

Excellence in Undergraduate Education (EUE) Proposal

Project ID# (leave blank)

3

Project Title

Success by Design: Grading Approaches to Boost Algebra Learning

Project Director	ID Number	Telephone	Email
	800646358	314-369-6906 (cell)	

Department	Campus Box	School College
Mathematics and Statistics	1653	CAS

Course or Program

MATH 116 Foundations of Algebra and MATH 120 College Algebra

Project Co-Director	ID	Department	Email
	800767968	Mathematics and Statistics	
	800184513	Mathematics and Statistics	

Student Impact: 690-720 students

Priority Rating (If Submitting Multiple Proposals):

Project Budget

Salary	Wages	Travel	Equip.	Comm	CServ	Auto	Tele	Awards	Total
\$9,000									

Cost-Sharing

Salary	Wages	Travel	Equip.	Comm	CServ	Auto	Tele	Awards	Total
\$6,467									

Prior EUE Support

Project Director	Project Number	Award Amount	Project Dates
N/A			

Applicable 2024-2025 Priorities (check all your proposal fits, if any):

- ☒ Course redesign project that uses inclusive, student-centered pedagogies to address equity gaps, improve student learning outcomes, & enhance retention
- ☒ Project involves courses that have high number of sections, a high ratio of D/F/W grades, or key required courses with high enrollments and opportunities to improve equitable student success
- ☐ Development or revision of IS courses with alignment to a specific Changemakers Pathway, integration of high-impact teaching practices, and either collaborative learning or community-engaged learning component.

Project Summary

While developing and teaching the new MATH 116 course, Foundations of Algebra, three instructors will implement and experience the differences between traditional grading and alternative grading and **compare the impact on student learning**. Each instructor will teach two sections of MATH 116 during the same semester in order to make this comparison, using a common cumulative final exam along with final course grade and a student survey about self-efficacy. The instructors will share responsibilities in the development of the course and in gathering and analyzing data from this project. **The impact on student learning** will be measured in MATH 116 itself and by following the students as they take the subsequent course, MATH 120.

Project Narrative

College Algebra (MATH 120/E/I) is an important gateway course for many students regardless of their major. For many of our first-time, first-year students, College Algebra is one of their first semester courses. Historically, College Algebra is a challenging course for students regardless of their placement score. Looking over the past three academic years, the percentage of D's, F's, and withdraws (DFW) in MATH120/E/I has averaged ~36% in fall semesters (202X35) and ~42% in spring semesters (202X15; Fig. 1). After four attempts, 31.5% of students enrolled in College Algebra have yet to pass. Over 2,800 students have enrolled in MATH120/E/I since Fall 2021. We also know that students who earn a DFW in their first semester on campus are less likely to persist into their second year. Taken together, the impact that College Algebra has on SIUE students is significant.

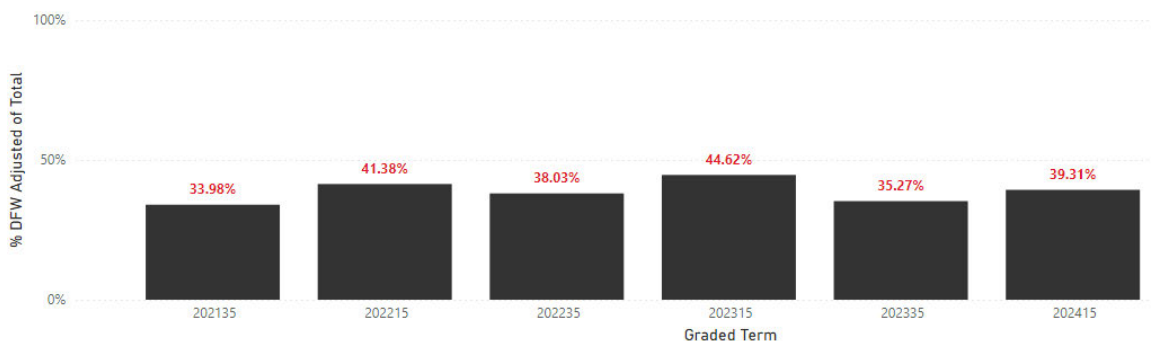


Figure 1. A longitudinal look at DFW rates across MATH120 since AY22.

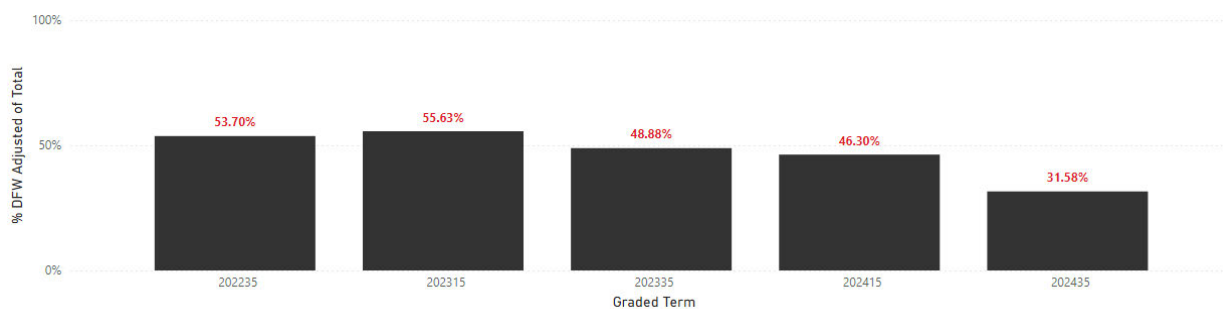


Figure 2. A longitudinal look at DFW rates across MATH120I since its inception in AY23.

As such, courses have been developed to provide additional support for these students; an intensive five contact hour course with smaller class sizes (15 students) that includes review of foundational math concepts and college algebra concepts. Math instructors teaching in the College Algebra curricula have engaged in professional development including the ACUE “Creating an Inclusive and Supportive Learning Environment” course, the Inclusive STEM Teaching Project course and learning community, and attending disciplinary education and teaching conferences. In the summer of 2024, the Department of Mathematics and Statistics developed MATH115: Foundations of Mathematics. MATH 115 was developed for students whose math placement scores are at the lowest level of math ability upon entering college. The goal of MATH 115 is to strengthen the arithmetic and computational skills needed to be successful in future courses at SIUE. The course uses Standards Based Grading (SBG) as the grading schema. SBG, as opposed to traditional grading, focuses on supporting students as they work toward proficiency in skills or content knowledge. SBG focuses on iterative improvement through re-assessment over the course of a semester allowing students to reflect, ask questions, and practice between attempts. After successfully completing MATH115, students move into the algebra curricula. Combined, these efforts have made inroads with MATH120I’s DFW rate dropping steadily since it began being offered in AY2023 (Fig. 2).

In the Fall 2024, MATH120 instructors (we) came together to share ideas, align materials, and develop plans to tackle the persistent issues in MATH 120I. This process was fruitful; we revisited syllabus language, discussed strategies to combat math anxiety, shared ideas for making students feel welcome, and implemented student metacognition activities. Combined with the offering of MATH115, which directed students with the least math readiness out of MATH120I, we saw a substantial drop in DFW rate (Fig. 2). However, through this process we also agreed that the amount of content covered in MATH120I is simply overwhelming for students and faculty alike. Based on the textbook, MATH120I covers over 100

math concepts, many of which build upon each other and are pre-requisite for subsequent course work in Business, Chemistry, Computer Science, Engineering, and Math courses.

For these reasons, we proposed and were granted approval to develop MATH116: Foundations of Algebra. The content breadth required in MATH120 will now be split between MATH116 and MATH120 allowing for better pacing. Through sharing ideas, we are also interested to see how SBG may help support student success in our algebra curricula. Given the opportunity to restructure this critical coursework, we are proposing two specific aims to continue to work together toward minimizing the DFW rates in our courses.

Aim 1: Determine the impact of alternative grading strategies on student success in Foundations of Algebra (MATH116)

- Develop MATH116 in (at least) two formats: traditional grading and alternative (standards based) grading.
- Controlling for instructor, compare student success in sections of MATH116 graded with these two grading strategies.

In order to accomplish Aim 1, we will spend Summer 2025 creating guided notes to be used across sections of MATH116 and an ALEKS homework shell, both aligned to the course objectives. ALEKS is the online homework system that will be utilized by both MATH 116 and MATH 120. It includes online homework along with an eBook for students to reference. The homework system provides feedback to students in real time as they submit answers to problems. Videos explaining concepts are also provided within ALEKS. We will summarize the topics into 20-25 objectives to be taught and tested over the course. This will be the base for all

MATH116 courses. Then to control for instructor, each instructor will teach two sections of MATH116, one with traditional grading and the other with alternative (standards-based) grading, in the same semester. The variables will be grading strategies (this is the independent variable), time of day of class (the time of day is an uncontrollable variable), and, potentially, student outcomes (dependent variable).

We will compare the traditional grading versus standard-based grading using a common cumulative final exam along with final course grade and a student survey about self-efficacy. In Summer 2026, we will analyze the relationship between grading strategy, student grades, and student math self-efficacy in MATH116.

Aim 2: Assess student retention of math knowledge and continued progress through the transition from Foundations of Algebra (MATH116) to College Algebra (MATH120)

- Sequence and separate the content of the former MATH120 into MATH116 and MATH120.
- Determine if grading strategy in MATH116 impacts subsequent success in MATH120.
- Measure the impact of reducing the course content in MATH120 on DFW rates.

In addition to the work with MATH116 in Aim 1, we will also finalize the learning objectives, content, and ALEKS homework that will remain in MATH120. As a result of developing MATH116, MATH120 will have fewer learning objectives than previous terms and will also directly address some learning objectives previously only addressed in ALEKS homework, if at all, due to time constraints and the number of required objectives.

In Summer 2026 we will analyze the impact of reducing the course content in Math 120 on DFW rates and determining if the grading strategy in Math 116 impacted subsequent success in Math 120. We will follow the progress of our students from Fall 2025 in the piloted course to Spring 2026 in Math 120. We will compare their outcomes in Math 120 and survey them to see if they felt prepared for the course content in Math 120. Finally, we will compare the DFW rates in MATH120 from Spring 2023, Spring 2024, and Spring 2025 to Spring 2026 to see if the curricular addition of MATH116 and/or MATH116 grading strategy impact student success.

Outcomes and Next Steps:

Upon completion of this project, we will have developed MATH116: Foundations of Algebra to support students who have demonstrated a need for increased support with math skills, restructured MATH120: College Algebra to reduce student workload and better address content needed in subsequent courses, and compared student academic success and self-efficacy based on grading strategy. These changes will aid decision making processes regarding these courses, course policies, and teaching strategies in these and other courses taught in the Department of Mathematics and Statistics.

Timeline:

	Summer 2025	Fall 2025	Spring 2026	Summer 2026
All	Apply for IRB for Study	Administer MSEAQ in MATH116	Gather Data on MATH116 Student Success in MATH120	Review & Interpret Data Analysis: Course Grades in MATH116, MSEAQ in MATH116, and MATH116 Student Success in MATH120 based on MATH116 Grading Strategy
	Finalize MATH116 Objectives and Map to SBG		Administer MSEAQ in MATH116	
	Review & Approve Notes & Homework			Submit EUE Report
	Develop Guided Notes for MATH116	Teach 2 Sections of MATH116		
	Create ALEKS Homework for MATH 116	Teach 2 Sections of MATH116		
			Teach 2 Sections of MATH116	Lead Data Analysis Efforts (see above)

Budget Justification

We are requesting one month summer salary for each instructor over the period of the grant to complete work related to this study, to be paid half Summer 2025 and half Summer 2026. This will include the development of notes (led by [REDACTED] online homework through ALEKS (led by [REDACTED], and data analysis (led by [REDACTED] together we will assemble an IRB proposal, finalize the MATH116 objectives and divide them from the remaining MATH120 objectives, agree on the notes and homework to be used in MATH116, administer the MSEAQ to students, collect data on student success moving from MATH116 to MATH120, review and interpret data analyses, and submit a summary our work in an EUE report.

Itemized Budget

Budget Item		Cost
1 mo. Summer Salary		\$5667
1 mo. Summer Salary		\$5040
1 mo. Summer Salary		\$4760
	Grand Total	\$15,467
	EUE Request	\$9,000
	CAS Cost Sharing	\$6,467

BIOGRAPHICAL SKETCH

NAME: [REDACTED]

POSITION TITLE: Instructor of Mathematics at Southern Illinois University Edwardsville

EDUCATION/TRAINING:

INSTITUTION	DEGREE	Completion Date	FIELD OF STUDY
University of Kentucky	BS	5/1998	Civil Engineering
Missouri University of Science and Technology	MS	12/2014	Applied Mathematics

[REDACTED] currently teaches first year mathematics students at Southern Illinois University – Edwardsville, joining the faculty in August 2022.

[REDACTED] began [REDACTED] teaching career in 2001 at the newly formed Winchester Christian Academy in Winchester, KY, teaching 4th – 12th grade math. [REDACTED] also worked during that time as a math teacher for the homeschool community and as a tutor for college students at the local community college. Upon moving to Missouri in 2010, [REDACTED] began teaching as an adjunct instructor for East Central College in Union, MO. Realizing that she wanted to continue to teach at the college level but lacking the credentials needed, [REDACTED] returned to school in 2012 to pursue a master's degree in applied mathematics from Missouri S&T in Rolla, graduating in December 2014.

[REDACTED] has worked as a graduate teaching assistant and lecturer for Missouri S&T, adjunct and full-time tenured instructor at East Central College, and as an adjunct instructor for Saint Louis Community College, teaching a variety of courses including prealgebra, introductory algebra, intermediate algebra, college algebra, precalculus, trigonometry, differential equations, introductory statistics, math for liberal arts, discrete mathematics, and contemporary math.

[REDACTED] passion and focus is on working with underprepared students in their first year at college or university and has worked with this population for the last 15 years. [REDACTED] is always interested in finding new and better ways to encourage [REDACTED] students to take ownership of their own learning and master those difficult topics.

BIOGRAPHICAL SKETCH

NAME: ██████████

POSITION TITLE: Instructor of Mathematics at Southern Illinois University
Edwardsville

EDUCATION/TRAINING

INSTITUTION	DEGREE	Completion Date	FIELD OF STUDY
McKendree College	BS	12/2002	Mathematics
McKendree University	Master of Arts	12/2009	Education
Southern Illinois University Edwardsville	Master of Science	12/2009	Statistics

██████████ has always had a passion for teaching. ██████████ has always wanted to obtain a position where ██████████ mathematical skills, compassion, and academic accomplishments will contribute to the growth and learning of students. ██████████ wants to be able to make a difference in the lives of others.

██████████ knew at an early age that she wanted to be a teacher. ██████████ always loved school and learning. ██████████ was always trying to make others love learning as well, starting with tutoring the neighborhood kids and a few high school kids as well.

██████████ graduated from McKendree College with a Bachelor of Science in Mathematics and went on to teach high school. ██████████ first taught in inner city St. Louis at *Soldan International Studies High School*. ██████████ spent the year there teaching Sophomore Geometry and learning how to teach to a very diverse group of students. ██████████ educated high school students in mathematics courses, prepared daily lessons, worked collaboratively with other teachers in the mathematics department. ██████████ then went to teach at *Christ Our Savior Lutheran High School* in Evansville, IL. In her two years here, she learned how to balance teaching many different classes at once, being the only math teacher on staff.

██████████, wanting to further ██████████ education, went back to school. ██████████ graduated December of 2009 with a Masters of Science in Statistics from *Southern Illinois University Edwardsville* and a Masters of Arts in Education from *McKendree University*. During and after this time she taught part-time college classes. ██████████ taught part-time at both *Southern Illinois University Edwardsville* and *Southwestern Illinois College*. ██████████ taught various courses, including College Algebra, Intermediate Algebra, Pre-Algebra, Pre-Calculus, Calculus, Statistics, and Mathematics for Elementary Teachers. ██████████ learned to prepare course syllabi and instructional lesson plans for courses, educate students in such a manner that enables them to learn, and to prepare and administrate tests and quizzes to students in order to effectively ensure they are

learning the necessary material.

██████████ has been teaching full-time at *Southern Illinois University Edwardsville* since January, 2018. █████ is currently serving as the College Algebra coordinator. █████ enjoys striving to make █████ students life-long learners and fulfill her life-long dream of being an educator.

BIOGRAPHICAL SKETCH

NAME: [REDACTED]

POSITION TITLE: Instructor of Mathematics at Southern Illinois University Edwardsville

EDUCATION/TRAINING:

INSTITUTION	DEGREE	Completion Date	FIELD OF STUDY
Westmont College	BS	5/2006	Mathematics
Azusa Pacific University	Master of Arts	1/2011	Education
Southern Illinois University Edwardsville	Master of Science	7/2022	Mathematics

[REDACTED] wanted to become a teacher ever since [REDACTED] was a child. [REDACTED] enjoyed math tutoring opportunities in high school and college, which increased [REDACTED] desire to teach and provided valuable experience in explaining math concepts in a variety of ways. [REDACTED] found it fulfilling to help others in their understanding of math concepts, and in the process encourage students about their ability to learn and reach their goals.

After studying math in college, [REDACTED] worked in an office for a few years, but missed the opportunities to directly help others in [REDACTED] work. After this, she chose to fully pursue teaching and completed coursework [REDACTED] Master's in Education while teaching high school math at *Providence School* in Santa Barbara, CA. Due to [REDACTED] own experience growing up in Japan, [REDACTED] was interested in teaching internationally, so [REDACTED] went on to teach high school math at *International School of Wuxi* in China for seven years, enjoying the opportunity to teach diverse students from many different countries around the world in the same classroom. During these years [REDACTED] taught all levels of math from Pre-Algebra through AP Calculus. [REDACTED] served as the math department head for five years, and also had administrative responsibilities such as creating the master class schedule each year. While in China, [REDACTED] had the opportunity to attend international educators conferences each year, providing valuable professional development.

When [REDACTED] moved to St. Louis in 2016, [REDACTED] worked part time in a variety of college settings both as adjunct faculty and as a math tutor, including *Harris-Stowe State University*, *St. Louis Community College*, *Southwestern Illinois College*, and *Southern Illinois University Edwardsville*. [REDACTED] had the opportunity to teach a variety of courses, including Pre-Algebra, Elementary Algebra, Intermediate Algebra, Pre-Calculus, Calculus I, and Statistics. During this time, [REDACTED] also took math courses in preparation for beginning a Master's in math. [REDACTED] completed [REDACTED] Master of Science in Mathematics from *Southern Illinois University Edwardsville* in 2022, which led to the opportunity to continue teaching at *Southern Illinois University*

Edwardsville full time starting in Fall 2022.

All these experiences prepared [REDACTED] well to teach diverse groups of students, to prepare lesson plans with students' needs in mind, to adapt teaching strategies depending on students' learning needs, and to assess students in ways that measure learning and become part of the students' learning process. [REDACTED] also participated in further professional development through two ACUE courses in the past two years.

[REDACTED] looks forward to many future years continuing to teach all students who come into [REDACTED] classroom and support them in their learning and progress towards their future goals.

SOUTHERN ILLINOIS UNIVERSITY EDWARDSVILLE

February 21, 2025

Dear EUE Awards Committee,

I am writing to express my strong support for the EUE grant application submitted by [REDACTED] [REDACTED] [REDACTED] to improve and enhance a recently designed by them course, MATH 116, Foundations of Algebra. A Foundations of Algebra course is designed to solidify the essential mathematical skills and conceptual understanding required for success in more advanced algebra courses. It typically revisits core concepts from pre-algebra and early algebra, ensuring that students have a firm grasp on these foundational topics before tackling the more sophisticated material of College Algebra. I strongly believe that fortifying students' fundamental algebra skills and strengthening their problem-solving strategies, a Foundations of Algebra course provides a well-structured pathway to confidently and successfully advance into College Algebra and therefore help the Department of Mathematics and Statistics to effectively address the increasingly high D/F/W rates that inflict College Algebra for several years.

As colleagues and fellow faculty members, I have had the privilege of working closely with these three instructors and witnessing their dedication, expertise, and passion for teaching firsthand.

Over the years, [REDACTED] [REDACTED] [REDACTED] have each demonstrated a commitment to fostering student success in mathematics through:

1. Innovative Teaching Methods:

They continually seek out and implement new pedagogical strategies—such as active learning approaches, technology-integrated lessons, and real-world problem-solving exercises—that keep students engaged and excited about mathematics.

2. Collaborative Curriculum Development:

They consistently collaborate with colleagues, sharing best practices, resources, and techniques to ensure that all course offerings maintain a high standard of rigor and relevance. Their willingness to learn from each other and adapt to student needs has led to measurable improvements in student outcomes.

3. Focus on Student Support and Equity:

Each of these instructors devotes extra time to support students outside of class. Whether through mentoring, office hours, or study groups, they create an

Department of Mathematics and Statistics – College of Arts and Sciences

t 618-650-2382 **w** siue.edu/artsandsciences/math/

a Science East, Room 2300, Box 1653, Edwardsville, IL 62026-1653

inclusive environment in which every student—regardless of background—has the chance to succeed.

4. Assessment and Continuous Improvement:

They rely on thoughtful, data-driven methods to assess how students learn best. When they notice patterns or areas for enhancement, they work diligently to modify assignments, exams, and in-class activities so students gain a deeper and more enduring understanding of the material.

By securing this EUE grant, they plan to broaden these efforts and integrate additional, innovative and well thought components into our curriculum. Their proposed initiatives—which include detailed analysis and comparison of two alternative grading strategies for MATH 116 and the impact they have on student success—have the potential to not only enrich our students' learning experiences but also serve as a model for other programs throughout our institution. In addition, the choice of grading strategy in MATH 116 plays a crucial role in shaping student learning experiences, knowledge retention, and overall performance in MATH 120. Given that MATH 116 serves as a foundational bridge to College Algebra, the way students are assessed in this course could significantly impact their preparedness, confidence, and ability to succeed in MATH 120. Summarizing, it becomes clear from the above discussion, that this study compares traditional grading with standards-based grading (SBG) to determine which approach better supports student success in mathematics.

I would also like to note that the proposed budget and timeline for this project have been thoughtfully designed to ensure feasibility and responsible resource allocation. The requested funds will support summer work by the instructors to develop guided notes, ALEKS homework modules, and assessment tools for MATH 116. The timeline allows for careful implementation, data collection, and analysis, ensuring that the results will provide meaningful insights into grading methods and curriculum adjustments.

Additionally, the team's expertise and collaborative approach make them highly capable of executing this project successfully. Their background in mathematics education, prior experience in course redesign, and engagement in professional development (such as the ACUE Inclusive Teaching course) demonstrate their commitment to improving student outcomes through evidence-based teaching practices.

I strongly endorse [REDACTED] application for this grant. Their dedication to innovative teaching, student success, and curriculum improvement makes them ideal candidates for this funding opportunity. The proposed project aligns with our institution's mission to support student learning and increase retention rates in mathematics.

Thank you for considering their application. If there is any further information I can provide, please feel free to contact me at **618-604-7580** or **gpeleka@siue.edu**. I look

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a Science East, Room 2300, Box 1653, Edwardsville, IL 62026-1653

forward to the positive impact these instructors will continue to have on our mathematics program.

Sincerely,

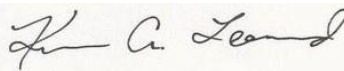
A handwritten signature in black ink, appearing to read "G. Pelekanos", with a long horizontal flourish extending to the right.

George Pelekanos
Distinguished Research Professor &
Chair
Department of Mathematics & Statistics

SOUTHERN ILLINOIS UNIVERSITY
EDWARDSVILLE

Date: February 27, 2025

From: Kevin Leonard, Dean, College of Arts and Sciences



Subject: EUE Dean Memo of Support

The College of Arts and Sciences strongly supports the application of [REDACTED] for an EUE grant to develop a new course, MATH 116: Foundations of College Algebra and to assess the impact of alternative pedagogical strategies on student success. The aim of the project is to develop and experiment with innovative grading and pedagogical strategies to enhance student learning, lower DFW rates and improve success rates of students in both MATH 116 and MATH 120, the course students move into after successfully completing MATH 116. Therefore, this project will have far reaching impact for students beyond this single course because it is foundational for their continued success in subsequent MATH courses that many students need for degree completion across the College and University. The project thus contributes to student success initiatives on campus and relates to EUE priorities.

The entirety of the budget is to compensate three instructors over two summers for course development, design, and assessment. Given the time intensive nature of this course development, implementation, and assessment of alternative grading and pedagogical strategies, EUE support is critical. The College of Arts and Sciences has agreed to contribute \$6,467 as cost share in recognition of the significance of this work in meeting our student success and retention goals.