ILLINOIS STATE UNIVERSITY REQUEST
FOR NEW PROGRAM APPROVAL
Financial Implication Form

Purpose: Proposed new undergraduate and graduate programs (degrees, sequences, minors, and certificates) must include information concerning how the program will be financially supported to proceed through the curricular process.

Procedure: This completed form is to be approved by the Department/School Curriculum Committee chair, department chair/school director, college dean, and Provost prior to submission of the proposal to the College Curriculum Committee.

Definition: A "program" can be a degree, a sequence within a degree, a minor, or a certificate. This form is to be used for both undergraduate and graduate programs.

Complete the following information:

Department: **Mathematics**

Contact person: **Gaywalee Yamskulna, Ph.D.**

Date: **August 24, 2020**

Proposed new program: **Data Science and Computational Mathematics Sequence (BS in Mathematics)**

(Note: if the proposed program is a sequence, please indicate the full degree it is housed within)

BRIEF DESCRIPTION OF THE PROPOSED PROGRAM

In the modern age of big data and artificial intelligence, massive and complex data have become common in many industries. It is very important to prepare students with not only analytic skills, but also knowledge of data structures and management strategies. This proposed sequence is designed to equip students with a solid mathematics and statistics background as well as advanced computer programming skills for modern data analysis. There are two concentrations in the proposed sequence. The Data Science concentration will provide students a comprehensive training in mathematical thinking, statistical modeling, and computational programming. The Computational Mathematics concentration will provide students a comprehensive training in applied and computational mathematics.

ENROLLMENTS

In the table below, summarize enrollment and degrees conferred projections for the program for the first- and fifth-years of operation. If possible, indicate the number of full-time and part-time students to be enrolled each fall term in the notes section. If it is not possible to provide fall enrollments or fall enrollments are not applicable to this program, please indicate so and give a short explanation.

TABLE
1

STUDENT ENROLLMENT AND DEGREE PROJECTIONS FOR THE PROPOSED PROGRAM		
Category	Year One	5th Year (or when fully implemented)
Number of Program Majors/Minors (Fall Headcount)	10	50
Annual Full-time-Equivalent Majors/Minors (Fiscal Year)	10	50
Annual Number of Degrees Awarded	0	12

Add any relevant notes for the enrollment table 1 (Students are to be enrolled in a cohort; all students will be enrolled part-time; etc.) as an attachment

Budget Rationale (as an attachment; include corresponding data in Table 2)

Provide financial data that document the department or school's capacity to implement and sustain the proposed program and describe the program's sources of funding.

a. Is the unit's (College, Department, School) current operating budget (contractual, commodities, equipment, etc.) adequate to support the program when fully implemented? If "yes", please explain. If new resources are to be provided to the unit to support the program, what will be the source(s) of these funds? *[Table 2 – Section 1]*

b. What impact will the new program have on faculty assignments in the department? Will current faculty be adequate to provide instruction for the new program?

   Will additional faculty need to be hired, either for the proposed program or for courses faculty of the new program would otherwise have taught? If yes, please indicate whether new faculty members will be full-time or part-time faculty, tenure track or non-tenure track faculty.
   [Table 2 – Section 2]

c. Will current staff be adequate to implement and maintain the new program? If "yes", please explain. Will additional staff be hired? Will current advising staff be adequate to provide student support and advisement, including job placement and or admission to advanced studies? If additional hires will be made, please elaborate. *[Table 2 – Section 2]*

d. Are the unit's current <u>facilities</u> adequate to support the program when fully implemented? Will there need to be facility renovation or new construction to house the program? (For a new degree program describe in detail the facilities and equipment available to maintain high quality in this program including buildings, classrooms, office space, laboratories, equipment and other instructional technologies for the program). *[Table 2 – Section 3]*

e. Are <u>library resources</u> adequate to support the program when fully implemented?   Please elaborate.

    We do not anticipate any additional library resources would be needed for this program.

f. Are there any additional costs not addressed in items a. – d.? If "yes" please explain.
    [Table 2 – Section 4]

g. Are any sources of funding temporary (e.g., grant funding)? If so, how will the program be sustained once these funds are exhausted? No.

h. If this is a graduate program, discuss the intended use of graduate assistantships and where the funding for assistantships would come from. This is not a graduate program

Table 2: RESOURCES REQUIREMENTS

TABLE 2

ESTIMATED COSTS OF THE PROPOSED PROGRAM- Only new resources not currently available to the program			
Category	**Unit of Measurement**	**Year One**	**5th Year** (or when fully implemented)
Section 1: Operating Expenses			
Including but not limited to: Contractual, Commodities, Equipment, etc.	$	$	$
Section 2: Personnel			
Faculty	FTE	# 2*	# 0
Faculty	$	$ 150,000	$ 0
Other Personnel Costs – All Staff excluding Faculty	$	$	$
Section 3: Facilities			
Including but not limited to rental, maintenance, etc.	$	$ 0	$
Section 4: Other Costs (itemized)			
•	$	$	$
•	$	$	$
•	$	$	S
•	$	$	$
•	$	$	$
Total	$	$ 150,000	$

* While we can start this program with 0 new faculty, we will quickly need these two additional faculty by YEAR 2 to support this program. The Department and College will strategically rank these positions as top priorities to support this program, while also working to support the existing needs of the Department.

Routing and action summary – in sequential order:

1. _Don P Baby_ _____ 21/Oct/2020
   Department/School Curriculum Committee Chair   **Date Approved**

2. _____ 11/19/20
   Department Chairperson/School Director   **Date Approved**

3. _Diane Zosky_ _____ 2/19/2021
   College Dean   **Date Approved**

4. _____ 3/4/21
   Provost   **Date Approved**

5. _Todd M. Stewart_ _____ 11/18/21
   College Curriculum Committee Chairperson   **Date Approved**

6. _____ _____
   Teacher Education Council Chair   **Date Approved**

7. _____ _____
   University Curriculum Committee Chairperson   **Date Approved**

Once approved, include this form with the curricular proposal for the new program.

Financial Implication Form for Data Science and Computational Mathematics Sequence

What impact will the new program have on faculty assignments in the department? Will current faculty be adequate to provide instruction for the new program?

Will additional faculty need to be hired, either for the proposed program or for courses faculty of the new program would otherwise have taught? If yes, please indicate whether new faculty members will be full-time or part-time faculty, tenure track or non-tenure track faculty.

Mathematics and Statistics courses are currently in high demand and always full. In addition to the need for actuarial students to take these courses, we are seeing increased interest in our statistics sequences at both the undergraduate and graduate levels. Currently, many tenured mathematics faculty members need to work course overloads to meet the instructional demand for our courses. In addition, number of graduate students in statistics sequence have been increasing significantly over the past five years. Most 300 level and 400 level courses in statistics are crowded. Also, in the next academic year, at least 15 students from our partner universities with which we have already have formal agreements with, Tianhua College at Shanghai Normal University (ISU-TIANHUA Dual Degree) and Jiangsu Normal University (5-year program), are planning to attend ISU. The number of students in these programs that plan to attend ISU will be increasing dramatically within the next four to five years.

The proposed sequence will have a significant impact on assignments of mathematics and statistics faculty members since the proposed sequence will be very attractive to students. We expect significant enrollments in this new sequence. Therefore, we will need to add more sections of mathematics and statistics courses. We are requesting a tenure-track position in Mathematics and a tenure-track position in Statistics for the proposed sequence.

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Illinois State University
Department of Mathematics
Data Science and Computational Mathematics Sequence-Undergraduate

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Students in this sequence follow a common track for the first two years before deciding a concentration in either Data Science or Computational Mathematics.

Common Requirements
A minimum of 45 hours in Mathematics is required with a minimum Mathematics GPA of 2.00 required for graduation.

Required Courses (41 hours)

MAT 145 Calculus I (4 hours)	IT 166 Python Programming for Science and Data Analysis (4 hours)
MAT 147 Calculus III (4 hours)	IT 168 Structured Problem Solving Using The Computer (4 hours)
MAT 146 Calculus II (4 hours)	IT 179 Introduction to Data Structures (3 hours)
MAT 175 Elementary Linear Algebra (4 hours)	IT 279 Algorithms and Data Structures (3 hours)
MAT 260 Discrete Mathematics (4 hours)	MAT 350 Applied Probability Models (4 hours)
MAT 252 Introduction to Statistics with Applications (3 hours)	

Data Science Concentration (DS)

This concentration is designed to equip students with solid mathematics and statistics background as well as advanced computer programming skills for the modern data analysis. Students majoring in Data Science will learn to think critically about the process of understanding data, and carry out analyses of data through the full cycle of the investigative process in scientific and practical contexts. The students in this major will be able to gain deep insights from data in context, using knowledge of statistical inference, computational processes, and data management strategies.

DS Major Additional Requirements

Required Courses (8 hours)

MAT 351 Statistics and Data Analysis (4 hours)	MAT 355 Generalized Linear Models and Predictive Modeling (4 hours)

At least three courses from the following (9 hours):

IT 244 Introduction to Business Intelligence (3 hours)	IT 348 Introduction to Machine Learning (3 hours)
MAT 353 The Analysis of Time Series (4 hours)	IT 352 Data and Information Visualization (3 hours)
MAT 443 Data Mining and Statistical Learning (3 hours)	MAT 354 Nonparametric Statistics (3-4 hours)
MAT 453 Regression Analysis (4 hours)	MAT 356 Statistical Computing (4 hours)
MAT 456 Multivariate Statistics (4 hours)	MAT 450 Finite Sampling (4 hours)
MAT 458 The Design of Experiments (4 hours)	MAT 455 Applied Stochastic Processes (4 hours)

Computational Mathematics Concentration (CM)

The Computational Mathematics concentration is a blend of foundational mathematics, applied mathematics, and computer science. It is suited for students interested in pursuing careers in technical fields that require excellent analytical and computational skills. This sequence is also suitable for students who wish to pursue advanced degrees in Applied or Computational mathematics for careers in academia or industry.

CM Major Additional Requirements

Required Course (4 hours)

MAT 363 Graph Theory (4 hours)

At least three courses (9-10 hours) from the following two groups, including at least two courses from Group 1:

Group 1:

MAT 247 Elementary Real Analysis (3 hours)	IT 244 Introduction to Business Intelligence (3 hours)
MAT 337 Advanced Linear Algebra (4 hours)	IT 326 Principle of Software Engineering (3 hours)
MAT 340 Differential Equations I (3 hours)	IT 328 Introduction to the Theory of Computation (3 hours)
MAT 361 Topics in Discrete Mathematics (2-4)	IT 348 Introduction to Machine Learning (3 hours)
MAT 362 Linear Programming (4 hours)	

Group 2:

MAT 351 Statistics and Data Analysis (4 hours)	MAT 443 Data Mining and Statistical Learning (3 hours)
MAT 355 Generalized Linear Models and Predictive Modeling (4 hours)	MAT 455 Applied Stochastic Processes (4 hours)

Note: Only seniors with good standing will be allowed to take a graduate-level course, those courses numbers 400 or higher, provided the Graduate School gives approval.

Note: It is to the advantage of the student to have a minor or double major in one of the above areas, but this is NOT a requirement of the sequence. Seniors in good standing are encouraged to take upper-level applied statistics course from cognate areas.

Contact Dr. George Seelinger, Department chair, for more information.
Mathematics Department
Campus Box 4520
Normal, IL 61790-4520 mathchair@ilstu.edu 2018-2019 Catalog

Data Science Program-SAMPLE PLAN

Data Science Concentration

First Year

Fall Semester

MAT 145 Calculus I	4
ENG 101 or COM 110	3
GE Natural Science	3
GE Individual & Civic Life	3
IT 168	4
Total credit hours	**17**

Spring Semester

MAT 146 Calculus II	4
ENG 101 or COM 110	3
GE Natural Science	3
IT 166	4
GE US Traditions	3
Total credit hours	**17**

Second Year

Fall Semester

MAT 147 Calculus III	4
MAT 252	3
IT 179	3
GE Language in the Humanities	3
GE Social Science	3
Total credit hours	**16**

Spring Semester

MAT 175	4
IT 180 (or IT 226)	1(or 3)
MAT 350	4
GE Fine Arts	3
GE Humanities	3
Total credit hours	**15(or 17)**

Third Year

Fall Semester

MAT 260	4
MAT 351	4
IT 261	3
LAN 112	3
Total credit hours	**14**

Spring Semester

MAT 355	4
MAT 353	4
IT 279	3
IT 378	3
Total credit hours	**14**

Fourth Year

Fall Semester		Spring Semester	
MAT 354 or MAT 356	4	MAT 455	4
IT 244	3	MAT 456	4
MAT 450	4	University Wide Elective	1
University Wide Elective	4	IT 344	3
Total credit hours	**15**	**Total credit hours**	**12**

Total Credit Hours   **120(or 122)**

Computational Mathematics Program (Group 1)

First Year

Fall Semester		Spring Semester	
MAT 145 Calculus I	4	MAT 146 Calculus II	4
ENG 101 or COM 110	3	ENG 101 or COM 110	3
GE Natural Science	3	GE Natural Science	3
GE Individual & Civic Life	3	IT 166	4
IT 168	4	GE US Traditions	3
Total credit hours	**17**	**Total credit hours**	**17**

Second Year

Fall Semester		Spring Semester	
MAT 147 Calculus III	4	MAT 175	4
MAT 252	3	IT 180(or IT 226)	1 (or 3)
IT 179	3	MAT 350	4
GE Language in the Humanities	3	GE Fine Arts	3
GE Social Science	3	GE Humanities	3
Total credit hours	**16**	**Total credit hours**	**15 (or 17)**

Third Year

Fall Semester

MAT 260	4
MAT 247	4
IT 261	3
LAN 112	3
Total credit hours	**14**

Spring Semester

MAT 361/362	4
MAT 236	4
IT 279	3
IT 378	3
Total credit hours	**14**

Fourth Year

Fall Semester

MAT 340	3
IT 244	3
MAT 337	4
MAT 363	4
Total credit hours	**14**

Spring Semester

MAT 341	3
MAT 347	4
MAT 336	3
IT 344	3
Total credit hours	**13**

Total Credit Hours	**120 (or 122)**

Computational Mathematics (Group 2)

First Year

Fall Semester

MAT 145 Calculus I	4
ENG 101 or COM 110	3
GE Natural Science	3
GE Individual & Civic Life	3
IT 168	4
Total credit hours	**17**

Spring Semester

MAT 146 Calculus II	4
ENG 101 or COM 110	3
GE Natural Science	3
IT 166	4
GE US Traditions	3
Total credit hours	**17**

Second Year

Fall Semester			Spring Semester		
MAT 147 Calculus III	4		MAT 175		4
MAT 252	3		IT 180(or IT 226)	1 (or 3)	
IT 179	3		MAT 350		4
GE Language in the Humanities	3		GE Fine Arts		3
GE Social Science	3		GE Humanities		3
Total credit hours	16		**Total credit hours**	15 (or 17)	

Third Year

Fall Semester		Spring Semester	
MAT 260	4	MAT 355	4
MAT 351	4	MAT 353	4
IT 261	3	IT 279	3
LAN 112	3	IT 378	3
Total credit hours	14	**Total credit hours**	14

Fourth Year

Fall Semester		Spring Semester	
MAT 247	3	MAT 455	4
IT 244	3	MAT 236	4
MAT 340	3	MAT 341	3
MAT 363	4	IT 344	3
Total credit hours	13	**Total credit hours**	14

Total Credit Hours   120 (or 122)