New Program Proposal

Date Submitted: 02/26/26 1:44 pm

Viewing: BS-AMAI : Bachelor of Science in Applied Mathematics with Artificial Intelligence

Last edit: 02/27/26 4:45 pm

Changes proposed by: kong2

Program Status	Active			
Requestor	Name	Kiah Ong	E-mail	kong2@iit.edu
Origination Date	2026-2-26			
Is this an interdisciplinary program?	No			
Is this stem-eligible?	Yes			
Available for direct application?	Yes			
Academic Unit	Applied Mathematics			
College	College of Computing			
Program Title	Bachelor of Science in Applied Mathematics with Artificial Intelligence			
Effective Academic Year	2026 - 2027	Effective Term	Fall 2026	
Academic Level	Undergraduate			

In Workflow

1. AMAT Chair
2. Academic Affairs
3. Undergraduate Academic Affairs
4. Director of Assessment
5. CC Dean
6. Marketing and Communications
7. Undergraduate Studies Committee Chair
8. Faculty Council Chair
9. Faculty Council Chair
10. Provost
11. President
12. Board of Trustees
13. Academic Affairs

Approval Path

1. 02/25/26 12:52 pm Chun Liu (cliu124): Approved for AMAT Chair
2. 02/25/26 2:01 pm Ayesha Qamer (aqamer): Rollback to Initiator
3. 02/25/26 2:53 pm Chun Liu (cliu124): Approved for AMAT Chair
4. 02/26/26 9:07 am Ayesha Qamer (aqamer): Approved for Academic Affairs
5. 02/26/26 12:13 pm Joseph Gorzkowski

(jgorzkow): Rollback to Initiator
6. 02/26/26 2:14 pm Chun Liu (cliu124): Approved for AMAT Chair
7. 02/26/26 2:42 pm Ayesha Qamer (aqamer): Approved for Academic Affairs
8. 02/26/26 2:43 pm Joseph Gorzkowski (jgorzkow): Approved for Undergraduate Academic Affairs
9. 02/27/26 3:02 pm Nicholas Menhart (menhart): Approved for Director of Assessment
10. 02/27/26 4:45 pm Nicole Beebe (nbeebe1): Approved for CC Dean

If all courses in a subject in your department are required, please enter each subject followed by the number ranges in the "Quick Add" field in the pop up box when you click the green plus button below. For example: ARCH 100-499.

What courses will factor the major GPA?	MATH 100 - Introduction to the Profession MATH 147 - College Algebra MATH 148 - Preparation for Calculus MATH 151 - Calculus I MATH 152 - Calculus II MATH 180 - Fundamentals of Discrete Mathematics MATH 191 - Business Calculus MATH 192 - Linear Mathematics MATH 230 - Introduction to Discrete Math MATH 251 - Multivariate and Vector Calculus MATH 252 - Introduction to Differential Equations MATH 332 - Elementary Linear Algebra MATH 350 - Introduction to Computational Mathematics MATH 380 - Mathematical Modeling with Data MATH 400 - Real Analysis MATH 402 - Complex Analysis

MATH 410 - Number Theory
MATH 430 - Applied Algebra
MATH 431 - Computational Algebraic Geometry
MATH 435 - Linear Optimization
MATH 437 - Network Optimization
MATH 439 - Network modeling and statistics
MATH 446 - Introduction to Time Series
MATH 453 - Combinatorics
MATH 454 - Graph Theory and Applications
MATH 461 - Fourier Series and Boundary-Value Problems
MATH 475 - Probability
MATH 476 - Statistics
MATH 477 - Numerical Linear Algebra
MATH 478 - Numerical Methods for Differential Equations
MATH 481 - Introduction to Stochastic Processes
MATH 483 - Design and Analysis of Experiments
MATH 484 - Regression
MATH 485 - Introduction to Mathematical Finance
MATH 486 - Mathematical Modeling I
MATH 488 - Ordinary Differential Equations and Dynamical Systems
MATH 489 - Partial Differential Equations
MATH 491 - Reading and Research
MATH 493 - Summer Research and Independent Study
MATH 497 - Special Problems
STAT 225 - Introductory Statistics
DS 100 - Introduction to the Profession

Program Type	Degree
Degree Type	Bachelor of Science (BS)

CIP Code
27.0301 - Applied Mathematics, General.

Is there more than one Academic Unit proposer?

No

Program Code	BS-AMAI
Program Attribute	
Total Program Credit Hours	120

Program Narrative and Justification

Narrative description of how the institution determined the need for the program. For example, describe what need this program will address and how the institution became aware of that need. If the program is replacing a current program(s), identify the current program(s) that is being replaced by the new program(s) and provide details describing the benefits of the new program(s). If the program will be offered in connection with, or in response to, an initative by a governmental entity, provide details of that initiative.

Illinois Tech identified the need for the Bachelor of Science in Applied Mathematics + AI through departmental curriculum review and alignment with university-wide artificial intelligence initiatives, including the development of the Certificate in AI Fluency and Certificate in AI Management. Faculty recognized a growing demand for graduates who combine strong mathematical foundations with applied AI competencies, particularly across data-driven and computational professions.

The BS Applied Mathematics + AI is not a fundamentally new degree. It is an enhancement of the existing BS Applied Mathematics program in which the traditional minor requirement is replaced with six courses drawn from the two AI certificates. This structure embeds AI fluency directly into the degree while preserving the full Applied Mathematics core and academic rigor.

This redesign ensures that students complete the same required mathematics coursework as in the original BS Applied Mathematics program, preventing enrollment cannibalization and strengthening participation in core AMAT courses. The program is intended to produce quantitatively grounded professionals with applied AI skills, rather than to serve as a specialized AI research degree.

The structure of the program was formally approved by the AMAT Undergraduate Studies Committee on February 19, 2026, reflecting faculty consensus on the importance of integrating AI competencies into quantitative majors.

This program does not replace an existing degree. Instead, it modernizes the BS Applied Mathematics curriculum by substituting the minor requirement with integrated AI coursework, providing students with market-relevant skills while maintaining the foundational identity of the program.

Narrative description of how the program was designed to meet local market needs, or for an online program, regional or national market needs. For example, indicate if Bureau of Labor Statistics data or State labor data systems information was used, and/or if State, regional, or local workforce agencies were consulted. Include how the course content, program length, academic level, admission requirements, and prerequisites were decided; including information received from potential employers about course content; and information regarding the target students and employers.

The BS Applied Mathematics + AI was designed to address workforce demand for professionals who can integrate mathematical reasoning, statistical modeling, computational thinking, and applied AI skills. Rather than creating a standalone AI degree, Illinois Tech elected to embed AI competencies within its established Applied Mathematics program to ensure graduates retain strong quantitative foundations while gaining practical exposure to AI tools and applications.

The program integrates coursework from the Certificate in AI Fluency and Certificate in AI Management, providing students with foundational AI concepts, data literacy, ethical considerations, and organizational applications of AI. This structure reflects employer expectations for graduates who possess both technical depth and applied AI awareness.

Course content, academic level, and prerequisites were determined through internal faculty review to maintain alignment with the rigor of the existing Applied Mathematics degree. The program targets students seeking mathematically rigorous preparation for careers in analytics, modeling, computational science, and AI-enabled professional environments, as well as employers requiring quantitatively trained graduates with applied AI fluency.

The program maintains the same degree length and admission standards as the existing BS Applied Mathematics program, ensuring accessibility to current and prospective students while adding structured AI competencies.

Narrative description of any wage analysis the institution may have performed, including any consideration of Bureau of Labor Statistics wage data related to the new program.

Illinois Tech reviewed Bureau of Labor Statistics (BLS) wage and employment data for occupations that align with applied mathematics, data analytics, and computational fields to assess labor market demand and economic outcomes. According to BLS, computer and mathematical occupations are projected to grow significantly faster than the average for all occupations over the 2024–2034 decade, with projected growth of approximately 10.1% compared to about 3% across all occupations, indicating strong future demand for quantitative skills.

In addition, BLS median wage data show that STEM and computer & mathematical occupations command substantially higher median wages compared to the national median for all occupations. For example, STEM occupations have a median annual wage of over $103,000, more than twice the median for all occupations, and computer and information research scientists have a median annual wage around $140,910.

BLS occupational wage data for specific mathematically intensive roles further reinforce the economic value of quantitative and data skills. Data scientists exhibit a median annual wage estimate above $108,000, while statisticians have median earnings over $104,000, both well above broad labor market medians.

Rather than targeting a single job title, the BS Applied Mathematics + AI prepares graduates for a broad range of high-wage, mathematically intensive roles where AI fluency and advanced quantitative reasoning are increasingly expected, including data analysis, modeling, quantitative consulting, and computational problem solving. The BLS data on wages and employment growth across these related roles provide evidence that graduates with strong applied mathematics and AI skills are positioned to compete for well-compensated opportunities in an expanding labor market.

Narrative description of how the program was reviewed or approved by, or developed in conjunction with, one or more of the following: a) business advisory committees; b) program integrity boards; c) public or private oversight or regulatory agencies (not including the state licensing/authorization agency and accrediting agency); and d) businesses that would likely employ graduates of the program. For example, describe the steps taken to develop the program, identify when and with whom discussions were held, provide relevant details of any proposals or correspondence generated, and/or describe any process used to evaluate the program.

The BS Applied Mathematics + AI was developed through departmental curriculum planning and faculty governance processes. The program structure was reviewed and approved by the AMAT Undergraduate Studies Committee on February 19, 2026.

Program design leveraged existing institutional AI initiatives, including the Certificate in AI Fluency and Certificate in AI Management, and was coordinated internally to ensure curricular coherence, academic rigor, and alignment with workforce needs. Faculty discussions focused on integrating AI coursework without diminishing the mathematical core of the Applied Mathematics degree.

This collaborative review process ensured that the program meets academic standards while responding to evolving employer expectations for quantitatively trained graduates with applied AI skills.

Admission Entry Details

Available Fall Admit	Yes	Available Spring Admit	Yes
		Available Summer Admit	No
Available On Campus	Yes	Available Online	
	No		
Available Full-Time	Yes	Available Part-Time	Yes
Available International	Yes	Available Domestic	Yes

What are the enrollment estimates?

Year 1	10	Year 2	15	Year 3	20

Attach Additional Program Justification Document(s)

Academic Information

Advising

Since quality advising is a key component of good retention, graduation, and career placement, how will students be mentored? What student professional organizations will be formed? How will the department work with the Career Services office to develop industry connections?

Students in the BS Applied Mathematics + AI program will receive the same advising and mentoring support currently provided to BS Applied Mathematics students. Faculty advisors within the Department of Applied Mathematics will guide students in academic planning, integration of AI certificate coursework, and preparation for internships, research opportunities, and post-graduate pathways.

Students will be encouraged to participate in existing mathematics- and data-focused student organizations, undergraduate research, and interprofessional projects. The department will continue its established collaboration with Illinois Tech's Career Services office to support career readiness through resume development, interview preparation, internship placement, and employer engagement. Faculty advisors and Career Services will leverage existing industry and alumni connections to help students access experiential learning and professional opportunities.

This program does not require new advising infrastructure; it operates within the current BS Applied Mathematics advising framework while incorporating applied AI coursework.

Program Resources

Which program resources are necessary to offer this program?

Personnel

Describe the personnel requirements necessary to offer the program. Describe how and when resources will be made available to hire any additional personnel that are required.

The BS Applied Mathematics + AI will be delivered using existing faculty and instructional resources in the Department of Applied Mathematics, together with courses already offered through the Certificate in AI Fluency and Certificate in AI Management. No new faculty or staff hires are required to implement this program. All core Applied Mathematics courses are currently staffed, and the AI certificate courses are already approved and scheduled through existing departments.

Because this program restructures the current BS Applied Mathematics degree rather than creating a new standalone program, no additional personnel resources are needed at this time.

Proposed Catalog Entry

Admission Requirements

Same as BS Applied Mathematics

Course Requirements

Required Courses

Applied Mathematics Requirements		**(45)**
STAT 225	Introductory Statistics	3
or MATH 476	Statistics	
MATH 100	Introduction to the Profession	3
or DS 100	Introduction to the Profession	
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 230	Introduction to Discrete Math	3
MATH 251	Multivariate and Vector Calculus	4
MATH 252	Introduction to Differential Equations	4
MATH 332	Elementary Linear Algebra	3
MATH 350	Introduction to Computational Mathematics	3
MATH 380	Mathematical Modeling with Data	3
MATH 400	Real Analysis	3
Select one of the following:		3
MATH 410	Number Theory	3
MATH 430	Applied Algebra	3
MATH 431	Computational Algebraic Geometry	3
MATH 454	Graph Theory and Applications	3
MATH 475	Probability	3
Applied Mathematics Electives		**(15)**
Select 15 credit hours [1]		15
Certificate in AI Fluency		**(9)**
MATH 123	AI for Computational Mathematics and Coding	3
COM 200	AI, Data, and Communications	3
CS 180	Artificial Intelligence Foundations	3
Certificate in AI Management		**(9)**
Data Literacy		3

Choose 1 of the 2 courses below		
DS 151	Introduction to Data Science	3
BUS 102	Introduction to Business Analytics	3
Organizational Transformation Through AI		
BUS 432	Artificial Intelligence in Business	3
Ethics and Responsible Use of AI		3
Choose 1 of the following 3 courses		
PHIL 381	Artificial Intelligence, Philosophy and Ethics	3
DS 261	Ethics and Privacy in Data Science	3
PHIL 372	Ethics of Technology and Communication	3
Computer Science Requirements		**(4-6)**
Select one of the following sequences:		4-6
CS 115 & CS 116	Object-Oriented Programming I and Object-Oriented Programming II	4
CS 104 & CS 201	Introduction to Computer Programming for Engineers and Accelerated Introduction to Computer Science	6
CS 105 & CS 201	Introduction to Computer Programming and Accelerated Introduction to Computer Science	6
Science Requirement		**(4)**
PHYS 123	General Physics I: Mechanics	4
Science Electives		**(6)**
Select six credit hours		6
Humanities and Social Science Requirements		**(21)**
See Illinois Tech Core Curriculum, sections B and C		21
Interprofessional Projects (IPRO)		**(6)**
See Illinois Tech Core Curriculum, section E		6
Free Electives		**(5-7)**
Select 5-7 credits [2]		5-7

Minimum degree credits required: 120

1 Applied mathematics electives are to be chosen after consultation with an academic adviser. Student goals, interests, and course availability should be determining factors in this selection process. The optional specializations on the Specializations tab may also serve as a guide to applied mathematics elective selection.

2 If you choose to double-count up to 6 credits from the AI Certificates toward your Humanities requirement, the number of remaining free elective credits will depend on how you satisfied the CS requirement. Students who completed CS 115 and CS 116 will need to take 7 credits of free electives to reach the 120-credit minimum.

Students who completed either CS 104 and CS 201 or CS 105 and CS 201 will need to take 5 credits of free electives to meet the same requirement.

Sample Curriculum/Program Requirements

Bachelor of Science in Applied Mathematics + AI Curriculum

Year 1

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 100	3	MATH 152	5
MATH 151	5	MATH 230	3
MATH 123	3	Computer Science Course[1]	2
Computer Science Course[1]	2	PHYS 123	4
Science Elective	3		
	16		14

Year 2

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 251	4	MATH 252	4
MATH 332	3	MATH 380	3
COM 200	3	CS 180	3
Data Literacy	3	Science Elective	3
Social Science Elective	3	Social Sciences Elective (300+)	3
	16		16

Year 3

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 430 or 431[2]	3	MATH 350	3
MATH 475	3	MATH 410 or 454[2]	3
BUS 432	3	MATH 476	3
Applied Mathematics Elective[3]	3	IPRO Elective I	3
Humanities Elective (300+)	3	Ethics and Responsible Use of AI	3
	15		15

Year 4

Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 400	3	IPRO Elective II	3
Free Elective	4	Applied Mathematics Elective[3]	3
Applied Mathematics Elective[3]	3	Applied Mathematics Elective[3]	3
Social Sciences Elective (300+)	3	Humanities Elective (300+)	3
		Free Elective	3

13 15

Total Credit Hours: 120

1 Students must complete one of the following computer science sequences: CS 115 and CS 116, CS 104 and CS 201, or CS 105 and CS 201.

2 Applied mathematics majors are required to take one of the following: MATH 410, MATH 430, MATH 431, or MATH 454. MATH 430 and MATH 431 are offered only during fall semesters; MATH 410 and MATH 454 are offered only during spring semesters. If a student chooses to take only one of these courses, then the other slot is to be interpreted as an applied mathematics elective.

3 Applied mathematics electives are to be chosen after consultation with an academic adviser. Student goals, interests, and course availability should be determining factors in this selection process. The optional specializations on the Specializations tab may also serve as a guide to applied mathematics elective selection.

Specialization Requirements

Specialization in Applied Analysis

Program adviser: J. Duan

Applied analysis is one of the foundations for interdisciplinary applied mathematics. The principles of analysis are applied to such areas as partial differential equations, dynamical systems, and numerical analysis. The basic framework, concepts, and techniques of modern mathematical analysis are essential for modeling, analysis, and simulation of complicated phenomena in engineering and science.

Required Courses

MATH 380	Mathematical Modeling with Data	3
MATH 400	Real Analysis	3
MATH 461	Fourier Series and Boundary-Value Problems	3
MATH 488	Ordinary Differential Equations and Dynamical Systems	3
MATH 489	Partial Differential Equations	3
Closely related courses which are recommended as additional electives include:		
MATH 402	Complex Analysis	3
MATH 478	Numerical Methods for Differential Equations	3
MATH 486	Mathematical Modeling I	3

MATH 380 and MATH 400 are required for all applied mathematics majors. The other three courses count toward MATH electives.

Recommended minors include: Physics or an engineering minor.

Specialization in Computational Mathematics

Program adviser: X. Li

The use of computation/simulation as a third alternative to theory and experimentation is now common practice in many branches of science and engineering. Many scientific problems that were previously inaccessible have seen tremendous progress from the use of computation (e.g., many-body simulations in physics and chemistry,

simulation of semi-conductors, etc.). Researchers and scientists in these areas must have a sound training in the fundamentals of computational mathematics and become proficient in the use and development of new algorithms and analytical techniques as they apply to modern computational environments.

Required Courses

MATH 350	Introduction to Computational Mathematics	3
MATH 435	Linear Optimization	3
or MATH 461	Fourier Series and Boundary-Value Problems	
MATH 476	Statistics	3
MATH 477	Numerical Linear Algebra	3
MATH 478	Numerical Methods for Differential Equations	3
Closely related courses which are recommended as additional electives include:		
MATH 431	Computational Algebraic Geometry	3
MATH 435	Linear Optimization [1]	3
MATH 461	Fourier Series and Boundary-Value Problems [1]	3
MATH 484	Regression	3
MATH 486	Mathematical Modeling I	3
MATH 488	Ordinary Differential Equations and Dynamical Systems	3
MATH 489	Partial Differential Equations	3

1 Only if not already counted as a required course.

MATH 350 is required for all applied mathematics majors. The other four courses count toward MATH electives. Recommended minors include: Artificial Intelligence, Computational Structures, or Software Engineering.

Specialization in Discrete Applied Mathematics

Program adviser: M. Pelsmajer

Discrete applied mathematics is a fairly young branch of mathematics and is concerned with using combinatorics, graph theory, optimization, and portions of theoretical computer science to attack problems in engineering as well as the hard and soft sciences.

Required Courses

MATH 332	Elementary Linear Algebra	3
MATH 430	Applied Algebra	3
MATH 435	Linear Optimization	3
MATH 453	Combinatorics	3
MATH 454	Graph Theory and Applications	3
Closely related courses which are recommended as additional electives include:		
MATH 410	Number Theory	3

MATH 431	Computational Algebraic Geometry	3

MATH 332 is required for all applied mathematics majors, and MATH 430 or MATH 454 satisfies the discrete mathematics core requirement. The other three courses count toward MATH electives.
Recommended minors include: Artificial Intelligence, Computational Structures, or Computer Networking.

Specialization in Mathematical Finance

Program adviser: T. Bielecki
Students who choose this specialization may qualify for admission to the Master of Mathematical Finance program—a collaborative program between the Stuart School of Business and the Department of Applied Mathematics. The objective of the MMF program is to provide individuals interested in pursuing careers in the finance industry with advanced education in theoretical, computational, and business aspects of relevant quantitative methodologies.
A business or entrepreneurship minor is required. See the Minors section for more details.

Required Courses

MATH 475	Probability	3
MATH 476	Statistics	3
MATH 478	Numerical Methods for Differential Equations	3
MATH 481	Introduction to Stochastic Processes	3
MATH 485	Introduction to Mathematical Finance	3
Closely related courses which are recommended as additional electives include:		
MATH 461	Fourier Series and Boundary-Value Problems	3
MATH 477	Numerical Linear Algebra	3
MATH 483	Design and Analysis of Experiments	3
MATH 484	Regression	3
MATH 486	Mathematical Modeling I	3
MATH 489	Partial Differential Equations	3

MATH 475 is required for all applied mathematics majors. The other four courses count toward MATH electives.

Specialization in Stochastics

Program Adviser: I. Cialenco
Stochastics includes traditional statistics (the methods of data analysis and inference) and probability (the modeling of uncertainty and randomness). However, also included are other areas where stochastic methods have been becoming more important in recent years such as stochastic processes, stochastic integration, stochastic dynamics, stochastic partial differential equations, probabilistic methods for analysis, mathematical finance, discrete mathematics, and computational methods for stochastic systems.

Required Courses

MATH 475	Probability	3
MATH 476	Statistics	3

MATH 481	Introduction to Stochastic Processes	3
MATH 485	Introduction to Mathematical Finance	3
MATH 488	Ordinary Differential Equations and Dynamical Systems	3
Closely related courses which are recommended as additional electives include:		
MATH 453	Combinatorics	3
MATH 483	Design and Analysis of Experiments	3
MATH 484	Regression	3
MATH 486	Mathematical Modeling I	3

MATH 475 is required for all applied mathematics majors. The other four courses count toward MATH electives.

Program Outcomes and Assessment Process

What are your learning objectives in this program? Please list each learning objective in the boxes below:

Note: These should be the same as described in your assessment plan at the bottom of this form.

Use a variety of techniques to manually solve mathematical problems.

Use appropriate software tools to solve mathematical problems.

Formulate basic mathematical and statistical models, apply them to solving real problems, and interpret the solution.

Construct a mathematical proof using fundamental mathematical concepts, logic, and arguments.

Communicate clearly and precisely, orally and in writing, their understanding of mathematical concepts.

Describe the broader and dynamic societal context in which mathematics plays a role and has an impact.

Upload your assessment plan here:

NEW BS AMAT Program Accessment.xlsx

Undergraduate Program Requirements

What courses will factor the major GPA?

Undergraduate Degree Requirements

Minimum credit hours 120

Specialization required?
No

Minor required?
No

Proposed General Curriculum

List Major Course Requirements
Same as outlined in the proposed catalog entries.

List Mathematics Requirements
Same as outlined in the proposed catalog entries.

List Science Requirements
Same as outlined in the proposed catalog entries.

List Computer Science Requirements
Same as outlined in the proposed catalog entries.

List Humanities and Social Sciences Requirements
Same as outlined in the proposed catalog entries.

List Interprofessional Project (IPRO) Requirements
Same as outlined in the proposed catalog entries.

List Technical Elective Course Options

List Free Elective Credit Hours (if applicable)

Semester-by-semester plan of study for the degree program

Reviewer Comments

Ayesha Qamer (aqamer) (02/25/26 2:01 pm): Rollback: Please revise sample curriculum requirements section as it is showing 123 credit hours which does not match the total program credit hours at the top which is 120. Additionally please revise the title of the sample curriculum section to show + AI

Ayesha Qamer (aqamer) (02/26/26 9:03 am): 2/26/2026, AQ: Revised program code. Incubator program*

Joseph Gorzkowski (jgorzkow) (02/26/26 12:13 pm): Rollback: COM 200 is showing as 0 credit hours in the sample curriculum instead of 3.

Nicole Beebe (nbeebe1) (02/27/26 4:45 pm): The provost has asked at all of the "X+AI" degrees be NAME <<X>> with Artificial Intelligence. I suspect others are coming through incorrectly, given the speed at which folks are creating these. Is this something we can change university wide later? I'm going to edit this proposal accordingly, if it permits me to without rolling it back to the beginning.

Key: 693