

PROGRAM APPROVAL PROCESS
(Revised June 2022)

Highlights of the Program Approval Process:

- The Regent universities shall submit the name and educational level of proposed programs that have already undergone an initial institutional review, are currently undergoing an in-depth institutional review, and are likely to be submitted for program approval by the Board of Regents. The proposed program must reside on the program planning list maintained in the Board office for at least three months prior to submitting a program proposal to allow sufficient time for discussion within the three Regent universities.
- The Board Office and the Council of Provosts shall review the annual program planning list at each Council of Provosts meeting.
- The universities shall complete their in-depth review of the proposed programs and submit their proposals to the Board Office using a program approval format developed by the Board Office (Form A).
- Letters of support from the other universities must be included with the program proposal.
- A review by the Iowa Coordinating Council for Post-High School Education (ICCPHSE) shall also occur prior to being submitted for Board approval. A program with unresolved concerns by the ICCPHSE should be so noted.
- The program proposals shall be reviewed in-depth by the Council of Provosts and the Board Office.
- With the recommendation for approval by the Board Office and the Council of Provosts, the program proposal shall be submitted to the Board of Regents Academic Affairs Committee and Board of Regents for discussion and action.
- Substantial expenditures for the proposed program or advertising/marketing of the proposed program shall not occur until after the program is approved by the Board of Regents. This means that the institutions shall not hire any new faculty, secure facilities, develop curriculum, or advertise the program until it has been approved by the Board of Regents.

FORM A
Board of Regents, State of Iowa

**REQUEST TO IMPLEMENT A NEW BACCALAUREATE, MASTERS,
DOCTORAL, OR PROFESSIONAL DEGREE PROGRAM**

THE PURPOSE OF ACADEMIC PROGRAM PLANNING: Planning a new academic degree program provides an opportunity for a Regent university to demonstrate need and demand as well as the university's ability to offer a quality program that is not unnecessarily duplicative of other similar programs offered by colleges and universities in Iowa.

Institution: Iowa State University

CIP Discipline Specialty Title: Applied Statistics, General

CIP Discipline Specialty Number (six digits): 27.0601

Level: Professional

Title of Proposed Program: Master of Applied Statistics

Degree Abbreviation (e.g., B.S., B.A., M.A., Ph.D.): M.A.S.

Mode(s) of Delivery (check all that apply): On-campus (face-to-face) ___ Off-campus (face-to-face) ___
Online X Hybrid ___ Other X (all courses available online and some also available in person)

Approximate date to establish degree: December 31, 2024

Contact person: Dan Nettleton, 515-294-7754, dnett@iastate.edu

College that will administer new program: Liberal Arts and Sciences (LAS)

Please provide the following information (use additional pages as needed). Do not use acronyms without defining them.

1. Describe the proposed new degree program, including the following:
 - a. A brief description of the program. If this is currently being offered as a track, provide justification for a standalone program.

The proposed program will teach students statistical methods and their application to data-driven problems in a variety of fields. When compared to our current Master of Science in Statistics degree, the proposed program:

- emphasizes practical applications and experiences with current statistical methodology and computing,
- includes a course on statistical consulting covering communication skills and ethical issues,
- provides course credit for experiential learning,
- is offered as an online program, and
- can be completed in 15 months of full-time graduate study.

The proposed program consists of 30 credits, of which 23 credits are online versions of existing courses currently taught in person on campus. The remaining 7 credits come from new courses: (3 credits for Introduction to Statistical Learning, 2 credits for Statistical Consulting, and 2 credits for Work Experience in Statistics). Full-time students could complete the program in 15 months – starting during a summer session and ending after the following summer session. Full program details are available in Appendix A to this document.

b. A statement of academic objectives;

The overall goal of this proposed program is to prepare students to be effective, responsible, and ethical users of statistical methods. The program is designed to provide recent graduates, researchers, and current professionals with a strong foundation in statistical applications, helping to create a “Future Ready Workforce”.

At the end of the proposed program, graduates will be able to:

1. correctly use and interpret the most commonly used classical and modern methods in statistics,
2. explain the theoretical foundations of classical and modern statistical methods,
3. identify relevant methods for a particular data-driven problem and describe advantages and disadvantages of each method,
4. effectively communicate statistical results to all stakeholders, including non-statisticians, and
5. successfully complete a work experience in statistics.

The connections between the program learning outcomes and curriculum are presented in Appendix A.

c. What the need for the program is and how the need for the program was determined;

There is an enormous and growing demand for statisticians and data science professionals in Iowa, the U.S., and internationally. The U.S. Bureau of Labor Statistics¹ ranks statistician as one of the fastest growing occupations in the next decade (more than 30% projected growth compared to an average of 3% across all jobs). Statistician is highly ranked among best technology jobs, best business jobs, and within the 100 “best jobs” category. Iowa State University is perfectly positioned to provide leadership in preparing future professionals in this field because of its strong presence in the field of statistics and long history in collaborative data-driven sciences. This program is designed to expand existing graduate degrees to a broader audience, including working professionals as well as remote students, and prepare them with an in-depth understanding of statistics and its applications in a variety of fields.

d. The relationship of the proposed new program to the institutional mission and how the program fits into the institution’s and college’s strategic plan;

Education in the fields of Statistics and Data Science are priority areas for the university. Iowa State University President’s Destination 2050² initiative features Big Data as one of the six targets. Iowa State University’s Presidential Initiative for Interdisciplinary Research specifically targets data-driven science. Data science is also one of the strategic areas in several colleges and academic units at Iowa State, including the College of Liberal Arts and Sciences.

e. The relationship of the proposed new program to other existing programs at the institution; describe how the proposed program will enhance other programs at the university. Will the proposed program duplicate existing programs at the university?

There are two graduate programs at Iowa State for different audiences and having different emphases that are related to the proposed program. The department offers the M.S. in Statistics as a full-time in-residence program. Students in this program complete a two-course sequence in statistical theory, a three-course sequence in statistical methods, one course in statistical

¹ <https://www.bls.gov/ooh/math/mathematicians-and-statisticians.htm>

² <https://www.destination2050.iastate.edu/category/big-data/>

computing, and a creative component. Additional credits are earned through elective courses in one or more of these three areas. In comparison to the existing M.S. in Statistics, the proposed program can be completed completely online, attracting remote students/professionals; it is shorter, making it appealing to more students; it provides more emphasis on the use of statistics rather than the mathematical theory of statistics; it trains students in modern statistical computing techniques, and requires a work experience instead of a creative component which will make the graduating students more valuable in the job market.

The College of Business offers a Master of Business Analytics, which has a focus on business applications of analytics techniques. In comparison, the focus of the proposed program is training students in the foundations of statistics, a broad set of statistical methods, and statistical computing with the aim of preparing them for real-life problem-solving in a variety of fields. One course required for the proposed Master of Applied Statistics program (STAT 572: Introduction to Time Series) is also an elective of the Master of Business Analytics program. Other than STAT 572, there is no overlap in the course lists for the proposed program and the Master of Business Analytics program. While the proposed program requires 10 courses in statistics, Master of Business Analytics students take between one and three statistics courses and augment those courses with training in marketing, management information systems, computer science, industrial engineering, or finance.

While not related programs, we anticipate potential connections with several mathematical or data-intensive undergraduate and graduate programs at Iowa State, such as mathematics, computer science, data science, economics, finance, and engineering. Completing the proposed program shortly after their undergraduate or graduate degrees will give students in these fields additional training and credentials to meet employer demands for qualified professionals with analytical skills.

- f. Special features or conditions that make the institution a desirable, unique, or appropriate place to initiate such a degree program.

The Department of Statistics at Iowa State University has a long tradition of the scholarship in and the teaching of statistical methods and their application, dating back to the 1920's and the founding of the Statistical Laboratory in 1933. Currently, the department maintains a widely respected statistical consulting group on campus, has nationally and internationally recognized faculty engaged in research in a wide variety of statistical methods, theory, and computing, and is well known nationally and internationally for training graduate students in statistics, ranking second in granting PhDs in the country over the last 10 years. The department teaches more than 7,000 students and 25,000 student credit hours each year in courses at all educational levels, including 24 M.S. level classes on statistical methods. Offering the Master of Applied Statistics is a natural extension of the department's strengths and existing programs and courses. In addition, having the support of the professionals in Online and Distance Learning³ unit on campus is expected to play a crucial role in making such an online program possible. This program is perfectly aligned with the University President's "Degrees of the Future" initiative. As outlined in President Wintersteen's "Jumpstarting the Strategic Plan," this new academic degree will meet student and employer demands and create a new revenue stream for the university.

- g. Describe the personnel, facilities, and equipment necessary to establish and maintain a high quality program. Include any reallocations from other programs or areas of the university.

In addition to support for students and faculty provided by Iowa State Online, the Department of Statistics hired a new Graduate Student Services Specialist in October, 2022, who supports the

³ <https://www.distance.iastate.edu/>

Statistics M.S. and Ph.D. programs and will also provide staff support for the proposed program. The proposed program involves 10 different courses. To allow flexible start times, two courses (STAT 586 Introduction to Statistical Computing, STAT 587: Statistical Methods for Research Workers) that serve as prerequisites for other courses in the proposed program will be offered each summer session and each fall and spring semester. This will result in a total of 14 course offerings annually, which can be covered by the teaching assignments of two tenured/tenure-eligible faculty and one term teaching faculty member. Hiring these three faculty will cost approximately \$425,000 annually, including salary and benefits. Snedecor Hall, home of the Department of Statistics, has office space available for these new hires. One-time startup costs associated with the hiring of these faculty and the purchase of computing equipment will total approximately \$200,000. No new facilities or equipment are required for the proposed program beyond the startup costs of faculty hires. Current faculty in the Department of Statistics with outstanding teaching credentials will create online versions of the program's courses at a cost of no more than \$100,000 for faculty time. An additional \$20,000 per year is budgeted for course maintenance and updates.

- h. How does student demand for the proposed program justify its development? What are the anticipated sources of students to enroll in this new program?

The Department of Statistics at Iowa State has an excellent reputation among units offering graduate degrees in statistics, rising to 19th among 101 such programs according to the most recent U.S. News & World Report⁴ ranking. Each year, the department receives far more applications for admission to the existing M.S. and Ph.D. programs than can be accepted, due to cost in financial terms and in faculty and staff time associated with each admitted student. For example, the number of applications for admission to the department's existing statistics graduate programs has averaged more than 260 per year since 2016, while the incoming class size is typically around just 25 students. The students entering the existing statistics graduate programs are paid stipends and receive tuition scholarships for their work as research or teaching assistants and require substantial faculty support to complete required creative component projects (M.S.) or dissertations (Ph.D.). For many applicants, the proposed program will better match their prior training and career goals than our existing M.S. and Ph.D. programs. The proposed program will also be more attractive to some prospective students because of the flexibility of online instruction and potentially much shorter time to degree. Neither our existing M.S. program nor our existing Ph.D. program is offered online, and neither is suited for students who are already employed on a full-time basis. The proposed program is designed to serve students who are already working professionals and also students who are not yet working professionals but are seeking the training necessary to begin careers requiring statistical expertise. Based on the applications we receive for our existing graduate programs, we expect students from the state of Iowa, throughout the nation, and from various international locations to be candidates for admission to the proposed program.

2. Estimate the number of majors and non-majors students that are projected to be enrolled in the program during the first seven years of the program.
- Undergraduate - NA
 - Graduate/Professional

⁴ <https://www.usnews.com/best-graduate-schools/top-science-schools/statistics-rankings>

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
Majors	10	25	35	45	55	60	60
Non-Majors	NA	NA	NA	NA	NA	NA	NA

The enrollment projection of an incoming class size of 10 students for Year 1 is based on an approximate 5% enrollment rate from the number of applications the department receives for its M.S. and Ph.D. programs. We project an increase of 5 students in each subsequent incoming class size during Years 2 through 5, resulting in incoming classes of sizes 15, 20, 25, and 30, respectively. We assume enrollment will level off at 30 new students in each of Years 6 and 7. We make the simplifying assumption that students will average 15 credits per year and thus typically take two years to complete the proposed program's 30 credits. Therefore, each year's enrollment projection includes the new incoming students in that year plus those who joined the program the previous year. There are some indications that our estimates of cohort size may be conservative. For example, Penn State University has an online Master of Applied Statistics program that admitted 79 new students in 2021.

- Describe the state and/or national workforce need and/or demand for graduates of the proposed program currently and in the foreseeable future (provide the sources of data used to estimate workforce need and demand).

Data-driven decision-making has become a cornerstone across many fields and industries, creating a demand for well-trained statisticians capable of processing, analyzing, and interpreting data of various types, complexity, and size. According to the U.S. Bureau of Labor Statistics⁵, the overall employment of statisticians is projected to grow more than 30 percent from 2020 to 2030, which is much faster than the average for all occupations. The U.S. News & World Report⁶ 2021 rated Statistician as the #6 overall Best Job, the #5 Best STEM Job, and the #2 Best Business Job; the rankings consider factors such as salary, job market demand, and future growth. LinkedIn⁷ lists data-driven decision-making skills such as analytical reasoning, scientific computing, and development of machine learning models in the top 10 most important skills companies were looking for in 2020. Similarly, Deloitte Insights⁸ reported in 2021 the number of jobs posted by tech companies for analysis skills — including machine learning, data science, data engineering, and visualization — surpassed traditional skills such as engineering, customer support, marketing, public relations, and administration.

Overall, these sources suggest that there is a high potential market demand for qualified professionals equipped with statistical analysis skills. Moreover, many typical entry-level jobs for a statistician need at least a master's degree, again demonstrating the need for highly trained graduates with statistical skill sets.

- The dean's office in the academic college proposing the new program is required to contact the corresponding dean's offices at the other two Regents universities (if there is no corresponding college, consider related programs in other colleges or contact the Provost's office for guidance). In some cases, such as for an interdisciplinary program, more than one college at the other universities may need to be contacted. Please summarize how this cross-institutional outreach was completed:

⁵ <https://www.bls.gov/ooh/math/mathematicians-and-statisticians.htm>

⁶ <https://money.usnews.com/careers/best-jobs/rankings/the-100-best-jobs>

⁷ <https://www.linkedin.com/business/learning/blog/learning-and-development/most-in-demand-skills-2020>

⁸ <https://www2.deloitte.com/us/en/insights/industry/technology/data-analytics-skills-shortage.html>

- a. Date that Form A was sent to dean's offices at the other two Regents universities.

ISU Statistics Department Chair Dan Nettleton shared the Form A proposal with Professor Kung-Sik Chan at the University of Iowa on June 6, 2023 and with Professor Mupasiri at the University of Northern Iowa and on June 11, 2023. This consultation resulted in the letters attached to this proposal. ISU's Associate Dean Slagell later reached out to share Form A with the appropriate Dean's offices.

- b. Date and format (email, telephone, video, in-person) of discussions between the dean's offices, and names/titles of those who participated.

ISU's Associate Dean Slagell corresponded via email with the Dean Fritch of the College of Humanities, Arts and Sciences at the University of Northern Iowa on August 16, 2023 and held a video call meeting with Associate Dean Getz in the College of Liberal Arts and Sciences at the University of Iowa on August 21, 2023.

- c. Summary of feedback received from the other two Regents universities, including any concerns raised. Where relevant, describe current or planned collaborations related to the program.

Our Regents colleagues recognize workforce needs for expertise in this area. Both see the opportunity for students to complete the program online as important. Iowa shared their experience of good growth in their on-campus master's program in Data Science and noted some overlap between the learning goals for students in one of the tracks in their Data Science master's program. The discussion concluded that the online-learning opportunity presented by this proposal, its focus on applied statistics, and the particular research programs and reputation of the faculty contributing to these two different graduate programs, make this proposal distinctive and of interest to a different set of students.

- d. Was the proposal modified to reflect these discussions? If so, describe.

Nothing was learned in the conversations that resulted in modifications to the proposal.

5. List other public and private institutions of higher education in Iowa currently operating programs similar to the proposed new degree program. (For comparison purposes, use a broad definitional framework, e.g., such identification should not be limited to programs with the same title, the same degree designation, having the same curriculum emphasis, or purporting to meet exactly the same needs as the proposed program.)

No other institutions in Iowa offer a Master of Applied Statistics. The University of Iowa offers an M.S. in Data Science and the Maharishi University of Management offers an M.S. in Computer Science with a Data Science track. Both require more computing and less applied statistics than the proposed program. Like Iowa State, the University of Iowa offers an M.S. in Statistics. For reasons discussed in 1.e., the M.S. in Statistics differs in important ways from the proposed Master of Applied Statistics degree. Unlike the proposed program, none of the potentially related programs are online degree programs.

If the same or similar program exists at another institution of higher education in Iowa (other than those Regent universities noted above), respond to the following questions:

- a. Describe collaboration efforts with other institutions.

We have not explored the possibility of a collaborative or inter-institutional program. However, if a student in our Master of Applied Statistics program takes or has taken a class at either the University of Iowa or the University of Northern Iowa that is a direct substitute for one of the required classes in our program and meets our university and college policies for course substitutions, we will accept that course substitution.

- b. With what representatives of these programs has there been consultation in developing the program proposal? Provide a summary of the response of each institution consulted.

NA

- c. Has the possibility of an inter-institutional program or other cooperative effort been explored?
See response to part a.
- d. Are the other programs similar to the proposed program at comparable quality and cost?

We are not aware of programs similar to the proposed program at comparable quality and cost within the state of Iowa. The program most closely related to the proposed program is the online Masters of Applied Statistics program offered by Penn State University.

6. If there are plans to offer the program off campus, online, or a blended modality, briefly describe these plans, including potential sites and possible methods of delivery instruction. Will off-campus delivery require additional **HLC or other accreditor approval**?

All courses will be delivered online through Canvas, following best practices of Iowa State Online. The bulk of course content will be provided to students via short video recordings and exercises to engage students asynchronously. Instructors will hold office hours online to provide students opportunities for synchronous interactions. Students will take exams through the Iowa State University Testing Center, either in person or remotely through the use of Testing Center approved proctors. Students on campus may opt to take up to seven of the program's ten courses in person. The seven courses – listed in Appendix A along with the semesters they are offered in person – are courses currently offered by the department in person. No additional HLC or other accreditor approval is required.

7. Will the proposed program apply for programmatic accreditation? When?

No. There is currently no accreditation for graduate programs in statistics.

8. For undergraduate programs: Will articulation agreements be developed for the proposed program? With whom?

NA

9. Describe any opportunities for experiential learning (e.g. internships, clinicals, research, community engagement/service learning).

Students will earn two credits for work experience in statistics. Students who are employed full time may satisfy the work experience requirement by completing and documenting a statistically oriented project with their current employer. Other students may choose to complete an internship. Paid internships for students with statistical expertise are frequently offered by many well-known pharmaceutical companies, tech companies, financial services organizations, government agencies, and other employers. A recent search on keywords data, analytics, and statistics on Iowa State's CyHire system produced over 250 postings for internship and co-op experiences. In addition, the statistical consulting group in the Department of Statistics at Iowa State, which assists ISU student, faculty, and staff researchers with the statistical challenges of their research, can offer unpaid work experiences to students in the program. Students may alternatively opt for an unpaid work experience through Iowa State's Statistics in the Community

(STATCOM) group. STATCOM provides pro bono statistical consulting to local nonprofit, governmental, and community service organizations.

10. From where will the financial resources to cover the costs for the proposed program come (list all that apply, e.g., department reallocation, college reallocation, grants, new to the university)?

Tuition paid by students will cover the cost of the program. With 45 students averaging 15 credits hours per year and paying \$1200 per credit hour, annual revenue for the program will exceed the College of Liberal Arts and Science’s annual program operating expenses, including college administrative costs and allocated costs assessed for the additional students and faculty. As indicated in 2.b., we expect annual revenue to exceed LAS expenses in the fourth year and in subsequent years of the proposed program. Revenue in excess of expenses will be shared by the College of Liberal Arts and Sciences and the Department of Statistics to strengthen other student programs, such as the M.S. and Ph.D. in Statistics.

11. Include any additional information that justifies the development of this program.

Many of the courses in the proposed program may play an important role in future online graduate programs. Such programs may focus on disciplines other than statistics but find that statistics courses are valuable for their students. By including one or more online courses from the proposed Master of Applied Statistics program as part of the curriculum for a new program, some barriers to development of revenue-generating online programs in other areas may be reduced.

Appendix A

Required Courses for Proposed Master of Applied Statistics Program

Name	Credits	Title	Semesters Offered Online		
			Fall	Spring	Summer
STAT 571	3	Introduction to Experimental Design	X		
STAT 572	3	Introduction to Time Series		X	
STAT 574	3	Introduction to Bayesian Data Analysis		X	
STAT 585	3	Data Technologies for Statistical Analysis		X	
STAT 586	3	Introduction to Statistical Computing	X	X	X
STAT 587	4	Statistical Methods for Research Workers	X	X	X
STAT 588	4	Statistical Theory for Research Workers	X		
STAT 5XX-1	3	Introduction to Statistical Learning	X		
STAT 5XX-2	2	Introduction to Statistical Consulting			X
STAT 5XX-3	2	Experiential Learning in Statistics			X

Total	30				
-------	----	--	--	--	--

Courses Offered in Person

STAT 571, STAT 587, and STAT 588 are offered in person on campus each fall and spring semester; STAT 572, STAT 574, and STAT 586 are offered in person on campus each spring semester; and STAT 585 is offered in person on campus every other spring semester.

Common Paths Through Proposed Program

Path 1

Summer 1	Fall	Spring	Summer 2
STAT 586 STAT 587	STAT 571 STAT 588 STAT 5XX-1	STAT 572 STAT 574 STAT 585	STAT 5XX-2 STAT 5XX-3

Path 2

Fall 1	Spring	Summer	Fall 2
STAT 586 STAT 587 STAT 588	STAT 572 STAT 574 STAT 585	STAT 5XX-2 STAT 5XX-3	STAT 571 STAT 5XX-1

Path 3

Spring 1	Summer 1	Fall	Spring 2	Summer 2
STAT 586 STAT 587		STAT 571 STAT 588 STAT 5XX-1	STAT 572 STAT 574 STAT 585	STAT 5XX-2 STAT 5XX-3

Connection of Required Courses to Program Learning Outcomes*

Course	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
STAT 571	P		D	B	
STAT 572	P		D	B	
STAT 574	P		D	B	
STAT 585	P		D	B	

STAT 586	P		D	B	
STAT 587	P		D	B	
STAT 588		P		B	
STAT 5XX-1	P		D	B	
STAT 5XX-2	P		P	D	
STAT 5XX-3				P	P

B = Beginning Level; D = Developing Level; P = Proficient Level

*Program Learning Outcomes are listed in 1.b.



**College of Liberal Arts and
Sciences**

Department of Statistics and Actuarial
Science

University of Iowa
241 Schaeffer Hall
Iowa City, Iowa 52242-1409
319-335-0712
<https://stat.uiowa.edu>

June 27, 2023

Dan Nettleton
Laurence H. Baker Chair
Distinguished Professor and Chair
Department of Statistics
Iowa State University

Dear Dan:

Re: Proposed Online MS Applied Statistics Program

It is my pleasure to write a letter in support of the proposed online MS Applied Statistics program.

Data-driven decisions and operations are increasingly deployed across every aspect of society, including businesses and industries, which fuels a growing demand for applied statisticians. Moreover, many working professionals may need to broaden their statistical skill sets. The proposed online program will contribute to meeting the training needs of those who have daytime jobs and aspire to become applied statisticians.

The Department of Statistics at Iowa State University is a highly ranked and renowned program. It possesses strong expertise in theoretical statistics, as well as applied and computational statistics. The proposed online program is well-designed to address the demand for more applied statisticians in the State of Iowa and nationwide.

Sincerely,

Kung-Sik Chan
Robert V. Hogg Professor & Chair

June 20, 2023

Dr. Dan Nettleton
Department of Statistics
Iowa State University

Dear Dr. Nettleton,

I am writing to express my support for the new Master of Applied Statistics (MAS) degree program that you have proposed. The lead statistician in our department, Prof. Syed Kirmani, and I have reviewed your proposal and determined that your proposed program does not duplicate any UNI programs. For this reason, I support your proposal for the new program. I would be happy to provide more information, should that be necessary.

Sincerely,



Douglas Mupasiri

Douglas Mupasiri, Ph.D.
Head and Professor
Department of Mathematics
319-273-2631 / 319-273-2012
220 Wright Hall / Cedar Falls, IA 50614
mupasiri@uni.edu /