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TO: Jaye Padgett, Chair
        Committee on Educational Policy

FROM: Chongying Dong, Chair
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RE: Feedback on General Education Reform

Mathematics – Disciplinary Communications in the Major

I. Educational Objectives
The objectives of mathematics education at UCSC is to provide students with an understanding of mathematical knowledge and thoughts, the ability to communicate mathematics, and the preparation to use these skills in the advanced study of science and careers requiring expertise in mathematics. Mathematical writing – technical writing and effective presentation of mathematics is essential in achieving educational goals.

Writing
1. Students should be able to communicate mathematical concepts and reasoning effectively.
2. Students should be able to write rigorous proofs.
3. Students should be able to write a short paper on a particular problem or a conjecture.

Speaking/Presentation
1. Students should be able to give a presentation on an important theorem, or a well-known mathematical problem, or a famous conjecture.
2. Students should be able to explain how to solve a mathematical problem clearly and concisely.

II. How the Educational Objectives Are Met in the Curriculum?

List of courses committed to disciplinary communication objectives:
While writing proofs is a skill required for almost all the upper division courses for all the majors, a special emphasis is given in the following courses. All mathematics majors are required to take Math 100, Math 194 (or Math 195).
Math 30: Mathematical problem solving
Math 100: Introduction to proofs and problem solving
Math 194: Senior seminar
Math 195: Senior thesis

How each course contributes to the objectives?
1. Math 30. Students learn techniques of problem solving such as inductions, contradiction, analogy, generalization and others in the context of solving problems drawn from number theory, probability, combinatorics, graph theory and geometry. Students are asked to write rigorous proofs of relatively simple statements.
2. Math 100. Students learn the basic concepts and ideas necessary for upper division mathematics and techniques of mathematical proofs: logics, set theory, counting principles, functions, relations and number theory. Students are required to provide proofs of general mathematical statements. This course teaches students how to solve problems using axioms, definitions and

theorems. The challenge is to write a well-organized and step-by-step proof of some well-known results.

3. Math 194. Students learn how write a mathematical paper on topics which are not covered normally in standard classes. Students are required to write a thesis and to present a lecture on it to the class.

4. Math 195. Students study on a particular problem under the guidance of a faculty sponsor and write a senior thesis.