# TEACHING SUMMARY

Daniel C. Cohen

I have been teaching mathematics at the university level since 1986, my first year as a graduate student. In this time, I have had the opportunity to teach courses ranging from calculus to graduate courses pertaining to my own research, to classes ranging in size from five students to two hundred.

Regardless of the level, in all my classes, I endeavor to share my excitement for, and appreciation of, mathematics with my students. In jest, I often tell my students that "math is not a spectator sport." Indeed, one of my principle objectives in any math course is to motivate the students into actively participating in the learning process, so that they can begin internalizing the key concepts of the course and and thus begin making these ideas their own.

To this end, I go to great lengths to demonstrate to my students that I care about how they are progressing in my courses. More often than not, classes begin with a discussion of homework problems. I also make a point of making myself available to students outside of class. I invariably make time to answer questions in my office, whether it be during my official office hours or not.

I also make a point of exposing my students to some of the history of mathematics. For instance, most students know that Newton developed many aspects of the Calculus. However, few are aware of his motivations, one of which was to understand the motion of the planets. I feel that mentioning facts such as this, even if merely in a passing remark made in class, adds texture to the course, and gives students an indication of why people care deeply about mathematics.

## Assessment Techniques

Student performance in undergraduate courses below the 4000 level is assessed using scores from quizzes and exams. Quizzes typically constitute 15% of the grade, hour exams 60%, and the final exam 25%. Quizzes are given frequently, closely reflect the homework, and provide students with regular feedback on their progress. In these courses, 3 or 4 exams are given. In addition to being an important tool for assessment, these also serve to reinforce the concepts of most importance in the course.

In the 4000 level and required graduate courses I taught, more detailed homework assignments took the place of quizzes, and constituted a larger percentage of the course grade.

In the seminar level graduate courses I have taught, assessment has been based primarily on participation and in-class presentations.

In addition to quizzes, exams, and written homework assignements, I have recently begun using the internet-based homework delivery package *WeBWorK* in undergraduate courses.

## Teaching History

| Course & Semester | | Title | Enrolled |
|---|---|---|---|
| Math 1550-19 | F-95 | Calculus I | 41 |
| Math 1431-07 | S-96 | Business Calculus | 39 |
| Math 1550-11 | S-96 | Calculus I | 40 |
| Math 1550-14 | F-96 | Calculus I | 31 |
| Math 1550-29 | F-96 | Calculus I | 39 |
| Math 2057-03 | S-97 | Calculus III | 39 |
| Math 2090-03 | F-97 | Elementary Differential Equations and Linear Algebra | 29 |
| Math 4200-02 | F-97 | Abstract Algebra | 13 |
| Math 2090-05 | S-98 | Elementary Differential Equations and Linear Algebra | 42 |
| Math 7590-01 | S-98 | Topics in Topology: Arrangements of Hyperplanes | 3 |
| Math 7999-10 | Su-98 | Readings in Topology: Differential Topology | 5 |
| Math 2057-05 | F-98 | Calculus III | 39 |
| Math 2065-01 | F-98 | Elementary Differential Equations | 37 |
| Math 1552-04 | F-99 | Calculus II | 35 |
| Math 1552-06 | F-99 | Calculus II | 28 |
| Math 7512-01 | S-00 | Topology II | 9 |
| Math 2090-03 | F-00 | Elementary Differential Equations and Linear Algebra | 29 |
| Math 2090-04 | F-00 | Elementary Differential Equations and Linear Algebra | 33 |
| Math 7590-01 | S-01 | Topics in Topology: Cohomology Theory | 5 |
| Math 2090-04 | F-01 | Elementary Differential Equations and Linear Algebra | 39 |
| Math 7999-09 | Su-02 | Readings in Topology: Morse Theory | 1 |
| Math 1550-38 | F-02 | Calculus I | 35 |
| Math 7520-01 | F-02 | Algebraic Topology | 7 |
| Math 1552-04 | S-03 | Calculus II | 33 |
| Math 7590-02 | S-03 | Topics in Topology: Cohomology Theory | 5 |
| Math 2057-04 | F-03 | Calculus III | 38 |
| Math 7590-01 | F-03 | Topics in Topology: Geometric Topology | 7 |
| Math 1550-12 | S-04 | Calculus I | 32 |
| Math 4153-01 | S-04 | Finite Dimensional Vector Spaces | 21 |
| Math 7999-14 | S-04 | Readings in Topology | 1 |
| Math 4999-04 | Su-04 | Undergraduate Readings in Mathematics | 1 |
| Math 7999-21 | Su-04 | Readings in Topology | 1 |
| Math 9000-22 | F-04 | Doctoral Dissertation Research | 1 |
| Math 7512-01 | S-05 | Topology II | 15 |
| Math 9000-23 | S-05 | Doctoral Dissertation Research | 1 |
| Math 9000-23 | Su-05 | Doctoral Dissertation Research | 1 |
| Math 2090-06 | F-05 | Elementary Differential Equations and Linear Algebra | 37 |
| Math 7590-01 | F-05 | Topics in Topology: Geometric Topology | 13 |
| Math 7999-12 | F-05 | Readings in Topology | 1 |
| Math 9000-22 | F-05 | Doctoral Dissertation Research | 1 |

Syllabi may be found at my web page, `http://www.math.lsu.edu/~cohen`.

## Instructional Contributions

In Fall 1997, one student took my MATH 4200, Abstract Algebra course with Honors. This "honors option" consisted of the student pursuing individually selected topics which arose in the course, but were not (fully) developed there. These topics, which I chose guided in part by interests expressed by the student, included the Chinese Remainder Theorem, Public Key Encryption, and the Fundamental Theorem of Algebra. I used the last of these to serve as an introduction to functions of one complex variable.

As indicated above, the focus of the topics course I taught in Spring 1998 was on arrangements of hyperplanes. This course provided an introduction to topological and combinatorial aspects of these objects, and the relationship between these aspects. Within this framework, I also used the course to introduce a variety of related topics, including braid theory, stratified Morse theory, Fox's free differential calculus, etc.. At the request of several students in this course, I directed a Reading Course in the following semester (Summer 1998). The focus of this reading course, which also attracted a number of students from outside my topics course, was on Differential Topology, one of the subjects which arose in the topics course. I subsequently directed a number of other reading courses, both at the graduate and undergraduate levels.

Based on my experiences with the course in Fall 1997 and Spring 1998, I administered a revision of the syllabus for MATH 2090, Elementary Differential Equations and Linear Algebra, in Summer 1998, together with several colleagues in the Mathematics Department, and in cooperation with a committee from the Electrical Engineering Department.

In the 2002-2003 academic year, I taught sections of Calculus I and II geared towards students in the new IT Residential College. In these sections, the standard Calculus curriculum was augmented by computer-based lab assignments using the symbolic computation program *Mathematica*, and by exposure to the internet-based homework delivery package *WeBWork*. The *Mathematica* labs, which provided students with both an additional perspective on the subject matter, and a powerful tool for use in this course and subsequent courses, were developed with Professor N. Stoltzfus, who taught analogous sections of Calulus I.

In Spring 2004, I integrated the internet-based homework delivery package *WeBWorK* into both my Calculus I course (MATH 1550) and my senior-level Linear Algebra course (MATH 4153). In both courses, students were given regular (computational) homework assignments using this package, which provides immediate feedback. In the Calculus course, this gave students strong encouragement to work regularly with the material, while in the linear algebra course, the computer-based homework assignments augmented other, more conceptual homework problems assigned from the text. Responses from students in both classes were very positive, and I plan to continue using *WeBWorK* in future undergraduate courses.

I have written and administered the Department of Mathematics Graduate Core II Topology Exam on several occasions.

## Mentoring

Thesis Advisor and General Examination Committee Chair for C. Egedy, Department of Mathematics, 2005–present.

Thesis Advisor and General Examination Committee Chair for G. Pruidze, Department of Mathematics, 2003–present.

Advisory Committee Chair for G. Tripathi, Department of Mathematics, 2005.

Communicating Mathematics Mentor for M. Cohen, Department of Mathematics, 2005.

Minor Professor, Graduate Student Advisory Committee for L. Moscovich, Department of Computer Science, 1999-present. Mr. Moscovich defended his Ph.D. thesis in Fall 2004.

Member, General Exam Committee and Doctoral Exam Committee for G. Cazucu, Department of Mathematics, 2001–present.

Member, General Exam Committee and Doctoral Exam Committee for M. Holcomb, Department of Mathematics, 2001–2003.

Communicating Mathematics Mentor for G. Pruidze, Department of Mathematics, 2003.

Member, General Exam Committee for R. Cazucu, Department of Mathematics, 2002.

Member, Doctoral Exam Committee for A. Cruz, Department of Mathematics, 2000.

Communicating Mathematics Mentor for R. Dutsch, Department of Mathematics, 2000.

Dean's Representative, General Exam Committee and Doctoral Exam Committee for R. Arts, Department of Industrial and Manufacturing Systems Engineering, 1999–2000.

## Teaching Evaluations

The evaluations below come from twelve standard questions formerly used by all faculty in the Department of Mathematics, College of Arts and Sciences. These questions are answered by students based on the scale of A = 4, B = 3, C = 2, D = 1, and E = 0, with A being the highest. The answers are grouped together to form the following scores:

**Technical Quotient (TQ)**: the average of the instructor's scores on the following questions.

| | | | |
|---|---|---|---|
| Well Preparedness | Proper Grade Emphasis | Timely Test Returns | Fair Grades |
| Budgets Time Well | Blackboard Technique | Time to Ask Questions | |

**Attitude Quotient (AQ)**: the average of the instructor's scores on the following questions.

| | | | |
|---|---|---|---|
| Clear Presentation | Evokes Interest | Concerned | Overall Rating |

**Overall Rating (Rating)**: the average of the instructor's score on the question "Overall, how would you rate your instructor as a teacher?"

My scores are listed in the table below. When another section of the same course was taught in the same semester, the average scores for all sections are given as well.

| Course, Section, and Semester | TQ Cohen | TQ all sections | AQ Cohen | AQ all sections | Rating Cohen | Rating all sections |
|---|---|---|---|---|---|---|
| Math 1550-19 F-95 | 3.62 | 3.27 | 3.42 | 2.79 | 3.68 | 2.96 |
| Math 1431-07 S-96 | 3.11 | 3.55 | 2.36 | 3.34 | 2.62 | 3.45 |
| Math 1550-11 S-96 | 3.44 | 3.37 | 2.89 | 3.12 | 3.19 | 3.26 |
| Math 1550-14 F-96 | 3.55 | 3.27 | 3.55 | 2.86 | 3.71 | 3.00 |
| Math 1550-29 F-96 | 3.76 | 3.27 | 3.54 | 2.86 | 3.62 | 3.00 |
| Math 2057-03 S-97 | 3.34 | 3.44 | 2.95 | 3.17 | 2.92 | 3.29 |
| Math 2090-03 F-97 | 3.69 | 3.53 | 3.58 | 3.40 | 3.75 | 3.47 |
| Math 4200-02 F-97 | 3.95 | 3.70 | 3.81 | 3.56 | 4.00 | 3.71 |
| Math 2090-05 S-98 | 3.82 | 3.59 | 3.70 | 3.48 | 3.88 | 3.67 |
| Math 7590-01 S-98 | 3.95 | | 3.92 | | 3.67 | |
| Math 2057-05 F-98 | 3.52 | 3.10 | 3.27 | 2.74 | 3.46 | 2.84 |
| Math 2065-01 F-98 | 3.46 | 3.38 | 3.32 | 3.13 | 3.45 | 3.31 |
| Math 1552-04 F-99 | 3.56 | 3.44 | 3.45 | 3.14 | 3.67 | 3.30 |
| Math 1552-06 F-99 | 3.75 | 3.44 | 3.49 | 3.14 | 3.76 | 3.30 |
| Math 7512-01 S-00 | 3.82 | | 3.73 | | 3.80 | |
| Math 2090-03 F-00 | 3.36 | 3.47 | 3.16 | 3.33 | 3.33 | 3.46 |
| Math 2090-04 F-00 | 3.59 | 3.47 | 3.41 | 3.33 | 3.59 | 3.46 |
| Math 7590-01 S-01 | 3.67 | | 3.64 | | 3.86 | |
| Math 2090-04 F-01 | 3.39 | 3.44 | 3.09 | 3.16 | 3.28 | 3.33 |
| Math 1550-38 F-02 | 3.48 | 3.34 | 2.97 | 2.97 | 3.06 | 3.08 |
| Math 7520-01 F-02 | 3.95 | | 3.92 | | 4.00 | |

The evaluations below come from the question "Overall the instructor was an effective teacher" currently used by all faculty in the Department of Mathematics, College of Arts and Sciences. This question is answered by students based on:

| strongly agree | agree | undecided | disagree | strongly disagree |
|---|---|---|---|---|
| 5 | 4 | 3 | 2 | 1 |

| Course, Section, and Semester | | Cohen | All Math Courses |
|---|---|---|---|
| Math 1552-04 | S-03 | 4.29 | 4.28 |
| Math 7590-02 | S-03 | 5.00 | 4.28 |
| Math 2057-04 | F-03 | 3.97 | 4.31 |
| Math 1550-12 | S-04 | 4.41 | 4.33 |
| Math 4153-01 | S-04 | 4.46 | 4.33 |
| Math 7512-01 | S-05 | 4.91 | 4.36 |

## Comments from Teaching Evaluations

With the student evaluations discussed above, the Mathematics Department includes an Evaluation Comment Sheet. Transcribed below are *all* comments concerning the teacher from these sheets for several of my recent classes at various levels. The next pages contain remarks made by Professor P.N. Kirk, a member of the LSU Physics and Astronomy Department, who audited my MATH 7512 Topology II course in Spring 2000, and Michael Sherman, who was a student in my MATH 2090 Elementary Differential Equations and Linear Algebra course in Fall 2000.

**MATH 1550-29 Calculus I Fall 1996**

- Exceptional teacher - I learned a lot in his class!
- Dr. Cohen is the best teacher I have ever had, in any subject. He took lots of extra office hour time with me and encouraged my further exploration into related mathematical questions and subjects. He grades very fairly, and is generous in giving points when the calculus is right but the answer is wrong because of algebra, etc..
- Very good
- Great
- Excellent teacher
- He is a great teacher. He presented all info on [illegible]
- . . . is a great person and enjoyable to be around. I would take another class taught by him
- Excellent instructor
- Better than other teachers
- He's alright. He understands what he's teaching and presents the material clearly - sometimes he runs over classtime though which conflicted with my next class.
- Good knowledge of subject matter. Has student concern.
- Good teacher. But to damn hard
- Good job; he was easy going and fair and explained everything clearly and answered any questions
- Okay, gives hard test which is okay but then curves so you're not really learning.
- Kudos for Dan Cohen. Although I lacked in homework completion, by coming to class and paying attention I still learned a great deal.
- Nice. I enjoyed this course. He can explain problems clearly.
- Excellent teacher

**MATH 4200-2** **Abstract Algebra** **Fall 1997**

- Very exciting.
- Excellent. Very well prepared and fair.
- Very good, concerned about the students, good at his job.
- Overall, probably the best teacher I've had at LSU. Good instructor, very personable, and is understanding when you have problems.
- One of the best I've encountered at LSU. Really concerns himself with students and goes well out of his way to accomodate and help them.

**MATH 1552-6** **Calculus II** **Fall 1999**

- The teacher presented the material as clearly as possible.
- He's an overall good teacher
- I like Dr. Cohen. I feel he did a good job teaching. If I had to take another math I feel prepared.
- $2^{nd}$ best teacher of my life. Very good course - enjoyed it very much
- Cool teacher
- Dr. Cohen was very interesting and a great teacher.
- Very intelligent, well organized.
- Uses interesting techniques in teaching material.
- Knows material well.
- Good teacher, explains well and is fair in grading.
- Well prepared! Presents material clearly
- Prof. Cohen is an excellent teacher. He speaks clear and delivers the material well. He has a good sense of humor.
- Very good, teaches well
- Excellent and enthusiastic
- Excellent teacher but could be more understanding/helpful students don't get something right away.
- Very good teacher
- He is a good teacher. Course was tough, but fun.

**MATH 7512-1** **Topology II** **Spring 2000**

- Converging to perfect. Very friendly and organized.
- Excellent.
- He is very considerate.
- Very good teacher. He is concerned about students learning. I would like to take another course in future.
- Is good in teaching. But the subject is too abstract to understand
- Excellent!! Perhaps the best I had so far. Very good chalkboard technique, very good explanations, very good teacher in general. And most of all he is human. Very interesting course. This fact of course became obvious to me because Dr. Cohen taught that class. He showed that Mathematics can be a social activity too, something that most of the professors here I believe they don't know.

**MATH 2090-4** **Elementary Differential Equations and Linear Algebra** **Fall 2000**

- Very thorough, can relate to material well
- Dr. Cohen is a good teacher. I enjoyed this course.
- Good teacher. Very well prepared and knowledgeable of the subject.
- Really knew the material
- Kinda quirky. Not too bad as math teachers go.
- Great teacher, funny, like format of class.
- Excellent
- Great, organized (not a lot of that going around)
- He is great. A nice course.
- Great teacher, wish there were opportunities for extra credit, but that's just a wish.
- Good
- Prof. Cohen was a good, well prepared teacher who taught very well.
- He is cool.
- Dr. Cohen is a very good teacher. Well-versed in his math and teaching skills.
- Excellent
- Teaches very well, but could use more and different examples.
- Good teacher for this course.
- Mr. Cohen did a great job of explaining the subject matter to me. I was pleased by the way he derived everything we had do know rather than throwing tons of formulas at us for memorization. The repetitiveness in which he taught really drove home the important facts.
- Prof. Cohen was my teacher for Math 1552 also. I enjoyed him very much then and that is the reason I am in this class with him now... He is an excellent teacher and I find that I have learned a great deal from him. He is very fair and he has a nice presentation. I don't think students are intimidated or afraid to speak to him... (THANK YOU)

*Campus Correspondence* LOUISIANA STATE UNIVERSITY

From: P.N. Kirk
Physics and Astronomy

Date: May 10, 2000

To: Ron Retherford, Chairman
Department of Mathematics

Guillermo Ferreyra, Chairman-elect
Department of Mathematics

During the preceding few years I have become increasingly convinced that the dynamical laws of physics, as well as some static properties of matter, will ultimately be understood from within the framework of geometry. I am neither the first nor the only physicist who subscribes to this point of view. Indeed, an increasingly large number of physicists have become interested in the possibility, and now there is an entire journal devoted to the relation between geometry and physics. For this reason, beginning in the fall of 1999, I decided to embark upon a study of geometry, which in the current context means topology and differential geometry. During the spring semester of 2000, I asked, and was granted, permission to audit Professor Dan Cohen's class entitled "Topology II". I attended every lecture, and at the end of the semester, Professor Cohen asked me for a candid assessment of his conduct of the course. I attempted to respond throught the normal mechanism for such assessments, the course evaluations which are handed out at the end of each semester, but unfortunately the young man who had been asked to collect responses was in a bit of a hurry. I could not complete my remarks without inconveniencing him and decided to submit my evaluation in this way. Consequently, this note replaces my abbreviated remarks which should be found among the other course evaluations.

Not only was subject matter of Topology II exquisitely beautiful, but the elegance of the subject was immediately evident to the students. This is not to say that the material was easy to master because it was not, and several members of the class felt themselves stretched beyond their limits. Nonetheless the students maintained interest in the material from the first lecture through the last.

The lectures themselves were well paced, well organized, and well delivered. Professor Cohen is precise in speech and good-humored. He was careful to define terms prior to their use. I do not feel qualified, however, to comment on the most important function of an instructor – the selection of material. I do not have the experience to know whether or not the material presented in these lectures was appropriate and must defer to the collective opinions of your faculty in this regard.

Topology II is probably not, however, a useful vehicle for evaluating Professor Cohen's commitment to instruction, as opposed to his aptitude for instruction. I doubt that there was a single time during this semester when his merely walking into the room was an act of high courage. The intellectual elegance and grace of the subject matter that sustained the students throughout the semester also sustained Professor Cohen, I suspect, and I doubt that even once was he called upon to summon forth inner reserves of professionalism, devotion to duty, or even personal pride in a job well done. For evaluation of his commitment to instruction perhaps it would be better to see how he fares when teaching freshman algebra to the jaded and reluctant sons and daughters of a wealthy house.

From a broader perspective, though, it seems to me that attention to the mechanics of teaching is a bit misplaced. One of the most distinguished American physicists, Murray Gell-Mann, when asked what he thought of American education, replied that he didn't think much of it at all because, he said, in the end there is no teaching, there is only learning. Gell-Mann's commentary is certainly applicable to physics, which is a subject that cannot be taught in the conventional sense of the word, and I suspect that it may be more applicable to other subjects than we might care to admit. However useful the evaluation of formal instruction may be for political purposes, teaching is, at least in my opinion, largely an illusion. It is a popular and comforting illusion to be sure, but it is an illusion nonetheless. Professor Cohen did not teach us topology; rather he created and maintained an atmosphere from within which learning was not only possible but a pleasure, and I can't think of a higher compliment.

From msherm2@lsu.edu Thu Nov 20 15:21:22 2003
Date: Sat, 3 May 2003 00:08:54 -0500
From: Michael P Sherman <msherm2@lsu.edu>
To: cohen@math.lsu.edu
Subject: Catch-up

Dr. Cohen,

I don't know if you remember me, but I took your 2090 class in Fall of 2000 (made an A, barely I think). That was quite a while ago, but I have been reminiscing a bit and just wanted to let you know that I am going to graduate in August in Computer Engineering, with minors in math and computer science. I'm taking graph theory right now with Professor Delzell. That's going pretty well.

Your class was required for my degree, and I've taken a couple of other required math classes since then, but I wanted to let you know that you inspired me to pursue more math than just what was required. Whenever I talk to other people about LSU or my education there, I always mention how great the math department has been. It seems that no other department I have been through (and I've been through a bunch, trust me) has had better teachers. Now that I'm near the end of my undergraduate degree, I can look back and say without a doubt that you were one of my best and favorite teachers. I honestly feel that I learned some math in your class (and that there is so much more to be learned!), and I really do appreciate it.

After graduation, I plan on taking some time off before applying to grad school. Although I may take a few classes at LSU here and there. I really want to study robotics, but I am uncertain because I do have broad interests encompassing computer science, math, and engineering. Of course, they all fit well together. Mostly, I think I've decided that I want to become a professor.

I hope that I will have the opportunity to take another of your classes in the future. Thank you for being a good teacher.

Sincerely,
Michael Sherman