Annual Assessment: B.S. in Mathematics-Applied Mathematics Option
M454
AY 2012-2013

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This report summarizes assessment of M 454 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 26 students In the fall 2012 M454 class that finished and received a letter grade. Out of these eight students were Applied Math or Mathematics majors. For the assessment a copy of the final exam was used. In particular, one problem was designed to comprehensively test both mathematical reasoning and ability to do computations to establish a fundamental concept. The goal was to analyze a pair of nonlinear differential equations in the plane by phase plane analysis. Specifically, the question tested the ability to compute equilibria, analyze behavior in their neighborhood by constructing the linear approximation, and then argue using index theory, Poincare-Bendixson theory and Dulac's criterion existence of periodic orbits in specific subregions of the phase plane.

Results:

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

Conclusions

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

recognize which parts of the phase plane analysis are rigorous and which are not; they must better understand what had been proven, and what is just a result of additional arbitrary assumptions they made when they drew a phase portrait.