

MONTGOMERY COLLEGE

**The College-wide Developmental Math Task Force
Year One Report: 2009-2010**

June, 2010

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I. Introduction

The current success rates in the developmental math program at Montgomery College mirror those nationally and the picture is not pretty. Across the country, community colleges enroll close to 50 percent of all undergraduates, and data from Columbia University's Community College Research Center indicate that 59 percent of first time community college students need remedial education. One million students enroll in developmental math each fall, and more than half of the math courses offered at community colleges nationally are developmental.

The truly discouraging news, however, is that nearly two-thirds of those who start in developmental math do not earn a 2- or 4- year degree. The costs to community colleges in attempting to raise these students to a college mathematics level are estimated to be \$1.9 to \$2.3 billion annually, yet these substantial expenditures do not include the difficult to measure psychological costs to students and the lost time and income as post-secondary education or employment are delayed or diminished.

Recent studies provide compelling information that links America's economic growth and competitive advantage to improving educational attainment. The U.S. Department of Labor's occupational outlook listing of livable wage and high growth jobs require at minimum community college certificates or associate's degrees. According to a June 2010 report by the Georgetown University Center on Education and the Workforce, the demand for workers with associate's degrees or higher will surpass supply by approximately 3 million graduates by 2018, an alarming data point.

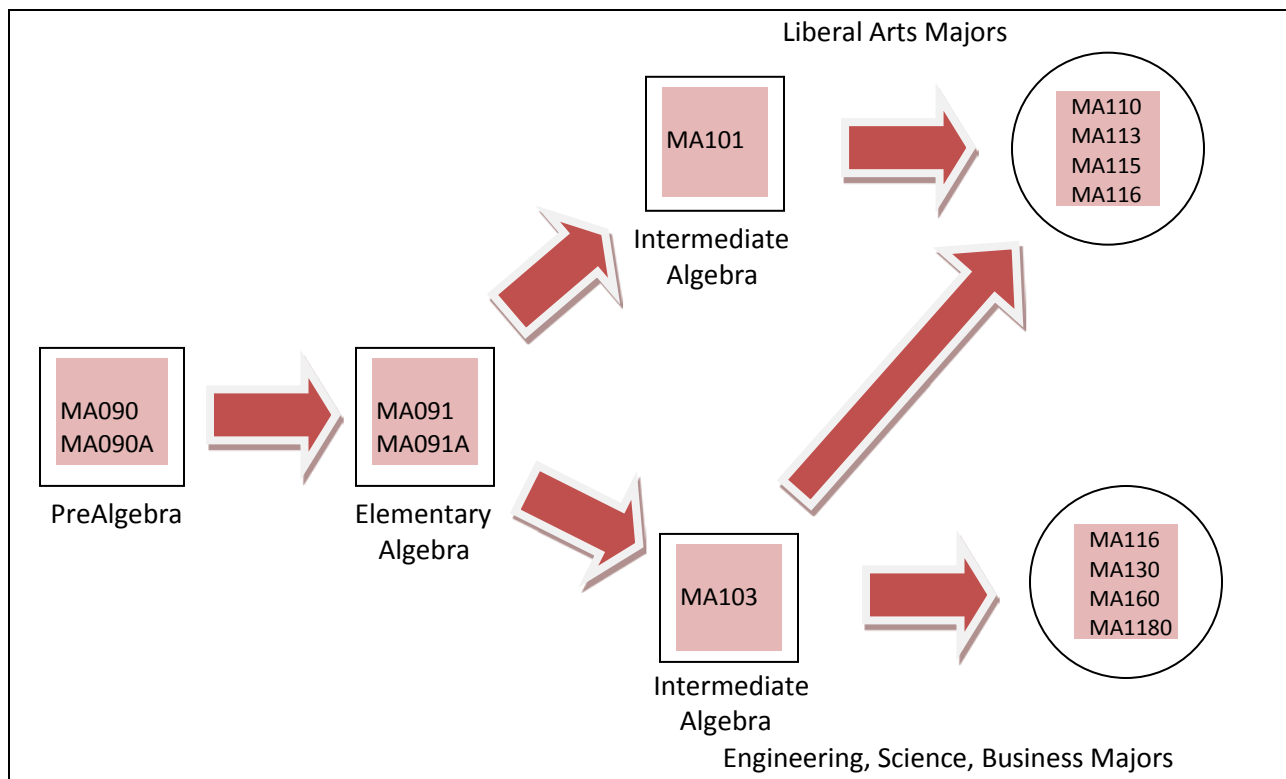
In the state of Maryland, students cannot earn a 2- or 4-year degree at a public institution without first passing at least one college-level math course, and for a substantial percentage of community college students, developmental math represents the gateway to such courses. Consequently, it is not an overstatement to say that the greatest hurdle for degree-seeking students at Montgomery College may be having to progress through developmental mathematics to successful completion of a college-level math course. Recognition of this is critical, because it highlights the fact that although the developmental math program is housed within the mathematics discipline, the consequences of not significantly improving its success rates are profound and of a college-wide nature. Simply put, this issue is one that must be on the radar screen of everyone who is committed to the mission of student success at Montgomery College.

Improving success rates in developmental math is no easy task; there are no quick fixes or one-size fits all approaches. There are pockets of promising strategies nationwide that we reviewed to inform our own reform approach. When we get developmental math teaching and learning right, we help students onto the path of achieving their dreams. Students stay in school and they have broader academic and career options. We also address the achievement gap for students of color in higher education, Hispanics, African Americans, as well as first-generation college students, who disproportionately require developmental math courses. These are the goals of developmental math reform at Montgomery College; we intend to dramatically reverse the trends, building on best practices nationally and locally to implement efficacious, evidence-based approaches that holistically address our students’ needs.

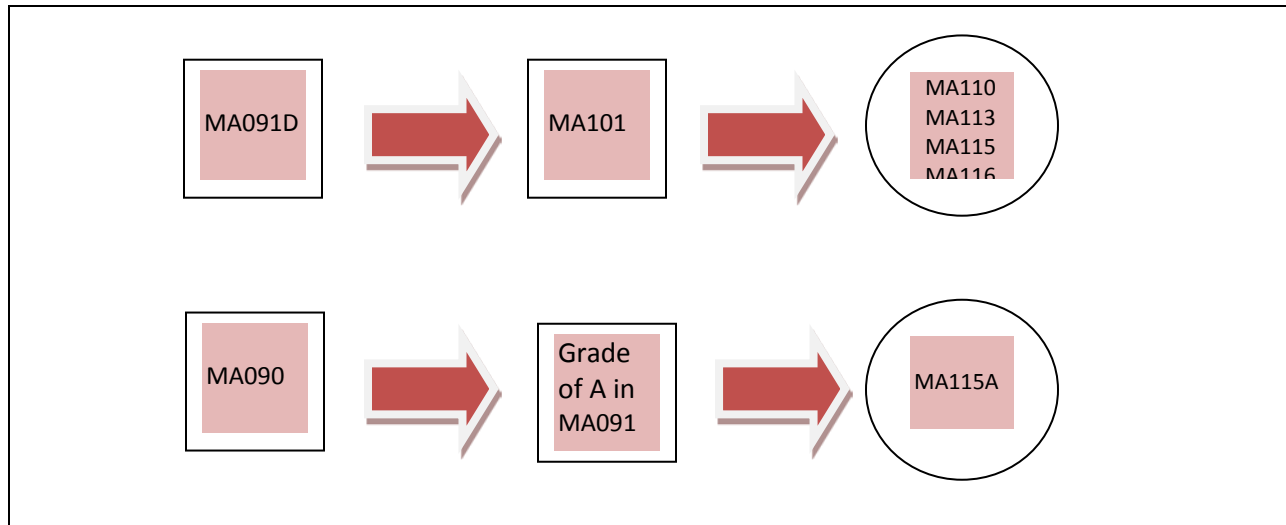
II. The Developmental Math Program at Montgomery College

The Developmental Math Program at Montgomery College is comprised of three distinct course levels of mathematics- Pre-Algebra, Elementary Algebra, and Intermediate Algebra – each with two or more variants to meet the specific needs of the student population. The program is designed to serve the needs of two distinct subsets of students: those who intend to major in a liberal arts discipline and those who seek degrees and careers in engineering, science, business, and education.

Developmental to First College Level Math: Typical Paths At MC



Accelerated Paths for Liberal Arts Majors



The number of students who participate in the developmental math program at Montgomery College is substantial; each fall, approximately 1 in 5 students enrolls in a developmental math course, and nearly 54% of all math classes offered at the College are developmental. Of the 4000 students new to college who enrolled at MC in fall 2009, two-thirds placed at the developmental level. More specifically:

- 32% placed at the Pre-Algebra level
- 20% placed at the Elementary Algebra level
- 15% placed at the Intermediate Algebra level

III. The Problem

The primary intended outcome of Montgomery College's Developmental Math Program is to position students to be successful on their first attempt in a college-level math course. Consequently, if a student successfully completes a developmental math course, but subsequently is unable to pass a college level math course on their first attempt, such a student is not deemed a successful outcome to the program. Unfortunately, the percentage of students who have started in developmental math, particularly at the MA 090 and MA091 levels, and have gone on to pass a college level math course on their first attempt has been consistently and disappointingly low. More specifically,

- Of students who start in MA 090:
 - 15% attempt a college level math course
 - 10% pass a college level math course

(minimum of 4 academic semesters + summers from 1st MA 090 attempt between Fall 04 and Fall 07)

- Of students who start in MA 091,
 - 35% attempt a college level math course
 - 22% pass a college level math course

(minimum of 3 academic semesters + summers from 1st MA 091 attempt between Fall 04 and Fall 07)

- Of students who start in MA 101,
 - 49% attempt a college level math course
 - 39% pass a college level math course

(minimum of 2 academic semesters + summers from 1st MA 101 attempt between Fall 07 or Spring 09)

- Of students who start in MA 103,
 - 62% attempt a college level math course
 - 50% pass a college level math course

(minimum of 2 academic semesters + summers from 1st MA 101 attempt between Fall 07 and Spring 09)

Depending on a student's initial placement in the developmental course sequence, the probability of passing a college level math course is as low as 10% and as high as only 50%. The following individual course statistics further demonstrate the need to reform the developmental math program at the College.

MA 090:

- 52% of the students pass on their 1st attempt.
- Only about half of the students who pass MA090 subsequently pass MA 091 on first attempt (and most with C's).
- 52% of the students who get a B and 62 % who get a C in MA 090 are not successful in MA 091 on first attempt.

MA 090A:

- 50% of the students pass on their 1st attempt.
- 77% of those pass on their 1st attempt with a grade of A or B.
- 2 out of 3 students who pass MA 090A on their 1st attempt are unsuccessful in MA 091 on their 1st attempt .
 - A's in MA 090A pass MA 091 only half the time
 - B's and C's in MA 090A pass MA 091 only about 1/4 of the time

MA 091:

- 51% of the students pass on their 1st attempt.
- 56% of the students who pass MA091 subsequently pass MA 101 on their 1st attempt.
- 40% of students who pass MA 091 subsequently pass MA 103 on their 1st attempt compared to 60% who place directly into MA 103.
 - B's in MA 091 pass MA 103 on their 1st attempt only 40 % of time
 - C's in MA 091 pass MA 103 on their 1st attempt only 25% of time

MA 091D:

- 49% of the students pass rate on their 1st attempt.
- 45% of the students who pass MA091D subsequently pass MA 101 on their 1st attempt (only half of B students, 30 % of C students).
- 33% of the students who pass MA091D subsequently pass MA 103 on their 1st attempt (only 37% of B students, 18 % of C students)

MA 101:

- 58% of the students pass on their 1st attempt
- Of the students who pass MA101, 67% subsequently pass MA 110 on their 1st attempt, compared to 70% who place directly into MA 110
- Of the students who pass MA101, 59% subsequently pass MA 116 on their 1st attempt, compared to 76% who place directly into MA 116.

IV. Past Attempts to Fix the Problem

Over the years the mathematics discipline at Montgomery College has made multiple changes to its developmental program. Efforts to address the unsatisfactory level of success have included curriculum changes, the introduction and elimination of combinations of developmental courses, a lengthy process to create two intermediate algebra tracks from one, the inclusion of counselors to teach study skills and address students' life issues, examination of appropriate calculator use, examination of reading level and success, correlating Accuplacer placement test scores and success, consideration of imposing a *floor* and examining options for students who scored below a minimum cutoff, the use of gateway (competency) exams and common finals, the creation of two 10-day review courses (Fast Track and Advanced Fast Track) to jump-start and accelerate students who needed a refresher course, combining intermediate algebra and a college level survey course (MA 115A) to shorten the path to CLM, and most recently, requiring students to do homework online using a commercial course management system.

Unfortunately, while individually some of these initiatives have proved successful – the Fast Track curricula and MA 115A are two such examples - there has been no significant improvement in achieving the program’s most important outcome: an acceptable percentage of students progressing from developmental through college level mathematics.

V. Developmental Math Task Force and Advisory Board

In June 2009, the Developmental Math Task Force was formed by Dr. Sanjay Rai and Dr. Judy Ackerman and was charged with taking an unconstrained approach to *fix the problem*. The Task Force includes John Hamman, Sharon Hauge, and Susan King, math department chairs at the Germantown, Takoma Park/Silver Spring and Rockville campuses respectively; math faculty members Mary Kay Abbey (TP/SS), Kevin Johnson (TP/SS), and Stephanie Pepin (R); Claudinna Rowley (R), Developmental Math Committee Chair; Margaret Latimer (G), former chair and interim associate dean; Bill Coe, developer and teacher of Fast Track; and Miriam Carter from the Rockville Deans Office, who has experience with underprepared students and grant writing. The Task Force is chaired by Ken Weiner, a recently retired faculty member from the Rockville Math Department.

It was recognized that there is a need for a totally new thinking, and that the scope of the problem extends beyond mathematics and its teaching. Consequently, broader perspective and input was sought through the formation in January, 2010 of a twenty-four member Advisory Board comprised of adjunct math faculty, faculty from the College’s developmental Reading and English departments and Student Development area, the Director of the Montgomery College Education Program, and representatives from MCPS and the local business community (Hughes Network and Maryland Insurance Fund) (See Appendix).

Since being constituted in the summer of 2009, the Task Force has met for two hours every 3 weeks, or a total of 16 times. It began its work by defining the problem, conducting a literature search, examining what other community colleges are doing, and collecting and analyzing extensive college-wide developmental math program data over a recent 4 to 5 year period. Based on this research, the Task Force then identified the primary reasons why students were failing to progress from developmental math through success on their first attempt at a college level mathematics within a reasonable amount of time. Included as part of this process were a series of student focus groups conducted on each of the three campuses early in Fall, 2009, a survey of all full and adjunct math faculty following a presentation of the Task Force’s work to the discipline in January, 2010, and a joint meeting of the Task Force and the Advisory Board on March 1, 2010, a meeting that was also attended by key academic administrators, including the Senior Vice President for Academic and Student Services.

VI. Why Students Are Not Succeeding

Student Focus Groups: The student focus groups were held on each campus in October, 2009 in an attempt to gain their perspective on their experience in mathematics both prior to and while attending Montgomery College. In what is perhaps a telling illustration of lack-of-engagement, the attendance at these events was very poor, despite the fact that students had completed a survey indicating their interest and availability – some of which included enthusiastic responses from the students – received invitations confirming time and location and follow-up email and telephone reminders. Students who participated provided the following insights:

- Forgetting material from high school, not seeing the relevance of the content and not doing homework were major obstacles to success.
- A sufficient investment of time and repetition and doing homework are necessary to achieve an A or B in these courses.
- The instructor is a very important factor in student success, and must provide alternative ways to do problems, and be motivating, passionate, and encouraging.
- Homework is critical to success and should be part of the grade. Students were very positive about MathXL/MyMathLab (interactive web-based instructional and homework systems) although some expressed a preference for a traditional text.
- Academic support is very important, particularly the need to have tutors who have a greater understanding of the needs of the developmental student.
- Some understood the need to enroll in developmental math in college despite having passed such courses in high school; others expressed great frustration about the requirement.
- A lack of understanding about the path to college level mathematics and knowledge about the poor success rates.

Input from Full and Adjunct Faculty: The faculty survey in January, 2010 yielded the following comments and suggestions:

- Students don't work hard enough and aren't motivated.
- Support for a modularized system with mastery learning that would encourage students to 'keep going'.
- Do not permit students to take a semester off while completing their mathematics requirement.
- Support for computerized instruction with the provision that good face-to-face instruction is available for students who need it.
- Assess students prior knowledge and permit them to build on what they know.

- Need for a program for students who lack basic arithmetic skills.
- Intervene when students are in MCPS.
- Coordinate counseling/study skills into developmental courses.
- Offer small, self-paced classes.

Input from the Advisory Board: Many of the ideas and suggestions at the joint Task Force/ Advisory Board meeting mirrored those from other sources and included:

- Alignment of developmental and college level math courses
- Required advising summer *boot-camp* for students unprepared for college level math
- Relating content to the *real world*
- A greater focus on quantitative literacy and reasoning skills
- Importance of students completing their developmental work early and with no breaks
- The need to integrate the expertise of student development faculty into the program, particularly at the MA 090 and 091 levels
- Professional development for instructors
- Assigning excellent teachers to developmental classes
- Incorporating teaching methods that address the learning styles of the diverse student population

Ultimately the Task Force identified and focused its attention on developing a plan to address the following seven critical reasons and root causes of the low success rates experienced in the developmental math program:

1. **Lack of student engagement** – As an open enrollment institution, the diversity of attitude and aptitude is an enormous challenge. Students with low motivation, who see little use for mathematics, are not engaged.
2. **Lack of time-on-task** – Students spend too much time listening to and watching others do math. They must begin to take considerably more responsibility for their learning and for their success.
3. **Requiring all students to progress at the same pace** – Unlike most other college courses, students have *seen* the material in high school and enter developmental math classes knowing, or believing that they know, many of the topics in the courses. Consequently, they do not pay attention in class and are often *tuned-out* or absent when concepts they have not learned are taught.
4. **Length of path from initial placement to college level math** – A nationwide study confirms what college-wide data reveals: only one third to two fifths of students referred to developmental education actually complete their entire developmental sequence, and only

one fifth of those who require three or more levels complete the program. Even students who pass their early developmental courses fail to complete the sequence.

5. **Inconsistent mastery of basic key math concepts and skills** – Math is hierarchical, yet students move on to new material in a course without first demonstrating a mastery of the essential prerequisite ideas and skills.
6. **Lack of continuity in math coursework** - Students who pass MA090 often delay taking MA091. There is no requirement that students register for math during their first semester, nor that they continue in consecutive semesters until completing their math requirement.
7. **Inconsistent academic standards and quality of instruction in developmental courses-** Students receive passing grades without having mastered the critical mathematics required for them to be successful in the next course. Some faculty teaching developmental math courses do not have sufficient awareness of the challenges of teaching developmental students and of successful strategies to address these.

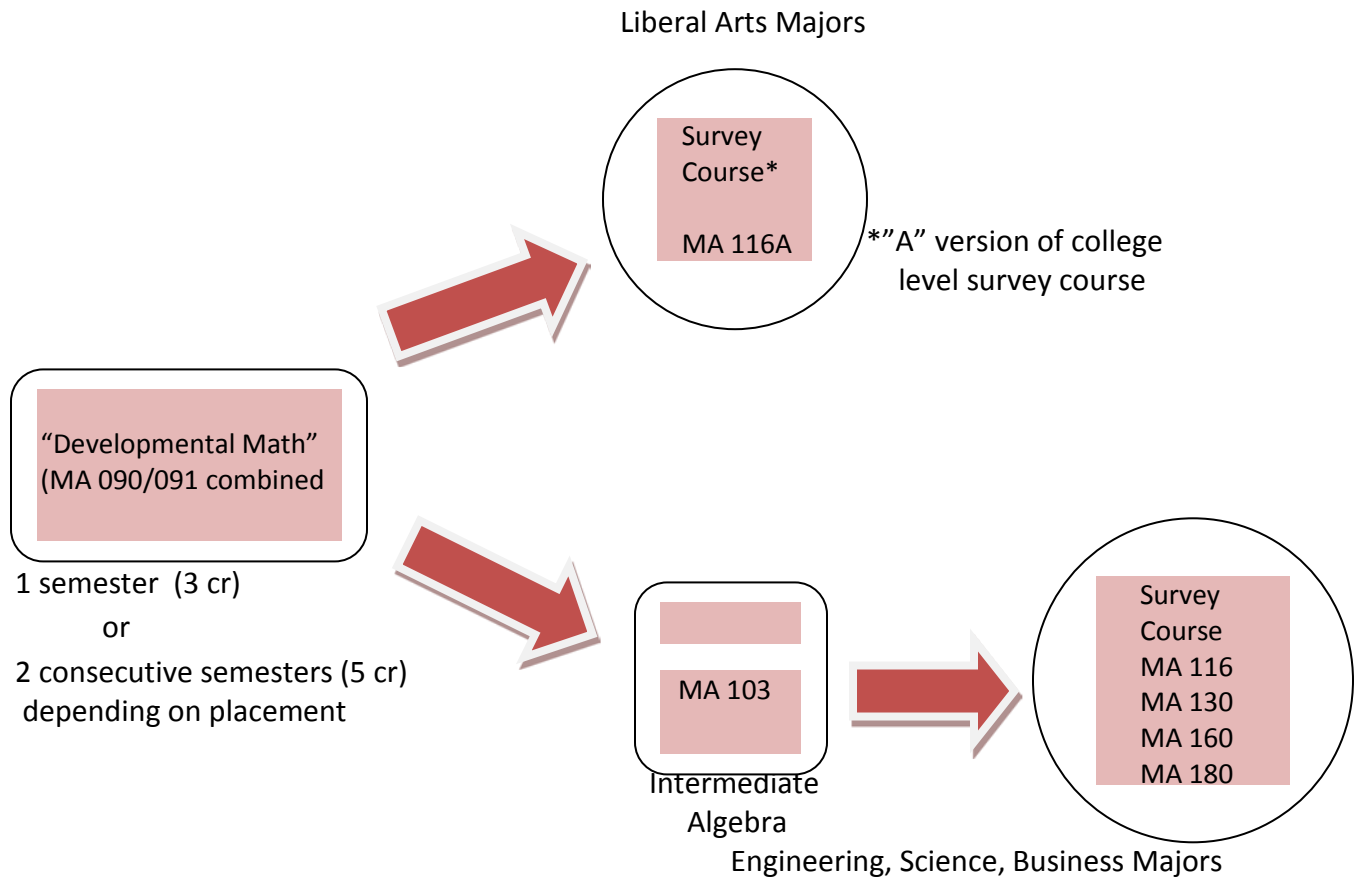
Using this work as a foundation, the Task Force investigated potential strategies to address the reasons and causes listed above, an extended discussion which eventually led to the initial set of recommendations proposed in the next section of this report.

VII. Recommendations to Reform the Developmental Math Program

- 1. Combine/Integrate MA 090 and MA091 into one “Developmental Math” course over two semesters.**
(Addresses lack of continuity in early developmental coursework; facilitates self-paced approach.)
- 2. Implement an emporium-style course redesign model for the new “Developmental Math” course.**
(Addresses lack of student engagement, inconsistent mastery of basic math, inconsistent academic standards, and insufficient time on task.)
- 3. Create a 5-hour MA116A integrating MA101 and MA116 (analogous to MA115A).**
(Addresses the length of the path from developmental to college level math for liberal arts majors.)
- 4. Eliminate MA 101.** Students who complete the combined MA090/MA091 course or who place into MA101 would enroll in MA116A or MA115A (or the equivalent new survey course – see recommendation 5) .
(Addresses the continuity of math coursework and shortens the path from developmental to college level math for liberal arts majors.)
- 5. Offer only one college-level survey course.** (Currently, there are two: MA110 and MA115.)
(Removes unnecessary confusion for students in deciding which course to take and eliminates the need to create a second hybrid survey math course which includes intermediate algebra.)

The impact of the proposed reforms on the structure of the developmental math program is shown below.

Proposed Developmental Paths to First College Level Math



Recommendation 1 - Combine MA090 and MA091 Into One Course Over Two Semesters:

The proposal to combine MA090 and MA091 into one course to be completed within two semesters will allow students to move seamlessly, continuously, and at their own pace through the developmental math curriculum. It does, however, have policy implications with regard to registration, tuition, and grades. After much discussion, the Task Force recommends the following:

- Students who are placed by Accuplacer into the second half of the proposed “Developmental Math” course, i.e., at the current MA091 level, would pay 3 credits of tuition and have one academic semester to complete the course.
- Students who are placed by Accuplacer into the first half of the proposed “Developmental Math” course, i.e., at the current MA090 level, would pay 3 credits of

tuition when they enroll in the course initially. If they do not complete the curriculum during the first semester, they would earn a grade of “X” signifying that they are “in progress” and pay 2 credits of tuition when they enroll for the second semester – *provided that this second semester is consecutive with the first*, e.g. one of the following semester combinations: fall/spring, spring/summer, spring/fall, or summer/fall. If, however, the second semester is not consecutive with the first, the student would pay 3 credits of tuition.

Based on this policy, students who complete the full curriculum within two consecutive semesters would realize a savings of from 1 to 3 credits of tuition when compared to the current program structure. It is expected that such savings will incentivize students to complete the entire developmental math curriculum without taking a break of one semester or longer between classes.

Recommendation 2 - Course Redesign: At the core of the proposed reform of the developmental math program is the recommendation to alter the instructional model from the traditional lecture/discussion approach currently used in the vast majority of developmental sections to one of “redesign” based on the “emporium model” for the new “Developmental Math” course. The emporium redesign model is characterized by the following elements:

- The course is built around an all-inclusive, web-based interactive software package.
- Students meet with their instructor once a week in a computer classroom.
- Students are required to spend a minimum number of hours each week in an open lab staffed by faculty.
- Students work at their own pace.
- Students are required to complete work before taking tests.
- Students must demonstrate a mastery level of concepts before moving on to new material.
- Faculty work one-on-one with students in the multiple roles of tutor, mentor, and facilitator.

Under this proposal, all students will enroll in a section of “Developmental Math” that meets with their instructor once a week for 75 minutes in a computer classroom. In addition, students will be required to spend a minimum of 2 ½ hours on-campus each week in a dedicated open lab studying, doing homework, getting questions answered, and taking quizzes and tests. In order to adequately serve the needs of the entire developmental population, the Task Force recommends that the lab on each campus be open 8 AM to 8 PM, Monday through Friday, and 10 AM to 3 PM on Saturday, and be staffed by faculty during those hours of operation. As is the

case with science labs, the open developmental math lab will be an extension of the weekly classroom experience, with faculty answering questions and explaining concepts within the context of each student's progress through the "Developmental Math" course. As is the case with the sciences, faculty would receive 0.75 ESH per instructional hour in the lab.

It is important to note that prior to reaching agreement on this recommendation, the Task Force arranged for a visit and presentation from the Mathematics Chair at Cleveland State Community College in Tennessee, where course redesign has been implemented in this format with great success. Subsequently, three Task Force members went on a two-day visit to Cleveland State and Chattanooga Community College to observe firsthand course redesign in action. Both schools cite significant improvement in student success and retention rates.

During the visit, issues that were discussed include classroom and open-lab staffing, placement, testing, online vs. paper textbooks, lab coordination and usage patterns, curriculum, academic standards, software, student services/counseling support, non-completion at the end of the semester, faculty reaction and training, inclusion of mathematical thinking/quantitative literacy vs. skills only, outcomes assessment, and cost. Upon their return, all three visiting Task Force members enthusiastically endorsed a change to the instructional delivery approach encompassed by the course redesign emporium model.

Recommendations 3 and 4 - Create MA116A and Eliminate MA101: The Task Force agrees with the recent urging of the American Mathematical Association of Two Year Colleges (AMATYC) to find ways to shorten the path to college level mathematics for liberal arts majors. The Task Force believes that the recent creation of MA115A serves as an excellent model to accomplish this goal.

Although the sample sizes are small, the data for MA115A are encouraging:

- Of the 346 students with Accuplacer scores at the MA 101 level, 77% passed MA115A without first enrolling in MA101 as a prerequisite.
- Of the 102 students who went directly from passing MA 091 into a MA 115A class without first attempting MA 101 (half with a grade of B or C), 73% passed MA 115A on their first attempt.

The Task Force believes that the discipline will experience similar success with a MA116A offering, and sees little added value to requiring liberal arts students to devote an entire semester to intermediate algebra in preparation for a college level survey math course or statistics.

Recommendation 5 - Offer Only One College Level Survey Math Course: Currently liberal arts students make a choice to enroll in either MA110 or MA115 with no good basis for doing so. In fact, there is widespread belief that the substantially greater enrollment in MA110 is likely due to the fact that it has a lower course number. The Task Force believes that students would be best served with a single survey course- one designed by discipline faculty that might be a hybrid of the two existing courses, puts a greater emphasis on modeling, or incorporates quantitative literacy and reasoning with as much practical and utile mathematics as possible to a greater degree than is currently the case. Of secondary importance is the fact that it is currently difficult for department chairs to determine how many sections of MA110 and MA115 to offer each semester. With only one such offering, this problem would be resolved.

VIII. Response of the Discipline to the Recommendations

At the end of the spring, 2010 semester, the Chair of the Task Force made presentations on the year one work of the Task Force, including the recommendations above, to each of the campus mathematics departments. At the ensuing well-attended full discipline meeting, held during the professional week in May, faculty were given the opportunity to comment on the recommendations and provide modifications or alternate suggestions to the proposal. Faculty were promised that these, along with additional comments sent via email, would be considered by the Task Force when finalizing the recommendations at its June 2, 2010 meeting.

Each of the five recommendations was discussed fully at the meeting, but the Task Force was not compelled by anything that it heard to alter the proposed set of recommendations. In fact, while no formal vote on the recommendations was taken at this meeting, the sense and tone of the discussions implied solid endorsement of the plan put forth by the Task Force. There were, however, a few concerns raised by individual faculty members, which, in the interest of providing a fair and comprehensive picture, are listed below.

- The proposed course redesign emporium model does not provide sufficient structure or connection to one instructor for the students. The suggestion was for all on-campus sessions to be in a computer classroom with the same instructor, rather than requiring students to attend an open lab.

Task Force response: In the classroom, students will be limited to working on the computer during the allotted class time and often may have to stop because the class period has ended. In fact, Anne Arundel Community College started course redesign with multiple classroom sessions each week, but recently changed to no classroom sessions, and students now do all

their on-campus work in the lab. The Task Force agrees that a connection to an individual faculty member is important for the student, but feels it's important to give each student the freedom to work on their math for as long as they want and whenever they want, and further believes that the recommended course structure of one 75 minute class and 2 ½ required hours in the lab each week best addresses both concerns. Perhaps most importantly, the proposed redesign model makes students more responsible for their learning and for their academic success.

- Many students are already challenged by the amount of content in MA116, and these students will be unable to succeed in a MA116A that incorporates an additional 2 credits of intermediate algebra. Assuming that the intermediate algebra material is front-loaded in the new course over the first 4 or 5 weeks, it will be particularly difficult for students to learn all of the statistics content in 9 or 10 weeks.

Task Force Response: Students will spend 67% more class time in MA116A than they do in MA116. The proposed MA 116A also offers a great opportunity to teach the course from a modeling perspective and integrate related topics in intermediated algebra and statistics, e.g., linear equations and regression analysis. The result - the intermediate algebra material will become more meaningful and relevant to students. Finally, the concern that students will have to learn all the statistics content in 9 or 10 weeks is mitigated by the fact that the discipline successfully offers MA116 in 6 weeks during summer sessions.

- MA101 should not be eliminated completely; offer some sections each semester for students who would rather enroll in intermediate algebra for a full semester in order to be better prepared for a college level survey math course or statistics.

Task Force Response: By enrolling in the 5 credit "A" versions of a college level survey math course or statistics, students will be more than adequately prepared in intermediate algebra to be successful with the college level content. Offering a small number of MA101 sections each semester will serve no real purpose, represent a confusing choice to developmental math students, and will be an additional scheduling headache for department chairs.

- Continue to offer a choice of MA110 and MA115 to liberal arts students who need a college level survey math course. Consider renaming the two courses so that it is clearer to a student which of the two is more appropriate for their academic and career needs.

Task Force Response: See comments above on page 13. The Task Force believes that while renaming the courses may help to alleviate the confusion that offering two survey courses presents to liberal arts students, these students would still be better served with a single survey math class that emphasizes quantitative literacy and reasoning in a mathematical setting that's highly useful and practical.

IX. Actions Necessary to Implement Recommendations:

The goal of the Task Force is to implement the five recommendations, if approved, by the start of the fall, 2011 semester. Recognizing that this is an ambitious timeline, the Task Force has identified the following steps necessary for successful implementation of the proposed plan.

All Recommendations:

- **Inform the Montgomery College community** – Support of the College community will be critical to the success of these proposed changes. The scope and nature of the problem and the proposed solutions will need to be understood by administrators, faculty, counselors, staff, students, and the broader community. Presentations to various groups will be necessary prior to fall 2011.

Recommendation 1 – Combined MA090 and MA091 “Developmental Math” Course:

- **Curriculum** - Development of the combined developmental course will require that curriculum, standards, and level of mastery be defined and approved college-wide by the math discipline. Curriculum changes, if any, will require appropriate action. Homework, quizzes, and tests will need to be written.
- **Registration** - Under the proposed tuition plan for the new “Developmental Math” course, a mechanism for tracking enrollment in successive semesters will have to be developed and implemented.
- **Grades and Financial Aid** – The impact of the “in progress” grade of “X” for the proposed combined “Developmental Math” course on international students and students who are receiving financial aid needs to be clarified.

Recommendation 2 – Course Redesign:

- **Identification of required resources** - All three campuses will need to identify dedicated open-lab and computer classroom space for course redesign. Power, HVAC, and other concomitant needs will have to be identified and met.
- **Input from new CIO for IT** - The support and advice of the Office of Information Technology will be critical to the successful implementation of redesign. Initially, the acquisition and

installation of computers may require significant financial resources. Maintenance and replacement costs will be ongoing.

- **Software** - A decision must be made on which web-based interactive software will be chosen to support the new instructional delivery system.
- **Registration** - The impact of scheduling all sections of “Developmental Math” to meet once a week for 75 minutes on overall college scheduling needs to be determined.
- **Student Orientation** – A common, college-wide student orientation which introduces and explains to students course redesign, the new structure of the developmental math program, and what it takes to successfully progress through college level math needs to be developed.
- **Professional development** – Full- and part-time faculty who will teach redesigned developmental math courses will need to be trained in the use of the software selected to support the new Developmental Math course, as well as in best-practices associated with success in a redesign environment. Ensuring consistency and teaching to encourage independent learning are areas where lessons have been learned by those who have implemented redesign.

Recommendations 3 and 4 – Creation of MA116A and Elimination of MA101

- **Curriculum and transferability** - The combined MA101 + MA116 course will need to be created in consultation with client disciplines at the College. Transferability must be considered from the outset.
- **MA113** – MA101 is the prerequisite for MA113. Criminal Justice appears to be the only major which specifies MA113 as a required course for its program, and currently only one section of MA113 is offered college-wide each semester. Discussions with the Criminal Justice faculty need to be opened to see whether they are amenable to accepting MA116 in lieu of MA113 for their program requirements.

Recommendation 5 – One College Survey Math Course

- **Curriculum**- Curriculum will need to be determined if neither the existing MA110 nor MA 115 is selected as the single survey course. Transferability will need to be considered at the outset, as will the needs of client disciplines.

Members of the Task Force have already been assigned to begin working on many of the implementation issues listed above. Math faculty from all three campuses will be recruited to help, especially with curriculum development for the proposed “Developmental Math”, MA116A, and single survey math courses.

X. Evaluation Plan

In proposing the major changes that it has, the Task Force feels strongly that there must be accountability for the success of the plan going forward. To that end, the following measures and benchmarks will be used to evaluate the success of the newly structured developmental math program envisioned in this report.

	Current	Target	Timeframe*
% of W's in "Developmental Math"	9% (MA090/MA091 Combined)	5%	by Fall 2012
% completing 1 st half of "Developmental Math" within 1 st semester on 1 st attempt	52%(MA090)	65%	by Fall 2013
% who place in 2 nd half of "Developmental Math" and pass (C or better) on 1 st attempt	51%(MA091)	65%	by Fall 2013
Average # of weeks to complete 1 st half of "Developmental Math" on 1 st attempt	14 (MA090)	< 14	by Fall 2013
Average # of weeks to complete 2nd half of "Developmental Math" on 1 st attempt	14 (MA091)	< 14	by Fall 2013
Of students who place in the 1 st half of "Developmental Math", % of students who pass (C or better) their first college level math course on 1 st attempt within 4 academic semesters	10%	25%	by Fall 2013
Of students who place in the 2nd half of "Developmental Math", % of students who pass (C or better) their first college level math course on 1 st attempt within 3 academic semesters	22%	40%	by Fall 2013
% students satisfied with instruction via course redesign	NA	85%	by Fall 2013
% of faculty teaching "Developmental Math" who feel that course redesign is effective	NA	85%	by Fall 2013

* Based on a Fall, 2011 implementation of the "Developmental Math" course and course redesign.

XI. Financial Impact of the Proposed Changes

As noted earlier, implementation of course redesign will likely required an upfront investment of computer hardware in order to adequately equip computer classrooms and the dedicated open labs on each campus. Furthermore, while a small increase in faculty ESH from what is currently being allocated for the developmental math program may be needed to support the proposed course redesign model, the additional costs are not expected to be substantial. However, the cost of doing nothing is not insignificant, given the large number of developmental students who fail to persist in their studies at the College, often because they are unable to progress through a college level math course. Tracking a cohort of developmental math students serves as a great illustration of this fact.

In fall 2007, 2300 students college-wide enrolled in MA 090 and MA091 for the first time, and of these 50% passed with a grade of C or better. By the end of the fall 2009 semester, the students who passed their first developmental course in Fall 2007 had attempted and earned an average of 12.5 more credits than those who did not pass that first developmental attempt two years earlier. In theory, a 60% first attempt success rate in developmental math (the target for the proposed “Developmental Math” course is actually 65%) would have translated into an additional 2875 credits attempted and completed* or an approximate additional \$300,000 in tuition revenue at the in-county rate for this one cohort of students over a two-year period. And while, for a percentage of these students, failure to pass their first developmental math course may not be the sole reason behind their diminished college progress, the potential revenue gains under course redesign are not hypothetical, as both community colleges in Tennessee report a significant increase in retention after transforming their developmental math program in this way.

It should also be noted that major grant opportunities, including the \$650 million *Investing in Innovation* Fund (i3) are available to institutions with a record in improving student achievement, attainment, or retention. Significant financial support may thus be provided to expand the implementation of proven innovative practices that improve student achievement or growth, close the achievement gaps, decrease dropout rates, increasing high school graduation rates, or increasing college enrollment and completion rates. All of these outcomes are anticipated with the implementation of the proposed developmental math reform, and the additional efforts by the Task Force next year.

* 230 additional students passing MA090 or MA091, each attempting and completing an additional 12.5 credits over two the referenced two-year period.

XII. Future Efforts: The Task Force – Year Two

The successful implementation of the above recommendations will only address some of the issues deemed critical to solving the developmental math problem. More specifically, in its second year, the Task Force will address the following additional important issues that arose during its year one discussions and at the joint Task Force/Advisory Board meeting in March:

- Enhance the quantitative literacy/contextual learning component of redesign curriculum.
- Investigate ways of incorporating the expertise of student development faculty within the developmental math program to address non-classroom student issues that negatively impact or interfere with student persistence and success.
- Collaborate with MCPS to identify students prior to their senior year who are not on track to be college ready and offer a pathway to college readiness.
- Increase the success rates for students who enroll in MA160 and MA180 after completing MA103.
- Possibly extend course redesign to additional courses, including MA103 and college level math courses as appropriate.
- Ensure that the needs of client disciplines are met.
- Identify the math/quantitative needs of the business community and ensuring that these are addressed.
- Investigate how to encourage or make mandatory early enrollment in developmental math.
- Find ways to inform chronically unsuccessful developmental students of alternate academic paths.
- Seek external funding and support for comprehensive developmental math reform under grant programs in the public sector sponsored by the U.S. Department of Education, NSF, U.S. Department of Energy and in the private sector by Lumina, Carnegie, Gates, Motorola and others.

In responding to the all of above issues in the coming year, but particularly with respect to the first three items, input from the Advisory Board will be vital.

XIII. Final Thoughts

When the Task Force was first convened in the summer of 2009 by Drs. Rai and Ackerman, it's fair to say that many of its members were skeptical of the outcome. Concern was expressed that a lot of data would be collected and much time spent rehashing issues, arguments, and posited solutions from similar efforts over the past twenty plus years, at most resulting in some minor tweaking of the curriculum and/or developmental program policy.

As this year one report is filed, all eleven members of the Task Force now feel very differently – all are excited about what they’ve accomplished and all are optimistic about the potential impact of the sweeping reform being proposed. And while all of us are clear-eyed about the amount of work required to implement the five recommendations contained herein, none are daunted by the challenges; rather everyone is excited and eager to get started turning around the developmental math program at Montgomery College as soon as possible.

Appendix: Advisory Board to Developmental Math Task Force

Business:

John Kenyon, Hughes Network

Herb Jordan, I.T. Applications Manager, Maryland Automobile Insurance Fund

MCPS:

Bob Domergue, Principal, Damascus HS

Vic Weinstein, Math Resource Teacher, Northwest

Lauren Duff, Instructional Specialist, Office of Curriculum and Instructional Programs

Counselors:

Harry Zarin (G)

Jennifer Dobbins (G)

Cathy Wilson (TP/SS)

Renee Gisriel (TP/SS)

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Reading Faculty:

Jean Van Meter (G)

Sue Simpson (R)

Sondra Komarow (R)

Windy Jefferson-Jackson (TP/SS)

Dev Eng Faculty:

Carla Witcher (G)

Mary Robinson (G)

Ellen Olmstead (R)

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