MS Spatial Informatics: UMaine Grad Catalog Changes for 2020-2021

Spatial Informatics

The master-of-science degree in Spatial Informatics (MSSI) provides an "all e-learning" "all coursework" degree for place-bound students that desire strong theory, computational, cognitive, analytical, policy and technical foundations in geographic information science and systems. As a general rule, students may view class videos and accomplish assignments at any time throughout a week in any of the offered program courses and have the weekly opportunity (or requirement) to participate in a one to two hour "live" discussion session at a mutually convenient time for distance class members prior to due dates for weekly assignments. The *MS Spatial Informatics* graduate degree is an "online only" version of the existing on-campus research-focused or project-focused *MS in Spatial Information Science and Engineering* degree.

The program focuses on advancing knowledge about spatial information particularly with respect to concepts needed in next-generation information systems. Emphasis is placed on learning and developing novel concepts and methods in the broad fields of spatial and geographic information science for sensing, storing, accessing, analyzing, and managing spatial data as well as modeling, extracting, integrating, visualizing, and communicating spatial information.

Spatial Informatics may be viewed as a field of study merging knowledge drawn from geographic information science, information science, cognitive science, computer science and engineering. Students build on foundations in computer science, mathematics, physics, geography, cognitive science, neuroscience, artificial intelligence, engineering and related fields to study spatio-temporal phenomena, design intelligent spatial information systems and develop human- centered accessible technologies. In addition, the design of spatial information technologies requires a comprehensive understanding of the social, legal, economic, and institutional issues affecting such systems, a commitment to human users and ethical uses of such systems, dedication to the ethics of broad access to information, and commitment to quality of information.

The program is designed to meet the growing demand in society for graduates with high-level geospatial technology skills. This student centered curriculum provides a path for women and men from diverse fields to rapidly transition to information system career paths by providing them with foundation graduate level courses in information

systems and geographic information science. Similar to an MBA or Law degree, the spatial informatics graduate program accommodates students from wide ranging undergraduate degree backgrounds.

Objectives

Students develop knowledge and technical skills in foundation areas of formal methods, programming, information system design, human computer interaction and information law and ethics. All of these general information systems graduate courses draw on spatial technology examples or contextual environments. Based on the foundation, a wide variety of in-depth skills are developed in the areas of web-based database systems design and development, real-time data stream processing, spatial cognition, geosensor networks, spatial data science, ontology frameworks and virtual/augmented reality. Students gain working familiarity with one or more programming languages if not already acquired. The online graduate program specializes in preparing graduates to better utilize location information, geographic information systems, sensors, sensor networks and mobile technologies in accomplishing the day-to-day tasks of businesses and government and to help advance new innovations in these domains. In addition, students may propose courses within their program of study that provide an understanding of business and engineering applications and thus provide further foundations for effective communication with end users.

Master of Science in Spatial Informatics

The Master of Science in Spatial Informatics is available only to distance students. The program consists of the same courses as taken by on-campus graduate students in Spatial Information Science and Engineering taught by the same instructors. Distance students view lectures and class discussions at times of their own choosing while deadlines for electronic delivery of assignments are often the same as for on-campus students. There is no thesis required although students may propose pursuit of a project-based course as part of their graduate program if desired.

As required by the University, all work for a master's degree must be completed within six years. The timing starts with the first semester of registration after admission to the Master of Science in Spatial Informatics.

Degree Requirements

The Master of Science in Spatial Informatics (MSSI) consists of 30 credits, all earned in course work. The program consists of five three-credit required core courses and a minimum of fifteen additional credits from a list of elective courses approved for the program drawn from a range of disciplines but primarily from distance courses offered by the School of Computing and Information Science. If some required courses are duplicative of courses that may have been taken in the student's undergraduate degree program or another graduate program, those courses need not be repeated, and the student will select in consultation with the MSSI Graduate Coordinator and MSSI Steering Committee additional approved courses to arrive at the total of 30 credit hours.

Required Courses

The following five courses must be taken and all count toward the graduate degree.

- SIE 505 - Formal Foundations for Information Science Credits: 3
- SIE 507 - Information Systems Programming Credits: 3
- SIE 515 - Human Computer Interaction Credits: 3
- SIE 525 - Information Systems Law Credits: 3
- SIE 550 - Design of Information Systems Credits: 3

Elective Courses

Students must take at least fifteen additional credits that are approved in advance by the MSSI Steering Committee from the following approved elective course listings in order to arrive at the total required of 30 credits.

Among courses that are regularly available for distance students include:

- SIE 501 - Introduction to Graduate Research Credits: 1
- SIE 502 - Research Methods Credits: 1
- SIE 503 - Principles of Experimental Design Credits: 1
- SIE 508 - Object Oriented Programming Credits: 3
- SIE 509 - Principles of Geographic Information Systems Credits: 3
- SIE 510 - Geographic Information Systems Applications Credits: 3
- SIE 512 - Spatial Analysis Credits: 3
- SIE 516 - Virtual Reality: Research and Applications Credits: 3 (on campus only)
- SIE 517 - Spatial Interaction Design Credits: 3
- SIE 554 - Spatial Reasoning Credits 3
- SIE 555 - Spatial Database Systems Credits: 3
- SIE 557 - Database System Applications Credits: 3
- SIE 558 - Real-Time Sensor Data Streams Credits: 3
- SIE 559 - Geosensor Networks Credits: 3
- SIE 570 - Spatial Cognition and Computing Credits: 3
- SIE 580 - Ontology Engineering Theory and Practice Credits: 3
- SIE 590 - Information Systems Internship Credits: 3
- SIE 693 - Graduate Seminar Credits: 1

Students may propose additional elective graduate courses than those listed to be included on their program of study on a case-by-case basis or added to the list. Depending on student interests and background and course availability for distance students, some students may choose to propose one or more courses from the list of UMaine Applied GIS Courses (https://spatial.umaine.edu/applied-gis-courses-and-projects/) for inclusion in their program of study. Some of the elective graduate courses may require prerequisites in addition to the minimum required for general admission to the MSSI graduate program.

Detailed Requirements

- Programs of Study are approved for each student by the Steering Committee for the MSSI graduate program. This committee consists of the MSSI Graduate Program Coordinator and two additional graduate faculty members in the department or affiliated with the program.
- Each student's Program of Study must include the five required core courses with the remainder of courses to be selected from an approved course list maintained by the department or proposed by the student and assessed for possible approval. The MSSI Steering Committee assesses the reasonableness of such requests and makes the final decision on whether specific additional courses serving the objectives of the MSSI program and the needs of the student may be included. Each student's Program of Study must be approved in advance by the MSSI Steering Committee. Students should NOT assume that any combination of program courses will be approved by the Steering Committee.
- At least 15 credits of the 30 required on a student's program of study must be at the 500 level or above.
- Up to two courses may be taken at other universities by distance methods or otherwise if contained on the student's graduate program of study and approved in advance by the MSSI Steering Committee.
- Up to two graduate courses may be transferred into the student's graduate program of study if taken prior to admission to the Graduate School, the courses did not count towards the student's undergraduate degree requirements, and the courses are approved by the MSSI Steering Committee.
- The MSSI Graduate Coordinator serves as the advisor for each student admitted to the program and the MSSI Steering Committee serves as the graduate committee for each student in the program.
- All students must complete the entire M.S. graduate program of study within a six-year period (as established by the Graduate School).

Admission Requirements

Admission to the University of Maine Master of Science in Spatial Informatics is competitive. In its admission process, the graduate faculty considers the potential of applicants to complete the program successfully and achieve positions of leadership in the private or public sectors. For all of our graduate programs we are generally seeking students that score at the mean or above on the verbal, quantitative and analytical segments of the GRE exam and in the 50th percentile or above on the exam overall. We generally seek an undergraduate grade point average of 3.0 or above. Exceptions are considered on a case-by-case basis. For applicants pursuing this non-thesis graduate degree, completion of the GRE Waiver Request may be appropriate.

At a minimum an applicant must have a four-year U.S. bachelor's degree from an accredited college or university, or a four-year international equivalent. Within their curriculum, all applicants should have completed a university course in Algebra as a minimum math prerequisite for admission. Previous programming courses or

experience are recommended but not required. The review committee considers both the curriculum completed and the institution attended in its assessment.

All students apply through the Graduate School and the entire application packet including transcripts, test scores and letters of recommendation must be received before a formal acceptance will be issued typically. To be considered for Fall admission, completed applications should be received if at all possible 8 weeks prior to the beginning of the term.

Note 1: Applicants applying for the MS Spatial Informatics that desire to acquire a Graduate Certificate in GIS or Information Systems along the way to acquiring the MS, should apply additionally for the Graduate Certificate prior to completing its course requirements.

Note 2: Students applying for Graduate Certificate programs are not required to submit GRE scores. Students that successfully complete a graduate certificate program in Information Systems or Geographic Information Systems (both offered on-campus and by distance) that includes the foundation courses of SIE 505, 507, 515, 525 and 550 in their certificate programs and receive a B or better in all of these courses are not required to submit a GRE score for admission to the full non-thesis MS programs in Information Systems (offered on-campus and by distance), Spatial Informatics (offered by distance only) and Spatial Information Science and Engineering - Project Option (offered on campus only). The 5 foundation courses automatically count toward the 10 courses required for the full MS degree.

Note 3: Early Admission: High performing undergraduate students from any discipline at the University of Maine may apply for early admission, preferably early in the junior year, to the MS Spatial Informatics degree through the Four Plus One Program using the Application for Admission to the SIE or MSIS Four Plus One Program.

Graduate Faculty
M. Kate Beard-Tisdale, Ph.D. (Wisconsin, 1988), Professor. Geographic information systems, map generalization, data quality and its visualization, geographic information retrieval, spatio-temporal phenomena and information integration.
Max J. Egenhofer, Ph.D. (Maine, 1989), Professor and Director of School of Computing and Information Science. Spatio-temporal reasoning, user interfaces for geographic information systems, design of spatial database systems, and mobile spatial information appliances.
Nicholas A. Giudice, Ph.D. (Minnesota, 2004), Professor and Director of VEMI Lab. Human computer interaction in real and virtual reality environments, indoor navigation, multimodal spatial cognition, information-access technology and multimodal spatial displays.
Torsten Hahmann, PhD (Toronto, 2013), Associate Professor. Spatial informatics, spatial ontologies as test bed for research about formal ontologies and their development, knowledge representation, artificial intelligence, and logic.
Silvia Nittel, Ph.D. (Zurich, 1994), Associate Professor and Director of Geosensor Networks Lab. Stationary and mobile sensor networks, decentralized in-network data collection algorithms for geosensor networks, management of distributed sensor data streams in real-time.

Harlan J. Onsrud, J.D. (Wisconsin, 1982), Professor and Graduate Coordinator. Legal, ethical, and institutional issues affecting creation and use of databases, ethics driven information systems design, assessment of social and societal impacts of spatial technologies.

Nimesha Ranasinghe, Ph.D. (National University of Singapore (NUS), 2013), Assistant Professor. Research interests include Multisensory Interactive Media, Augmented Reality, and Human-Computer Interaction