Research, Teaching & Service: The Miniconference as a Model for CS Graduate Seminar Courses

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What keeps me up at night

- 3 graduating PhD students on job market:
  - Scott Pike – Fault Containment
  - Nigamanth Sridhar – Design Patterns
  - Chris Bohn – Model Checking
- 2 other affiliated students on job market:
  - Murat Demirbas – Sensor Networks
  - Jason Hallstrom – Software Product Lines
- *Do they know what they are getting into?*

Inadequacy in Preparation

Each level requires different skills:

- High school
  - take tests
- Undergraduate student
  - answer questions
- Graduate student
  - ask questions
- Faculty member
  - run a business

Our Idea

- Distill the "academic experience"
  - Create a course structure that captures all the essential elements
- Constraints
  - 1 course (10 weeks)
  - No sacrifice of technical content
  - Heterogeneity of audience
- We're bold, but also realistic
  - Preparing future faculty is a daunting task
  - Programs, workshops, panels, seminars, books, …
  - Our course structure is just one small step

The Miniconference Model

- During the term
  - Professor covers normal technical material
  - Students make some seminar presentations
  - Students carry out original research projects
- Seminar culminates in a "miniconference"
  - Call for papers is circulated
  - Papers are written and submitted
  - The class acts as the program committee!
    - Review (& critique) papers
    - Make accept/reject decisions
  - Accepted papers are presented

Past Miniconferences

- Sample projects:
  - Dynamic interceptor composition framework
  - Temporal component-based specifications
  - **Dynamic software module replacement**
  - Heuristics for distributed scheduling
  - Distributed discrete-event simulation app
  - Structured parallel programming techniques
  - **Distributed recording service for debugging**
  - Encapsulating concurrency for sequential reasoning
- Many accepted papers led to "real" publications

The Three Pillars

This model touches on all three aspects of academia:

- Research
  - Focused, graduate-level research project
  - Miniconference paper preparation & submission
  - Miniconference paper presentation
- Teaching
  - Seminar presentation to class
  - Topic chosen to relate to student's project
- Service
  - Professional service: paper reviewing
  - Professional service: program committee

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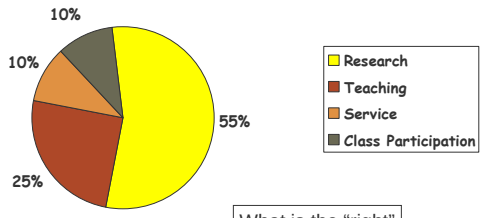
Mechanics: Grading Scheme



What is the "right" weighting?

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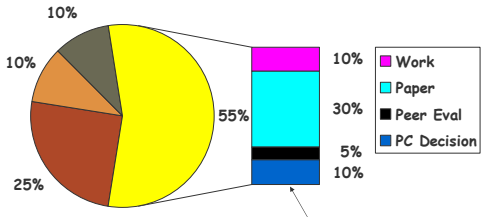
Mechanics: Grading Scheme



0 – hard reject
3 – soft reject
6-10 – presentation quality

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Mechanics: Paper Review

- Review metrics: specific and quantitative
  - A. Relevance
    - Category, audience, appropriateness
  - B. Presentation
    - 14 different metrics, scale of 1-10
  - C. Contribution
    - Importance, strengths, weaknesses, correctness
  - D. Conclusions
    - Overall recommendation, confidence level
  - E. Open-ended (private and public) comments
- Everyone reviews several (~3) papers

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Benefits of This Model

- Many similar approaches exist, with similar benefits
  - Writing skills
  - Oral presentation skills
  - Critiquing skills
- In addition, miniconference model reveals:
  - Insights into each of the "three pillars"
  - Inter-relationships among them

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Learning Gains: Research

- Writing a good research paper
  - Targeting a specific audience
  - Packaging the paper's contribution
- Giving a good research talk
  - Breadth and interests of audience
- Collaborative research and writing
  - Dynamics of writing a joint paper
- Mentoring junior students
  - In student-led projects, senior students can play the role of advisor

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Learning Gains: Teaching

- Potential synergies between research and teaching
  - Experience with research project improves student lectures
  - Preparing for lectures helps with project
- Contrast research talk and lecture
  - One is meant to instruct, the other to inform (and persuade, and sell)
  - Different evaluation forms used

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Learning Gains: Service

- Reviewing and critiquing peers' work
  - Authors see (anonymous) reviews
  - PC committee sees all (other) reviews
  - Note: PC committee consists (only) of authors!
- Behind-the-scenes look at PC decision process
  - Each submission discussed to reach consensus
  - No one has seen every paper
  - Outcome can be influenced by the right "champion"
  - Seriousness: outcome affects people's lives
  - Conflicts of interest: discussing competitors' papers

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Robustness of the Model

- We have tried many variations
  - Low vs high miniconference acceptance rates
  - Group vs individual projects
  - Professor- vs student-led projects
  - Long vs short revision windows
  - Relative weightings in grade distribution
- Other things we have not changed (yet)
  - Graduate-level seminar courses
  - Single-course scope for miniconference

In general, the model is surprisingly robust!

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Pointers for Success

- Specific, focused research projects
- Authentic CFP:
  - Firm deadline, page limits
  - Include typesetting requirements (ACM)
- Authentic conference:
  - Session chair imposing time limits
  - "Published" proceedings
- Focused quantified review templates
- End-of-term debriefing session

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Summary

The miniconference model for graduate seminars:

- Provides a microcosm of academia
- Introduces inter-relationships among research, teaching, and service
- Is surprisingly robust under variation
- Is worth trying!

What else might one add to this model?

- Proposal writing and funding (?)
- Promotion and tenure (???)
- Department/university citizenship
- The joy of advising students !

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- *They may be better prepared than most*

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