CAL POLY

September 2008

MATH 258 Methods of Proof in Mathematics Laboratory

1. Catalog Description

MATH 258 Methods of Proof in Mathematics Laboratory (1) (CR/NC)

Facilitated study and discussion of the methods and techniques of proof in mathematics. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 248.

2. Required Background or Experience

Concurrent enrollment in the associated section of Math 248.

3. Learning Objectives

The student should:

a. Achieve the course objectives of Math 248 at a higher level of understanding and with improved performance and self-confidence. The learning objectives of MATH 248 are: To read and write proofs of elementary propositions in set theory, number theory, geometry, analysis, and algebra.
b. Communicate and interact with peers on a sophisticated mathematical level.
c. Develop a sense of community with fellow classmates.

4. Text and References

The course supervisor has several possible texts and supplemental texts for the course. Some of the most appropriate ones (in alphabetical order) are:

1. Schumacher, Carol, Chapter Zero, 2nd ed., Addison-Wesley, 2000.
2. Schwartz, Diane Driscoll, Conjecture and Proofs, Brooks/Cole, 1996.
3. Smith, Douglas, Eggen, Maurice, and St. Andre, Richard, A Transition to Advanced Mathematics, 6th ed., Brooks/Cole, 2006.

5. Minimum Student Materials

Paper, pencils and notebook.

6. Minimum University Facilities

Classroom with ample chalkboard space for class use.

7. Content and Method

The laboratory is conducted under the guidance of a student facilitator who also attends the associated lecture. During the lab, which meets after the lecture, the facilitator provides enrichment activities designed to improve student performance and self-confidence in mathematics. The activities are chosen to match and amplify the topics discussed in lecture. These topics are:

a) **Logic and Proofs**
Propositions, connectives, truth tables, conditionals and biconditionals, tautologies, quantifiers, negations, methods of proof (including mathematical induction).

b) **Set Theory**
Basic notions, set operations, power sets, indexed families of sets, proving theorems about sets.

c) **Relations and Functions**
Cartesian products, relations, equivalence relations, partitions, basic notions of functions, composition, injections, surjections, bijections, inverse functions, cardinality, proving theorems about functions.

d) **Topics in Analysis**
Sequences, limits of sequences and functions, continuity, monotonic sequences, integration.

Method
Supervised work both individually and in small groups, facilitated discussions, oral presentations, practice examinations.

8. Methods of Assessment

The primary methods of assessment of student learning are team-based activities, oral presentations, in-class problem sets, quizzes, and mock exams. All of these assessment methods will be used to establish whether the student has achieved the learning objectives listed above. Credit will be awarded on the basis of attendance, participation, and a grade of C- or better in the corresponding section of Math 248.