MATH PATHWAYS PROJECT CHARTER
MATH PATHWAYS AND COREQUISITE SUPPORT PROJECT PLAN

Project Group Charge

This project group was charged with the following:

ACADEMIC AFFAIRS	ACADEMIC AFFAIRS MATH PATHWAYS
GOAL 1	Develop math pathways at ISU that ensure that students are placed in a math course that is matched with the right major and program and best aligns with the student's needs, interests, and academic goals.
GOAL 2	Collaboratively with Student Affairs, develop implementable strategies that help more students take math in their first year.
GOAL 3	Create, implement, and publicize appropriate support mechanisms to assist students who are struggling in their math courses.
GOAL 4	Implement curricular changes as outlined in the Math Pathways/Co-requisite Support white paper (September 16, 2019) and continue implementation of the corequisite model, ensuring that faculty purview over curriculum is respected and maintained.

Project Group Membership

The Math Pathways Project Group Membership included Co-chair DeWayne Derryberry (Chair, Department of Mathematics and Statistics), Co-chair Chris Hunt (Associate Registrar), Laura Ahola-Young (Associate Professor of Art), Cory Bennett (Professor of Teaching and Educational Studies), Susanne Forrest (Academic Advisor, Central Academic Advising), Abbey Hirt (Academic Advisor, College of Nursing), Andy Holland (Professor of Chemistry), Randa Kress (Associate Lecturer, Department of Mathematics and Statistics), Rachel Hulse (Assistant Professor of Medical Laboratory Science), Michael Matusek (Clinical Instructor of Systems Technology and Education Center), Teri Peterson (Clinical Associate Professor), and Craig Thompson (Director of University Housing).

Executive Summary

The Math Pathways Project Group, working in lock-step with the Department of Mathematics and Statistics, has made tremendous progress over the course of this project charter. Although the work of this project group will continue indefinitely as we build our retention and graduation rates through math completion, this project group has implemented and made recommendations for all four of the charter goals. Critical successes include: 1) All ISU

programs now recommend a math course fulfilling Objective 3 that is matched with that major and program and best aligns with each student's needs, interests, and academic goals. 2) Specific first year math course recommendations are officially listed on program specific Academic MAPS and in the catalog for virtually all undergraduate programs. 3) The Math Department and Central Academic Advising developed and implemented an early intervention pilot program during Spring 2019 which is continuing. 4) Co-requisite support courses for the three widely adopted statewide math pathways have been added to the catalog.

Goal 1 - Develop Math Pathways

There are three widely adopted statewide mathematics pathways. ISU offers the following courses in each pathway that fulfill Objective 3 of our general education requirements: the quantitative reasoning pathway (Math 1123 Math in Modern Society), the statistics pathway (Math 1153 Statistical Reasoning), and the STEM pathway (Math 1143 College Algebra, Math 1147 College Algebra and Trigonometry, Math 1160 Survey of Calculus, Math 1170 Calculus I, and TGE 1140).

Actions completed:

- All ISU programs now recommend a math course fulfilling Objective 3 that is matched with that major and program and best aligns with each student's needs, interests, and academic goals.
- ISU now offers corequisite support courses for all three pathways (please see Appendix A for details).
- Specific math course recommendations are officially listed on program specific Academic MAPS and in the catalog for virtually all undergraduate programs.
- Advising has communicated these recommended math courses to all advisors.

Actions ongoing:

- There are several programs that will officially add their specific math course (Objective 3) recommendation in the 2021-22 catalog.

Recommendations:

- Develop a strategy to regularly and collaboratively discuss math gateway courses (Objective 3) across the university.
- Continue interdisciplinary discussions regarding math requirements for business and math requirements for education.
- (Note: This committee recommends instituting an annual or bi-annual summit which serves as a means of regular cross-departmental communication with the focus of student success.)

Goal 2 - Develop Strategies to Encourage First Year Students to Take Math

ISU students who enroll in a math course during their first year are retained at significantly higher rates, anywhere from 12% to 23% higher and an average of 17% higher, than those who do not enroll. ISU students who pass their math course during their first year are retained at

even higher rates. These students are retained at rates of from 87% to 74% with an average retention rate of 81%. Self-selection is clearly leading to these high rates of retention, yet student preparation and confidence in subsequent courses may play a part as well.

Before the cancellation of the newly developed summer New Student Orientation (NSO) events, there were plans for Central Academic Advising, the Office of the Registrar and the Math Department to estimate the demand for Objective 3 math courses for first year students. Seats in those courses were to be reserved specifically for incoming freshmen. Due to the cancellation of the summer NSO events and advising sessions, this project was postponed until 2021.

Actions Completed:

- Specific first year math course recommendations are officially listed on program specific Academic MAPS and in the catalog for virtually all undergraduate programs.
- Advising currently recommends that all first year students take their recommended math course in their first year.

Actions Ongoing:

- Plan to reserve seats in Objective 3 courses for 2021-22 NSO events.

Recommendations:

- Review the current prerequisite evaluation process for increased efficiency and simplification.
- Encourage first-year students who are underprepared in math or who express a concern with taking math, to take the co-requisite section (Plus or “P” section) as their recommended Objective 3 math course.
- Develop a marketing plan which targets first year students and encourages them to take math in their first year. We have a real opportunity to provide consistent messaging to students regarding their first year course schedule that could increase retention and completion of requirements. This could help create a consistent culture that supports student success.
- (Note: This committee recommends that the Office of Marketing and Communications, New Student Orientation, and Central Academic Advising develop a communication plan which encourages first year students to take a math course in their first year.)

Goal 3 - Create, Implement and Publicize Appropriate Math-Support Mechanisms

As noted above, there is strong evidence that ISU students who enroll and complete a math course in their first year have extremely high retention rates, rivaling those of small elite liberal arts colleges across the country. Thus, the importance of math-support mechanisms is clear and critical.

Actions Completed:

- The Math Department and Central Academic Advising developed and implemented an early intervention pilot program from Spring 2019 through Spring 2020 (see Appendix B for details).

- Virtual tutoring through Tutor.com was made available during the 2020 Spring and Summer semesters. This tutoring was offered for all first year math courses and was available from 9 p.m. to 9 a.m during the week and all weekend long.
- Key Information (days, times, tutor expertise, ect.) and encouragement for Math Center use is now included on the syllabi for all Objective 3 courses.
- The College of Technology has implemented new tutoring initiatives such as COT's TAP Center and Online Tutoring.

Actions Ongoing:

- The Math Department and Central Academic Advising are continuing the early intervention program through Fall 2020.

Recommendations:

- Develop a strategy to increase both face to face tutoring and Tutor.com usage.
- Develop a student success communication plan which includes the use of tutoring resources as a key strategy for mathematics success.
- Encourage any student who is (or feels) underprepared, or who has been out of school for a significant time period, to take the co-requisite section (Plus or "P" section) as their recommended Objective 3 math course.
- Provide key information (days, times, tutor expertise, etc.) and encouragement for Math Center use in the syllabi of all math courses 3000 level and below.

Goal 4 - Implement Co-requisite Curricular Changes and Continue Co-requisite Implementation

For each math pathway, ISU offers a "P" or "Plus" course, which provides supplemental instruction in a co-requisite support model. The co-requisite support model allows for students to receive "just in time" information, training, and confidence in building tools to bring about success.

Any student who feels underprepared, or who has been out of school for a period of time (on a mission, on a deployment, or a returning non-traditional student) should be encouraged to take the course. Those students who do not have the requisite skills or knowledge base for success in their particular math course, should enroll in the "P" course as well.

Actions Completed:

- Co-requisite support courses for the three widely adopted statewide math pathways have been added to the catalog. As evidenced in Appendix A, these courses are showing strong signs of success.
- ISU expedited implementation of SBOE policy III S. as stated in the Provost's memorandum dated January 9, 2020. "ISU is expediting implementation of the Idaho State Board of Education's recently revised policy III S. Remedial Education and phasing implementation associated with MATH 1123P and MATH 1153P. Thus, ISU will no longer require completion of a non-gateway course for enrollment in MATH 1123P and MATH 1153P. Moreover, all students will be permitted to enroll in these two courses,

regardless of current test scores (e.g., ACT, SAT, ALEKs, etc.) or pre-requisite courses completed." (The memorandum is attached as Appendix C.)

- Academic Affairs reiterated this policy update in a memorandum dated July 1, 2020. "ISBOE Policy III S. is intended to support mathematics gateway course completion. Thus, for implementation purposes, any student may take the corequisite "Plus" version of MATH 1123 or MATH 1153 if they believe it is in their best interest to do so. Students may make this decision without regard to "high" or "low" test scores (e.g., ACT, SAT, ALEKS, etc.)." (The memorandum is attached as Appendix D.)
- The Math Department restructured and standardized the content for Math 1123 in response to discussions with faculty members across campus.
- The Math Department is utilizing Open Access Educational Resources for each of the three math pathways Objective 3 courses.

Actions Ongoing:

- The Math Department will continue to regularly evaluate the success of ISU's corequisite courses and make updates to the content and delivery based on this evaluation.

Recommendations:

- This committee recommends that the university continues to encourage underprepared students to take ACAD 1103 – College Learning Strategies for Mathematics. This is a one credit course that most students who take have found quite beneficial.

APPENDIX A

Co-requisite support Math 1123, 1153 – Overview

The co-requisite model allows for students to receive "just in time" information, training, and confidence in building understanding to bring about success. In a typical Math 1123 or Math 1153 class 25 students are taking the 3 credit course and 10 students are taking the 4 credit Plus course. Specifically, traditional courses are generally offered Monday-Wednesday-Friday, while the Plus version offers the extra hour on Tuesday. Thus, this is considered an embedded course. The traditional and Plus aligned courses have the same instructor. The instructor covers topics such as Study Skills, Grit, and Growth Mindset as well prerequisite material for the "just in time" support. The Plus version also provides time for covering plenty of practice problems and many questions. Instructors of both Math 1123 and Math 1153 share ideas and resources about how to approach the corequisite support.

Co-requisite support has been found to be particularly successful in courses such as MATH 1123 and 1153 because traditional remedial math courses, developed with success in algebra in mind, do not explicitly prepare students for success in these courses. Those students who are underprepared for these types of courses often need different types of support, rather than traditional math training, to be successful. Frequently, what these students lack most is a straight-forward understanding of how to approach learning in math.

Because math placement tests do not function as strong indicators of success in Math 1123 or 1153, as of Fall 2020, there are no placement restrictions in either of the P versions of these courses.

Math 1123 Plus – Math in Modern Society

Unlike most of the 1000 level gateway math courses, Math 1123 has never had standardized content. Therefore, the content covered from one section to another varied dramatically, making tutoring support particularly problematic. Additionally, because Math 1123 has largely been taught by adjunct instructors and graduate students, it has not been updated regularly nor taught with an explicit focus on student success.

In the Fall of 2019 several faculty members who teach Math 1123 met with faculty from the Division of Arts and Humanities within the College of Arts and Letters (a group brought together by Dr. Ahola-Young). The purpose of this discussion was to highlight concerns with regard to the course, and also determine the necessary mathematical content for success in careers in the arts. Over the past year, the math department has restructured and standardized the material for this course. Moreover, the Math Department is making a concerted effort to select appropriate instructors for this course. Fall 2020 is the first semester with this new standardized content, clearer focus on student success, and deliberate instructor selection.

MATH 1123/1123P Table

		Enrolled	Passed	% of Total
Summer 2018	MATH 1123	14	9	0.64
	MATH 1123B	25	21	0.84
Fall 2018	MATH 1123	117	73	0.62
	MATH 1123P	2	2	1.00
Spring 2019	MATH 1123	91	69	0.76
	MATH 1123P	12	10	0.83
Summer 2019	MATH 1123	18	14	0.78
	MATH 1123B	16	14	0.88
	MATH 1123BP	69	57	0.83
Fall 2019	MATH 1123	112	72	0.64
	MATH 1123P	27	19	0.70
Spring 2020	MATH 1123	88	62	0.70
	MATH 1123P	20	13	0.65

B sections are Bengal Bridge sections.

It should be noted that the pass rates for the P versions are quite good, although a bit inconsistent. Note however that even pass rates of 65% are outstanding given that none of these students would have even been allowed to enroll in the course in previous years. The impact for those students who do pass is enormous.

Math 1153 Plus – Statistical Reasoning

Math 1153P does not have many of the concerns that Math 1123P had. The content of Math 1153 is standard nationwide, so no revision of the content was needed. Also, the faculty who have historically taught this course are all experienced and extremely student centered.

As stated above, there is a group of instructors who meet and share ideas for teaching the Plus versions of both Math 1123 and Math 1153. The Plus sections of Math 1153, like those of Math 1123, focus partially on statistics concepts and partially on approaching learning mathematics in general.

MATH 1153/1153P Table

		Enrolled	Passed	% of Total
Summer 2018	MATH 1153	42	36	0.86
	MATH 1153B	20	16	0.80
Fall 2018	MATH 1153	350	275	0.79
	MATH 1153P	18	18	1.00
Spring 2019	MATH 1153	338	258	0.76
	MATH 1153P	48	24	0.50
Summer 2019	MATH 1153	29	23	0.79
	MATH 1153B	34	20	0.59
	MATH 1153BP	123	84	0.68
Fall 2019	MATH 1153	295	239	0.81
	MATH 1153P	58	45	0.78
Spring 2020	MATH 1153	248	184	0.74
	MATH 1153P	48	32	0.67

B sections are Bengal Bridge sections.

It should be noted that the pass rates for the P versions are quite good, although a bit inconsistent. Note however that even pass rates of 50-67% is outstanding given that none of

these students would have even been allowed to enroll in the course in previous years. The impact for those students who do pass is enormous.

Math 1143 Plus – College Algebra

The strategy for Math 1143 "Plus" is very different from the Plus courses described above. Based on leading universities across the country, best practice for this course seemed to be a cohort model meeting five days a week (the student earns 5 credits). Math 1143P also differs from Math 1123/1153 in that an ALEKS placement exam does, in fact, appropriately place

students in appropriate algebra-based courses. As is the case with Math 1123/1153, placement exams such as, SAT, ACT, or COMPASS do not work well for placement with Math 1143 either.

In the STEM pathway everyone must take the general education course Math 1143, or place into a course for which it is the prerequisite. Math 1143 is considered the STEM math course that should have a co-requisite "Plus" version.

MATH 1143/1143P Table

		Enrolled	Passed C-	Passed D-	% of Total C-	% of Total D-
Summer 2018	MATH 1143	19	15	17	0.79	0.89
Fall 2018	MATH 1143	164	98	129	0.60	0.79
Spring 2019	MATH 1143	163	96	112	0.59	0.69
Summer 2019	MATH 1143	12	11	12	0.92	1.00
	MATH 1143B	10	8	8	0.80	0.80
Fall 2019	MATH 1143	156	78	96	0.50	0.62
	MATH 1143P	35	18	26	0.51	0.74
Spring 2020	MATH 1143	129	75*	84*	0.58*	0.65*
	MATH 1143P	35	29*	31*	0.83*	0.89*

*There were some concerns about online cheating during Spring 2020. These numbers may be artificially high. B sections are Bengal Bridge sections.

The distinction between “Passed C-“ and “Passed D-“ is that passing with at least a C- is required in math in order to take the next course in the sequence. However, passing with a D- is the minimum grade required to earn credit for the course, and fulfil the Objective 3 requirement, particularly for a non-STEM major. Of the various Plus classes, this distinction is clearly more important with Math 1143 than with Math 1123 or Math 1153. Almost everyone who takes Math 1143P will take an additional math class, so it is really the “Passed C-“ rate that is most important.

Math 1108 Plus – Intermediate Algebra

To support less prepared students, we also offer Math 1108 in the Plus format similar to Math 1143 – 5 days a week, 5 credits, cohort approach.

MATH 1108/1108P Table

		Enrolled	Passed C-	Passed D-	% of Total C-	% of Total D-
Summer 2018	MATH 1108	23	17	19	0.74	0.83
	MATH 1108B	43	39	40	0.91	0.93
Fall 2018	MATH 1108	904	509	600	0.56	0.66
Spring 2019	MATH 1108	313	161	197	0.51	0.63
Summer 2019	MATH 1108	18	15	16	0.83	0.89
	MATH 1108B	39	30	33	0.77	0.85
	MATH 1108BP	52	40	44	0.77	0.85
Fall 2019	MATH 1108	307	152	185	0.50	0.60
	MATH 1108P	74	29	36	0.39	0.49
Spring 2020	MATH 1108	172	107	118	0.62	0.69
	MATH 1108P	56	30	34	0.54	0.61

APPENDIX B

Early Intervention Program

Annik Martin, a lecturer in mathematics, and Suzanne Forrest of central academic advising piloted a small scale early intervention program (EIP) beginning in Spring 2019. For that first semester it involved 5 sections of 1108/1108P and with roughly 145 students enrolled. In the following two semesters the participation was larger: 14 classes [0090 (3), 1108 (3)/1108P (3), 1123/1123P (2), 1143 (1)/1143P (2)] in Fall 2019 and 13 classes [0090 (3), 1108 (2)/1108P (3), 1123/1123P (1), 1143P (2), 1147 (1), 1160 (1)] in Spring 2020. In the latter two semesters roughly 380-400 enrolled students were in these classes.

A substantial number of students were flagged and contacted. For example, in Fall 2019 172 of 385 students were flagged (45%) by faculty resulting in over 515 contacts from Suzanne Forrest. About 55% of students flagged had at least one "successful" conversation with Suzanne. That represents about 23% of the total students in the program.

Anecdotally, Annik Martin reported: *"As an instructor, I know it helped students who were in the wrong class in the first 10 days; it also helped students who were failing deciding their best course of action before the last day to withdraw; it also helped students with social and health issues.*"

Suzanne Forrest said: "*Without analyzing every entry on the smartsheets for the EIP for fall, I would say that my experience with the interventions was very similar to before. Students generally appreciated when they received a call with the exception of two or three who did not wish to be called and, it seems, helped. I think these were students who simply were in over their head with their classes in general and also worked too much.*

Overall, I always feel good when we can save someone from having to do a late withdrawal appeal and we had some of those. A number of students, as usual struggled with health issues, physical and mental, and I would like to believe that our calling and care helped them get the care they needed.

I recorded a total of 515 contacts via phone or email for fall. The number is likely a little bit higher, as I do not count an email string as multiple contacts if they happen in the same day."