

## ELECTRICAL ENGINEERING SERVICE COURSE IMPROVEMENTS

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**Abstract** -- This Work in Progress describes a project being undertaken at Rose-Hulman Institute of Technology (RHIT) to improve the effectiveness of electrical engineering service courses offered to mechanical engineering students. The authors had taught these courses several times and were dissatisfied with the outcomes. The delivery features of the new course includes: studio format; presentation of material from the viewpoint and in the context of the discipline being served; a variety of active learning strategies; and Web-based learning and assessment tools including on-line quizzes, lecture notes, multimedia simulations, and detailed problem solutions in an intuitive point-and-click format. For the duration of the project, a board will review the educational materials developed, provide information for their continuous improvement, and assure that the materials developed can serve as a model for the development of service courses in electrical systems.

*Index Terms* - Service Courses, Studio Format.

### COURSE DESIGN GOALS

The purpose of this WIP is to describe the initial steps taken to improve the service course “Elements of Electrical Engineering” (ECE207) which is offered to mechanical engineering (ME) students at RHIT.

The authors felt that the major reasons for lack of student motivation in service courses were:

- a) inability to relate the material presented in class to real world applications, and
- b) failure to view the service course as serving an integral part of their major curriculum.

Item (a) was the subject of a previous WIP that described the steps taken to establish a studio approach for providing a hands-on component to this course.

Item (b) will be the subject of the remainder of this WIP. To clearly establish the course as an integral part of the ME curriculum, the authors established two course design goals:

- i) presentation of the material in the context of tasks that a practicing mechanical engineer might be expected to perform, and
- ii) integrating the course into the ME curriculum.

As an example of the steps taken to address item (i), it was felt that “measurement” could be an area that the service course could lay a foundation for subsequent ME courses. To better engage the ME students, much of the course material is presented in the context of tasks that mechanical engineers might expect to perform in their work. A limited number of transducers are presented so that the ones that are studied can be studied in some depth—strain gages, RTDs, thermocouples, and accelerometers were chosen as ones widely used in mechanical engineering.

As these transducers are studied, electrical systems material can be integrated in a natural way. Signal conditioning—amplifying, transforming transducer signal into a current or voltage, filtering—can readily be placed in the context of measuring strain, acceleration or temperature.

To address item (ii), the authors met several times with the ME department faculty (who were conducting a review of their curriculum) and as a result ECE207 is now part of a vertically integrated series of required courses, as shown in figure I.

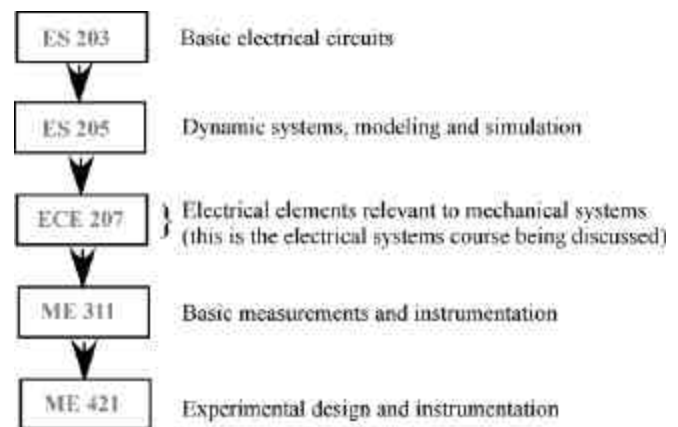


FIGURE I:  
DESIRED COURSE SEQUENCE IN ME MODELING & MEASUREMENT

Keeping the course as an integral part of the ME curriculum, is only possible if the faculty in both departments keep communication channels open. The class, although taught by ECE faculty, cannot be viewed as being “owned” by the ECE department. Changes in the content affect ME courses. Conversely, changes in ME courses that provide background knowledge for the ECE course cannot be changed without affecting the ECE service course.

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