The Art and Science of Teaching and Conducting Research in CEM

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Extension

Academic Programs

BS Construction Engineering (ABET)
  • General Construction (128 credits)

MS/MCE (CE)
  - Develop a program that makes sense to YOU
    - MCE: 7 CON courses, 1 CE, 2 Supporting
    - MS: 7 CON courses, up to 6 research credits
  - Research – develop expertise

PhD (CE)
  - Develop and conduct research
  - Build on MS/MCE – specialized expertise
Key Questions

- **What is my Background?**—how I become a CEM professor
- **How do you teach?**
- **How do you conduct research?**
- **What is industry’s role in teaching and research?**
- **What are your challenges?**

My Background

- **Edward J. Jaselskis, PhD, PE, NAC**
  - 224 Mann Hall
  - ejjasels@ncsu.edu

- **Education**
  - BS General Engineering, Univ. of Illinois
  - SM Civil Engineering, MIT
  - PhD Civil Engineering, Univ. of Texas

- **Academic Experience**
  - ~22 years as professor at Iowa State University
    - Visiting faculty at UNSW (Australia)
    - Visiting faculty at Chung Hua University
    - 1 Year rotation as NSF Program Director
  - ~7 years at NC State

- **Industry Experience**
  - Summers at Perkins and Will (A/E firm)
  - One summer with MIT A/E Facilities
  - 3 years Exxon (one year spent in Colombia, S.A.)
  - 6 months Bechtel on a power plant SCR upgrade
How I became a CEM Professor

- **Construction**
  - Began young (Touhy)
  - Uncle union carpenter
  - Built shelves, deck,
    - Klondike sled
- **Teaching**
  - Boys summer camp
  - Father’s influence as a professor
- **Research**
  - SM project at MIT
  - My interest in adopting new ideas (difficult to do in industry)

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How do you teach?

- **Began learning how to teach at UT**
- **Teach both graduate and UG students**
  - Intro to CM, Materials and Methods, Estimating, Legal Aspects,
  - Advanced CM, Global Construction
- **Teaching style changed over time**
  - Instinct at first (Iowa State story)
  - Knowledge: mentoring and teaching workshops provided great insights and new ideas to better engage students (Richard Felder)
Keys to teaching success ... it’s all about Engagement

- **Instinct**
  - Know your stuff
  - **Keep message simple**
  - Care about your students

- **Knowledge (about How to Teach)**
  - **Use Active Learning**
    - Stories
    - Questions
    - Visualizations
    - Mini activities
    - Teaching Innovations
  - **Understand different learning styles**

 Keys to teaching success

- **Simplicity**
  - Breaking complex concepts into simpler ones

Hypothesis Testing

**Hypothesis Testing and Z Score**
Keys to teaching success

- **Active Learning**
  - Stories
  - Visualizations

Partner Question

Summarize the Owner’s Responsibilities in Article 4 of ConsensusDOCS 200 as it pertains to differing site conditions.

Turn to your Partner Question
How do you teach?

Mini Activities

Group Questions Related to the Determinants of Construction Project Success

1. What does construction project success mean to you?

2. What criteria would you use to measure the success of a construction project (i.e., consider the perspectives and try to be specific with your criteria).

   Owner  Designer  Contractor

3. What do you think are some of the key project inputs related to project success?

Teaching Innovations

Virtual Construction Site Tours

Show video
Global Construction Practices Course

- **Objective**
  - Learn about the **differences and challenges of constructing projects in different countries** (e.g., contracting, legal issues, financing, culture, language, etc.)
  - Experience working on a multinational team

- **Partner Universities**
  - IIT-Madras, Tianjin, Tsinghua, University of Calgary, Polytechnic University of Puerto Rico

- **Delivery Modes**
  - Synchronous and Asynchronous

### Class Schedule

<table>
<thead>
<tr>
<th>Institution</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
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<tbody>
<tr>
<td>NC State University (every Monday beginning January 7 — a few exceptions on Wednesday evening)</td>
<td>7-11 15-19 23-27</td>
<td>1-5 11-15</td>
<td>12-16 20-24 28-32</td>
<td>13-17 21-25 29-33</td>
<td>14-18 22-26 30-34</td>
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<tr>
<td>IIT-Madras (Asia) — every Monday in sync with NC State beginning the 3rd lecture</td>
<td>1 3 4 5 6 7 8 12-16 20-24 28-32</td>
<td>Break</td>
<td>9 10 11 12 13 14 15 18-22 26-30</td>
<td>Break</td>
<td>1 3 4 5 6 7 8 12-16 20-24 28-32</td>
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<tr>
<td>University of Calgary (every Wednesday beginning January 9 from 8-9 pm)</td>
<td>1 3 4 5 6 7 8 12-16 20-24 28-32</td>
<td>Break</td>
<td>9 10 11 12 13 14 15 18-22 26-30</td>
<td>Break</td>
<td>1 3 4 5 6 7 8 12-16 20-24 28-32</td>
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<tr>
<td>Tianjin University (Wednesdays)</td>
<td>1 7 9 11 13 15 4 6 8 10 12</td>
<td>Break</td>
<td>1 3 4 5 6 7 8 9 11 13 15 4 6 8 10 12</td>
<td>Break</td>
<td>1 3 4 5 6 7 8 9 11 13 15 4 6 8 10 12</td>
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<tr>
<td>Tsinghua University</td>
<td>1 2 3 4 5</td>
<td>Break</td>
<td>1 3 4 5 6 7 8 9 11 13 15 4 6 8 10 12</td>
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- Pre-Recorded
- Live
Keys to teaching success

- **Different Learning Styles**
  - Visual, Auditory, Reading & Writing, and Kinesthetic

How do you conduct research?

**Identifying Research Topics**
- Opportunity

**Project Success**
- Safety*
- Contractor Evaluation
- Improved Profitability
- Models to predict failure and success
- Improved mega project performance
- Project Control Metrics

**Innovative Technologies**
- Robotics in hazardous waste remediation
- RFID
- Laser Scanning
- MW for HMA density
- Virtual site visits

**My Research**
- Nonfunded research

*Team and Individual

You don’t need a lot of money to do good research.
Reverse Engineering the Inka Road

NSF and Smithsonian Institute Funded Project
• Understand how the Inka Indians designed and built their infrastructure in South America
• Provide collaborative learning experience
  • Introduce students to the field work

Industry’s role in teaching and research

• Symbiotic relationship
  • Benefits to Academia
    • Industry experience to lectures
    • Jobsite tours
    • Program advice
    • $ for scholarships
    • Advisory boards
    • Offering co-ops/internships
    • Help with research ($, data, letters of support)
  • Benefits to Industry
    • Advantage in hiring students
    • Students might need to use their services
    • Learning new knowledge (distance education)
What are your challenges?

• **UG Program**
  - Marketing the benefits of a construction engineering degree
    - 20-30% of CE’s go into construction
  - Pressure to reduce credit hours and need to add soft skills and BIM

• **Graduate Program**
  - Sustaining a vibrant research program
    - Obtain adequate research funding
    - Rising cost of graduate students

Questions and Discussion