offered Spring 2006  
Instructor Aleksandar Dimitrovski  
10th Day Enrollment 23  Number Completing Successfully (C grade or better) 20

I. Assessment Outcomes from the Course Syllabus

☐ (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.  
☐ (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

This course now includes 9 different experiments and one final “design project”. The experiments are designed to augment the material taught in EE 361 on electromechanical energy conversion, and introduce concepts of measurements and instrumentation, and simple control methods. Experiments are performed on single phase and three phase low a.c. voltage (120/208 V) power system devices: transformers, a.c. machines, loads, and low voltage (245 V) d.c. machines. Eight of the nine experiments are explained in details with complete procedures. One experiment is left open ended so that students must decide on proper procedures and appropriate measurements. The students work in groups of 3 or less to perform the assignments.

1. Introduction: presentation of safety and equipment protection in lab procedures, introduction to lab facilities, three phase loads.  
2. Introduction to the fundamentals of LabView.  
4. Transformers: calculation of losses and impedances in positive sequence three phase
cannections.
5. General rotating machinery and induction machines: calculation of parameters and
measurement of performance.
6. Synchronous machines and DC supplies modeling.
7. DC machines: machine parameters, investigation of series and shunt connections.
8. Controller design in LabView.
9. Simulation of dynamic systems.
10. Project design: machine control.

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</th>
</tr>
</thead>
<tbody>
<tr>
<td>(C) Ability to design a system, component, or process to meet desired needs.</td>
<td>1-10</td>
<td>Lab reports, Quizzes, Final project report</td>
</tr>
</tbody>
</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.

(C) Ability to design a system, component, or process to meet desired needs.

At the beginning, during the first 2, 3 experiments, the students needed a lot of assistance
from the instructor and/or the TAs. After that period, most of the students felt more
comfortable in the lab and were able to perform the tasks with less help. After completion
of the first 7 experiments, most of the students were able to function independently in the
lab. They understood the equipment and software and how to employ it to achieve
different lab objectives.

The students perform the experiments more quickly with the PC (LabView) than they
would do with traditional instruments. The flexibility and ease of use with this computer
based approach is greatly improved. However, there is a hidden drawback in that the
students tend to accept results from computers as unquestionably correct, without trying
to validate them. There is also an additional layer of abstraction which sometimes
aggravates students’ lack of understanding of some of the fundamental principles.

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.

As demonstrated in the final project, the students showed a fairly good understanding of
the design parameters, sensing and control variables. They also showed good problem
solving capability in determining the flaws in their approach. As usual, there was
variability among groups in terms of teamwork. Some of the groups relied on one or two
more capable individuals to guide the work. Nonetheless, all of the students completed the final project successfully using more or less similar designs and they seemed pleased with a sense of accomplishment when their control systems worked as designed.

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.

1. There is a growing feeling that power electronics has to be introduced in the labs. However, this will require significant changes in the curriculum and possibly introduction of a new course.
2. Some of the existing labs have already been modified to reflect the greater variety of experiments that can be done with the PC based virtual instrumentation. This has to continue further.
3. The virtual instruments have not been modularized sufficiently. They still look too complex and students tend not to experiment with them as they can’t completely grasp their function.
4. The write-ups have been changed to prevent students from taking all measurements first without completely understanding what kind of data and why that data is needed. However, the students still tend to do this and the result is repetition of parts of the experiment later to take all the data needed. Something else needs to be done regarding this.
5. Requiring lab groups to change group leaders for each lab during the course has proved to be difficult to monitor. However, it should continue as it promotes teamwork and help assure independent skills.

Signature ___________________________ Date: ___________________________

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