Goals for Math 147 Graduate Teaching Seminar

Marcia Groszek and Alex Barnett

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We gather together our goals for Dartmouth Mathematics Department's nationally-recognized graduate teaching seminar, Math 147. After a summary, we go into more depth on each.

1. **Main goal: Graduate students will become (even!) better teachers than the current Dartmouth mathematics faculty.** Math 147 (6 weeks plus the follow-up observations) is just the *start* of this process. With that said, by the end of Math 147, we want graduate students to:
   (a) understand certain things about *how* people learn mathematics (cognitive and social aspects);
   (b) be in charge of their own professional development: have a vision of themselves as a teacher and know how to improve their teaching;
   (c) have a range of specific teaching tools at their command.
2. There are some secondary goals as follows:
   (a) During Math 147, graduate students will work well closely in a group, and have fun doing so.
   (b) At Math Camps, the high school kids will enjoy being introduced to some high-level mathematical concepts.

Now for more detail on the above items in 1. These are goals to be achieved by the end of Math 147.

1 (a) How people learn mathematics

Graduate students will...

i) Use their knowledge of learning theory to design courses, lesson plans, and other content, and be able to explain *how* they do so. (Notice that this is one level of self-awareness beyond merely knowing how to make a good course, lesson plan, etc.)

ii) Be able to analyze critically their own teaching, and that of others, in light of their understanding of how people learn.

iii) Know the importance of *affective* elements of the learning experience, and address these elements in course and lesson plan design and implemenation. *Example: how to balance challenge vs support in the classroom atmosphere.*

iv) Know how to address the *diversity* of students in their classes, in particular the diversity of

I. learning styles

II. demographics

III. race and gender

IV. different levels of preparation,

and reflect this knowledge in their planning and teaching.

1 (b) Professional development

Graduate students will...

i) End the course with a teaching statement and portfolio. (The latter may include video clips.)

ii) Form a supportive group network that continues to talk about teaching with each other.

iii) Be able to demonstrate their ability in setting goals for themselves as teachers, evaluating their progress, and making specific plans for improvement.

iv) Be able to find and use resources to help them improve as teachers. *Examples: DCAL, teaching mentors, peers, literature, conferences.*

v) Know of the existence of research on teaching and learning, and be able to seek and find resources particular to their needs. *Examples: what is a good textbook for Math 20? How do students conceptualize "function," how does this change with mathematical level, and how can I facilitate this development? Where do I find computer demos to illustrate a particular concept?*

1 (c) Specific tools

Graduate students will be able to...

i) Design a course, its syllabus, and its lesson plans via the approach of "goals $\rightarrow$ evaluation $\rightarrow$ implementation."

ii) Use effectively, in the classroom and in the creation of course materials, the following elements of teaching:

I. lecturing (or more generally "presentation," encompassing voice, blackboard, interactivity, live demonstrations, computer and projector, etc)

II. cooperative learning (e.g. group activities, games, projects, ...)

III. writing activities

IV. projects

V. homework exercises

VI. exams and quizzes

Notice that these split roughly into in-class (the first 2-3 elements) vs beyond-classroom.

iii) Create and maintain an effective learning environment (in both cognitive and affective aspects)

iv) Know Dartmouth-specific expectations and resources that are key to high-quality teaching in their 3rd through 5th years.