

MEMORANDUM

FINAL FACULTY SENATE APPROVAL ON MARCH 10, 2015

TO: Faculty Senate

FROM: Jack Kirby

DATE: February 26, 2015

SUBJECT: Curriculum Proposal #14-15-20 REV #2

College of Science & Technology; Math Support Program

I recommend approval of the attached Curriculum Proposal #14-15-20 REV #2. This proposal requests to replace the developmental Math courses that were previously offered by Pierpont Community & Technical College.

C: Dr. Christina Lavorata Dr. Donald Trisel Ms. Beth Thompson Dr. Mahmood Hossain Ms. Leslie Lovett Ms. Cheri Varkonda



CURRICULUM PROPOSAL (Submit one hard copy and an electronic copy to the Associate Provost by the second Tuesday of the month.)

Proposal Number:	#14-15-20
School/Department/Program:	Science & Technology/Computer Sci., Math, & Physics/Math Support
Preparer/Contact Person:	L. Beth Thompson
Telephone Extension:	4722
Date Originally Submitted:	12/12/15
Revision (Indicate date and label it Revision #1, #2, etc.):	02/26/2015 Rev. #2
Implementation Date Requested:	FALL 2015

I. **PROPOSAL**. Write a brief abstract, not exceeding 100 words, which describes the overall content of the proposal.

The Math Support Program will replace the developmental courses that were previously offered by Pierpont Community & Technical College. The separation of the two institutions, as well as recent state initiatives to minimize non-credit bearing courses in college, has catalyzed the inception of this program. This program includes four support courses (MATH 1001, 1007, 1011, & 1012) that implement the correquisite model for mathematics. These courses have been/will be offered as MATH 1199 courses in Fall 2014 & Spring 2015. This proposal requests that these courses be approved for the FSU 2015-16 catalog and assigned a formal MATH course number.

- II. **DESCRIPTION OF THE PROPOSAL**. Provide a response for each letter, A-H, and for each Roman Numeral II– V. If any section does not apply to your proposal, reply N/A.
 - A. Deletion of course(s) or credit(s) from program(s)

Total hours deleted. n/a

B. Addition of course(s) or credit(s) from program(s)

Total hours added. _____n/a_____

C. Provision for interchangeable use of course(s) with program(s) n/a

- D. Revision of course content. Include, as an appendix, a revised course description, written in complete sentences, suitable for use in the university catalog. n/a
- E. Other changes to existing courses such as changes to title, course number, and elective or required status. n/a
- F. Creation of new course(s). For each new course
 - 1. Designate the course number, title, units of credit, prerequisites (if any), ownership (FSU or shared) and specify its status as an elective or required course. If you are creating a shared course, attach a memo from the Deans of the affected Schools explaining the rationale for the course being shared.

MATH 1001 – Applied Technical Math I Support – 1.0 credit hour - PR: Math ACT of 15-18, Math SAT 350-450, COMPASS 20-35, or MATH 1107. CR: Must be enrolled in MATH 1101 concurrently. FSU owned course. Required for students taking MATH 1101 who do not meet the pre-requisites for that course.

MATH 1007 – Fundamental Concepts of Math Support – 1.0 credit hour – PR: admission to FSU. CR: Must be enrolled in MATH 1107 concurrently. FSU owned course. Required for students taking MATH 1107 that do not meet the pre-requisites for that course alone.

MATH 1011 – *Pre-College Algebra* – 4.0 credit hours – PR: Math ACT 15-18, Math SAT 350-450, COMPASS 20 – 35, or MATH 1107. FSU owned course. Required for students desiring MATH 1112 credit who do not meet the pre-requisites for MATH 1012 or MATH 1112.

MATH 1012 – College Algebra Support – 1.0 credit hour – PR: Math ACT 19-20, Math SAT 460-490, COMPASS 36-48, or credit for MATH 0095 or MATH 86, or a C or better in MATH 1011. CR: Must be enrolled in MATH 1112 concurrently. FSU owned course. Required for students taking MATH 1112 who do not meet the pre-requisites for that course.

- Include, as an appendix, a course description, written in complete sentences, suitable for use in the college catalog.
 See Appendix B.
- 3. Include, as an appendix, a detailed course outline consisting of at least two levels. **See Appendix C.**
- In order to meet the requirements as outlined in Goal One of the Strategic Plan, please include Outcome Competencies and Methods of Assessment as an appendix. Examples are available upon request from the Chair of the Curriculum Committee. See Appendix D.
- G. Attach an itemized summary of the present program(s) affected, if any, and of the proposed change(s).

Describe how this proposal affects the hours needed to complete this program. Specifically, what is the net gain or loss in hours? Use the format for Current and Proposed Programs in Appendix A. n/a

III. RATIONALE FOR THE PROPOSAL.

A. **Quantitative Assessment**: Indicate the types of assessment data, i.e., surveys, interviews, capstone courses, projects, licensure exams, nationally-normed tests, locally developed measurements, accreditation reports, etc., that were collected and analyzed to determine that curricular changes were warranted. Quantitative data is preferred.

Beginning in Fall 2015, Fairmont State has been mandated to fully implement a math program that meets the needs of FSU students who do not have the appropriate pre-requisites for creditbearing math courses. FSU students will no longer be able to take non-credit bearing developmental math courses through Pierpont Community & Technical College. According to an ACT profile report* for West Virginia students in 2012, 63% of the graduating class scored lower than the required math ACT score of 21 to get into College Algebra at FSU. Furthermore, 52% of these students scored below 19, which is the current score needed to take a credit-bearing math course at FSU. If FSU students reflect the statewide trend, these co-requisite courses will need to serve approximately 50-60+% of the 4000+ students enrolled, preferably within the first 2 years. The following tables include information specific to recently enrolled FSU students.

*(http://www.act.org/newsroom/data/2012/pdf/profile/WestVirginia.pdf)

Fall 2014 Profile for Incoming Fairmont State Freshman Requiring Developmental Math (i.e. Not ready to directly enroll in credit-bearing undergraduate math class.)

Category	Number of Students
Enrolled in Math 89 – PCTC	39*
<i>Enrolled in Math 1100</i> – PCTC Intermediate Algebra (credit-bearing)	28*
<i>Enrolled in Math</i> 1199 – <i>"Trial run" FSU Support class</i> model – (credit-bearing)	127
Have not yet enrolled, but test scores indicate dev. math/support required (ACT < 19)	193
Have not yet enrolled, but test scores indicate dev. math/support may be needed (ACT 19-20)	38
Total Estimated Freshman students needing Dev. Math	425

* These students will have to enroll in future math support courses.

Profile for FSU Returning Students Requiring Developmental Math

Years	MATH	# Students Failed
	Courses	
2013-14	80 - 86	335**
	1100	99
2012-13	80 - 86	439**
	1100	141
2011-12	93	220
	94	632
	95	508
	1100	106

** These are averages for number of students failing all 80-86 courses in the years indicated. Due to the number of overlapping students in each course and the self-paced format, an average was used, rather than individual totals.

The MATH 1199 courses offered in Fall 2014 all filled rapidly. High demand resulted in an additional section of the STRETCH course being added late in the summer. Initial results indicate the majority of students are remaining in the courses. Consultation with the instructors indicates students who regularly attend classes tend to be performing well.

CRN	Course Title	#Students	Α	B	С	D	F	W
10696	Fund. Conc. Ext.	33	7	9	3	9	2	3
10697	Fund. Conc. Supp.	16	9	1	1	1	3	1
10698	Fund. Conc. Supp.	17	9	2	2	1	1	2
10702	Coll. Alg. STRETCH	25	2	6	6	4	4	3
10703	Coll. Alg. Ext.	11	4	3	2	1		1
10704	Coll. Alg. Ext. Supp.	11	4	2	4			1
10909	Appl. Tech. I Ext.	25		1	4	6	12	2
10709	Coll. Alg. Ext.	16	2	8	3	2		1
10710	Coll. Alg. Ext. Supp.	16	11	4				1
10823	Coll. Alg. STRETCH	17	3	6		1	4	3
10911	Appl. Tech I Supp.	14	7	1		3	1	2

Fall 2014 Midterm Grades for MATH 1199 Courses

B. **Qualitative Assessment**: Based upon the assessment data above, indicate why a curricular change is justified. Indicate the expected results of the change. Be sure to include an estimate of the increased cost, or reduction in cost of implementation. FOR EXAMPLE: Will new faculty, facilities, equipment, or library materials be required?

Offering a co-requisite model within the math program at FSU will allow students to immediately begin credit-bearing courses, while supplying the necessary support to help curb dropout rates, improve retention rates, and address attrition issues. Past models of developmental math instruction often took as long as 5 "successful" semesters (Math 93, 94, 95, 1100, 1112) to achieve credit for the desired math course, i.e. College Algebra. Implementing the courses outlined in this proposal will allow any FSU admitted student to immediately begin the general studies math course with support (MATH 1107 & 1007). Furthermore, those students requiring College Algebra for a degree who do not meet benchmark standards now have the potential to earn that credit within 1-2 semesters, increasing confidence and student satisfaction.

The program currently has two adjunct instructors and a coordinator, who also teaches a full-time instructor load. The spring semester will add 2-4 adjuncts. The large number of future courses will require additional faculty members; however, the expenses should be completely offset by tuition paid. A student pays between \$225-546 for a single credit hour. For a 15-seat support class, this is a range of \$3375-8190 (midrange = \$5783) collected from tuition, which more than covers expenses and nets a profit for the university. In the past, Fairmont State students who needed developmental courses took them through Pierpont, which resulted in a "charge back" situation for the university. With FSU offering these courses to its own students, the school is keeping those funds.

Ultimately, the large number of students requiring these courses should make the co-requisite model cost effective for the university, while appropriately serving FSU students. Without providing these support classes, students would have to seek credit elsewhere and transfer those credits into FSU, losing potential income for the university.

IV. Should this proposal affect any course or program in another school, a memo must be sent to the Dean of each school impacted and a copy of the memo(s) must be included with this proposal. In addition, the Deans of the affected schools must sign below to indicate their notification of this proposal.

By signing here, you are indicating your college's/school's notification of this proposal.

College/School	Dean	Signature

V. Should this proposal affect any course to be added or deleted from the general studies requirements, a memo from the chair of the General Studies Committee indicating approval of the change must be included with this proposal.

VI. ADDITIONAL COMMENTS.

Throughout the progress of the pilot program for this co-requisite model of support, there have been various revisions. To assist with correct placement for the Spring 2015 term, a simple flow chart has been created for the MATH 1199 courses. It is included in this proposal.

See Appendix E.

A flow chart with the proposed course numbers and placement information is included. If approved, this would represent correct math support placement information beginning in Fall 2015.

See Appendix F.

Note: Proposed curriculum numbers have been cleared with the registrar via personal meeting on 2/16/2015.

APPENDIX A – Not applicable B.X. Degree in XXXXXXX

Current Program

Required Major Courses	HRS
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TOTAL Required Major Courses	
Major Electives	
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Minor Requirements/Electives (if minor is required)	×
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TOTAL HOURS FOR MAJOR (and minor if required) XX

Attribute IA – Critical Analys		Χ
	Major Course - PSYC 3310	
Attribute IB – Quantitative L	iteracy	3
	MATH 1107 or higher in IB	
Attribute IC – Written Comm	nunication	3
	ENGL 1104	
Attribute ID - Teamwork		X
	Major Course - PSYC 3310	
Attribute IE – Information Lit	ieracy	3
	ENGL 1108	an man a san a san an san a
Attribute IF – Technology Literacy		3
	ENGL 1109	r ferhend ar y an georgen gebreit Marken in Son in the anti Sama tan hannan Silin (1933) an americ (ang
Attribute IG – Oral Commun	ication	3
	COMM 2200 or 2201 or 2202	n (n fearman a' ann a' channa ann an 2019 an 2019 an 2019 an 2014 a' dhao 2013 a' dhaonn 2014 an 1 a' thair bhao
Attribute III - Citizenship		3
	HIST 1107 or 1108 or POLI 1103	1111 March 11
Attribute IV - Ethics		3
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Attribute V - Health		3
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Attribute VI - Interdisciplinar	Letter 1 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 /	3

	SOCY 2200 or any course in VI	
Attribute VIIA - Arts		3
	Any course in VIIA	
Attribute VIIB - Humanities		3
	Any course in VIIB	
Attribute VIIC – Social Science	S	X
	Major Course - PSYC 1101	er versel from al red all from from the
Attribute VIID - Natural Science)	3
C+(1)<0.001)/1 2000000000000000000000000000000000000	Any course in VIID	1
Attribute VIII – Cultural Awaren	Iess	3
	Any GEOG course in VIII	
Additional General Studies hou	IRS	X
	Major Course - PSYC 3390 writing intensive course	
TOTAL GENERAL STUDIES	HOURS	39
TOTAL FREE ELECTIVES		XX
TOTAL HOURS		120

APPENDIX B – Course Descriptions

MATH 1007 Fundamental Concepts of Math Support1 hr.

This course is a supplement to MATH 1107: Fundamental Concepts of Math and designated as a support to students requiring MATH 1107 and who do not meet the pre-requisites for that course. The course content will reinforce fundamental concepts essential to completing MATH 1107, as well as review pre-requisite topics, such as order of operations, exponents, and linear equations, as deemed necessary. This course will utilize mini-lectures, computer-assisted work, group activities, and math manipulatives to reinforce concepts and engage students. This course meets for two hours each week. Students are required to enroll in a MATH 1107 concurrently with this course. PR: Admission to FSU. CR: MATH 1107.

This course covers Pre-Algebra, Elementary Algebra, & Intermediate Algebra. This course is designed for students who need MATH 1112: College Algebra, but do not have the appropriate pre-requisites to enter either College Algebra or College Algebra Support. Students will complete Elementary Algebra concepts in the first portion of the term and then proceed into additional pre-requisite material for College Algebra in the remainder of the semester. Review of foundational concepts will occur to reinforce student learning as deemed appropriate by the instructor. Class work will include mini-lectures, computer-assisted work, MyLabsPlus, group activities, and use of math manipulatives to reinforce concepts and engage active student learning. This course meets for 5 hours each week. NOTE: Upon successful completion of this course, students are eligible for MATH 1012: College Algebra Support. PR: MATH ACT 15-18, or MATH SAT 350-450, or COMPASS 20-35, or MATH 1107.

MATH 1012 College Algebra Support1 hr.

This course is a supplement to MATH 1112: College Algebra and designated as a support to students requiring College Algebra and who do not meet the pre-requisites for that course. The course content will reinforce fundamental concepts essential to completing MATH 1112, as well as review pre-requisite topics, such as evaluating expressions, graphing and functions, linear equations, factoring, and geometric concepts, as deemed necessary. This course will utilize mini-lectures, computer-assisted work, group activities, and math manipulatives to reinforce concepts and engage students. This course meets for two hours each week. Students are required to enroll in a MATH 1112 concurrently with this course. PR: MATH ACT 19-20, or MATH SAT 460-490, or COMPASS 36-48, or MATH 0095, or MATH 0086, or MATH 1011 with a "C" or better. CR: MATH 1112.

The following course descriptions are for current math courses that are affected by the proposed courses. <u>The</u> <u>underlined portions</u> include the new PR information for the proposed courses.

This course includes a review of real numbers, complex numbers, algebraic expressions, equations and inequalities of non-linear functions, functions and function operations, composition of functions, inverse functions, graphing and transformations of nonlinear functions, exponents and radicals, exponential functions, logarithms, and applications. PR: MATH ACT score of 21 or MATH SAT of 500 or COMPASS score of 49 or MATH 1100 or MATH 1012 or concurrent enrollment in MATH 1012.

APPENDIX C – Course Outlines

MATH 1001 – Applied Technical Math I Support

Course Outline

- I. Order of Operations
 - A. Multiplication and division
 - B. Grouping symbols
 - C. Absolute value

II. Calculator Usage

- A. Using graphing calculators effectively
- B. Graphing function
- III. Functions and Graphing
 - A. Slope
 - B. Intercepts
 - C. Domain
 - D. Range
 - E. Linear Functions
- IV. Geometry Triangle Basics
 - A. Adjacent and opposite sides/angles
 - B. Congruence
 - C. Similarity
 - D. Bisection/intersection
 - E. Complementary/supplementary angles
 - F. Pythagorean theorem
- V. Geometry Additional Topics
 - A. Distance formula
 - B. Quadrants
 - C. Ordered pairs
- VI. Trigonometry Basics
 - A. Trigonometric functions
 - B. Switching quadrants
- VII. Reading and Solving Problems
 - A. Organization
 - B. Comprehension
 - C. Translating
- VIII. Vectors
 - A. Law of sine
 - B. Law of cosine
- IX. Factoring and Fractions
 - A. Simplifying fractions
 - B. Algebraic fractions
 - C. Least common multiple & greatest common factor
 - D. Factor trees
 - E. Venn diagrams

MATH 1007 – Fundamental Concepts of Math Support

Course Outline

- I. Introduction
 - A. Connection to MATH 1107: Fundamental Concepts of Math
 - B. KenKen puzzles
- II. Integers and Estimations
 - A. Order of Operations
 - B. Place value
 - C. Rounding
 - D. Estimation
- III. Exponents
 - A. Properties of exponents
 - B. Hindu Arabic number system
- IV. Solving Linear Equations
 - A. Integer coefficients
 - B. Rational coefficients
- V. Math Applications
 - A. Mathematical models
 - B. Factor trees
 - C. Number theory
 - D. Fractions
 - E. Decimals
 - F. Percents
 - G. Use of a calculator to aid in solving math applications
- VI. Personal Finance Calculations
 - A. Exponents
 - B. Grouping symbols and order of operations
 - C. Scientific notation
- VII. Numbers and Operations
 - A. Divisibility
 - B. Irrational numbers
 - C. Relationship to probability
 - D. Simplifying square roots
 - E. Positive and negative integers
- VIII. Cartesian Plane

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- A. Plotting points in the Cartesian plane
- B. Graphs of linear equations in the Cartesian plane

MATH 1011 – Pre-College Algebra

Course Outline

- I. Introduction
 - A. Math study skills
 - B. Pathway to MATH 1012 & 1112
- II. Algebraic Expressions
 - A. Properties
 - B. Fraction notation
 - C. Positive/negative numbers
 - D. Order of operations
- III. Equations and inequalities
 - A. Solving equations
 - B. Formulas
 - C. Solving inequalities
 - D. Problem solving
 - E. Set builder notation
 - F. Interval notation
- IV. Graphing
 - A. Reading graphs, plotting points, and scaling
 - B. Graphing linear equations
 - C. Intercepts
 - D. Slope
 - E. Rates
 - F. Slope-intercept and point-slope form
- V. Polynomials
 - A. Exponents
 - B. Addition, subtraction, multiplication, and division of polynomials
 - C. Negative exponents and scientific notation
- VI. Factoring
 - A. Factoring trinomials
 - B. Quadratic equations
 - C. Principle of zero products
 - D. Applications
 - E. Pythagorean theorem
- VII. Rational Expressions and Equations
 - A. Simplifying rational expressions
 - B. Solving rational equations
 - C. Combining unlike denominators
 - D. Complex rational expressions
 - E. Radicals

VIII. Systems of Equations

- A. Solving systems of equations
 - 1. Graphing
 - 2. Substitution
 - 3. Elimination
- B. Applications using systems
- C. Linear inequalities

MATH 1012 – College Algebra Support

Course Outline

- I. Introduction
 - A. Connection to MATH 1112: College Algebra
 - B. Evaluating expressions
 - C. Distributive property of multiplication over addition
 - D. Determine if a candidate is a solution to an equation
 - E. Reasonableness of solutions
- II. Graphing Basics
 - A. Plotting points
 - B. Writing linear equations
 - C. Graphing linear equations
 - D. Slop-intercept form
 - E. Determining x- and y-intercepts
 - F. Learning graphing utilities, such as fooplot, desmos, etc.
- III. Algebra Properties
 - A. Integer exponents
 - B. Rational exponents
 - C. Negative exponents
 - D. Zero exponents
 - E. Roots
 - F. Identities versus inverses for addition and multiplication of real numbers
- IV. Functions and Transformations
 - A. Modeling functions
 - B. Graphing calculator activities
 - C. Use of calculator to evaluate functions, including exponential and logarithmic
- V. Factoring
 - A. Quadratic functions
 - B. Factor by grouping
- VI. Geometry Concepts
 - A. Pythagorean theorem
 - B. Arithmetic average of two real numbers
 - C. Analytic Geometry
 - D. Slope between two points
 - E. Definitions
- VII. Simultaneous Equations
 - A. Graphing systems of equations
 - B. Solving simultaneous equations by graphing
 - C. Solving simultaneous equations using substitution
 - D. Solving simultaneous equations using elimination
- VII. Linear Inequalities
 - A. Solving linear inequalities
 - B. Graphing linear inequalities

APPENDIX D – Course Outcomes and Objectives

Outcomes and Course Objectives MATH 1001 – Applied Technical Math I Support

1. Use symbolic manipulation skills to simplify algebraic expressions. Assessment: quiz score.

2. Synthesize math knowledge to solve and graph functions and relations. Assessment: activity score.

3. Solve problems using simultaneous equations, vectors, and trigonometric functions. Assessment: assignment score.

4. Demonstrate proficiency in *MATH 1101: Applied Technical Math* lecture course by earning a grade of "C" or better. Assessment: grade in co-requisite math course.

Outcomes and Course Objectives MATH 1007 – Fundamental Concepts of Math Support

1. Utilize technology to demonstrate problem solving and mathematical modeling skills. Assessment: assignment score.

2. Demonstrate symbolic manipulation and mathematical language skills. Assessment: written and oral mini-projects.

3. Synthesize mathematical knowledge for a reasoned, logical, and legitimate conclusion. Assessment: activity score.

4. Demonstrate proficiency in *MATH 1107: Fundamental Concepts of Math* lecture course by earning a grade of "C" or better. Assessment: grade in co-requisite math course.

Outcomes and Course Objectives MATH 1011 – Pre-College Algebra

1. Demonstrate proficiency in solving and graphing linear equations. Assessment: exam.

2. Demonstrate proficiency in factoring polynomials and simplifying rational expressions. Assessment: online test score average.

3. Utilize appropriate terminology to effectively translate word problems into mathematical language. Assessment: in-class activity score.

4. Prepare a notebook that incorporates class notes and assignments and demonstrates progress throughout the term. Assessment: notebook score.

Outcomes and Course Objectives MATH 1012 – College Algebra Support

1. Demonstrate symbolic manipulation skills to solve linear equations and inequalities. Assessment: exam or quiz.

2. Translate word problems into correct mathematical language to investigate, model, and solve real world problems. Assessment: activity score.

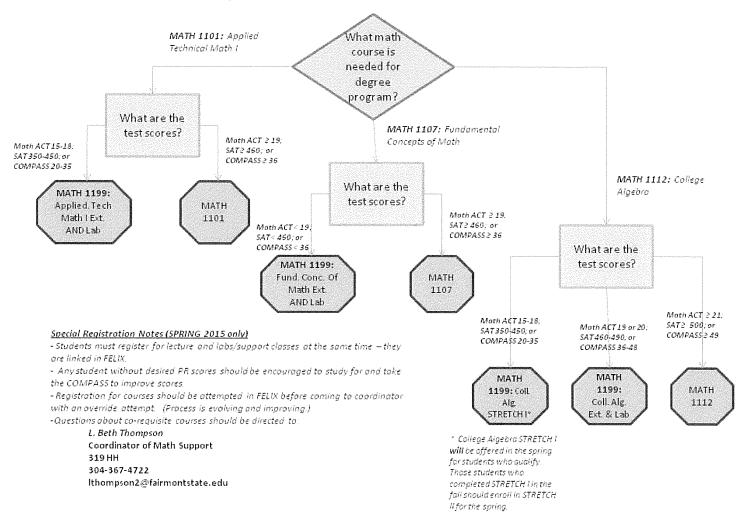
3. Demonstrate knowledge of the language of math to evaluate and analyze problems. Assessment: group project score.

4. Synthesize mathematical knowledge to graph, analyze, and evaluate linear functions and relations. Assessment: assignment score.

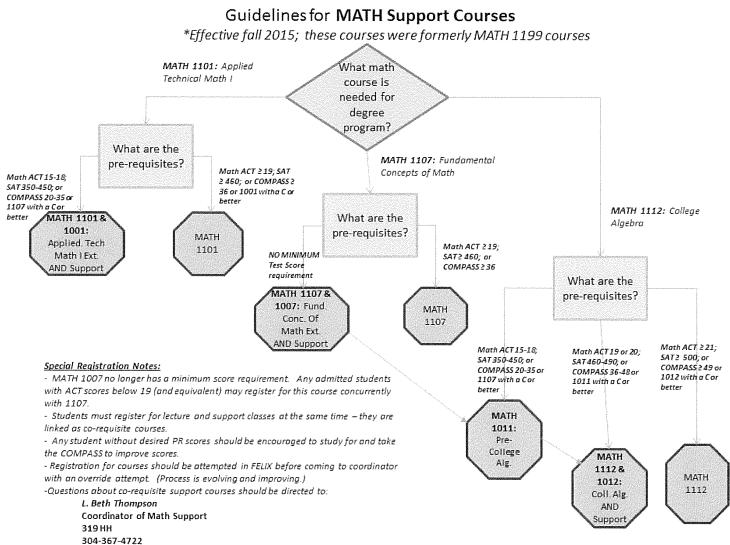
5. Demonstrate proficiency in *Math 1112: College Algebra* lecture course by earning a grade of "C" or better. Assessment: grade in co-requisite math course.

APPENDIX E – Math 1199 Spring 2015 Placement

Spr. 2015 Guidelines for MATH 1199 Courses



APPENDIX F – Proposed Fall 2015 Math Support Placement



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