Date: January 20 2015
To: SEN
From: Doreen Mattingly
Subject: Class Size Task Force

Information:

SDSU University Senate Class Size Task Force, Final Report (with modified budget estimates)
January 15, 2015

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INTRODUCTION

The general charge for this Task Force was to examine the potential policy implications of the Class Size report created in Spring 2014. . The Class Size report noted an across-the-board increase in class sizes between 2001 and 2013, with significant impacts on student learning. The Task Force considered whether the data presented in the Report suggested the need for some form of intervention.

The Task Force met weekly during the Fall semester, 2014. We agreed that our mission was not to consider across-the-board changes in class sizes, but rather to recommend targeted interventions that had the potential to make significant improvement in student learning. In our deliberations, we consulted research about class size and student learning and spoke with campus experts, including Janet Bowers (Professor of Math Education), Cathie Atkins, (Associate Dean, College of Sciences), and Jane Abbott (Director of Compact Scholars). Our recommendations are guided by three principles: *equity, impact*, and *assessment*. In terms of *equity*, we sought interventions that were evenly distributed among students (not departments or colleges). In terms of *impact*, we endeavored to recommend changes with maximum potential to influence student learning and success, so that any additional resources required might be used efficiently. Finally, all of our recommendations are designed to be rigorously *assessed*.

With these guidelines in mind, we narrowed our focus to two types of possible interventions: 1) reduction in the size of classes at the very beginning of a student's education, where foundations of learning are established; and 2) reduction in the size of classes at the very end of a student's education, where specific skills are mastered. While we agreed that small classes are important in

both areas, we opted to prioritize the first because of the vital role of basic writing and quantitative skills in student persistence and overall learning. In this respect, our recommendations support the priorities of Academic Affairs and fit squarely into the list of "Opportunities for Improving Student Retention, Graduation, and Achievement" identified in the recent report from the Academic Planning and Policy (AP&P) Committee and the Undergraduate Council. Our recommendations also help the University to achieve a key goal in the SDSU strategic plan:

Student Success Goal: San Diego State University will continue to focus on Student Success by emphasizing high-impact practices that produce transformational educational experiences and by fostering an institutional culture that recognizes and rewards student achievement.

The Task Force recommendations therefore focus on two areas of the General Education Curriculum: Composition and Quantitative Reasoning. The basic recommendations are summarized below; the following pages include more detailed information, including the rationale and plans for assessment. Both recommendations have been discussed with appropriate deans (Paul Wong, Dean of the College of Arts and Letters, and Stanley Malloy, Dean of the College of Sciences) and with Academic Affairs; all have endorsed the recommendations in principle.

Summary of Task Force Recommendations

1. Reduce the size of classes fulfilling the Composition and Intermediate Composition and Critical Thinking General Education Foundations requirements (I.2 and I.3) from 30 to 18.
2. Reduce the size of recitation sections to a maximum of 30 and increase the contact time from one to two hours in lower-division mathematics and statistics courses for STEM majors.

We see the specific changes presented here as but the first steps in an ongoing process to ensure that decisions about class sizes will improve student learning. The end of the report contains our suggestions for future areas to be considered, including class reduction within capstone courses for each major.

DISCUSSION

<u>Recommendation1:</u>
We recommend that enrollment in first-year composition courses—which satisfy GE Communication and Critical Thinking 2 (Composition) and 3 (Intermediate Composition and Critical Thinking)—be decreased from 30 to 18.

If there is insufficient funding in first year to implement this recommendation, we suggest reducing all classes to 24, with provision of sections of 18 students for targeted groups of high-risk students (e.g., EOP, Compact Scholars, commuter students).(A complete list of these courses can be found in Appendix A.) Alternate methods of phasing in the changes may be determined to

be more appropriate, although urge that the proposed class limit be realized when additional funding is secured.

Decreasing the size of GE writing classes would allow instructors to significantly enhance writing instruction through the following steps:

- Increase the number of both small and major writing assignments
- Provide more opportunities for editing and revising writing assignments
- Generate more feedback on writing assignments
- Return graded work more promptly, thus enabling students to apply suggestions for improvement to future assignments more effectively
- Schedule more conferencing appointments with students outside of class
- Maximize student participation in class discussions. A larger percentage of students will contribute in a smaller course
- Participate in robust assessment leading to meaningful "closing the loop" steps

Cost:
The estimated annual cost (based on 2014-15 data) of capping all classes at 18 is $1,197,192. This will pay for instructors to teach 179 additional sections. It is estimated that all but 15 of these sections will be taught by lecturers; most departments already employ all available TAs. (A table providing a detailed breakdown by class and semester can be found in Appendix B.)

The estimated annual cost of capping all classes at 24 is $374,796, which will pay for 57 additional sections.

Rationale:
For the following reasons, this reduction will be an important step in improving student success across the University:

- The professional standard for college writing courses dictates that "No more than 20 students should be permitted in any writing class. Ideally, classes should be limited to 15."[1]
- In studies assessing the impact of class size on student learning, 20 students is a critical threshold, beyond which student learning decreases. These findings are reflected in rankings of universities, which include measures of the number of classes under 20.
- Improving basic writing and critical thinking skills will decrease time to degree by strengthening student skills that will enhance their success in later classes.
- As the work of George Kuh and others demonstrates, writing-intensive classes are a high-impact practice that has been widely tested and shown to be beneficial for college students from many backgrounds.[2]

[1] "Statement of Principles and Standards for the Postsecondary Teaching of Writing," Conference on College Composition and Communication" (http://www.sandhills.edu/academic-departments/english/teaching/cccc-writing.html).

[2] Horning, Alice. "The Definitive Article on Class Size." *Writing Program Administration* 31.1-2 (2007): 11-34 (http://wpacouncil.org/archives/31n1-2/31n1-2horning.pdf).

- These two areas of General Education (Composition and Intermediate Composition and Critical Thinking) affect the vast majority of San Diego State students; thus the intervention will be broadly distributed.

Response to Faculty Survey

This recommendation responds to the 2013 survey of faculty about class size in the following ways:

- The greatest increases in class size occurred at the 100 and 200 level. Between 2001 and 2013, the number of lower-division courses smaller than 25 decreased from 1006 to 246.
- 25% of all faculty completing the survey and 35% of those teaching upper-division classes volunteered the insight (when asked about impact of class size increases on student learning in general) that student writing ability declined.
- Across the board, faculty reported that writing assignments have become shorter and less frequent as class size has increased. In particular, 86% of those teaching upper-division writing courses and 65% of those teaching upper-division courses (GE and non-GE) reported a decrease in the frequency and/or length of writing assignments. The reduction in opportunities to build writing skills in other classes increases the importance of first-year composition courses.
- 72% of all faculty completing the survey reported that they have reduced the feedback they give students. Smaller first-year writing classes will provide an opportunity for instructors to give students much-needed feedback.

Assessment

In 2012-13, the College of Arts and Letters created, tested, and finalized a rubric for assessing the four primary Communication and Critical Thinking goals essential to the Composition and Intermediate Composition and Critical Thinking courses offered by Africana Studies, American Indian Studies, Chicana and Chicano Studies, Linguistics, Philosophy, and Rhetoric and Writing Studies. The goals and the complete rubric are included in Appendix C of this report. In Spring 2014, student achievement in Composition and Intermediate Composition and Critical Thinking courses for 2013-14 within CAL was assessed using the rubric developed the previous year. The assessment included independent scoring of 224 randomly selected papers by two different reviewers.

Communication & Critical Thinking – Assessment scores

	100 level				200 level			
	Goal 1	Goal 2	Goal 3	Goal 4	Goal 1	Goal 2	Goal 3	Goal 4
Below	0	0	0	0	0	3%	0	0
Beginning	1%	3%	4%	5%	1%	2%	3%	6%
Developing	20%	33%	26%	28%	23%	25%	25%	28%
Proficient	55%	46%	48%	50%	47%	45%	40%	46%
Advanced	24%	18%	22%	17%	29%	25%	32%	20%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%

All involved departments are committed to using the same rubric and methodology to annually assess the changes in learning outcomes in smaller classes.

Targets for Improved Student Learning in Composition and Intermediate and Critical Thinking Courses:

- Intermediate Composition and Critical Thinking courses: In 2013-14, students exhibited a level of achievement in Intermediate Composition and Critical Thinking courses that too closely resembles student performance in the Composition courses that precede them in the curriculum. Thus, the target is to have at least 50% of Intermediate Composition and Critical Thinking students in the category of "advanced" and 40% in the category of "proficient" over the four goals, with no more than 10% "developing" or below.

Composition courses: The goal is to have at least 40% "advanced" and 40% "proficient" over the four goals in Composition courses, with no more than 20% at "developing" or lower. These levels of achievement, we believe, will help us reach the ambitious benchmarks we have set for student learning in Intermediate Composition and Critical Thinking courses.

Recommendation 2:

We recommend changes to the size and structure of teaching-assistant-led sections in selected Mathematics courses that satisfy the GE Foundations Quantitative Reasoning requirement.

To improve student learning in these courses, we propose an integrated set of changes that includes a new format for breakout sections and a reduction in their size. Lecture size will range between 90 and 150, roughly what it is now.

- Breakout sections will range from 20 to 30 students, compared to the current size of 40.
- Each breakout section will meet two hours per week, but will be classified C7 so that it counts as one unit.
- Breakout sections will employ problem-based active learning.
- Teaching assistants will be trained in active-learning pedagogy, and thoroughly supported and mentored during the semester.
- Teaching assistants will be responsible for two sections. Each teaching assistant will be responsible for a maximum of 50-80 students, compared to the current maximum of 160-240.
- Teaching assistants will also work for four hours per week in the Math Learning Center, which will meet the majority of its staffing needs.

The proposed changes would be made in a series of phases. They are being piloted in Precalculus (Math 105 and Math 141) in Spring 2015, and *Phase 1* of the changes will be the complete implementation for Precalculus in Fall 2015. *Phase 2* will address the freshman calculus sequence Math 150, Math 151. These classes are the top priority because they have high DFW rates and are prerequisites for advanced courses in most Sciences and Engineering departments. *Phase 3* will address advanced Math and Statistics service courses: Math 252, Math 245, Math 254, and Statistics 250. The results of the first and second phase will be evaluated to determine the most cost-effective way to include breakout sessions with active learning in these classes. *Phase 4* will develop strategies for service courses addressed to a broader student population: Statistics 119, Math 118, and Math 120. (See Appendix A for course titles.)

For maximum impact, these changes to class size and structure will be supported by several other ongoing and proposed innovations:

- In Spring 2015, the Mathematics and Statistics Department will bring experts in pedagogical innovation and 0TA training to campus to help redesign the calculus sequence and improve placement testing.
- Coordination of the calculus sequence will be significantly improved. This includes coordination of the sequence as a continuum as well as coordination of a particular course over time and diverse instructors, teaching assistants, and tutors.
- A Math Learning Center is being formed, whose director will be a member of the Mathematics and Statistics Department and will work closely with coordinators of lower division Math courses.
- Tutors at the Math Learning Center will receive similar training and guidance as the teaching assistants.
- Additional resources will be allocated to ensure coordination of the Calculus curriculum and training of teaching assistants and tutors.

Cost

The additional cost for Teaching Assistant for the *Phase 1* is $97,695, the cost for the *Phase 2* is an additional $191,633, and the cost for the *Phase 3* is an additional $139,028. The total increased cost for the three phases is $428,355. Because of the time lag before the implementation of the *Phase 4*, the data are not included in this proposal. (A detailed breakdown is in Appendix D.)

Rationale

Student persistence in the STEM disciplines is a national problem. The Higher Educational Research Institution at UCLA found that it is not uncommon for 40-60% of students initially intending to major in a STEM discipline to switch to a non-STEM major.[3] Research shows that a primary reason students leave STEM fields is poor instructional experiences in first-year Mathematics courses. This is particularly true for under-represented populations. Targeted changes to first-year Mathematics courses have the potential to dramatically impact the number of students persisting in STEM fields.

Redesigning instruction in first-year Mathematics courses has the potential to significantly improve SDSU's 4-year and 6-year graduation rates. Among students entering as freshman in 2008, 29.5% graduated in four years and 66.6% graduated in six years. The very high DFW rates in Calculus courses and the subsequent courses that build on them contribute to these low numbers. In Fall 2013, for example, 27% of students in Math 150 and 42% of students in Math 151 did not pass (DFW). Courses requiring Math 151 also have high DFW rates, including EE 210 (41% in Fall 2013) and AE 210 (40% in Fall 2013).[4] From informal conversations with instructors teaching courses that require knowledge of Calculus, it seems that the lack of comprehension of the fundamentals of Calculus adds to the DFW rate.

[3] Hurtado, S., Eagan, K., & Chang, M. (2010). Degrees of success: Bachelor's degree completion rates among initial stem majors. *Higher Education Research Institute at UCLA, January*.

[4] These are from notes on failure rates presented at an AP&P meeting.

Studies of best practices in Calculus instruction, such as Characteristics of Successful Programs in College Calculus,[5] have found that institutions with more successful Calculus programs make greater use of active learning instructional approaches. Implementing active learning, particularly for those new to the method, requires smaller class sizes and support. Research in other STEM disciplines also points to the necessity of smaller class sizes if instructors are to implement research-based, interactive instructional approaches. The proposed smaller, 20-30 student, two-hour TA-led sections will make use of active learning, problem solving, and group work. The new TA training will focus on the requisite pedagogical skills and beliefs about learning and teaching that are necessary for successful implementation of active learning. The proposed TA training sequence will also improve training and career success for graduate students, especially those who go on to teach at the high school or college level. At SDSU, the Department of Rhetoric and Writing Studies and the School of Communication have developed model TA training programs that have improved instruction and employment of master's-level students. The proposed TA training in Mathematics will make use of lessons learned from these programs, as well as the lessons learned about the TA training programs studied as part of the Characteristics of Successful Programs in College Calculus project.

Response to Faculty Survey

This recommendation responds to the 2013 survey of faculty about class size in the following ways:

- The greatest increases in class size occurred at the 100 and 200 level. Between 2001 and 2013, the mean section size for lower-division classes increased from 36 to 64, and the median student experience (defined as the 50th percentile section based on the total number of seats filled) increased from 41 to 118.
- Math instructors were particularly concerned about the impact of larger classes on student learning. The survey included complete data from instructors teaching 13 lower-division Mathematics/Statistics courses, seven of which had breakout sections. Among instructors of the 13 sections, all said that the size of their classes had increased, 10 (77%) said that student learning had decreased due to larger classes, 12 (92%) said they had decreased the number of assignments they give, and 12 (92%) reported that there was less student participation.

Assessment

The impact of the proposed changes will be assessed in two ways.

First, the Math/Stat Department has already initiated work with Analytical Studies and Institutional Research to obtain and analyze student demographic and course performance data. The data will be mined for features related to student success and persistence. It will provide a baseline picture and allow for future analysis of the impact of changes on student behavior and grades.

[5] For more information on this project see http://www.maa.org/programs/faculty-and-departments/curriculum-development-resources/characteristics-of-successful-programs-in-college-calculus

Second, because the proposed changes are to be implemented in phases, each phase will include formative evaluation. Experience in each phase will lead to refinement of the TA training and adaptation of the training to the different types of courses in each of the four phases of implementation. Students in the Mathematics and Science Education doctoral program will have opportunities to assist with the evaluation, potentially writing dissertations that focus on successful models of educational transformation. Such evidence-based pedagogical innovation could bring national recognition to SDSU.

FUTURE DIRECTIONS

The Task Force is very aware that the changes proposed here are only the first steps. We hope that the Senate and other campus leaders will continue to scrutinize the results of the faculty survey, student leaning outcomes, and other measures of student success in order to recommend and implement targeted changes to class size. Specifically, we recommend that two areas be considered for future reductions as resources permit.

Statistics courses that satisfy the GE Foundations Quantitative Reasoning requirement, many of which are taught outside of the Mathematics and Statistics Department.

In addition to the courses offered by the Mathematics and Statistics Department, there are several statistics courses that satisfy the Mathematics/Quantitative reasoning requirement. (See complete list in Appendix A.) Included in this list are several that focus on elementary statistics: ARPE 210, Biology 215, Economics 201, Political Science 201, Psychology 280, Sociology 201, Statistics 119 and Statistics 250. In each of the past two semesters, there were at least 14 such sections with a total enrollment of over 2,000 students. Class sizes ranged from 15 to 250 students per section.

Introductory Statistics classes across the University have some common elements, even though they emphasize different methods and often require different texts. Surprisingly, different sections in the same department can cover different topics and use different textbooks (based on syllabi at the Library's repository). Despite these differences, nearly all courses covered statistical graphics, descriptive statistics (mean, standard deviation, etc.), confidence intervals, t-tests, and linear regression. Clearly, there is a core of material that is taught in all these classes.

A careful look at these courses may reveal ways that the classes can be structured to maximize student interaction with graduate students and faculty in small classes without increasing demand on faculty and budgets. For example, it might be advantageous to have a shared set of core modules (lecture, problems, activities) in an online portion of each class. These would contain the same core set of quantitative topics, but the examples could easily be customized for each course. By pooling resources to cover these shared topics, each department or instructor would have more time to teach students about the specific applications in their discipline. It is even possible that pooling resources would allow more small discussion and activity recitation sections without incurring additional cost. There are significant challenges to a coordinated approach, but it is worth further investigation.

Courses within departments that provide high-impact learning practices

Each department or program has a need for small classes for advanced undergraduate students that focus on high-impact practices such as community-based service learning, research methods, and writing within the discipline. A mechanism could be created for supporting and assessing small sections of these classes. Such a mechanism must be flexible, given the great diversity of academic departments and student learning outcomes at SDSU.

CONCLUSIONS

This report recommends phased-in changes in class sizes that are distributed to provide the greatest potential impact on student learning across the University and for practically all SDSU undergraduates at a critical point in their academic career. Our recommendations are in keeping with the goals of the SDSU Strategic Plan, whose Student Success Goal calls for the University to "continue to focus on Student Success by emphasizing high-impact practices that produce transformational educational experiences," as well as to "create Writing and Math Centers [the Writing Center has already been created and is in operation] by investing in faculty, graduate assistants and support staff resources," and to "invest funds to increase the four-year graduation rates of all students and eliminate the achievement gaps of under-represented students."

We believe that the steps suggested in this report advance the University toward the achievement of this goal.

Appendix A: Selected General Education Requirements from SDSU Catalog

I. COMMUNICATION AND CRITICAL THINKING

2. Composition

- Africana Studies 120. Composition (3)
- American Indian Studies 120. Written Communication (3)
- Chicana and Chicano Studies 111B. Written Communication (3)
- English 100. Rhetoric of Written Argument (3) [Same course as Rhetoric and Writing Studies 100.]
- Linguistics 100. English Composition for International Students (3)
- Rhetoric and Writing Studies 100. Rhetoric of Written Argument (3) [Same course as English 100.]
- Rhetoric and Writing Studies 101. Rhetoric of Written Argument (3)

3. Intermediate Composition and Critical Thinking

- Africana Studies 200. Intermediate Expository Writing and Research Fundamentals (3)
- Chicana and Chicano Studies 200. Intermediate Expository Research and Writing (3)
- English 200. Rhetoric of Written Arguments in Context (3) [Same course as Rhetoric and Writing Studies 200.]
- Linguistics 200. Advanced English for International Students (3)
- Philosophy 110. Critical Thinking and Composition (3)
- Rhetoric and Writing Studies 200. Rhetoric of Written Arguments in Context (3) [Same course as English 200.]

II. FOUNDATIONS OF LEARNING

4. Mathematics/Quantitative Reasoning

- Administration, Rehabilitation and Postsecondary Education 201. Introductory Statistics and Research Design for Education (3)
- Biology 215. Biostatistics (3)
- Computer Science 100. Computational Thinking (3)
- Economics 201. Statistical Methods (3)
- Geography 104. Geographic Information Science and Spatial Reasoning (3)
- Mathematics 105. College Algebra (3)
- Mathematics 118. Topics in Mathematics (3)
- Mathematics 120. Calculus for Business Analysis (3)
- Mathematics 122. Calculus for the Life Sciences II (3)
- Mathematics 124. Calculus for the Life Sciences (4)
- Mathematics 141. Precalculus (3)
- Mathematics 150. Calculus I (4)
- Mathematics 151. Calculus II (4)
- Mathematics 210. Number Systems in Elementary Mathematics (3)
- Mathematics 211. Geometry in Elementary Mathematics (3)
- Mathematics 245. Discrete Mathematics (3)
- Mathematics 252. Calculus III (4)
- Mathematics 254. Introduction to Linear Algebra (3)
- Philosophy 120. Introduction to Logic (3)
- Political Science 201. Elementary Statistics for Political Science (3)
- Psychology 280. Statistical Methods in Psychology (4)
- Sociology 201. Elementary Social Statistics (3)
- Statistics 119. Elementary Statistics for Business (3)
- Statistics 250. Statistical Principles and Practices (3)

APPENDIX B: Estimated cost of increasing caps in classes meeting Communications and Critical Thinking GE requirement to 18 and 24. For each class we list the number of additional sections.

Decrease to **18** students	Fall	Spring	Total AY
Ling 100	2	5	7
Ling 200	4	1	5
CCS 111B	2	0	2
CCS 200	2	1	3
AMIND 120	1	0	1
AFRAS 120	2	0	2
AFRAS 200	1	1	2
Phil 110[6]	8	7	15
RWS 100, 101/ENGL 100	68	2	70
RWS 200	26	47	73
Total additional sections[7]	115	64	180
Additional lecturer expenses[8]	$ 489,739	$ 260,889	$ 755,205
Additional TA expenses[9]	$ 18,400	$ 16,100	$ 34,500
Benefits (51.6 %)			$ 407,438
Total increase	$ 508,139	$ 276,989	**$ 1,197,192**

Decrease to **24** students	Fall	Spring	Total AY
Ling 100	0	2	2
Ling 200	1	0	1
CCS 111B	1	0	1
CCS 200	1	1	2
AFRAS 120	1	0	1
AFRAS 200	0	0	0
Phil 110*	3	3	6
RWS 100, 101/ENGL 100	20	1	21
RWS 200	9	14	23
Total additional sections	36	21	57
Additional lecturer expenses	$ 151,041	$ 82,386	$ 233,427
Additional TA expenses	$ 6,900	$ 6,900	$ 13,800
Benefits (51.6 %)			$ 127,569

[6] Philosophy 110 classes will be taught by TAs, all other classes will be taught by lecturers.
[7] Based on an estimated 98% fill rate.
[8] Based on an average lecturer cost of $4,577 per class. This number is the actual average per class cost in the RWS Department in Spring 2015.
[9] Based on an average TA cost of $2,300 per class.

Total increase	$ 157,941	$ 89,286	**$ 374,796**

Appendix C: Rubric used in assessment of Composition and Critical Thinking courses.

	GOAL 1	GOAL 2	GOAL 3	GOAL 4
	Craft well-reasoned arguments for specific audiences. (Although arguments may contain characteristics of content, structure, evidence, audience awareness, and language representing more than one level of proficiency, classification should be based on the preponderance of the characteristics.)	**Analyze a variety of texts commonly encountered in the academic setting.**	**Situate discourse within social, generic, cultural, and historical contexts.**	**Assess the relative strengths and weaknesses of arguments and supporting evidence.**
Beginning (1)	Content: **Provides** a basic or largely incoherent case, focused on a single issue or no discernible issues. Structure: **Organizes** argument in a rudimentary or confusing fashion. Evidence: **Marshals** minimal support, with few quotations and specific examples from appropriate texts. Audience: **Demonstrates** a lack of awareness of audience. Language: **Communicates** in an inappropriate register or with frequent errors or distractions that obscure meaning.	**Attempts** rudimentary analysis and **mentions** rhetorical concepts, but primarily summarizes and paraphrases.	**Begins to explore** the relationship between texts (and the arguments they make) and contexts (whether social, generic, cultural, historical, or issue- or controversy-based).	**Mentions** arguments and evidence, but not to a clear or useful purpose.
Developing (2)	Content: **Provides** an elementary or minimal case, perhaps with significant inconsistencies, that is narrowly or over generally focused. Structure: **Organizes** argument in a mechanical and/or occasionally unclear fashion. Evidence: **Marshals** incomplete support, providing insufficient and/or mismanaged quotations and examples. Audience: **Addresses** a general audience or misconstrues the specific audience. Language: **Communicates** with frequent errors and distractions.	**Applies** concepts and models in order to support analytic passages, but relies more heavily on summary, paraphrase, and perhaps repetition.	**Locates** texts (and the arguments they make) within specific contexts, minimally addressing ways texts are shaped by and shape other variables.	**Marshals** relevant evidence, but without careful assessment or consideration of multiple positions. Careful attention to audience is absent.
Proficient (3)	Content: **Presents** a coherent case addressing multiple issues Structure: **Organizes** argument clearly and appropriately. Evidence: **Marshals** sufficient support, integrating specific quotations and examples from appropriate texts into analysis of their own making. Audience: **Demonstrates** an awareness of the audience's specific expectations and values. Language: **Communicates** *competently*, with minimal significant errors or distractions.	*Competently* **analyzes** arguments, applying concepts and models to answer relevant "how" and "why" questions.	**Locates** texts (and the arguments they make) within a variety of specific contexts, demonstrating significant ways texts are shaped by and shape other variables.	**Assesses** the relationships among multiple positions (including strengths and weakness) with respect to audience, but may weigh some evidence incompletely or unpersuasively.
Advanced (4)	Content: **Presents** a solid case addressing a range of relevant issues and considerations. Structure: **Organizes** argument to meet the specific needs of the content. Evidence: **Marshals** ample support, successfully integrating specific quotations and examples from appropriate texts into analysis of their own making. Audience: **Accommodates** multiple expectations and premises of the audience. Language: **Communicates** *effectively*, with relatively few errors or distractions.	*Successfully* **analyzes** arguments, applying specific concepts and models in order to produce significant insights,	*Successfully* **locates** texts (and the arguments they make) within a variety of contexts, demonstrating complex ways texts are shaped by and shape other variables.	*Successfully* **assesses** the relationships among multiple positions (including strengths and weakness), with respect to audience, avoiding simplistic judgments and demonstrating, where appropriate, how the preponderance of the evidence supports specific positions over others.

Appendix D: Estimated costs for additional Teaching Assistants (TAs) for core Mathematics and Statistics courses in Phases 1-3.

	Course	**# of Students**	Current TAs	Proposed TAs	Change in TAs	Additional cost for TAs
Phase 1	Math 105/141 Fa	620	4	12	8	$60,120
	Math 105/141 Sp	369	3	8	5	$37,575
	Total Phase 1	989	7	20	13	$97,695
Phase 2	Math 150 Fa	535	2	10	8	$60,120
	Math 150 Sp	434	3	8	5	$37,575
	Math 151 Fa	590	2.5	10	7.5	$56,363
	Math 151 Sp	447	3	8	5	$37,575
	Total Phase 2	2006	10.5	36	25.5	$191,633
Phase 3	Math 252 Fa	393	1.5	6	4.5	$33,818
	Math 252 Sp	245	1	4	3	$22,545
	Math 245 Fa	169	0	4	4	$30,060
	Math 245 Sp	131	1	2	1	$7,515
	Math 254 Fa	142	1	2	1	$7,515
	Math 254 Sp	165	1	4	3	$22,545
	Stat 250 Fa	228	2	3	1	$7,515
	Stat 250 Sp	217	2	3	1	$7,515
	Total Phase 3	1690	9.5	28	18.5	$139,028
Total Phase 1-3		**7680**	34	140	106	$428,355