ICEE 2004
October 16-21

Lessons Learned in the Inaugural Capstone Design Course at Smith College

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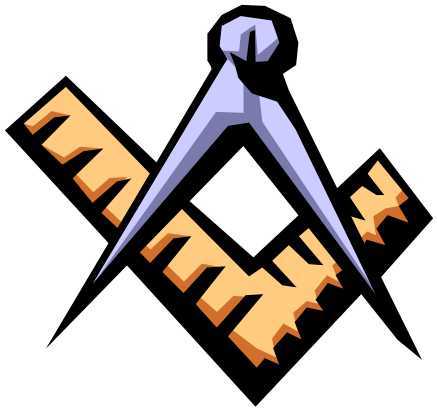
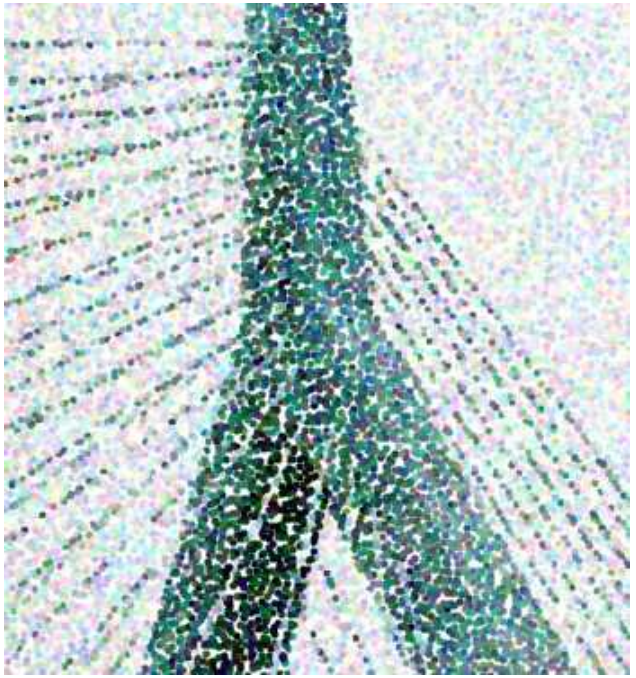


Overview

- Context
  - Smith College
  - Picker Engineering Program
- Design Clinic
  - Structure
  - Design Projects
  - Lectures
- Lessons Learned
  - Discussion
  - Future Plans



Smith College

- Nation's largest liberal arts college for women
- Approx. 2600 undergraduates
- Founded in 1871 by Sophia Smith
- Located in Northampton, MA

Founding Mission: "…to furnish for my own sex means and facilities for education equal to those which are afforded now … to young men."

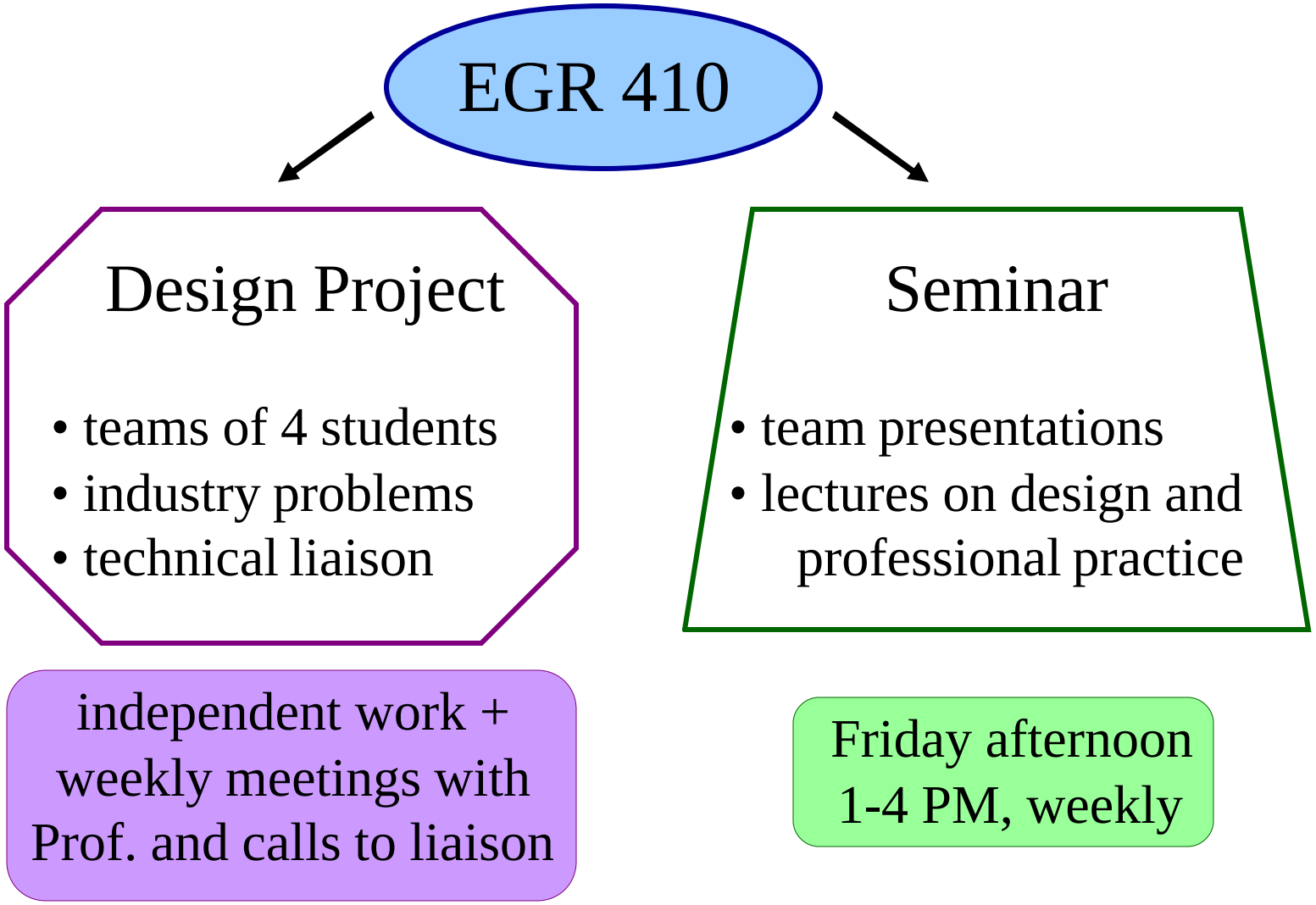
Picker Engineering Program

- Established in 1999
- First graduating class in May 2004
- B.S. in Engineering Science
  - core engineering courses
  - technical electives
  - liberal arts distribution
- Design Clinic as capstone

EGR Class of ‘04

Vision: “…to emphasize unity of knowledge across engineering subjects in a liberal arts context, and to prepare women for lea dership roles in society as well as in the engineering profession. .”

Design Clinic – Course Structure



Design Projects

Sponsors

Ford

GE Plastics

Metcalf&Eddy

MITRE

Northampton DPW

Design Deliverables

Weekly Progress Reports

Project Proposal/Presentation

Mid-Year Report/Presentation

Final Report/Presentation

Final Poster

Seminar - Calendar

Sept				Oct					Nov				D
5	12	19	26	3	10	17	24	31	7	14	21	28	5

J	Feb			Mar				Apr				
30	6	13	20	27	5	12	19	26	2	9	16	23	30

= deliverables presentations

= working presentations

= seminar topics/ guest lectures

Seminar - Lecture Topics

- Team Dynamics
- Engineering Design
- Project Management
- Technical Communications
- Sustainability
- Regulations and Standards
- Engineering Ethics
- Engineering Economics
- Universal Design
- Assistive Technology
- Work/Life Balance
- Engineering Consulting
- Starting a Business


Lessons Learned

Working Presentations

Approach:

Work-Through	50 min.	White board; no PPT slides
Technical	50 min.	Equations, diagram, figures
Visual	20 min.	Graphics; no bullet lists of text

Results (+/-):

+ teams focus presentations on theme areas
+ students contribute to all project teams
+ 80% of students rated 4 or 5 (5=highly effective)

Lessons Learned:

- include themed working presentations
- add 4th focused on constraints

Team Formation and Dynamics

Approach:

- divided by project preference
- followed with team dynamics lecture/reflections

Results (+/-):

+ 19 of 20 students got 1st choice
– MBTI: all teams somewhat unbalanced
– some teams hampered by personality clashes

Lessons Learned:

- incorporate personality and project preference

Liaison Selection

Approach:

- liaisons selected by sponsoring organizations

Results (+/-):

+ convenient for sponsors
– students had mixed experiences
– difficulties when students perceived liaison as:
  - not invested in project
  - too busy with other work
  - not knowledgeable about project details

Lessons Learned:

- seek liaisons who are excited by project
- communicate more regularly with liaisons

Project Descriptions

Approach:

- instructor and liaison discuss project
- instructor writes short description, ok'd by liaison

Results (+/-):

+ uniform, summary format
– 45% thought description wasn't clear
– 40% had expectations differ from experience

} from same 3 teams

Lessons Learned: → "Project Summary Form"

- require sponsoring orgs. to write descriptions
- list intended deliverables
- describe implementation plans

Seminar Topics/Guest Speakers

Approach:

- lectures on design process and professional practice
- “expert” guest speakers (17 total)

Results (+/-):

+ exposure to successful engineers/role models
+ 80% found seminars valuable overall
– 65% gained knowledge about engineering careers
– only 15% learned info applicable to project

Lessons Learned:

- reduce # of guest speakers → use to supplement
- include activities to connect seminars with projects

Performance Evaluation

Approach:

- 35% individual grade, 65% team grade
- assignments had guidelines, but no grading rubrics

Results (+/-):

+ w/o rubric: preparation for industry, no coddling
– students don’t know how grades are calculated
– grade may overlook factors, be inconsistent
– overall success outweighed by interim deliverables

Lessons Learned:

- use rubric for main deliverables, comment on others
- increase weight of “overall project success”

Seminar Timing

Approach:

- weekly Friday seminar, 1:00-4:00 PM

Results (+/-):

+ convenient for guest speakers
+ adaptable for long activities
– too long for students to focus
– Fridays conducive to absence
– miss one class, miss a full week

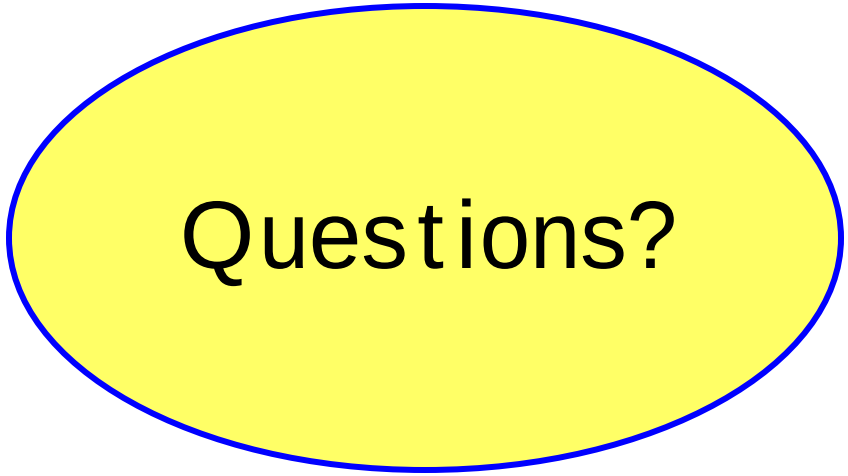
Lessons Learned:

- keep 3 hours Friday, add 1.5 hours Monday
- seminar for 1.5 hours M/F; team time for rest of F

Summary

- ✓ Encourage themed “working presentations”
- ✓ Incorporate personality and preference for teams
- ✓ Select liaisons who are excited and invested
- ✓ Provide detailed project descriptions
- ✓ Include activities to connect lectures with projects
- ✓ Use guest speakers to supplement the course
- ✓ Implement a grading rubric for major assignments
- ✓ Avoid scheduling on only Friday afternoons

- ✓ Communicate expectations clearly and often!


Questions?