

Developing an Introductory Course in Engineering Economy: A Resource for IEs and Non-IEs

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Abstract

Faculty teaching Engineering Economics come from a variety of educational and professional backgrounds. The spectrum of expertise ranges from faculty possessing a doctorate in Industrial Engineering to those with no formal course work or industrial experience in this vital area. Members of the latter group are usually assigned this course because it is an integral part of the university's engineering curriculum and the schools have no formal Industrial Engineering program or faculty to teach the course.

A required course in Engineering Economics emphasizes the importance of this subject in the overall undergraduate education of engineering and engineering technology students. This priority in turn necessitates the need to ensure the course offered provides a complete and comprehensive covering of all the material essential to a quality first course in Engineering Economics. Because of their extensive education, Industrial Engineering faculty teaching the course are rather ambitious in their expectations of what can and needs to be covered in this "first" and sometimes only course in the subject. This also leads to a variety of topics covered [1]. On the other hand, faculty with little or no formal education or experience in the subject are greatly disadvantaged and may tend to treat the course material from a "survey" perspective. They do not have an in depth understanding of the material and its application to a wide variety of engineering projects to rely on for guidance. The course syllabi of faculty on both ends of the education and experience spectrum may vary significantly resulting in a wide variety of material taught in an introductory Engineering Economics course.

In view of the above, the purpose of this paper involves laying out a multiple year project culminating in a series of specific recommendations for faculty with various backgrounds assigned to teach Engineering Economics. These recommendations will address a wide variety of areas directly impacting what the course content should look like for specific circumstances. Parameters to be included in the analysis and subsequent recommendation will include faculty background, length of semester, student's discipline, class size, academic year for course offering and how Engineering Economy relates to the overall curriculum along with any other factors identified during the project.

1. Introduction

When faced with teaching an Engineering Economics course for the first time, it has been our experience that faculty usually receive very little guidance and assistance from colleagues, as they are generally engrossed with their own teaching requirements. The academic discipline or education division associated with the course generally does not offer much help either. Few faculty have significant formal training in Engineering Economics. Consequently, these faculty struggle to develop a quality needs based course curricula. Many refer to the “Table of Contents” of a text written on the subject. While satisfactory as a starting point, producing a meaningful and credible syllabus requires other considerations besides simply selecting a particular textbook. Additionally, the various engineering and engineering technology disciplines may have differing needs which are not clarified nor generally addressed within current texts [2]. Another problem addressing the vitality of the course involves supplemental material used by the instructors. Over the years faculty members charged with teaching this introductory course in Engineering Economics have compiled a wealth of personal resource material. Much of what they learned to make the course challenging, exciting and interesting needs to be shared with the larger community. Less experienced faculty would appreciate access to the insights, examples, projects, special problems and lessons learned of their senior colleagues.

Discussion among several concerned colleagues on this dilemma led to the idea of producing an Engineering Economics course reference resource. In addition to being invaluable to first time faculty members, especially those with non-Industrial Engineering (IE) backgrounds, the reference resource could serve as the ASEE, Engineering Economics Division’s (EED) contribution to assisting faculty needing help and guidance. Heavy reliance on the content would come from IE faculty having expertise in this area. Non IE faculty contribution would take the form of providing a “lay person” perspective with suggestions on what reasonably can be taught to non-IE students taking the course as a requirement. Underlying the intent of the reference resource would be a “quality control” element associated with ensuring a minimum level of consistency in the course taught throughout the country.

It is envisioned that this reference resource would require several specific inputs from faculty members and the output would be in the form of a recommended syllabus, texts, and other supplemental teaching aids. Concomitantly, the resource potentially would create a faculty network. As discussions continued on this “reference resource” concept, it became apparent the project would take considerable time. The project would require significant input from a multitude of sources and the time required to solicit, compile, collate, produce and disseminate the final results would last several years. The final product, however, is deemed important enough to warrant the extensive effort required.

2. Concept Development

As discussions continued on the “scope” of the project, it became apparent the end result would take approximately three years. Each year would serve as a building block for the previous year’s efforts and the desired end results would be available in the summer of 2001. Interim progress reports would be available annually and interested faculty members from across the country could be added as consultants and advisors to the development team. This in turn would add value to the project,

making it a true contribution from the faculty associated with teaching Engineering Economics. This collaborative effort would definitely add to the “esprit de corps” of those teaching the course and hopefully would result in more joint ventures among interested faculty.

Table 1 below contains the projected “scope” of each year’s project requirements. The first year involves laying out the concept to accomplish the project while the second year presents the results of the extensive survey to be conducted by the development team. The third year culminates with the presentation of the final report and a thorough examination of the lessons learned during the project.

Table 1: Project Scope by Year

<u>Year</u>	<u>Scope</u>
1999	<ul style="list-style-type: none"> • Project overview and intent • Identification of reference sources • Accumulation of data
2000	<ul style="list-style-type: none"> • Dissemination of Survey Results • Initial presentation of “guidance” results • Initiate discussion of results to determine the focus for year three
2001	<ul style="list-style-type: none"> • Final presentation and dissemination of results <ul style="list-style-type: none"> ▪ Reference resources (syllabi, text, etc.) ▪ Guidance material ▪ Sample course outlines that reflect the different needs of the community.

3. Concept Implementation

The design team currently consists of two IEs and two non-IE faculty members all from different universities. The two IEs hold doctorate degrees in the field and have extensive experience in the area. The non-IEs are from engineering and engineering technology programs and combined, have taught the introductory Engineering Economics in excess of twenty five years. A common love of the subject, membership in the EED, attendance at the annual ASEE conferences and now the enhanced ability to communicate via the Internet brought the design team together. The synergistic potential associated with the above ingredients serves to motivate and energize each member of the design team.

The first year tasks associated with the project are shown in Table 2. While somewhat tentative in nature and subject to change, the content of the Table serves to provide the first year outline for the project.

Table 2: Proposed Details of Year 1 (1999-2000)

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| <ul style="list-style-type: none"> ▪ Procure an extensive list of faculty involved in instruction of Engineering Economics ▪ Develop an instrument to identify the current needs for the proposed resource |
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- Examine current texts
 - Consult with faculty to determine current pedagogical trends in the field
 - Review ABET requirement
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The primary tasks for the upcoming year include (1) development of an extensive survey designed to obtain the data base information and (2) compiling an exhaustive list of faculty teaching Engineering Economics. It is intended the draft versions of both of these tasks will be available at the time of the presentation of this paper at the 1999 ASEE conference. Peer input will be sought throughout the project with special emphasis on this first year of the endeavor since that is where the implementation plan will be finalized.

4. Conclusions

Reinventing the “wheel” is an exercise in “trivial pursuit” and most faculty do not have the luxury of “playing” that game when preparing course materials. However, many times new and/or inexperienced faculty members spend voluminous amounts of time reinventing the proverbial “wheel”. They do this because a credible and comprehensive resource document is not available to help them prepare for the introductory course in Engineering Economics

Faculty teaching Engineering Economics need to communicate with each other so a healthy and meaningful cross-fertilization of ideas can occur. Senior faculty have a leadership responsibility to assist less experienced faculty in areas where the senior member’s expertise would be an invaluable resource for both learning and teaching a subject of common interest. The EED has an even greater leadership responsibility to provide an extensive resource base on *the* introductory course in the field that has the greatest exposure to those outside of the Industrial Engineering discipline.

The end product of this paper focuses on providing an instrument which will help all three of the above groups accomplish their responsibility to the profession. Special emphasis on those two groups having a definite leadership role will take the form of soliciting the continuous input and critique of senior faculty. Support, endorsement, and encouragement to use the final product will reaffirm the EED’s leadership role to its members. New and lesser experienced faculty will be exposed to a Division and its senior member who demonstrate a concern, commitment and desire to help those interested in teaching a subject near and dear to their hearts.

Bibliography

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