

REVIEW OF THE M.S. IN INFORMATION SYSTEMS

Classification of Instruction Programs (CIP) Code: 11.0103
Data Processing and Data Processing Technology/Technician

OVERVIEW

The **M.S. in Information Systems** program at Illinois State University is housed in the School of Information Technology within the College of Applied Science and Technology. The School of Information Technology houses six degree programs: a B.S. in Computer Science, B.S. in Cybersecurity, a B.S. in Information Systems, a B.S. in Network and Telecommunications Management, an M.S. in Computer Sciences, and an M.S. in Information Systems. In addition, the school offers a minor in Information Systems and Graduate certificates in Data Science: Computer Science, Enterprise Computing Systems, Information Assurance and Security, Internet Application Development, Network and Telecommunications Management, and Systems Analyst. The last review of the M.S. in Information Technology program occurred in 2013-2014.

The M.S. in Information Systems program is intended to provide students with knowledge and skills needed to succeed in the field upon graduation and the depth of understanding necessary to learn new technologies as they emerge. The program is strengthened by its presence in an academic unit with four undergraduate degree programs related to information technology because faculty in the school have a greater depth and breadth of knowledge than is typical of information systems graduate programs. Students enrolling in the M.S. in Information Technology select from five sequence options: Geographic Information Systems sequence, Information Systems sequence, Internet Application Development sequence, Network and Security Management sequence, and Systems Development sequence.

Enrollment by Plan of Study, Fall Census Day, 2014-2021

M.S. in Information Systems, Illinois State University

First Majors Only

	2014	2015	2016	2017	2018	2019	2020	2021
Geographic Information Systems sequence							1	2
Information Assurance and Security sequence	6	1						
Internet Application Development sequence	12	29	8	5	12	9	16	5
Information Systems Development sequence	10	29	8	2	17	2	5	12
Network Security Management sequence	4	12	8	3	8	5	8	7
No subplan	76	22	54	54	19	34	40	32
Total	108	93	78	64	56	50	70	58

Table notes: The Information Assurance and Security sequence was deleted effective Fall 2014. The Web Computing sequence began in Fall 2017.

Degrees Conferred by Plan of Study, 2014-2021
M.S. in Information Systems, Illinois State University
 First Majors Only

	2014	2015	2016	2017	2018	2019	2020	2021
Geographic Information Systems sequence					1			
Information Assurance and Security sequence								
Internet Application Development sequence			21	13	8	6	8	7
Information Systems Development sequence			14	18	6	21	3	7
Network Security Management sequence			3	8	2	9	7	10
No sequence			4	2	5		7	8
Total	26	29	42	41	22	36	25	32

Table notes: Graduating Fiscal Year consists of summer, fall, and spring terms, in that order. For example, Graduating Fiscal Year 2019 consists of the following terms: summer 2017, fall 2017, and spring 2018. The Information Assurance and Security sequence was deleted effective Fall 2014. The Web Computing sequence began in Fall 2017.

EXECUTIVE SUMMARY
PROGRAM REVIEW SELF-STUDY REPORT

Program goals

The program educational objectives (PEO) of the MSIS Graduate Program are as follows:

- Be a successful practitioner in a computer science related field or accepted into a graduate program.
- Design and develop creative and effective solutions to practical computing problems.
- Exhibit teamwork and effective communication skills.
- Be characterized by effective leadership skills and high standards of ethics.
- Engage in lifelong learning to adapt to an ever-changing professional environment.

Student learning outcomes

At the time of graduation, a student in our Information Systems graduate program must attain the following outcomes:

- An ability to analyze the impact of information technology in an organization
- An ability to analyze a problem, and apply various systems development methodologies to design an information technology solution
- An ability to evaluate and implement an information technology solution, along with applications and tools necessary to support organizational needs
- An ability to function effectively on teams to accomplish Information Technology project goals
- Recognition of the need for and an ability to engage in continuing professional development

Program curriculum (2021-2022)

M.S. in Information Systems (Geographic Information Systems sequence) requires 36-39 credit hours. This includes 21 credit hours of core courses, and 9 credit hours of geography courses. The thesis option requires 6 thesis credit hours. The sequence offers two the non-thesis options. The project option requires 6 credit hours of Master's project

hours, and an additional of 3 credit hours of geography course credit. The courses option requires 3 credit hours of a capstone course, 3 credit hours of an English course, and 3 additional credit hours of geography course credit.

M.S. in Information Systems (Internet Application Development sequence) requires 36-39 credit hours. This includes 21 credit hours of core courses, and 9 credit hours of additional information technology courses. The thesis option requires 6 thesis credit hours. The sequence offers two the non-thesis options. The project option requires 6 credit hours of Master's project hours, and an additional of 3 credit hours of information technology course credit. The courses option requires 3 credit hours of a capstone course, 3 credit hours of an English course, and 3 additional credit hours of information technology course credit.

M.S. in Information Systems (Information Systems Development sequence) requires 36-39 credit hours. This includes 21 credit hours of core courses, and 9 credit hours of additional information technology courses. The thesis option requires 6 thesis credit hours. The sequence offers two the non-thesis options. The project option requires 6 credit hours of Master's project hours, and an additional of 3 credit hours of information technology course credit. The courses option requires 3 credit hours of a capstone course, 3 credit hours of an English course, and 3 additional credit hours of information technology course credit.

M.S. in Information Systems (Network Security Management sequence) requires 36-39 credit hours. This includes 21 credit hours of core courses, and 9 credit hours of additional information technology courses. The thesis option requires 6 thesis credit hours. The sequence offers two the non-thesis options. The project option requires 6 credit hours of Master's project hours, and an additional of 3 credit hours of information technology course credit. The courses option requires 3 credit hours of a capstone course, 3 credit hours of an English course, and 3 additional credit hours of information technology course credit.

Program delivery

The program is offered on the Normal campus.

The program is delivered primarily through face-to-face or blended face-to-face/online instruction.

Department faculty (Fall 2021)

21 tenure track faculty members (8 Professors, 5 Associate Professors, and 8 Assistant Professors)

16 non-tenure track faculty members (3 full-time, 13 part-time, totaling 7.2 FTE)

Specialized accreditation

Specialized accreditation is not available for the M.S. in Information Systems program at this time.

Changes in the academic discipline, field, societal need, and program demand

Likely the biggest change experience by the M.S. in Information Systems program since the program's last review is the change in demand among prospective students. The program faculty observed increasing inquiries/interest from prospective students related to the M.S. programs in computer science and cybersecurity. The overall reduction in demand for M.S. in Information Systems program seems a trend in Illinois and nationwide. Externally, the industry demand for M.S. in Information Systems students remains strong. According to the IS Job Index (last published in 2019), placement rates at graduation seem low (at 47 percent) but look much better six months after graduation (at 81 percent), and average starting salaries have risen to over \$84,000. The program faculty also notice there is an increase in the number of online master programs, especially in Information Technology related fields. The program faculty have created a fully online certificate in Data Science and will investigate alternative program delivery methods. Another external impact on the program comes from changing expectations in the academic community. The focus of the M.S. in Information Systems model curriculum has been changed from a list of topics to a set of competency areas. Instead of listing detailed courses that fit in the knowledge areas in its previous 2006 model, the 2016 competency model only identified a set of competency areas with competencies that M.S. in Information Systems graduates should attain by the time of graduation. Thus, M.S. in Information Systems 2016 does not specify

the curriculum topics that should be included; instead, the topics will be determined when an actual curriculum implementation is designed.

Responses to previous program review recommendations

1. *Continue to improve and implement the student learning outcomes assessment plan to identify and implement improvements needed to maintain currency and relevancy of the program and document how this has been addressed.*

The M.S. in Information Systems assessment plan was put in use during this program review period. The relevant assessment data has been collected and carefully studied to identify potential changes to pedagogy and program design that may be needed.

2. *Explore development of non-traditional program delivery, such as online courses, to expand the number and diversity of students.* While continually offering a few graduate level summer courses, the program faculty have also implemented a fully online Data Science Certificate starting in Fall 2021.

3. *Explore establishment of international partnerships and exchange programs that would provide students with international exposure and experiences.* Multiple faculty have visited several institutes in foreign countries during their sabbaticals to seek appropriate opportunities to build international partnerships and exchange programs. In addition, the school is currently working closely with the INTO office to bring more diverse international students to the graduate programs, which is also indirectly providing in-house students with international experience.

4. *Design and implement a systematic program of regular communication with program alumni to collect and maintain data on alumni perceptions of the program and on alumni successes in employment and additional education.* The School of Information Technology instituted a program of collecting data from graduates at commencement receptions, including a non- Illinois State email and information about employment. The program faculty have also made some attempts to collect the same information from students who do not attend the receptions; but have been less successful in getting data from those graduates. The program has also improved communications outward to alumni and have increased opportunities for alumni to be engaged with current students. The program maintains multiple social media sites (Facebook, LinkedIn, Instagram) as well as sending a bi-annual newsletter (called IT matters). However, the program still needs to improve data collection to include a larger percentage of alumni and the program faculty also need to work on developing a more systematic program of data collection from those alumni.

5. *Continue efforts to address gender diversity among faculty members as hiring opportunities arise.* The program has successfully hired five new female tenure-track M.S. in Information Systems faculty in the school. While women are still in the minority, the program and the school as a whole now have a substantial percentage of women in tenure-track roles to serve as role models and mentors for students.

6. *Explore expansion of co-curricular opportunities in the school to include programs and activities intended especially for graduate students to provide them unique opportunities to network with colleagues and prospective employers.* There are three registered student organizations that are particularly relevant to the graduate students in the M.S. in Information Technology program, all of them with faculty advisors in the School of Information Technology.

- The Association for Computer Machinery (ACM) student chapter is primarily focused on career development and partners with the Association for Information Technology Professionals (AITP) student chapter to host an annual internship fair each fall and an annual Information Technology mixer each spring as well as other career-focused events. In addition, the ACM chapter has several special interest groups which typically meet weekly through the semester. SIG topics have included game development, web development, machine learning, robotics, and competitive programming. Most of these are focused on practice. For example, the game development SIG typically creates a game each semester.

- The Security Club meets regularly (typically weekly during semesters) to learn about a variety of cybersecurity topics and participate in various security competitions.
- The Women in Technology group works to support women interested in technology, both in the School of Information Technology and across campus. The group also seeks opportunities to support younger females interested in technology. For example, a group of members volunteers each year at the Millennium Girls event at State Farm.

It is worth mentioning that other regular events/activities below provide unique opportunities to network with colleagues and prospective employers:

- A Mobile Application Development competition is sponsored by State Farm for School of Information Technology students each year. Participants design and develop an app for a mobile device and are judged by mobile development professionals from State Farm.
- State Farm has also sponsored several Capture the Flag events at Illinois State University since the last program review.
- Students have the opportunity to participate in various programming competitions.
- Students also have the opportunity to participate in hackathons at nearby universities, and the School of Information Technology has sponsored three hackathons on the Illinois State University campus. Hackathons are competitions in which participants create some sort of application from scratch in a limited period of time (a different meaning of “hack” from the security-related version of the term).

7. Explore additional opportunities for students to participate in faculty research, internships, and client-based projects, and encourage communication by students of their research, creative works, and professional experiences through publications and through presentations at the University Research Symposium on campus and other appropriate venues. The school strongly encourages graduate students to participate in faculty research. Through guest lectures in the mandatory core course “Research Methodology”, students can learn individual faculty's research interest; through the graduate advisor, students can learn about faculty members’ active research projects; through the graduate mailing list, faculty can directly recruit appropriate graduate students into their projects. Some faculty also use social media to connect to the students directly. As a result, during the period between the last program review and now graduate students have actively participated in faculty research and generated multiple high-quality publications with several publications having graduate students listed as first authors. At least one paper with a graduate student as the first author has won the best paper in a well-established professional conference. The school also encourages graduate students to present their work in professional conferences and the Illinois State University research symposium. The School and College provide several small funds to support student travel and presentations. The school also explores sponsorship from industry to support graduate student's research. For example, State Farm has helped establish Graduate Research Assistantship since 2018 to encourage students engaged in data science related research projects.

Major findings

Overall, the program faculty believe that the M.S. in Information Systems program is doing well, although there are opportunities for improvement.

- There is a finalized assessment plan for the M.S. in Information Systems. The assessment data collection has also been started, which will be used to improve the program.
- The number of received applications has been steadily increasing over the past several years, which seems to indicate increased visibility of the program. Moreover, the average quality of admitted students (assessed by their average GRE scores and GPA) has also been steadily increasing over the past several years.
- The program's percentage of underrepresented ethnic minorities was slightly increasing.
- The M.S. in Information Systems program has been successful in hiring multiple female faculty and has been successfully maintaining a high percentage rate of female students.

Initiatives and plans

Based on major findings of this program review self-study, the M.S. in Information Systems faculty plan to do the following during the next program review cycle to improve the program:

- Grow enrollment and increase diversity among students. Currently, the program has worked closely with the INTO office to create related pathway programs for M.S. in Information Systems. The program faculty are currently preparing accelerated programs for all undergraduate majors in the school. Continue to evolve the M.S. in Information Systems assessment plan and better leverage the data collected.
- Review the current sequences and curriculum in the M.S. in Information Systems program to determine if any revisions are necessary to keep the program meeting the demands and expectations of prospective students and employers.
- Identify and implement at least one new sequence in M.S. in Information Systems.
- Investigate the opportunities to develop accelerated master's degrees for programs outside the SIT.
- Improve the quality of students admitted to the program.
- Continue to work on maintaining strong ties to alumni of the program. Since the last review, the program has started increasing communications outward to the M.S. in Information Systems alumni. But the program has been less effective at consistently getting feedback from alumni.
- Build and expand international partnerships and exchange programs that would provide students with international exposure and experiences.
- Continue efforts to address gender diversity among faculty members as hiring opportunities arise.

PROGRAM REVIEW OUTCOME AND RECOMMENDATIONS FROM THE ACADEMIC PLANNING COMMITTEE

Review Outcome: The Academic Planning Committee, as a result of this review process, finds the M.S. in Information Systems program in the School of Information Technology to be in Good Standing.

The Academic Planning Committee recognizes that many of the efforts and activities that led to the development of the self-report were accomplished during the time period coinciding with the COVID-19 pandemic. The committee thanks the program for a comprehensive and critical self-study report that included input from multiple stakeholders including from an advisory board.

The committee notes that the program's enrollment during the period covering the program review cycle declined (from 108 in 2014 to 70 in 2020). The program indicates that, with current resources, this enrollment level is at their ideal target of 60 to 70 students. The committee commends the School faculty for efforts to increase the gender and racial/ethnic diversity among its students. The percentage of students identifying as female has varied (showing a steady increase over the period of review, from 29 percent in fall 2015 to a high of 42 percent in fall 2019). The committee notes that the drop back to 28.6 percent in 2020 may reflect impacts of the COVID-19 pandemic. The percentage of graduate students from groups traditionally underrepresented in the discipline has increased (ranging between 4.3 percent in fall 2015 to 8.6 percent in fall 2020), but still remains relatively low.

The committee commends the program faculty for their efforts to support the success of their students. We commend the program on its ability to continue to limit enrollments in many of its courses, which is in keeping with the University's commitment to fostering a small-college atmosphere with large-university opportunities. The committee commends the program for having over 95 percent of their students completing the degree within the specified timeframe. The committee commends the program for the creative and varied co-curricular options it provides its students to meet their education and career goals. These include three student organizations, collaboration with State Farm on an annual mobile application development competition, and opportunities to participate in other competitions and hackathons. These opportunities help the School prepare students for employment and build a strong student community in the program. The School provides opportunities for student participation in research opportunities through a required research methodology course, research assistantships, and supervised work with faculty on research projects and theses. The committee also notes that the School has excellent laboratory facilities and works to incorporate significant hands-on experiences into the curricula of the various programs.

The committee commends the program for the creative and varied curricular options it provides students to meet their educational and career goals. The committee commends the faculty's work to revise the curriculum during the period of review based on feedback from multiple stakeholders. These revisions include the development of a new

course (IT 357), and several revisions to the program's core and elective course lists. We also commend the program faculty on the development of a new data science graduate certificate program.

The committee commends the program faculty on the development, implementation, and revision of their plan for the assessment of student learning outcomes. During the current review cycle, faculty have used the evidence gathered through the student learning outcomes assessment plan to inform program changes, and this includes the incorporation of rubrics as tools for assessing student coursework regarding the program's learning outcomes. The committee acknowledges the use of such rubrics as one method to provide consistent reviews of student learning that can provide potential areas for improvement. The information gathered through these measures has been used to make program changes, and several examples of these changes were specified.

The committee commends the School faculty on their success at hiring and retaining a higher number of female faculty members. We recognize the faculty members of the program for their scholarly contributions to the M.S. in Information Systems program. Faculty members are active researchers who publish peer-reviewed journals articles, submit grant proposals, and present at national and international professional conferences.

The committee appreciates the in-depth analysis of comparator and aspirational programs. As part of this analysis, the program faculty identified multiple institutions with similar programs that excel in ways that this program may aspire to. The committee also recognizes that faculty developed specific action plans to implement similar initiatives as those to improve the program at Illinois State University.

Recommendations.

The Academic Planning Committee thanks faculty and staff members of the School of Information Technology for the opportunity to provide input regarding the M.S. in Information Systems program at Illinois State University through consideration of the self-study report submitted by the faculty. The following committee recommendations to be addressed within the next regularly scheduled review cycle are provided in a spirit of collaboration with School faculty members. In the next program review self-study report, tentatively due October 1, 2030, the committee asks the program to describe actions taken and results achieved for each recommendation.

Develop a plan for controlled enrollment growth. As noted above, the program's enrollment has declined since the start of the period of review, but it is also near their ideal target given current resources. We support the program's goal to grow enrollment and increase diversity among its students. The committee acknowledges the work faculty have completed regarding their recruitment efforts and that this work has been successful in enrolling students into the program. Given the time and energy that must be devoted to such recruitment activities, the committee notes that considering which sources are most likely to be successful in recruiting students and prioritizing those when recruiting can provide an efficient strategy to assist in guiding these efforts (e.g., what is the ideal ratio of domestic to international students, which Illinois State undergraduate programs are the strongest pathway into the Master's program, are there opportunities to develop new sequences to meet high industry demand). The committee suggests that the program explore the potential of partnerships with other units to support students interested in pursuing dual Master's programs. In light of the comparator and aspirational analyses, we also recommend that the program faculty continue to explore the potential of developing non-traditional program delivery options (e.g., online courses), and engage with comparator institutions to better understand factors driving enrollment declines. Lastly, we recommend that the program continue to work closely with the INTO partners to identify unique challenges facing those students and to develop supports necessary for their success in the program.

Continue to focus on equity, diversity, inclusion, and access. While the committee recognizes the efforts to increase the gender and ethnic diversity of faculty and students within the program, the committee encourages the program to continue to pursue its goals related to further developing an equitable, diverse, and inclusive environment that effectively supports students, faculty, and staff from diverse backgrounds. We encourage the program to continue refining and implementing their plans for recruiting students from domestic groups who are traditionally underrepresented in the program and discipline. We note that many of the recruitment strategies are described at the School level, and we recommend that the program faculty explore the use of program-specific recruitment strategies (e.g., program-specific scholarships). Furthermore, we encourage the program faculty to continue to examine and document ways to infuse diversity, equity, and inclusion into the curriculum.

Continue to focus on student success and retention. The committee recommends that the program faculty develop a plan for student success. The plan should be used to increase transparency and communication around “student success” by defining the program’s goals for, assessment of, and actions towards supporting students enrolled in the program. The plan may provide an overarching structure for other plans (e.g., retention, curriculum, alumni engagement). The committee recommends continued periodic review of the program structure and content to remain current with changes in the field and to maintain program retention and graduation rates. We encourage the program faculty to review the program’s mechanisms that support timely graduation of students who enter the program without all the foundational coursework. Finally, while we note the relatively high number of international students within the program, the committee recommends that the program faculty examine strategies that are intentionally designed to smooth the transition of moving to another country and support a feeling of community and belonging for this population of students.

Continue to review and revise the curriculum. The committee recognizes substantial work by faculty members to review and update the program and its curriculum. The committee recommends continued periodic review of the program structure and content to remain current with changes in the field. The committee encourages the program to continue developing opportunities for student research and creative activities. We strongly recommend that the program faculty continue to explore avenues for the infusion of equity, diversity, and inclusion issues into the program’s curriculum. Lastly, the committee recommends that the program faculty examine the current graduate certificate programs to determine the continued value of their availability.

Continue to develop training and mentoring opportunities for Graduate Teaching Assistants who support teaching in the Information Systems program. The committee commends the policy that graduate assistants complete the training course prior to becoming a teaching assistant. While the committee acknowledges that all graduate students are encouraged to participate in the professional development opportunities offered by the Center for Teaching, Learning, and Technology (CTLT) on campus and through professional/disciplinary conferences, we recommend that the program faculty consider ways to expand the training and mentoring of their graduate teaching assistants. This may include creating additional assessments mechanisms like observations of teaching and mid-semester feedback and evaluation.

Continue implementing and refining the student learning outcomes assessment plan. The committee encourages faculty to continue its implementation of the student learning outcomes assessment plan for the program during the next program review cycle, to continue to utilize information gathered through plan implementation to make program revisions as necessary, and to document how that has been done. The committee encourages faculty to periodically evaluate the effectiveness of the plan in assessing student learning to identify any modifications to the plan faculty may deem necessary.

Continue the collaborative work with Milner Library. The committee recommends that the program work with the subject liaison librarian to examine and evaluate the library's journals and monograph collection related to information systems to aid in both the selection and deselection process of these sources. Given recent journal cancellations and expected increases in distance and hybrid courses, we encourage the School and the Library to further collaborate to increase awareness of alternative access to resources, such as Interlibrary Loan and I-Share lending, among faculty and students. We also recommend that the program work with the subject liaison librarian to develop a tiered approach for information fluency learning outcomes for the School, align those outcomes to the curricula, and integrate those outcomes into the student learning outcomes assessment plan for the program.

Continue to refine a plan for alumni tracking and engagement. The committee encourages the faculty to continue to refine their plan for tracking program alumni (not only School-wide, but also specifically at the graduate program level) and use this system to enhance alumni networking and engagement. These activities may become even more important in the years ahead as the program’s alumni become more diverse. The program could benefit from increased involvement of its alumni, employers, and other external stakeholders in providing input regarding the program and in mentoring students and providing employment opportunities for program graduates.