



DATE: December 16, 2010
TO: Neal Smatresk, President
Michael Bowers, Executive Vice President and Provost
CC: UNLV Department of Mathematical Sciences Chair, Derrick Dubose
UNLV Department of Mathematical Sciences Associate Chair, Ananda Malwane
UNLV Department of Mathematical Sciences Undergraduate Committee
FROM: UNLV Department of Mathematical Sciences Undergraduate Chair, Carryn Bellomo
RE: Second Draft, Proposed Restructuring of Lower Division Mathematics Courses

Thank you in advance for your time and attention. I look forward to your feedback and go ahead to move forward on these projects.

Bullet Points of Proposal

- Proposal 1 – Continued restructure of UNLV DMS Placement Exam (PEX) to more adequately place students into the appropriate level course.
- Proposal 2 - Eliminate Math 124, and use Math 126 to cover curriculum.
- Proposal 3 - Restructure Math 095 and Math 096 into six separate one credit modules that better align with skills needed in core courses.
- Proposal 4 - Revise Math 120 to be an appropriate alternative college level mathematics course.

Bullet Points of Additional Resources

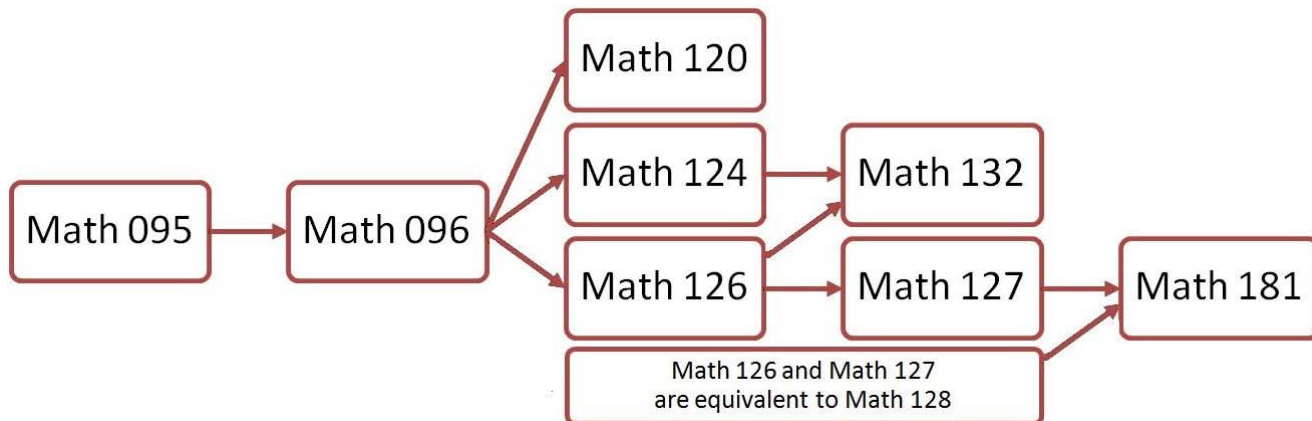
- One full time staff member to assist the undergraduate coordinator, effective immediately.
- Contract funding for the *UNLV Center for Research, Evaluation and Assessment* to analyze data and assist with electronic version of placement exam.
- Extramural funding to the Undergraduate Coordinator Summer 2012 to transition the placement exam to electronic format.
- One permanent full time faculty in residence to be hired effective Summer 2011 to serve as remedial coordinator.
- One full time staff member to assist the remedial coordinator.
- Two tenure track assistant professors in mathematics education, to begin Fall 2011.

The following document serves as a follow up of a proposal that significantly changes the undergraduate curriculum for the Department of Mathematical Sciences (DMS) at UNLV. Any changes made must be approved by the DMS, and other appropriate governing bodies across campus.

Current Structure of Course Flow

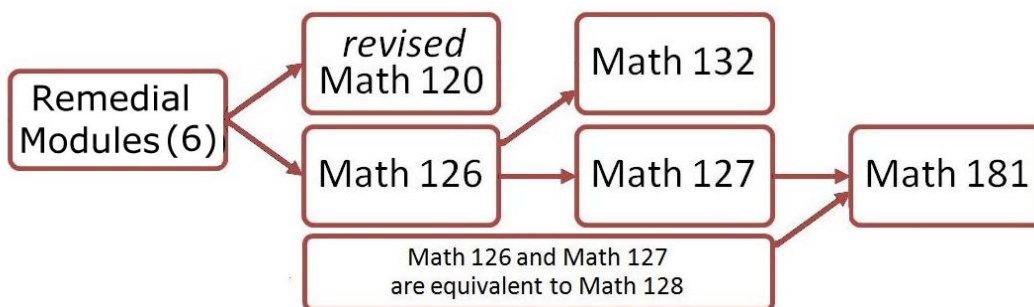
Currently the UNLV DMS has the following flow between courses (Figure 1). The default placement position is Math 95, however a student can place anywhere into the flow of courses through appropriate SAT/ACT scores, or the DMS placement exam.

Figure 1. Current Structure for Mathematics Courses at UNLV



I propose the following structure for lower division Mathematics courses at UNLV (see Figure 2). This document includes a justification for such changes, a plan for implementation, request for resources, and an approximate timeline.

Figure 2. Proposed Structure for Mathematics Courses at UNLV



Proposal 1

Restructure the UNLV DMS Placement Exam (PEX) to more adequately place students into the appropriate level course.

Justification for Restructuring

While there is no direct measure that students taking our current placement exam are misplaced, the fail and withdraw rates in math courses are notoriously high, and an examination of placement policies is long overdue. In addition, changes in cut scores and placement policies at the system level (effective Fall 2010) made it increasingly clear that the UNLV DMS needed to invest time to develop a new PEX. With alternate admitted students and transfers we fill a constant need for alternative means for

placement, making the PEx a crucial component in adequately placing students into appropriate level courses. In addition, placement into mathematics courses at the college level has gotten increased attention nationally; successful implementation of placement would give the UNLV DMS notoriety.

Timeline and Tasks for Restructuring

I designed the PEx Spring 2010 with careful consideration of Math 120/124/126 prerequisite skills. These skills were cataloged and organized, and questions were designed to assess each skill objective. Questions to assess these objectives have been written and reviewed by the Undergraduate Committee. The PEx was piloted Fall 2010 with eye-opening results. With the help of the *UNLV Center for Research, Evaluation and Assessment*, we will be tracking student performance and analyzing the exam's effectiveness before implementing it directly. It is designed to assess a student for placement into Math 120/124/126. A student who wishes to place into a higher level course must begin the process with the PEx, and after a proper score will be given additional content specific testing.

To continue this process, the DMS needs to continue to collect data on the effectiveness of the PEx and revise it accordingly with the help of the *Center*. The likely timeline to fully implement the PEx is Fall 2011. The PEx will be a living document under constant scrutiny and revision; data collection will be ongoing with a yearly report at the end of each summer term (August). In addition, the PEx will eventually be transitioned into a computer based test, for ease of implementation and data collection.

Proposal 2

Eliminate Math 124, and slightly shift objectives of Math 126 to cover curriculum. In addition, determine avenues for consistency between Math 126 sections, and develop an appropriate assessment plan.

Justification for Restructuring

Math 124 (College Algebra) and Math 126 (Precalculus I) significantly overlap in content. Because of this natural overlap, I feel that a restructuring will only benefit our student population. All outcomes in Math 124 can be included in Math 126 without overloading Math 126. Focusing on one course will allow for greater attention to be paid to maintaining consistency and assessment.

In addition, the DMS has noticed a natural, though gradual, shift of students from Math 124 to Math 126 over the past several years. According to the DMS chair, the enrollment numbers for Math 124 have slowly declined, while enrollment numbers for Math 126 have slowly increased. This shift, while currently undocumented, is the driving force behind my desire to analyze this overlap. I did this by documenting and comparing the objectives in each course. This analysis identified a clear overlap, which could explain the shifts in enrollment patterns.

Effect of Restructuring

The core math requirement for UNLV is "any 100 level mathematics course," with a few exceptions. Typically those students not enrolled in science or engineering take Math 124 or Math 120, depending on their field of study.

It is my belief that those departments that require Math 124 (over Math 120) will comply with the restructuring. It will be the DMS job to identify affected departments, speak with department chairs to assess their particular needs, and ensure that Math 126 fulfills these needs. A likely timeline for this assessment is Spring 2011 through Summer 2011.

In addition, those departments that do not have a *specific* mathematics requirement will still have the flexibility of enrollment in any 100 level math course (typically Math 120 or Math 126), which will likely have little effect on their majors.

Timeline and Tasks for Restructuring

The DMS will need to restructure Math 126, determine avenues for consistency, and develop an appropriate assessment plan. A likely timeline to begin this restructuring is Fall 2011 (after speaking with affected departments). Implementation of the deletion and restructured course would then begin with the Fall 2012 catalog.

Proposal 3

Restructure Math 095 and Math 096 into six separate one credit modules that better align with skills needed in Math 124/126. Determine avenues for consistency between sections, transfer between modules, and develop an appropriate assessment plan.

Justification for Restructuring

Realigning the content of the remedial courses to better fit with our existing courses is long overdue. From Figure 1, it is clear that Math 096 is a gate keeper for entrance into college level mathematics courses (unless otherwise placed). In addition, there has been controversy with remedial level coursework at a research intensive university, and as a result, the Math 095/096 sequence was for some time eliminated from the UNLV curriculum. However, for various reasons, they were returned. Prior to my analysis, a review of Math 096 and how it aligns with content standards has never actually been performed at UNLV.

For these reasons, I did an analysis of how well the Math 096 course did in terms of covering objectives necessary for success in each of the core courses (Math 120/124/126). The prerequisite skills above basic arithmetic that are necessary for success in Math 120/124/126 were cataloged and organized, and then compared to the objectives covered in Math 096. My analysis confirmed that Math 096 contains unnecessary material, and is missing needed material.

Effect of Restructuring

Any efforts made to align courses in terms of flow of outcomes and objectives will provide a better learning experience for our students. Breaking content up into modules will allow students to begin closer to their actual skill level, and transition between content more smoothly. The teaching of the modules and any assessments will be closely monitored, and a student will not progress without demonstrating a level of proficiency on the stated objectives.

Timeline and Tasks for Restructuring

The DMS will need to restructure the content of the remedial sequence, divide it into appropriate modules, determine avenues for consistency across sections and transfer between modules, and develop an appropriate assessment plan and grading scheme. A likely timeline to begin this restructuring is Summer 2011. A two year pilot of the restructuring could then begin Fall 2011, and with documented success could be transitioned for another academic year and fully implemented with the Fall 2014 catalog.

Proposal 4

Revision of Math 120 to be an appropriate alternative college level mathematics course.

Justification for Revision

Unsubstantiated comments from our student body have trickled back to the department – Math 96 is more difficult than Math 120. In my analysis, it is clear that Math 120 and Math 096 are misaligned in terms of expected prerequisite skills. After review of the objectives presented in Math 120, it is clear that content wise it is substantially below both Math 124/126. In short, a student who takes this course and obtains the objectives is not, in my opinion, prepared for real world mathematics, or future course of study in mathematics.

Effect of Restructuring

Any efforts made to better align Math 120 with its prerequisite course (the new Remedial Modules), and also update its content will provide more rigorous and appropriate choices for our student body.

Timeline and Tasks for Restructuring

Math 120 will need to be completely overhauled. Initially, the DMS will solicit feedback from the chairs of department that have no specific math requirement, as Math 120 is typically the course of choice for these majors. The course will be tailored to the following:

1. Needs of the university community, in terms of majors most likely to enroll in this course
2. Alignment of Math 120 to the objectives obtained in the Math Modules
3. Incorporation of technology, if appropriate given resource constraints
4. Incorporation of real-world mathematics

The DMS will need to overhaul Math 120, determine avenues for consistency, and develop an appropriate assessment plan. The DMS will first identify affected departments, and speak with department chairs to assess their particular needs, and ensure that Math 120 fulfills these needs. A likely timeline for this assessment is Spring 2011 through Summer 2011. A likely timeline to begin restructuring is Fall 2011. Implementation of the restructured course would then begin with the Fall 2012 catalog.

Summary and Necessary Resources

As the Undergraduate Coordinator developing these ideas and implementing these changes, I will need my own staff member effective immediately. The DMS is currently severely understaffed, and another person to assist in my administrative duties is paramount to the success of these (and many other) projects.

In addition, to assist me in the development of the remedial modules, and to coordinate and teach their pilots, the DMS will need one permanent full time faculty in residence to be hired effective Summer 2011. Once the courses are fully implemented, this individual will continue to coordinate these courses, oversee data collection on their success, assess the courses, hire and review instructors, etc. In addition, this individual will need a full time staff member to assist in the management of students, classroom space, placement, etc.

Currently, the DMS is handicapped by the very high student to faculty ratio. We are a faculty body of about 30 who serve about 12,000 students annually. As a result, *almost all* of our lower level courses (below Math 181) are instructed by graduate assistants. As a result, maintaining rigor and structure in these courses has proven to be problematic. As a result of restructuring, Math 120 and Math 126 will be the two courses most often populated as core math courses. In order to effectively teach and maintain these courses, we need to hire two faculty members (at the assistant level position in mathematics education) effective Fall 2011. Their job will be to teach, revise course content, generate research on

effective means of delivery and retention, coordinate all sections, review instructors, develop common assessments, and provide teacher training to graduate assistants. With my assistance, we could literally transform the remedial and general education courses within a year.

In Table 4, you will find a timeline for this process, should it be initiated.

Table 4. Summary Timeline

	FL 2010	SP 2011	SU 2011	FL 2011	SP 2012	SU 2012	FL 2012
Proposal 1 PEX	- pilot - collect data	(cont.)	- analyze data - revise exam	- implement exam - collect data	(cont.)	- analyze data - make electronic version	- repeat
Proposal 2 124/126 Shift		- ensure 126 fills needs of community	(cont.)	- restructure course	- develop consistency checks	- develop assessment plan	- implement
Proposal 3 Remedial Modules		- hire	- restructure - recruit students	- pilot modules 1-3 - collect data	- pilot modules 4-6 - collect data	- analyze data - revise	- continue to pilot modules 1-6
Proposal 4 Revise 120		- ensure 120 fills needs of community	(cont.)	- restructure	- develop consistency checks	- develop assessment plan	- implement