

## A COURSE ON PROFESSIONAL ENGINEERING PRACTICE

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### INTRODUCTION

A course entitled Professional Engineering Practice is available as an elective to engineering students at the University of Nevada, Las Vegas. This paper describes the course and the methods used in coordinating and helping to teach the course. The course materials are entitled "Issues in Professional Practice" by Dr. Ronald Bucknam, a Civil Engineering Faculty member at the University of Washington.

The course derives from the early activities of the Associated Soil and Foundation Engineers (ASFE), now known as The Association of Engineering Firms Practicing in the Geosciences. Numerous claims were brought against soils and foundation engineers during the fifties and sixties. Liability insurance for these practitioners became quite expensive and largely unavailable by 1968. ASFE was formed in 1969 by several nationally known **geotechnical firms**. The **firms** worked with a consultant on liability loss prevention to identify problem areas and to develop solutions. The work of ASFE revealed that the problems of design professionals in **Geotechnical** Engineering at that time were not technical inadequacies but were centered on practice deficiencies including client relations, project and resource management, **financial** planning, marketing, and several other areas.

The programs developed by ASFE to overcome these deficiencies were prepared and presented by the Institute for Professional Practice (**IPP**). These programs proved very effective such that **Geotechnical** Engineering became the least liability prone design profession by 1980 and experienced among the lowest professional liability costs based on a 1987 survey. ASFE referred to the program as loss prevention and the "Enhancement of Professionalism." The program addressed virtually all practice issues including checking technical work, improving client and project selection, scope of work development, personnel management, and dispute resolution. The program went through several modifications and name changes.

Currently, the program is offered by the Institute for Professional Practice (**IPP**) to all design professionals. program participants are expected to read the textbook, take several exams, perform some assignments, and otherwise participate in a two-and-one-halfday workshop. Course materials were made available to interested university faculty in the Spring of 1992. The Civil Engineering Department at UNLV acquired the course materials and the elective course was **first** offered in the Fall semester of 1992 to 24 students. The course has been offered four times with a high enrollment of 43 students including civil, electrical, and mechanical engineering majors.



## COURSE CONTENT

The major difference in the course developed for university students and that offered to design professionals is the set of Course Lecture **Notes<sup>1</sup>** prepared by **IPP**. The lecture notes are divided into five Sections:

Section I: Professionalism.

Characteristics of professions and professionals

Section II: Engineering Practice Organizations.

Types of organizations; Income, expenses, profit

Section III: Obtaining the Work - Marketing.

**Defining** markets; Marketing clients/projects; The **RFQ/SOQ/RFP** process; **QBS selection**;  
Contract payment methods

Section IV: Performing the Work - Project Management.

Project Manager Role; Personnel Management; Team building; TQM; Value Engineering;  
Ethics in Engineering Practice

Section V: Avoiding Losses - Retaining a Profit.

communications; Project overruns; Contract Language; Insurance; Liability and loss  
prevention; Dispute Resolution

## COURSE MATERIALS

In addition to the lecture notes mentioned above, a number of other materials are available through the Institute for Professional Practice. The so-called "course-in-a-box" is available at no cost to schools willing to implement all or portions of the course. Materials include copies of three texts, the lecture notes, several references, and a set of audio tapes. The lecture notes are being revised and should be ready by Fall, 1996. **IPP** is preparing a similar program entitled "Applied Ethics in Engineering Practice" for release this summer. Information on obtaining these course materials is available from:

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## SETTING UP THE PRESENTATIONS

Several engineers from the Converse Consultants Southwest office in Las Vegas, a sponsor of the IPP program, told us about the course and agreed to help us get it under way at UNLV. Converse arranged a meeting with some 15 local engineers who were willing to help in team-teaching the course. At this meeting, the course schedule as proposed by IPP was discussed. We agreed on a schedule of 20 classes to cover the lecture notes and the material to be covered in each class. Classes meet from 4:00 to 5:15 PM on Mondays and Wednesdays, the times and days considered most convenient to the local engineers. The time choice was interesting because they felt they could go home after class rather than return to their offices.



Once the schedule was agreed to, a syllabus was prepared for distribution to each practitioner and to the students. Engineers selected the section they would present based on their interests and schedule. A reminder letter and a parking pass were sent to each team-teacher about ten days before their class. Scheduling requires some flexibility. The need to reschedule teaching days can occur a day or two ahead of time (an unanticipated problem) or a couple of weeks in other cases. If teachers cannot be rescheduled, then the faculty coordinator must fill in. On a couple of occasions, two teachers made all the arrangements to switch days and then informed the coordinator.

One of the purposes of bringing in practitioner teachers is to add the so-called “red-world” of engineering to the lecture material. War stories are encouraged. However, another reason is that ultimately the coordinator may want to present the material solo. This does not appear to be a good idea unless enough practitioners are not available to participate. Students really enjoy the participation of the practitioners and consider it the strong point of the course.

Classes are held in the following format. The practitioner supplies copies of a resume for class distribution. Resumes range from a short paragraph appropriate for an introduction to one pagers used for proposals to complete several page documents. Students accumulate about 20 professional resumes which can serve as a guide in preparing their own. The resumes also show that Professional Engineers are involved in a variety of organizations and community service activities in addition to their work. Two or three students volunteer as note-takers. Other students are encouraged to listen and ask questions. Student notes are typed up and submitted. Copies are distributed to all students and to the teachers for their comments. Test questions are derived from both student notes and the course lecture notes. Every student must eventually serve as a note-taker. The notes are graded and count as part of the final grade.

Some teachers provided handouts which ranged from one page to a spiral-bound 40-page set. Others distribute samples of work for students to look over and return. Some teachers used slides, overhead projectors, the blackboard, audio and video tapes, and even computers while some strictly lectured. The wide diversity of presentations appealed to the students.

Several classes involved panel discussions. A three-member panel on professional ethics has included engineers, a practicing attorney, and a Professor of Philosophy specializing in Ethics. A panel on **insurance** included the CEO of a local **firm** and an insurance representative specializing in professional **liability** insurance. The final presentation of the semester generally involves three local engineers discussing “being sued,” a situation in which each has had experience.

The professionals recruited for the course range from Project Engineers to District **Office Managers** to CEOs and Principals. All engineers are Licensed Professional Engineers. Three presenters are current members of the Nevada State Board of Registration for Professional Engineers and Land Surveyors including the current **Chairman**. The biggest error in the **first** year was not recruiting any women engineers for the program. This became evident when a woman student asked if there were no woman engineers in Las Vegas. This oversight has been corrected.

## DISCUSSION CLASSES

The course schedule includes 28 classes and a **final** exam. The 8 open dates are used for the introduction, presentation of audio and video tapes, class discussions, a mid-term exam, and schedule flexibility.



The classes devoted to student participation start with any questions or comments about the practitioner presentations. This is followed by a presentation and discussion of current professional issues. The point is made that virtually all their engineering and science courses **deal** with strictly technical issues. However, this course is concerned with professional issues that may not seem too important to them now but which will affect their careers and be quite important later on.

Current professional issues are easy to find. All one needs are several copies of Engineering Times (ET), the NSPE publication, and perhaps the editorials found in technical society publications such as ASCE magazine. ET provides information on a variety of topics. As an example, a recent issue included the following topics:

- \* **PE Design Rights**
- \* **Licensure System Changes**
- \* **NAFTA Accord**
- \* **Legal Corner**
- \* **You be the Judge**
- \* **What Do You Think**
- \* **Viewpoint - Cross-Border Licensing**
- \* **Focus: Project Management**
- \* **ABET Assessment Criteria**
- \* **The Engineer's editor**

A **very good** topic for discussion is a controversial issue such as the **long-running** debate on Continuing Education. A controversial topic attracts a number of pro and con letters to the editor and points out to students that even professionals have differences of opinion. Some articles can generate 8 to 10 letters in subsequent issues and even editorials. Students are provided copies of articles and letters and asked to write a brief 2- or 3-page paper on the issue.

In November of 1995, the NSPE Board of Ethical Review (**BER**) issued an invitation to NSPE Chapters to participate in preparing a response to an Ethics Case and compete with other chapters in writing the best decision. The Fall 1995 class was divided into seven groups of three to four students and asked to prepare a response to the ethics case. The responses were reviewed by four members of our local NSPE Chapter. The best of the several responses was submitted to the BER as the entry of the southern Nevada Chapter of NSPE.

All student papers are graded for writing, punctuation, and spelling in addition to content. Grades are recorded as part of their **final** grade.

## CONCLUSION

The course on Professional Engineering Practice appears to be a success. The course is attractive to students as one which provides insight into the business side of engineering rather than just more technical knowledge. Students are especially intrigued that so many prominent industry representatives would take the time to meet with them. One of **the** easiest parts of organizing the course was getting practitioners to participate. They enjoy the students and interacting with them **almost** as much as I do.



## Bibliography

1. "Issues in Professional Engineering Practice, Course Lecture Notes, Version 92.2," Ronald E. Bucknam, Executive Director, Institute for Professional Practice, Seattle, Washington, 1992.

## Biography

Walter C. Vodrazka, Ph. D., P. E., is Associate Dean of Engineering and Professor of Civil Engineering at the University of Nevada, Las Vegas. He earned the BCE, MS, and PhD degrees at Manhattan College, Mississippi State University, and Purdue University respectively.

