

## Senior Project Teams: Increasing Productivity and Learning

Approaches from computer and software engineering  
Eric Durant, EECS  
MSOE Faculty In-Service  
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## Key Senior Design Goals

- Simulate a real project experience
  - But most students are not quite prepared for it
- Aspects
  - Project planning and risk management
  - **Presentations**
  - Appropriate documentation
    - **Weekly status memos**
    - **Deliverable documentation**
  - Dealing with clients
  - Seeking out experts
  - Developing additional expertise
  - **Self-directed teams**

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## Timetable

- Spring of junior year
  - Organizational meeting, form teams (encourage combinations with any engineering major, CE/EE/SE collaborations are most common)
  - Preliminary proposal by end of quarter
- Fall of senior year
  - Research problem and key technologies
  - Document requirements, perhaps begin prototyping, high level design, cyclic development
- Winter/Spring
  - Cyclic development: 3-5 week cycles, focus on demonstrable functionality, or other deliverable

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## Presentations

- 12-minute team presentation each quarter
  - Report on status and progress
    - Focus on technology in fall
- Developed rubric
  - Refined with faculty input over the last few years
    - Removed/combined various dimensions
  - Team and individual items
  - At least 3 faculty evaluate every presentation
  - Scores and comments aggregated and returned to instructors
    - Comments provided to teams
    - Different faculty pick up on different aspects resulting in enhanced feedback and, hopefully, fairer grading
  - See references for further details and inter-rater reliability analysis

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## Appropriate Documentation: Weekly Status Memos

- Goal
  - Summarize progress and demonstrate good project management while not introducing excessive overhead
- Key elements
  - Executive summary
  - Introduction
  - Status update (milestones met/not met, effort required)
  - Discussion (the core of the report, 1-6 paragraphs)
  - Plan update (what is next, given this week's progress?)
  - Conclusion

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## Appropriate Documentation: Deliverables

- Problem with old system
  - With 1 or 2 major reports per quarter, teams would spend excessive amounts of time and often produce reports that had no clear message.
    - Underlying causes?
      - Insufficient practice writing a large report, need to build up
      - Not enough feedback cycles (1 review/revision per report)
- Solution: decrease scope, increase frequency
  - Teams identify 3-5 “deliverables” per quarter and write a report for each
    - Must consider how each will fit into comprehensive documentation at end of project
  - Examples: research summary, requirements specification, demonstration of functioning subsystem, PCB layout

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## Hiccups With Deliverable Reports

- Have been using for two quarters
- Student feedback
  - Con: Requirements unclear
    - See specification and grading checklist (references at end)
  - Con: Late penalties not ironed out
  - Pro: Feedback/review cycle leads to improved report
- Advisor feedback
  - Pro: Steadier documented progress, but...
  - Con: Large slippage from committed deliverables
  - Con: Tracking multiple, different deadlines for each team

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## Self-directed Teams

- Goal: encourage critical evaluation of development process by increasing ownership of that process
- High-level goals are given to teams
  - General end-of-year expectations
  - A general path for getting there
    - Key dates on timeline, reports required
  - Lessons from past teams (*e.g.*, be proactive, limit scope)
  - *Purpose* of reports (presentations, deliverable reports, cycle reports, weekly status memos)
- Freedom to make changes, with advisor approval
  - Change cycle dates to fit deliverables
  - Change report format, if appropriate goals are defined and met

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## References

- Henry Welch, Deepti Suri, and Eric Durant, "Rubrics for Assessing Oral Communication in the Capstone Design Experience: Development, Application, Analysis and Refinement," *International Journal of Engineering Education (IJEE)*, 2008 (accepted 8/2007 and pending publication).
- Henry L. Welch, Deepti Suri, and Eric Durant, "Rubrics for Assessing the Capstone Design Experience: Development, Application, Analysis and Refinement," *Best Assessment Processes (BAP) VIII*, Session 59, Terre Haute, IN, February, 2006.
- <http://people.msoe.edu/~rothede/twiki/bin/view.cgi/SeniorDesign/StatusReports>
- <http://w3.msoe.edu/eecs/cese/sendes/course/GroupPresentationRubric.pdf>
- [gradingChecklistDeliverableReport.pdf](http://w3.msoe.edu/eecs/cese/sendes/course/gradingChecklistDeliverableReport.pdf)

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