# Annual Assessment: B.S. in Mathematics-Applied Mathematics Option
# M455
# AY 2012-2013

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This report summarizes assessment of M 455 with regard to the Applied Mathematics Option and the rubric

- (Outcome 1) Use rigorous mathematical reasoning or computations to establish fundamental applied mathematics concepts.

There were 14 students In the spring 2013 M455 class that finished and received a letter grade. Out of these seven students were Applied Math or Mathematics majors. For the assessment a copy of the final exam was used. In particular, two problems was designed to comprehensively test both mathematical reasoning and ability to do computations to establish a fundamental concept. The first problem asked to analyze dynamics of one-dimensional map using a Markov partition, proving that the system is chaotic and computing invariant natural measure. The second problem asked to prove that a chaotic attractor cannot contain a sink.

**Results:**

| | Exceptional | Acceptable | Marginal | Unacceptable |
|---|---|---|---|---|
| Computational skills | 3 | 3 | 1 | 0 |
| Mathematical reasoning | 5 | 0 | 1 | 1 |
| Overall | 4 | 2 | 1 | 0 |

**Conclusions**

The overall outcome of the assessment was positive. In the future, more emphasis should be placed on rigorous mathematical reasoning. In particular, some of the proofs of

the second problem were not written sufficiently rigorously. In the first problem, students correctly used Sharkovskii theorem, but during the semester they often used in wrong context i.e. in two dimensional maps.