# Teaching Portfolio

David N. Ford  
March 2, 2004

## Table of Contents

1. Teaching Philosophy and Objectives
2. Teaching Responsibilities  
   2.1 Current Teaching Position  
   2.2 Previous Teaching Positions  
   2.3 Teaching Professionals  
   2.4 Reducing Barriers to Learning
3. Teaching Strategies and Methods  
   3.1 Graduated Complexity  
   3.2 Engaging Students in Learning  
   3.3 Linking Theory to Practice
4. Improvements in Teaching  
   4.1 Realized Improvements  
   4.2 Planned Improvements
5. Assessments of Teaching  
   5.1 Student Evaluations of Teaching  
   5.2 Peer Reviews of Teaching  
   5.3 Student Evaluations of Advising

## Appendices

Appendix 1: Reusable Teaching Products Developed  
Appendix 2: Curriculum and Course Development  
Appendix 3: Papers Published Concerning Teaching and Contributions to Textbooks  
Appendix 4: Products of Teaching and Student Learning  
Appendix 5 Teaching Assessments by Others  
Appendix 6: Example Syllabus with Self-Assessment  
Appendix 7: Example Examination with Assessment
1. Teaching Philosophy and Objectives

I strive to develop my students into lifelong learners who use rigorous and objective means to expand their awareness, increase their knowledge, and develop their skills. They will be capable of independently managing their own learning, both as individuals and in teams. Through reflection they will develop insight and deep understanding about the systems in which they work and live, their roles in those systems, and their responsibilities to properly protect, use, and develop them.

I work to fill many roles to facilitate student learning, including being an example to follow, a mentor who guides and inspires, a supervisor who directs, corrects, and encourages, a portal to valuable information, knowledge, and skills, and a sage with whom to question and ponder. Different roles are central to my teaching of different students. For example being a good role model of a professional engineer and supervisor of basic skill building is critical with undergraduate students, whereas mentoring and questioning is central to my work with Ph.D. students.

My students vary widely in their backgrounds, experiences, sharing of my teaching objectives, and development toward them. Undergraduate and graduate engineering students represent the largest groups of students. Therefore my teaching objectives differ for students seeking to practice engineering and those pursuing engineering research and teaching careers. My primary objective as a teacher of students who plan to enter engineering practice is to prepare them to design and manage the complex systems they will encounter by helping them develop their critical and generative thinking, problem solving, and independent learning skills. In introductory courses this includes having my students develop a fundamental knowledge and understanding of engineering domains. In graduate courses this includes training students in seeing systems through the lens of the system dynamic methodology and modeling these systems using its fundamental assumptions. My primary objective as a teacher of students pursuing engineering research and teaching careers is to help them develop their abilities to think critically and creatively, develop new knowledge, and effectively share their work with others. An example of my efforts in this direction is an assignment in my Research Methods for Civil Engineers course in which students conceptually design and then assess a wide range of approaches to investigate a single research question.
2. Teaching Responsibilities

2.1 Current Teaching Position

As a professor in the Department of Civil Engineering at Texas A&M University I teach both undergraduate and graduate courses to students across the College of Engineering. My primary teaching responsibilities are within the Construction Engineering and Management Program, in which I focus on project planning, management, and control, and the strategic management of construction. I have taught or am currently teaching seven courses a total of sixteen times, as described next. I was the sole or responsible instructor of each of these courses.

4. Introduction to the Civil Engineering Profession. CVEN207. Dept. of Civil Engineering. Texas A&M University. Required undergraduate course. 2001-2003, two sections teach year. instructor. average enrollment: 175 students per course.

I consider it a part of my teaching responsibility to develop and improve courses. Therefore I also conceive, develop, test, and use new reusable teaching tools in these courses. These tools are listed and described in the Appendix 1: Reusable Teaching Products Developed. I have also developed new courses and curriculum, as described in Appendix 2: Curriculum and Course Development.

In addition to teaching formal courses, I teach by advising graduate students in their thesis work (CVEN691) and independent projects (CVEN685) and advising visiting scholars. This has included or includes thirteen masters students, three Ph.D. students, and three visiting student scholars.

2.2 Previous Teaching Positions

As a professor in the Department of Information Science and visiting professor at other European universities I taught primarily graduate courses to students in a variety of academic programs (information science, management of technology, engineering technology, education). My primary teaching responsibilities were within a domain-independent graduate program in the system dynamics
methodology. This included training students in seeing systems through the lens of the system dynamics methodology and modeling these systems using its fundamental assumptions. These teaching responsibilities included course development and teaching for students that represented five continents and over a dozen countries. These students rarely had American-style educational backgrounds and often English was their second (or third) language. The breadth of educational and cultural backgrounds dramatically increased the efforts needed to lower these potential barriers to learning. As an instructor at Delgado Junior College I taught two introductory engineering courses to undergraduate students. In these teaching roles I taught eight courses a total of twenty-two times, as described next. I was the sole instructor for each of these courses, except as noted.


In addition to teaching these formal courses, I taught by advising twelve graduate students in their thesis work toward a Master of Philosophy degree at the University of Bergen. Thesis topics ranged from water allocation policies in Cyprus to information flows in small firms to Lemming population dynamics.

### 2.3 Teaching Professionals

As part of fulfilling Academia's mission to distribute knowledge I also have a responsibility to teach professional practitioners. I address this obligation through my work with firms in industry and public agencies such as the Texas Department of Transportation. For example I am currently working with British Petroleum to develop and provide a course for development project managers based on my research in project dynamics.
2.4 Reducing Barriers to Learning and Addressing the Special Needs of Students

Different groups of students have special needs that, if not addressed, can destroy or severely constrain their student work. Some students have cultural backgrounds significantly different than those in which they are currently studying that require time for adjustment. Culturally-driven reticence by female students to participate equally with male students is a form of this special need that I consider particularly important and amenable to improvement with attention by teachers. Other students have educational backgrounds very different than those in which I teach. Even talented students can struggle to succeed in such circumstances. Some students lack the prerequisite knowledge and skills to learn what is being taught. For other students the standards for acceptable effort, performance, and behavior (e.g. what is considered cheating) in the settings in which I teach and in my courses differ significantly from their expectations. For others English is a difficult language with which to communicate effectively. This can hide student abilities and potential behind a fog of unintelligible writing or spoken words. *These are not theoretical concepts for me. In over eight years of teaching I have taught many students with all these special challenges.* As a specific example, when teaching in Europe almost all of my full-time students were from developing or Eastern European countries and I taught students with wide ranges of backgrounds, abilities, and expectations. I also regularly teach students with special needs at Texas A&M University.

I find that successfully addressing the special needs of students to be one of the most challenging aspects of teaching. I know of no easy, universal solution to specific special needs that helps students and fulfills teaching objectives. I have and continue to apply a collection of approaches. Perceiving and recognizing the need is a critical first step. I do this by means such as engaging with students in class is simple ways (e.g. questions and answers) and observing assignment scores. I am also working to incorporate tools such as prerequisite testing at the beginning of courses to help identify students with special needs. In my experience the vast majority of students with special needs seek to address them in ways that meet my teaching requirements and objectives as well as their own goals. I have found that respecting the individuality and positions of students with special needs with sensitivity is critical to helping effectively. Misunderstandings of standards or prerequisites are a common cause of special needs challenges. In many cases clarifying discussions, such as about plagiarism, resolve problems. In other cases, such as prerequisite deficiencies, I also provide access to means to develop the needed knowledge and skills. In some circumstances I have developed new course material to address special needs. For example, I discovered that most students from developing countries and Eastern Europe had little understanding of basic free market forces that almost all American students understand (e.g. prices respond to supply and demand). This led me to revise examples and course assignments. Doing so greatly improved the benefits that these students received from my courses.
3. Teaching Strategies and Methods
I use three fundamental teaching strategies in the development and delivery of my courses: graduated complexity, engaging students in learning, and linking theory to practice.

3.1 Graduated Complexity
A teaching strategy based on graduated complexity begins with relatively small simple concepts and exercises supplemented by large amounts of support from the instructor. As students develop their awareness, knowledge, and skills, increasingly complex concepts and problems are introduced and support is incrementally reduced over time. This approach builds student abilities and confidence. I apply graduated complexity at two levels of aggregation: across a student's engineering education and within individual courses. I apply graduated complexity over the span of a college engineering education by providing significant amounts of support and educational infrastructure for lower level undergraduates to introduce and reinforce fundamentals and reducing supports while increasing challenges for upper level undergraduates, graduate students, and especially research advisees.

In applying graduated complexity in individual courses I typically progress through three fundamental teaching approaches: recitation, mental model improvement, and constructivism. Most of my courses initially provide students lots of supporting information in the form of the syllabus, extensive course work and examination rules, lectures providing context for the course, and assignments with extensive and detailed instructions. Recitation teaching takes traditional forms such as lectures and assignments from textbooks and can be effective for transferring basic concepts and skills from instructors to students. Support systems and the familiarity of recitation teaching provide an environment in which students can easily orient themselves to the course and create early learning successes. Within this structured approach I begin to introduce concepts that become important later, such as the existence of better and worse solutions but not absolute right or wrong ones in some circumstances. I transition into a mental model improvement approach fairly quickly to focus on helping students elicit, explore, examine, and improve the models, tools, and methods they use to solve problems. This approach can be particularly effective for developing skills such as design, project analysis, and modeling, and often requires extensive interaction between students and the instructor. Finally, in circumstances such as graduate level term projects and research advising I apply a constructivist approach. Individuals or teams of students are provided with set of circumstances, knowledge, tools, etc. and provided the space to develop ("construct") their own knowledge with limited but relatively deep engagement with me.
Graduated complexity provides me with a framework within which I can adjust my teaching to the needs of specific student groups while maintaining guidelines for meeting course and curriculum objectives. Effectively applying a graduated complexity approach to teaching requires two additional teaching strategies: deeply engaging students in their own learning (especially with mental model improvement) and linking theory to practice (especially with constructivism).

3.2 Engaging Students in Learning
Teaching only becomes learning as students internalize awareness, knowledge, and skills. Active, personal participation is the most effective means of internalizing new information and developing new skills. Therefore, providing learning opportunities that engage students deeply in their own education is a central strategy of my teaching. To do this I create stimulating and motivating but safe environments in which students can absorb and construct knowledge, experiment, reflect, and reinforce lessons learned. I always attempt to include active student participation (versus passive absorption) when engaging students. For example, one of my graduate courses begins with students managing a simulated lumber supply chain and in an undergraduate course students select and observe active construction operations and estimate labor and equipment productivity as the basis for cost estimating.

A teaching strategy of engaging students deeply in their own learning has led me to develop numerous teaching tools. These tools are described in more detail in Appendix 1: Reusable Teaching Products Developed. Those that specifically engage students in their own learning are:

- The Rig Installation Game
- The Design Phase Management Game
- Coordination and Conflict Resolution at Worldwide Plaza
- Deer Management on the Kaibab Plateau
- Arms Races and Border Disputes
- The Dynamics of Social Programs, Pig Festivals and Population Policies
- Construction Supply Chain Design and Management
- Pig Festivals and Population Policies, The Dynamics of Social Programs

Interactive teaching aids that are educational as well as engaging are challenging to develop. Selecting the tool's balance between simplicity and the resulting clarity that facilitates learning and reality that reflects practice is particularly difficult. As an example of one such choice, my most recent tool (The Rig Installation Game) simplifies the installation of offshore oil rig systems into a single decision for each system about whether to risk installation in the deep waters of the Gulf of Mexico with success being relatively cheap and fast but failure being very slow and expensive, or testing (for a price) the system before attempting installation with an assurance of installation success. But good tools can be very effective teaching aids by activating under-utilized learning mechanisms.
For example in The Rig Installation Game students become engaged in competing to improve their performance while sharing an experience that I use later as the basis for, discussions, lessons and an exercise on the management of uncertainty.

3.3 Linking Theory to Practice

To be useful the knowledge and skills that are embodied in theory and developed by students must be applicable to practice. Therefore effectively preparing students to practice (whether as engineers, teachers, or researchers) requires that theory be related to practice. My students differ widely in their ability to relate lessons to practice, from students with extensive experience who immediately understand the relevance of coursework to students who have so little knowledge of practice that they don't know what to relate to the theory. I use four methods to help my students link theory to practice: 1) sharing industry experience in the context of relevant theory, 2) case studies, 3) integrating student experiences of actual and proxy practice into teaching, and 4) integrating research into teaching. I share industry experience in the context of relevant theory by using my own experiences in practice as examples of the use of theory and by including visiting practitioners and seminars by practitioners in coursework. I use case studies that have been previously developed and cases I have developed to position students into roles and circumstances similar to those they may experience in practice. I integrate student experiences of actual practice into courses with construction project site visits, and supporting internships and participation in hands-on student activities such as the steel bridge or concrete canoe projects. I integrate student experiences in proxy practice through my use and development of teaching tools that reflect circumstances experienced in practice. Tools that I have developed that specifically link theory to practice are:

- The Rig Installation Game.
- The Design Phase Management Game
- Construction Supply Chain Design and Management
- Coordination and Conflict Resolution at Worldwide Plaza
- A Decision for Cladding
- Policy Development to Control Engineering Employment
- To Bug or Not to Bug, That is the Question
- Deer Management on the Kaibab Plateau
- Arms Races and Border Disputes
- The Dynamics of Social Programs, Pig Festivals and Population Policies
- Construction Supply Chain Design and Management
- Dynamic Decision Making for Development Project Management
- Pig Festivals and Population Policies, The Dynamics of Social Programs

Integrating research as a process for building new knowledge using data into teaching can effectively link theory to practice. Research can be used throughout university instruction to improve learning. Examples of methods that I use to integrate research into my teaching include teaching freshmen the
importance of asking important and difficult questions, requiring seniors to seek out data from a variety of sources to test their assumptions, providing small pieces of my active research projects to graduate students as term projects, teaching research methods to thesis students in a formal class, and mentoring my advisees as they develop their research skills. Because my research builds links between theory and practice, integrating my research into teaching strengthens my student’s ability to apply engineering principles to solve real-world problems. Integrating research into teaching also develops independent learning skills in students by training them in a structured process for directing, planning, and self-correcting their learning. This prepares them to be successful civil engineers and lifelong learners.
4. Improvements in Teaching

4.1 Realized Improvements in Teaching

I consider improving my teaching to be a continuous and never-ending process. To facilitate my development as a teacher I have participated in several organized teacher training and education development activities, as follows:


As a result of my individual efforts and participation in these activities I have made significant advancement in developing my teaching to meet the needs of my students, my teaching institution, and myself. Examples of improvements in my teaching that I have made include, but are not limited to:

- Integration of components of the research process into instruction of domain-based topics
- Development and use of team evaluations by students to guide and direct team assignments and instruction
- Integration of interactive modeling exercises in class time
- Reuse and integration of interactive student learning activities into many portions of courses to develop themes and linkages among course topics
- Development of interactive case method facilitation skills
- Development and use of in-class exercises
- Development and use of multi-media presentation methods (e.g. Powerpoint, demonstrations, simulation)
- Development and use of information technology based tools to engage students in learning
- Exploitation of information technology (e.g. web pages and CAD project drawings) to reduce required effort for course administration and time spent in class on course administration
- Improved clarity and communication of my expectations for student performance and behavior
- Development of tests to assess a wide range of student abilities
- Developed criteria for thesis evaluation across topics

The success of my efforts to develop and improve my teaching to date are illustrated in the products of my teaching and student learning. As detailed in Appendix 4: Products of Teaching and Student Learning, I have co-authored three peer-reviewed journal papers with six students and am currently working with additional students to develop papers based on their thesis work. I have also had three conference papers published with students and made eight research presentations based on work with students.
4.2 Planned Improvements in Teaching

In the future I plan to continue to develop my teaching skills by participating in organized teacher training activities and incorporating new tools and methods into my instruction. Case studies can be effective means of teaching about the rich, multi-faceted topics such as projects and construction. Therefore I plan to develop more case studies, improve my case method facilitation skills, and use them in my teaching. My systems approach has contributed significantly to my development of small case studies and their use in my teaching and will help me build larger, better cases. Other planned improvements in my teaching include:

- Development and use of prerequisite tests to facilitate student identification of individual study needs
- Short discussions in small student teams to introduce more constructivism into lower level undergraduate classes
- Oral examinations in graduate level courses as an assessment method
- Topic-linking to improve integration of course content across curriculum
5. Assessments of Teaching
5.1 Student Evaluations of Teaching
5.1.1 Current Teaching Position: Texas A&M University

Optimal value = 5 (Excellent)

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Semester Taught</th>
<th>Avg. Responses</th>
<th>Class Prep.</th>
<th>Assignments</th>
<th>Communications</th>
<th>Responsiveness</th>
<th>Academic Concern</th>
<th>Availability</th>
<th>Grading</th>
<th>Environment</th>
<th>Average Eval.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN689</td>
<td>Sum. '01</td>
<td>6.00</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>4.83</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
<td>4.83</td>
<td>5.00</td>
</tr>
<tr>
<td>CVEN689</td>
<td>Sum. '02</td>
<td>16.25</td>
<td>4.94</td>
<td>4.69</td>
<td>4.63</td>
<td>4.50</td>
<td>4.31</td>
<td>4.58</td>
<td>4.06</td>
<td>4.63</td>
<td>4.52</td>
</tr>
<tr>
<td>CVEN654</td>
<td>Fall '00</td>
<td>15.00</td>
<td>3.80</td>
<td>3.00</td>
<td>3.40</td>
<td>3.40</td>
<td>3.53</td>
<td>4.00</td>
<td>3.20</td>
<td>3.40</td>
<td>3.47</td>
</tr>
<tr>
<td>CVEN654</td>
<td>Fall '01</td>
<td>14.00</td>
<td>4.57</td>
<td>4.50</td>
<td>4.00</td>
<td>4.50</td>
<td>4.21</td>
<td>4.50</td>
<td>4.29</td>
<td>4.36</td>
<td>4.37</td>
</tr>
<tr>
<td>CVEN654</td>
<td>Fall '02</td>
<td>19.00</td>
<td>4.58</td>
<td>4.00</td>
<td>4.42</td>
<td>4.21</td>
<td>4.53</td>
<td>4.21</td>
<td>4.26</td>
<td>4.32</td>
<td>4.33</td>
</tr>
<tr>
<td>CVEN654</td>
<td>Fall '03</td>
<td>14.00</td>
<td>4.21</td>
<td>4.14</td>
<td>4.36</td>
<td>4.36</td>
<td>4.71</td>
<td>4.14</td>
<td>4.43</td>
<td>4.35</td>
<td>4.35</td>
</tr>
<tr>
<td>CVEN473</td>
<td>Spr. '03</td>
<td>19.13</td>
<td>3.65</td>
<td>3.37</td>
<td>3.42</td>
<td>3.32</td>
<td>3.68</td>
<td>3.63</td>
<td>3.42</td>
<td>3.63</td>
<td>3.52</td>
</tr>
<tr>
<td>CVEN349</td>
<td>Spr. '00</td>
<td>23.00</td>
<td>4.39</td>
<td>3.96</td>
<td>4.22</td>
<td>4.22</td>
<td>4.13</td>
<td>3.87</td>
<td>3.17</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>CVEN349</td>
<td>Spr. '01</td>
<td>24.00</td>
<td>3.58</td>
<td>2.54</td>
<td>3.04</td>
<td>3.13</td>
<td>2.96</td>
<td>2.67</td>
<td>2.04</td>
<td>3.00</td>
<td>2.87</td>
</tr>
<tr>
<td>CVEN207</td>
<td>Spr. '02</td>
<td>47.50</td>
<td>4.41</td>
<td>3.76</td>
<td>4.32</td>
<td>4.14</td>
<td>4.04</td>
<td>3.72</td>
<td>3.37</td>
<td>4.12</td>
<td>3.98</td>
</tr>
<tr>
<td>CVEN207</td>
<td>Fall '03</td>
<td>71.00</td>
<td>4.52</td>
<td>4.04</td>
<td>4.41</td>
<td>4.20</td>
<td>4.20</td>
<td>4.01</td>
<td>3.86</td>
<td>4.34</td>
<td>4.20</td>
</tr>
<tr>
<td>ENGR112</td>
<td>Spr. '03</td>
<td>70.88</td>
<td>4.13</td>
<td>3.21</td>
<td>3.82</td>
<td>3.79</td>
<td>3.77</td>
<td>3.43</td>
<td>3.04</td>
<td>3.82</td>
<td>3.63</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td><strong>28.31</strong></td>
<td><strong>4.31</strong></td>
<td><strong>3.85</strong></td>
<td><strong>4.09</strong></td>
<td><strong>4.09</strong></td>
<td><strong>4.02</strong></td>
<td><strong>3.64</strong></td>
<td><strong>4.08</strong></td>
<td><strong>4.01</strong></td>
<td></td>
</tr>
</tbody>
</table>

Typical Student Comments

Positive
"Dr. Ford is very energetic and inspires students to participate and not become merely observers." (CVEN689, Summer, 2001)
"He was always available to questions outside the classroom." (CVEN654, Fall, 2000)
"In this course I feel like I have learned a lot of construction projects and about managing a construction. We visited a construction site and studied real cases of construction in different parts of the world. We learned a lot from the case studies (CVEN349, Spring, 2001)
"Punctual, reflects on his own experiences." (CVEN207, Spring, 2002)

Mixed
"Need class notes handed out to class before course to concentrate on learning not taking notes." (CVEN654, Fall, 2000)
"He was very stern and straight." (CVEN207, Spring, 2002)

Negative
"The class is not meant to be hard. Dr. Ford has made this class difficult and has taken a lot of the enjoyment out of the material." (CVEN 349, Spring, 2001)

5.1.2 Previous Teaching Position: University of Bergen
The Department of Information Science at the University of Bergen had no regular practice of evaluating teaching while I was on faculty there. Therefore in 1998 I developed a course evaluation form based on those used at MIT. Course evaluations rated 17 aspects of the course’s organization, instructor, text and readings, and assignments and exercises. The teaching assistant administered the evaluation, aggregated the results, and reported them to me.
Optimal value = 7 (Excellent or strongly agree)

<table>
<thead>
<tr>
<th>Course No. and Semester Taught</th>
<th>IV461 Fall, '98</th>
<th>IV461 Fall, '99</th>
<th>IV344 Spring, '99</th>
<th>Average Eval.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Responses</td>
<td>9</td>
<td>12</td>
<td>7</td>
<td>9.3</td>
</tr>
<tr>
<td>The course...was structured in an organized way.</td>
<td>6.6</td>
<td>6.0</td>
<td>6.6</td>
<td>6.4</td>
</tr>
<tr>
<td>...was administered well.</td>
<td>6.1</td>
<td>5.8</td>
<td>5.6</td>
<td>5.8</td>
</tr>
<tr>
<td>...had access to the necessary equipment.</td>
<td>6.2</td>
<td>5.5</td>
<td>5.1</td>
<td>5.6</td>
</tr>
<tr>
<td>Overall course rating:</td>
<td>6.1</td>
<td>5.9</td>
<td>5.7</td>
<td>5.9</td>
</tr>
<tr>
<td>The instructor...gives well-prepared, relevant presentations.</td>
<td>6.7</td>
<td>6.8</td>
<td>6.1</td>
<td>6.5</td>
</tr>
<tr>
<td>...explains clearly, answers questions well.</td>
<td>6.8</td>
<td>6.8</td>
<td>6.1</td>
<td>6.6</td>
</tr>
<tr>
<td>...uses the blackboard and visual aids well.</td>
<td>6.8</td>
<td>6.7</td>
<td>6.6</td>
<td>6.7</td>
</tr>
<tr>
<td>...speaks clearly.</td>
<td>6.6</td>
<td>6.8</td>
<td>6.6</td>
<td>6.7</td>
</tr>
<tr>
<td>...encourages questions, is sensitive to class.</td>
<td>6.3</td>
<td>6.2</td>
<td>5.6</td>
<td>6.0</td>
</tr>
<tr>
<td>...excites interest and is enthusiastic.</td>
<td>5.7</td>
<td>6.8</td>
<td>5.7</td>
<td>6.1</td>
</tr>
<tr>
<td>...is friendly and supportive.</td>
<td>5.9</td>
<td>6.8</td>
<td>5.9</td>
<td>6.2</td>
</tr>
<tr>
<td>...is available outside of class.</td>
<td>5.7</td>
<td>6.1</td>
<td>5.4</td>
<td>5.7</td>
</tr>
<tr>
<td>Overall instructor rating:</td>
<td>5.9</td>
<td>6.8</td>
<td>6.1</td>
<td>6.3</td>
</tr>
<tr>
<td>The text and readings...were relevant.</td>
<td>6.2</td>
<td>5.6</td>
<td>5.7</td>
<td>5.8</td>
</tr>
<tr>
<td>...were interesting.</td>
<td>5.7</td>
<td>5.0</td>
<td>5.3</td>
<td>5.3</td>
</tr>
<tr>
<td>Assignments and exercises...were relevant.</td>
<td>6.3</td>
<td>6.2</td>
<td>5.9</td>
<td>6.1</td>
</tr>
<tr>
<td>...were interesting.</td>
<td>5.6</td>
<td>5.3</td>
<td>4.3</td>
<td>5.1</td>
</tr>
<tr>
<td>Average Evaluation</td>
<td>6.2</td>
<td>6.2</td>
<td>5.8</td>
<td>6.1</td>
</tr>
<tr>
<td>Official instructor contact hours per week</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Estimated student hrs. per week including time in class:</td>
<td>54.0</td>
<td>50.8</td>
<td>50.0</td>
<td>51.6</td>
</tr>
<tr>
<td>Official hours per week including time in class:</td>
<td>40.0</td>
<td>40.0</td>
<td>40.0</td>
<td>40.0</td>
</tr>
</tbody>
</table>

Typical Student Comments (including quotes from teaching assistant summary of comments)

Positive
“Probably the best instructor I have had so far on the university.” (IV461, Fall, 1999)
“Prof. is wonderful.” (IV461, Fall, 1998)
“Good combination of what is taught in class and given in the assignment.” (IV461, Fall, 1998)
“The Prof. gives well prepared and relevant presentations.” (IV461, Fall, 1998)
“I like Ford’s style of teaching, rigorous as much as funny where it’s needed” (IV344, Spring 1999)

Mixed
"According to one student 'The course is well - organized.' However another student suggested that the average grade of all assignments should go towards the student’s final grade." (IV461, Fall, 1998)
"Most said the assignments were too long and sometimes difficult but that they helped in the learning process. For example one student said 'The assignments were probably the best input in the learning process.'" (IV461, Fall, 1998)

Negative
"…some complained that grading of assignments were a bit delayed.” (IV344, Spring 1999)
"They all said that the number of assignment was too much, although most of them said that the difficulty of each assignment was 'about right'." (IV461, Fall, 1999)

5.2 Peer Reviews of Teaching
Copies of letters documenting the peer reviews of my teaching are in Appendix 5: Teaching Assessments by Others.
5.3 Student Evaluations of Advising
To evaluate and improve my advising of thesis students I developed a thesis advising evaluation form. From December, 1998 - December, 1999 I requested that graduating thesis students that I advised in the Department of Information Science at the University of Bergen complete and return their evaluation to me after completing their degree work and final grades had been submitted. The infeasibility of anonymous thesis advising evaluations was clearly established in the evaluation instructions.

Optimal value = 7 (Excellent or strongly agree)

<table>
<thead>
<tr>
<th>Number of Responses = 4</th>
<th>Average Eval.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The advisor...was reasonably available for meetings.</td>
<td>6.75</td>
</tr>
<tr>
<td>...was prepared for our meetings.</td>
<td>6.75</td>
</tr>
<tr>
<td>...was knowledgeable about my research topic.</td>
<td>6.00</td>
</tr>
<tr>
<td>...was knowledgeable about my research method(s).</td>
<td>6.25</td>
</tr>
<tr>
<td>...provided useful direction to my research work.</td>
<td>7.00</td>
</tr>
<tr>
<td>...provided useful advice.</td>
<td>7.00</td>
</tr>
<tr>
<td>...was open to and encouraged the incorporation of my ideas into my research.</td>
<td>6.00</td>
</tr>
<tr>
<td>...showed interest in my research, was friendly and supportive.</td>
<td>6.75</td>
</tr>
<tr>
<td>/</td>
<td></td>
</tr>
<tr>
<td>thesis defense.</td>
<td>6.75</td>
</tr>
<tr>
<td>Overall rating of advising:</td>
<td>6.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>My final examination / thesis defense...</th>
<th>Average Eval.</th>
</tr>
</thead>
<tbody>
<tr>
<td>...was administered well (scheduling, process, etc.)</td>
<td>7.00</td>
</tr>
<tr>
<td>...provided the committee information needed to evaluate my work.</td>
<td>6.00</td>
</tr>
<tr>
<td>...was fair.</td>
<td>6.75</td>
</tr>
</tbody>
</table>

Typical Student Comments
The advisor:
"My advisor's style of advising was active and directive." (spring, 1999)
"...he came from new & better angles that helped me clarify issues for myself." (fall, 1998)
"He allowed me to bring out my ideas and we discussed them." (fall, 1998)
"His communication ability was excellent." (spring, 1999)
"...clear. accurate." (spring, 1999) "Excellent." (fall, 1998)
"Open & direct, with good understanding of the 'human nature' issues that pop up when dealing with pressure from job, family, gov't, other cultures, etc." (fall, 1998)
"He knew my domain and he was interested in my research." (spring, 1999)
"...was directive but gave the student very little chance for discussions." (spring, 1999)
Final examination / thesis defense:
"...was active and interactive and I learnt a lot." (spring, 1999)
"The judgement was made carefully and fairly." (spring, 1999)
"I was surprised overall about how well it went." (fall, 1998)
"Well organized and fair." (fall, 1998)
Appendix 1: Reusable Teaching Products Developed

The Rig Installation Game
I conceived of and completely developed this desktop simulation of the installation of multiple systems for an off-shore oil and gas rig in the Gulf of Mexico. Student teams develop and apply multiple strategies for managing risks of late completion and budget overruns due to innovation-caused uncertainties. The simulated installations are separated by guided discussions of potential installation strategies, measures of performance, and the strengths and weaknesses of specific strategies. Students discover the challenges of successful decision-making under uncertainty and about tools and methods for managing the resulting risks. Developed 2003-2004. Used for instruction in 2004.

The Design Phase Management Game
I conceived of and completely developed this simulation of the design phase of a development project, case description, and modeling exercises. Students discover the challenges of successful decision making to manage the design phase of a development project through a role-playing simulation in which they dynamically reallocate resources to minimize the design phase duration. This experience forms the foundation for a series of three exercises which guide students through all the major phases of building a dynamic simulation model to investigate policy analysis. The context of the design phase of a product development project and perspective of the design manager which are maintained throughout the series focus students on a common and widely applicable domain and realistic managerial challenges. Lessons address the challenges of decision making in dynamic settings and policy design and testing. The game and dynamic simulation model are easily extended to investigate different project types, additional project features and a variety of issues. Developed in 1998 and used with case study and exercises for instruction in 1998-1999. Game developed in 2001 and used for instruction from 2001 to present.

Construction Supply Chain Design and Management
I conceived of and developed three teaching tools for use after students participate in an existing in-class exercise in managing a lumber supply chain. In Policies in Managing a Lumber Chain individual students reflect on the policies they used to order lumber during the exercise and describe their policy in three, increasingly formal, forms (descriptive prose, instructions, and If-Then-Else statements). Students then evaluate their policy, propose an improved policy, and reflect on how the structure of the supply chain and their policies interacted to impact system performance. In Conceptual Modeling of Lumber Supply Chains teams of 3-4 students use modeling tools taught in the course to build a conceptual model of the lumber supply chain system and their management of the system. In Simulation Modeling of Lumber Supply Chains student teams formalize the conceptual model of the supply chain and use it to simulate behavior similar to the behavior they experienced in the in-class exercise. This "closes the loop" in student learning by having them build models that reflect the structure they experienced and can simulate the behavior they generated in their own management of a supply chain. Developed in 2000. Used for instruction from 2001 to present.

Coordination and Conflict Resolution at Worldwide Plaza
I conceived of and developed this case study exercise. The Worldwide Plaza skyscraper development project on Manhattan's west side as described in the book Skyscraper by Karl Sabbagh is the basis for this case study exercise in integrating the multiple perspectives and objectives of project team members to find solutions to multi-disciplinary challenges. In Part 1: Problems and Positions each student represents one of the three primary project team organizations faced with a technological problem which threatens the success of the project and which can only be resolved as a team. In Part 2: Finding Solutions students form teams to wrestle with their different goals and recommend a single solution. Lessons address the interaction of technological and management systems in development projects and the roles of communication and "people" skills in addition to technical knowledge and coordination. Developed in 1992. Used for instruction in 1992-1993 and 2000.

A Decision for Cladding
I developed this exercise in the analysis of building systems. A major multiple-use development project in Boston, Massachusetts is the basis for a case study and assignment in integrated system selection for a complex product. Lessons address alternative design evaluation and subsystem interdependencies. Developed in 1991. Used for instruction in 1991 - 1993.
Policy Development to Control Engineering Employment
I developed this case study to teach students about the dynamics of systems, concepts in control theory, and computer simulation modeling. This simulation model and policy development exercise allow students to apply concepts from engineering control theory to the design of policies to guide decision makers in the control of an education and employment system which responds dynamically to both internal and external changes. Students use four basic types of controller used for physical systems to design and test engineering enrollment policies to control steady state and transient unemployment in an engineering population. In model building courses the exercise includes building the controllers into the simulation model from the differential equations which define the controller types. Lessons address system performance specification, error measurement, system response to individual and combined control mechanisms and control implementation in managed systems. Developed in 1997. Used for instruction in 1997-1999 and 2001.

To Bug or Not to Bug, That is the Question
I conceived of and completely developed this case and model, using a "Dilbert" cartoon to describe the system being modeled. Students or workshop participants use a written case and simple computer-based dynamic simulation model of a software development project to design and test managerial policies for reducing the number of defects (bugs) in software code. Lessons address the dynamics of software development systems, unintended side effects of managerial policies, and policy design and testing. Developed in 1996. Used for instruction in 1996 - 1999.

Deer Management on the Kaibab Plateau
I developed this case study based on an existing simulation model to teach computer simulation modeling. Students use a written case and small computer-based simulation model of an isolated but dynamic ecosystem to develop and iteratively improve guidelines for three related population control decisions. Lessons address the challenges of decision making in dynamic environments, policy development processes for performance improvement, and computer interface effectiveness. Developed in 1997. Used for instruction in 1997 - 1999.

Arms Races and Border Disputes
Background and current conditions of the ongoing border dispute over contested land between the nations of Columbia and Peru are provided to students in text and through references to internet web pages. This forms the basis for student teams to develop a simple but realistic dynamic simulation model of the arms race between these countries. Students use the model to investigate policy alternatives by the disputing parties, the role of imperfect information on system behavior, and alternative dispute resolution. Questions help students reflect on the implications of the lessons learned about a border dispute for other types of dispute and dispute resolution. Developed in 1998. Used for instruction 1998-1999.

Pig Festivals and Population Policies, The Dynamics of Social Programs
Students act as a program director of the World Health Organization to evaluate and recommend action concerning programs to improve the health and well being of the Tsembag Maring tribes, several groups of a few thousand people in an isolated and mountainous region of New Guinea. Through the reconstruction and analysis of a dynamic form of a classic anthropological model of the Tsembaga Maring students identify potentially disastrous policies and their causes and design potentially more effective policies which address multiple objectives. Developed in 1998. Used for instruction 1998 - 1999.

Special Projects Assignment
This assignment was developed with Professor Luciana Barroso for graduate students to provide an opportunity to investigate a topic of special interest to the student. The assignment takes the form of a small research project, with critical components of the research process. This assignment is intended to introduce students to research as a process of building knowledge by testing hypotheses with data.
Appendix 2: Curriculum and Course Development

2001-2002 CVEN 689/661 - Research Methods for Civil Engineers
I designed this course to train students in the scientific method (research) as a process of developing new knowledge by testing theory with data. Research concepts (e.g. researchable questions) and skills in research development (e.g. problem description) that are shared across civil engineering domains are developed through lectures, exercises, and workshops. The roles and uses of tools and methods used in more specific types of civil research (e.g. interviews and statistics) are discussed to prepare students to identify additional research training needs for specific research projects. Students develop research skills through the evaluation of the products of research by professional researchers, the generation of research products on a project of their own choosing, and practice in the written and oral communication of research results. This course has been accepted as a permanent course (CVEN661) in the Texas A&M catalog.

2000-2001 CVEN 654 - Design and Analysis of Construction Engineering Operations
I re-designed this course to integrate a strategic perspective of construction management and computer simulation modeling. Students develop and use computer simulation models as a means of improving their understanding of the strategic issues that face construction managers. Construction management challenges used in the course address projects (e.g. process design and resource allocation policies) as well as internal and external influences on construction organizations such as the selection of core competencies and market forecasting. Students develop a fundamental understanding of system dynamics methodology and develop skills in building and using simulation models. These models are used to relate project structures and operating policies to performance and thereby design and analyze construction to improve performance. Current research by the instructor is integrated into the course through team-based student projects that use course lessons and skills to extend or expand established issues and models.

I introduced two significant new features into this course, the use of computer assisted drawings (CAD) as the basis for term projects in place of paper drawings, and the addition of subcontracting into project estimating by student teams through repeated interactions with practicing a professional construction manager who represents subcontractors for portions of the term project.

2000-2001 CVEN 349 - Civil Engineering Project Management
I re-organized this course, including the development of new course lectures and assignments. I introduced case studies to integrate tools and methods and provide integration of project management theory with civil engineering project management practice. Cases utilize multimedia technology and traditional text descriptions in new assignments and interactive class-discussion based analysis. Field trips to a construction site were organized. Applications of information technology have significantly improved teaching effectiveness.


1998 - Developed master's thesis evaluation criteria (with Prof. S. Nordbotten) as objective basis for assessment across thesis topics and committees, Department of Information Science, University of Bergen, Norway.

1998 - Developed methods and initiated use of remote external examiners on master's thesis evaluation committees, expanding the pool of potential external examiners from regional to global scale, Department of Information Science, University of Bergen, Norway.

1995-1997 - Initiated and developed Master of Philosophy in System Dynamics degree program (with Prof. P. Davidsen). Department of Information Science, University of Bergen, Norway. Curriculum design, course design and development.
Appendix 3: Papers Published, and Presentations Concerning Teaching and Contributions to Textbooks

Papers Published


Contributions to Textbooks

Presentations

Appendix 4: Products of Teaching and Student Learning

Peer Review Journal Articles with Students (* indicates students)


Published Conference Papers Published with Students (* indicates students)


Research Presentations Based on Student Work
based on research products (model) of Alban Tresarrieu's "Modeling Real Options in Product Development"

based on research products (model) of Clement Mialet's "Modeling Options in Development: Toyota's Set-Based Concurrent Engineering"

based on data collection, modeling, and analysis of case study by Sandeep Parasnis in "Flexible Acquisition Project Strategies for Construction Projects"

based on model development by Nevzat Gokmen in "Assessing Uncertainties in Construction Projects Managed with Flexible Strategies"


Note: Formatting has been condensed to save space.

First abstract with instructor comments shown in bold italics (used Word's "changes" tool in actual course):

**DNF comments**

Good start.

*Add title, author, date*

8.5

The problem that practitioners or researchers have that my research addresses is the *how to obtain? The lack of a method to obtain?? clarify*? Obtainment of bulk metallic materials by consolidation of ultrafine-grained powders. The specific knowledge that is missing to improve this circumstance is *to consider the delete* appropriate method and factors for an adequate compaction and mechanical properties of the resulting material. *good* My proposed answer to this knowledge gap is the use of Equal Channel angular Extrusion (ECAE), a novel technique which permits *to apply delete the application of* high strains to the material without considerable change in the shape of the processed material. *Very good* I will test the quality of my proposed solution by processing canned metallic powders via ECAE and investigate the microstructural and mechanical properties of the obtained bulk material. *Be more specific than “investigate”...tell what you will do with the data from the investigations to judge the quality of the process* The results of my research will be interesting *to tell who it will be interesting for* show the ability of ECAE process in consolidating nanocrystalline metallic powders and obtaining a material with better mechanical behavior because it will give them the necessary results and understanding on the influence of the nature of processed powder and processing variables on the final product.

Final Research Proposal Abstract:

**Consolidation of nanocrystalline powder using ECAE process.**

The problem that practitioners or researchers have that my research addresses is fabrication of bulk metallic materials by consolidation of ultrafine-grained powders. The specific knowledge that is missing to improve this circumstance is appropriate method and factors for an adequate compaction and mechanical properties of the resulting material. My proposed answer to this knowledge gap is the use of Equal Channel angular Extrusion (ECAE), a novel technique which permits the application of high strains to the material without considerable change in the shape of the processed material. I will test the quality of my proposed solution by processing canned metallic powders via ECAE and relate the microstructure to the mechanical properties of the obtained bulk material by conducting optical microscopy, scanning and transmission electron microscopy, X-ray diffraction, microhardness, tensile and compression tests, and fatigue experiments. The results of my research will be interesting to the scientific community of the domain as well as the aerospace and naval agencies because it will give them the necessary results to show the ability of ECAE process in consolidating nanocrystalline metallic powders and obtaining a material with better mechanical behavior.
Appendix 5: Teaching Assessments by Others
Course and advising assessments by students are included in Section 5: Assessments of Teaching.

Peer Reviews of Teaching:

TEXAS A&M UNIVERSITY
Department of Civil Engineering
Construction, Geotechnical, and Structures Division

February 26, 2001

MEMORANDUM

TO: Dr. John M. Niedzwiecki
Wofford Cain Professor and Department Head

FROM: Dr. Stuart Anderson
Dr. Jose M. Roesset

SUBJECT: Peer Review of Teaching for Assistant Professor David N. Ford

As requested a committee consisting of Dr. Stuart Anderson and Dr. Jose M. Roesset reviewed the teaching performance of Assistant Professor David N. Ford. Following the procedural instructions for peer review of teaching, we looked at his student course evaluations, his course materials, and his progress report. We also sat in his course CVEN 349 Project Management, which is the first offering in this area.

Professor Ford has been at Texas A&M since January 2000. He had however considerable experience at other universities before coming to us. During his first year, he taught the introductory undergraduate course on project management, CVEN 349, in the Fall, and a graduate course CVEN 654, Design and Analysis of Construction Engineering Operations, in the Spring. Student course evaluations were only available for the Fall course at the time of this review. He is now teaching again the undergraduate course CVEN 349. A graduate course, CVEN 638, Computer Integrated Construction Systems, that he was scheduled to teach for the first time this semester did not make it due to low enrollment. He is planning to introduce a new graduate course (CVEN 689), Research Methods for Civil Engineers, in the summer, and teach again CVEN 349 and CVEN 654 in the Fall. His student evaluations for CVEN 349 in the spring of 2000, his
first semester here, ranged from 3.2 to 4.6 with an average of 4.0 for the 8 categories rated. It should be noticed that the low grade corresponded to homework that was considered too difficult by some students. His student evaluations for the courses he taught previously in Norway and Sweden were very good.

Professor Ford teaches his undergraduate course in an interactive way, trying to get the students involved, asking them frequent questions and maintaining an informal, casual atmosphere. He is doing an impressive job using the Web and multimedia facilities in his courses. He has developed for instance a Web page for each course, where he includes summaries for each week of material covered, assignments and other activities. He has the students submit report directly through the Web. And he makes the students participate in teams in simulation exercises using interactive CD ROM multimedia case studies. We feel that this has a tremendous potential and that other faculty members could benefit from seeing it, so we have asked him, through DR. Roschke, to make a presentation to the area faculty. Professor Ford is also very interested in teaching students how to do independent thinking and research. In combination with Professor Barroso he has developed material for Special Projects Assignment for graduate students, guiding them on the necessary steps to conduct research. We believe this will be of great value, particularly as a replacement for the thesis in the Master of Engineering program.

In addition to his classroom teaching and his work developing instructional material, Dr. Ford has already 1 Ph. D. student and 1 Master of Engineering student that he is supervising. He supervised some 12 Master students previously in Norway. He is also a member of the doctoral committees of 2 Ph. D. students, one at MIT, the other in Canada. This type of recognition is unusual for an assistant professor.

Since joining TAMU Professor Ford has published 2 papers in refereed journals, another 2 papers in conference proceedings and a chapter of a book. He has made 6 research presentations and he has been actively seeking research funding and writing research proposals.

We believe in summary that Professor’s Ford performance in his first year at TAMU is quite satisfactory. He had already the credentials of a good teacher and a person committed to education and research and he is clearly maintaining these characteristics. The work that he has done with the Web, the multimedia case studies and the initiation of graduate students to research (in combination with Dr. Barroso) is very impressive. We feel that his new summer course should be an excellent addition to our curriculum and extending beyond the area of project management.

Reviewed by

[Signature]

David N. Ford
Assistant Professor.
11 February 2002

To: Dr. Paul N. Roschke, Division Head, Construction, Geotechnical, and Structural Engineering, and Dr. John M. Niedzwecki, Head, Department of Civil Engineering

From: Peer Review Committee: Dr. Lee L. Lowery, Jr., Chair Dr. James T. P. Yao, Member

Subject: Peer Review of Teaching for Dr. David N. Ford

Our review of Dr. Ford's teaching effectiveness was performed following the guidelines provided by the "Policy on Procedures for Peer Review of Teaching, Department of Civil Engineering" (adopted 4/1/92, revised 4/18/97, updated 4/14/98). The stated objectives of the peer review process are to: (1) provide constructive feedback to help each faculty member to maximize their teaching effectiveness and (2) provide information to support decision-making processes involving tenure, promotion, awards, and merit salary increases. The 2001-2002 peer review consisted of (1) a study of Dr. Ford's faculty progress report, (2) an interpretation of his student evaluations, (3) a reading of the course material he has developed, and (4) a visit to his undergraduate course CVEN 207 (by Dr. Lowery this year and Dr. Yao last year). The reviewers have met with Dr. Ford to discuss the results of the peer review given below.

1. Faculty Progress Report

   Dr. Ford is a motivated teacher. He has had approximately 15.5 years of practical and academic experience that is highly desirable for our students. To date, he has taught two graduate and two undergraduate courses since joining our faculty in 2000. He has graduated three ME students, and is directing one doctoral candidate. In addition, he has successfully graduated 15 master students elsewhere. He has published 11 journal articles, one book in CD ROM format, 6 contributions to books, and numerous proceeding papers. Meanwhile, he has a total of four (4) externally funded research projects, three (3) internally funded projects, and two (2) self-funded projects. We believe that the future potential for Dr. Ford is great indeed. We are particularly impressed by the fact that he has attempted to emphasize the quality of his work more than the quantity, as he expressed to at least one of us.

2. Student Evaluations

   Student evaluations ranged from 2.87 (CVEN 349 - Civil Engineering Project Management, in Spring 2001) to 4.96 (CVEN 689 - Research Methods for Civil Engineers, in Summer 2001.) Examining students' comments abroad and at TAMU, most students said that the courses were good and interesting and that the instructor was enthusiastic and a good lecturer. His students also stated that his assignments helped them to learn. However, many students complained that the course workload was excessive, that assignments were too long, and that the time for each assignment was too short. They had further concerns regarding course grading. Perhaps David sets his standards too high and expects too much from his students.
3. **Course Materials**

   David designed CVEN 689 - Research Methods for Civil Engineers (3-0) to introduce students to the scientific and research method as a process for developing new knowledge by testing theory with data. This course involves interviews and statistics and is for students of the entire department.

   He re-designed CVEN 654 - Design and Analysis of Construction Engineering Operations (3-0) to integrate construction management and computer simulation modeling at the strategic level. Current research is integrated into this course through team-based student projects that use course lessons. In addition, he has developed the use of Web Pages for course administration.

   He also re-designed CVEN 349 - Civil Engineering Project Management (3-0) by including the development of new course lectures and new assignments. Case studies utilize multimedia technology, and traditional civil engineering project management practices were introduced. In addition, field trips to construction sites with other courses were organized. Use of electronic communication tools and report submissions have helped to improve student communication skills.

   He is currently teaching CVEN 207 - Introduction to Civil Engineering. He has re-written the course syllabus, problem assignments, and other documents. As an excellent teacher, he is very effective in conducting this introductory course (see Section 4 below).

4. **Visit to Classes**

   Dr. Lowery visited Dr. Ford's CVEN 207 class on Friday, January 2002. Dr. Ford's enthusiasm and lecture style was very impressive. Dr. Ford's lecture was well organized and well delivered. Although Dr. Yao was unable to attend Dr. Ford's classes this semester, he did attend his presentation on Construction Engineering and Management when he taught CVEN 207 during the spring semester of 2001. Both the students and Dr. Yao were impressed by the lecture, and many questions were asked Dr. Ford questions showing their interest in that area.

5. **Recommendations**

   Dr. David Ford is an excellent teacher. We sincerely recommend that he be kept on the faculty. Although his expectations for his students are high and his assignments are too long for some students, we recommend that he be allowed to set his standards at the level he sees fit. We have discussed the student comments on grading with Dr. Ford, and he intends to work on this aspect of his teaching.

   Sincerely,

   Lee Lowery, Jr.  James T.P. Yao

   Cc: Dr. David Ford
Teaching Evaluation

David N. Ford, Ph.D., P.E.
Construction Engineering and Management Program
Department of Civil Engineering
March 21, 2003

Professor Ford has been a member of the faculty of the Construction Engineering and Management Program in the Civil Engineering Department since January of 2000. During the previous two semesters he taught a graduate level research methods course (CVEN 689), a graduate level construction management course (CVEN 654), and a graduate level seminar course (CVEN 681). He is currently teaching a freshman level service course in the Foundations of Engineering (ENGR 112) and an undergraduate project estimating and planning course (CVEN 473). The student evaluations of these courses, which are available, average 4.25.

Professor Ford teaches in an interactive way, using several methods to involve his students in their own learning. His informal manner develops a safe learning environment in which students feel free to question and fail as means of developing their engineering knowledge and skills. He frequently asks questions to engage students in discussion, particularly through case studies, some of which he has developed. In one course students play the role of managers in a simulation of a construction system to establish a shared experience. Professor Ford then uses that experience throughout the course to illustrate construction management theory and practice. The effectiveness of Professor Ford's approach is illustrated by an average student rating of 4.39 of his responsiveness and use of questions in class and an average rating of 4.35 of the learning environment that Professor Ford creates.

Professor Ford is particularly interested in teaching students independent thinking skills and in integrating research into his teaching. The most obvious demonstration of his commitment to these goals is his second teaching of CVEN 689 Research Methods for Civil Engineers, which he has submitted for inclusion in the Texas A&M course catalog as a regular course. In addition, through his advising of four Master of Science students in their thesis work, a Master of Engineering student, a Texas A&M Ph.D. candidate, and two visiting Ph.D. students Professor Ford mentors students as they develop their individual research skills. Professor Ford also integrates research into his teaching of traditional engineering topics. For example, portions of research projects form the basis of term projects by student teams in the graduate construction management course that he teaches (CVEN 654). He requires seniors in his project estimating and planning course to test their assumptions with
data from multiple sources. He encourages freshmen to identify and question the assumptions that describe engineering challenges and proposed solutions.

Professor Ford also uses information technology effectively to improve his teaching. He develops and uses a web page for each course. Although each page is customized for each course, they all provide students with vital course information and easy access to course documents. In one course (CVEN 689) almost all student submittals are made electronically and Professor Ford comments, grades, and returns submittals electronically. These applications of information technology largely eliminate paperwork in Professor Ford's courses, reduce course administration in class, and thereby allow more material to be covered. This approach to course management has great potential for adoption by other faculty members.

Based on student evaluations, Professor Ford is enthusiastic, well prepared, and clearly explains course material. Students regularly compliment Professor Ford's presentation style in their evaluations. Some lower level undergraduate students believe that Professor Ford requires that they work too hard. In response to these comments Professor Ford has increased the clarification and specification of work requirements with students and tests whether those requirements are reasonable through discussions with other faculty members.

Chair: Cheung Kim
Committee member: Kenneth Reinschmidt
March 9, 2004

MEMORANDUM

TO:     Dr. Paul N. Roschke
        Professor and Interim Department Head

FROM:   Dr. Carroll Messer, Chair, Peer Review Committee
        Dr. Joseph M. Bracci, Member, Peer Review Committee

SUBJECT: Peer Review of Teaching – Dr. David Ford

Dr. Bracci and I performed a peer review of teaching for Dr. David Ford. The review consisted of the following: (i) review of his faculty progress report; (ii) interpretive evaluation of student opinionnaires; (iii) evaluation of sample course materials; and (iv) evaluation during a classroom visit.

The teaching activities and plans as outlined in his progress report show significant efforts devoted to educational activities. He has taught a variety of both undergraduate and graduate courses, and he has developed a new graduate course and redesigned/reorganized two existing courses. At TAMU, he currently is the committee chair for 2 M.S. students and 3 Ph.D. students. He has graduated 4 M.E. students whose research led to research products and 3 other M.E. students. He has been a committee member for a variety of Master and Ph.D. students. At the University of Bergen, he supervised 12 Master’s level students.

The student opinionnaires highlight Dr. Ford’s interest and dedication to teaching. Many students describe his sincere interest for student learning, willingness to help students beyond classroom needs, and his enthusiasm for higher learning. The average student ranking for his teaching over the past four years is about 4.0/5.0, which is very commendable. The only weakness noted from a significant number of opinionnaires is that his lectures consistently go beyond allotted class time. The review committee feels that Dr. Ford should concentrate on the length of his lectures to fit within the allotted time and believes that his students ranking would correspondingly improve.

The course materials that we reviewed were sample syllabi and a very well developed and comprehensive web page of course materials, such as syllabi and lecture materials using PowerPoint presentations. David is doing a very good job of maintaining course materials.
Finally, we visited his CVEN 473 class (Estimating) on 3/3/04 to assess his teaching first hand. As observers, we noted that he has tremendous enthusiasm and energy for teaching and comprehension of materials in his subject areas. He encouraged students to ask questions and replied in a clear, understanding manner. To complement lecture materials, he discussed his own professional experiences related to the subject matter. The students really appreciate such discussions. However, Dr. Ford might prioritize these discussions in order to keep within the allotted lecture time.

To summarize, the peer review committee feels that Dr. Ford is doing a very good job with teaching. The only area of his teaching that needs improvement is in keeping within the allotted lecture time, which the committee is confident that he can accomplish.

We met with Dr. Ford on 3/9/04 and discussed this report with him.

Cc: Dr. David Ford
**Appendix 6: Example Syllabus:** The Strategic Management of Construction  
(CVEN654, 2003)

**Note:** Formatting has been condensed to save space.

**Design and Analysis of Construction Engineering Operations**  
(The Strategic Management of Construction)  
Course Syllabus  
Fall, 2003

**Course Description**

Computer simulation modeling techniques for complex construction and project management operations; modeling non-determinate problems and evaluating uncertainty factors; identifying methodologies for schedule versus cost process optimization; productivity improvement; and performance forecasting. (This is the description in the catalog.)

Construction operations present a variety of problems to the designers of industry, organization, and project processes and the management policies used to control those systems. The objectives and problems are often poorly defined. Performance and objectives fluctuate, sometimes dipping in and out of crisis conditions many times over the life of a single project or the planning horizon of a construction organization. The boundaries between projects and organizations and their environments are uncertain and changing. Projects respond to efforts to control them with multiple feedback effects, long time delays, and nonlinear responses. Many of the most difficult construction management challenges relate to the dynamic nature of construction operations.

How can construction managers improve their understanding of the dynamic complexity inherent in the construction industry, organizations, and projects and develop effective project designs and operating policies? How can construction managers understand why some firms and projects prosper while others stagnate or die? How can the designers and managers of these complex systems identify and design systems and policies that are not thwarted by unanticipated side effects and are effective across time and variations in operating conditions? How can they learn to respond to the increasingly complex systems in which they operate? Effective design, management and learning in such environments require methods for understanding and managing dynamic complexity. Due to the costs and delays of learning with actual construction operations researchers, designers and managers use models to improve their system understanding and performance.

The course has two simultaneous focuses: strategic construction management and computer simulation modeling. You will use the building and use of computer simulation models as a means of improving your understanding of some of the important strategic issues that face construction managers. Strategic issues will address projects (e.g. process design and resource allocation policies) as well as internal and external influences on construction organizations such as the selection of core competencies and market forecasting. In this course you will develop a fundamental understanding of the system dynamics methodology and begin to develop the skills needed to build and use system dynamics modeling for the design and analysis of construction operations. You will learn to visualize construction operations in terms of the structures and policies that create dynamics and regulate performance. You will build models of construction operations and policies to improve your understanding of the ways in which performance is related to internal structure (i.e. system design) and operating policies (i.e. system management). This understanding and these models will provide you some of the tools needed to design and manage the strategic issues that determine the success or failure of construction organizations and projects.

**Course Objectives**

- Exposure to issues in the strategic management of construction
- Develop skills in building simulation models of construction systems and their use for strategic process and policy design and analysis
- Experience in the combined use of research literature and computer simulation modelling to investigate a specific construction management issue
• Experience in team modelling and work

**Instructor**
Dr. David N. Ford  
Office: 705D, CE/TTI Building  
Voice: 845-3759  
Email: DavidFord@tamu.edu  
Office Hours: Tuesday 11:00 – 1:00 or by appointment

**Class Schedule**
Class: Tuesdays and Thursdays 9:35 – 10:50 from September 2 to December 9, 2003  
Final: December 12, 2003 from 12:30-2:30  
See http://www.tamu.edu/admissions/records/academic_calendar.html for exceptions to schedule and redefined days  
Location: CE221

**Course web page**
The Course Work Policies are available on the course web page and are made a part of this syllabus by reference.

**Course web page**
The course home page can be found through the instructor's home page at http://ceprofs.tamu.edu/dford/.

**Topics, Reading Assignments, Exercises and Examinations**
Topics, reading assignments and exercises are described and available on the course web page. Reading assignments should be completed prior to the class lecture. See and follow the course work policies concerning assignments that are linked to the course web page and examinations.

**Grading**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual assignments and quizzes</td>
<td>20%</td>
</tr>
<tr>
<td>Team assignments</td>
<td>20%</td>
</tr>
<tr>
<td>Midterm examination*</td>
<td>20%</td>
</tr>
<tr>
<td>Term Project proposal</td>
<td>10%</td>
</tr>
<tr>
<td>Term Project Presentation</td>
<td>10%</td>
</tr>
<tr>
<td>Term Project Report</td>
<td>10%</td>
</tr>
<tr>
<td>Class participation</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total Grade</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

* - A second examination may (at the discretion of the instructor) be given at the time of the final examination and the greater of the two grades used as the grade for the midterm examination.

Passing grades for graduate courses are A, B, C, and S.

**Text and Readings**

Other required reading material will be provided on the course web page.

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in room 126 of the Koldus building, or call 845-1637.

Notes: Formatting has been condensed to save space

Texas A&M University
Department of Civil Engineering
CVEN654 - The Strategic Management of Construction
Mid-term Examination - October 23, 2003
============================================================================
"Aggies do not lie, cheat, or steal, nor do they tolerate those who do."
The Aggie Code of Honor

I have complied with the Aggie Code of Honor in my conduct of this examination.

Name (printed)

Signature          date
============================================================================
Instructions
1. Write and sign your name above. Write your name on each answer sheet.
2. Number your answer sheets.
3. Label your answers clearly using the same numbering as the questions.
4. Submit this cover sheet, all question sheets, all answer sheets, and all attachments provided.
5. Keep your answers short, clear, and concise.

The weighting of the questions in grading is as follows:

<table>
<thead>
<tr>
<th>Question</th>
<th>Percent of Total Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>5</td>
</tr>
<tr>
<td>1B</td>
<td>10</td>
</tr>
<tr>
<td>1C</td>
<td>10</td>
</tr>
<tr>
<td>2A</td>
<td>10</td>
</tr>
<tr>
<td>2B</td>
<td>10</td>
</tr>
<tr>
<td>2C</td>
<td>5</td>
</tr>
<tr>
<td>3A</td>
<td>5</td>
</tr>
<tr>
<td>3B</td>
<td>5</td>
</tr>
<tr>
<td>3C</td>
<td>10</td>
</tr>
<tr>
<td>4A</td>
<td>10</td>
</tr>
<tr>
<td>4B</td>
<td>10</td>
</tr>
<tr>
<td>4C</td>
<td>10</td>
</tr>
</tbody>
</table>

Total 100%

1. Conceptual Modeling of a Strategic Construction Issue
A copy of the previously assigned reading "Halter Marine: A Case Study in the Dangers of Litigation" (1990) by Kimberly Reichelt is attached. In this article the author describes Halter Marine's strategy for managing fluctuations in orders (pp. 3-4).

A. Draw reference mode of the strategic construction issue faced by Halter in the portion of the article referenced above and the firm's response.

B. Draw a complete system structure diagram of a model of Halter's strategy and how it impacted Halter's capacity that can generate the Halter's behavior in response to fluctuations in orders as described in the article.
C. Describe how the causal feedback structure can generate the behavior.

Reference

2. Accumulations in Construction Systems
One of your responsibilities as an Assistant Project Manager on the Big Build Project is to manage the staging area for structural steel and mechanical equipment. Structural steel requires 100 square feet per 1000 pounds of steel. Mechanical equipment requires 50 square feet per 1000 pounds of equipment. The project schedule shows 10,000 pounds of steel leaving the staging area each week of the 100 week project for delivery to the site starting in week 30 and 5,000 pounds of mechanical equipment leaving the staging area each week of the 100 week project for delivery to the site starting in week 30. The delivery rates of steel and mechanical equipment from supplies to the staging area are shown below. Assume all changes occur at weeks that are a multiple of five (i.e. Wk 0, wk5, wk10, etc.), that all constant rates are multiples of 5,000 pounds, and all ramped changes occur for at least 5 weeks (i.e. treat changes that look like very steep ramps as step changes at the 5-week time).

A. Sketch the amount of structural steel (in pounds) to be stored in the staging area during the project. Assume that the staging area is empty at the beginning of the project. Label the time and pounds (\(\text{time, pounds}\)) of all initial, final, minimum, and maximum points on the sketch and all discontinuous changes in slope.

B. On a separate pair of axes sketch the amount of mechanical equipment (in pounds) to be stored in the staging area during the project. Assume that the staging area is empty at the beginning of the project. Label the time and pounds (\(\text{time, pounds}\)) of all initial, final, minimum, and maximum points on the sketch and all discontinuous changes in slope.

C. What is the maximum amount of combined area needed for structural steel and mechanical equipment staging during the project? Show your work.

3. The Structure and Behavior of Systems

A. During what approximate time period or periods is the Rule of 70 applicable in the structure and simulation above? Why?

B. During what approximate time period or periods is Little's Law applicable in the structure and simulation above? Why?

C. Sketch the behavior of the Upstream Stage over time for the conditions above except that, in addition to the step change to the Upstream Inflow shown above, the Average Time in Downstream Stage also doubles at time \(= 30\) days. Label the time and size of the Upstream Stage (\(\text{time, size}\)) of all initial, final, minimum, and maximum points on the sketch and all discontinuous changes in slope. Show your work.

4. Construction System Model Building Blocks
The model building block below describes a possible structure for changes in a project budget. The structure and variable values are the same as the example used in class.

Equations

Model equations inserted here.
A. The following are equilibrium conditions.
Init Budget Surplus=0 units: Thousands of dollars
Init Changes in Review=0 units: Thousands of dollars
Avg Budget Change time=5 units: months
Surplus Fraction Proposed=0.2 units: months

A. Is this a stable or unstable equilibrium? Show how you know.

B. At the beginning of the project costs are projected to exactly equal the budget (Init Surplus=0) but that the owner is considering decreasing the budget by $1,000 to save money (Init Changes in Review=-1). Assume the values for the Avg. Budget Change time and Surplus Fraction Proposed given above. Will the Project Budget Surplus or the Project Budget Changes in Review reach a maximum first? Show how you know.

C. Draw a sketch of the behavior over time of the Project Budget Surplus under two conditions: 1) the conditions described in B. above, and 2) the conditions described in B. above, except that the Surplus Fraction Proposed is doubled from 0.2 months to 0.4 months. Clearly label each behavior line with "Fraction Proposed=0.2" or "Fraction Proposed=0.4"