

UNIVERSITY OF MAINE SYSTEM
STATEMENT OF INTENT TO PLAN

Graduate
 Two-Year
 Four-Year

University of Maine

1. Title

Degree: Master of Science

Area: Spatial Informatics

CIP Code: 14.3801

2. Person Responsible for Planning

Harlan Onsrud, Graduate Coordinator, Spatial Informatics Programs, School of Computing and Information Science, 340 Boardman Hall, University of Maine, Orono, ME 04469-5711. Tel: 207-581-2175. Email: onsrud@spatial.maine.edu.

3. General Objective of Proposal

The objective of this proposal is to provide an "all e-learning" "all coursework" master of science degree in Spatial Informatics (MSSI) for place-bound students that desire strong theory, computational, 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 class members prior to the due dates for their weekly assignments.

(1) Program Rationale:

The business climate in Maine and the rest of the nation is characterized by rapid technological change, intense global competition, faster product life cycles and more complex, specialized markets. Individuals with information systems expertise who can design and develop information systems, manage sophisticated information resources, work on interdisciplinary teams and communicate effectively with business managers, engineers and other end-users are in short supply. A major goal of all the graduate programs in the School of Computing and Information Science is to produce individuals who can make significant contributions to economic development by ensuring that private and public enterprise have the expertise needed to remain competitive.

Already existing on-campus programs include the *Master of Science in Information Systems* (MSIS) and the *Graduate Certificate in Information Systems* (GC-IS) (<http://www.umaine.edu/msis/curriculum-and-degree-requirements/>) as well as the *Master of Science in Spatial Information Science and Engineering* (MS-SIE) and the *Graduate Certificate in Geographic Information Systems* (GC-GIS) (<http://spatial.umaine.edu/graduate-info/sie-graduate-info/>). Many of the courses affiliated with these programs are already offered with online class sections. This proposed graduate program will help us move to offering e-learning class sections for most of our master's level courses.

Non-traditional students that may be working full time or who are otherwise unable to travel to Orono will be able to take this graduate degree anywhere that high speed Internet access is available (such as from their home or office) and will be able to view most class lectures or discussions in all courses at any time of their choosing.

Three existing graduate programs (GC-IS, MSIS, GC-GIS) and this proposed graduate program (MSSI) to be offered entirely by distance methods are highly intertwined in that the beginning core courses are largely the same for all four graduate programs. This common foundation and skills approach provides great flexibility for graduate students in the event they desire to switch to a different graduate program after taking a few courses. Courses offered online through the IS and GIS programs will also help support the proposed online graduate programs in Digital Curation and Bioinformatics as well as a proposed graduate program in Applied Geographic Information Systems at the University of Southern Maine.

(2) General Program Goals:

The proposed *MS in Spatial Informatics* and the existing *Graduate Certificate in Geographic Information Systems* focus on technical, managerial and policy issues associated with constructing and managing computer-based information systems for modern organizations with a particular emphasis on spatial technologies. The objectives of these programs are to meet the growing demand in society for graduates with high-level geographic information system skills and provide 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 IS and GIS. Similar to an MBA or Law degree, these programs are explicitly designed to accommodate students from wide ranging undergraduate degree backgrounds. Many past graduates from our on-campus spatially-focused graduate programs are involved in advancing spatial technology itself or developing software and systems to enhance the ability of individuals, business, government, and industry to better utilize location information, sensors and mobile systems in their daily tasks. Other graduates are involved in more traditional areas of managing land information systems, producing maps and digital databases through the application of geospatial technologies and techniques, or managing, developing, and preserving land and natural resources. Yet others are involved in managing information about the environment, transportation and communication networks, utilities and the built environment generally.

We view the online offerings as a means to better support and recruit for our on-campus research-focused MS and PhD programs in Spatial Information Science and Engineering. Through our long experience in offering distance courses and through capitalization on very recent simple-to-use distance delivery capabilities, we believe the distance program offerings will complement and help support our on-campus research-based graduate programs rather than detract from them.

(3) Student Outcomes and Behavioral Objectives:

Students will develop knowledge and technical skills in such areas as information system design, human-computer interaction, database systems design and management, systems development, computer networks, and information law and ethics. They will gain working familiarity with one or more programming languages, the concepts of managing resources across local and wide area networks including technical and managerial concepts of distributed systems, client-server systems, world-wide web, digital libraries, and further evolving network-based systems. Relational and object-oriented databases and systems for group decision support are addressed in the context of designing and managing databases. Virtually all of these general information systems graduate courses draw on spatial technology examples or contextual environments. This new online graduate program will specialize in preparing graduates to better utilize location information, geographic information systems, sensors 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 have the opportunity to take courses that provide

an understanding of business and engineering applications and thus provide further foundations for effective communication with end users.

4. Documented Evidence of Need

(1) Workforce Needs

Geospatial technologies have been identified specifically as a High Growth Industry by the US Department of Labor¹ and “geographic information systems” is one of the academic programs suggested for focus among Maine's high-demand workforce areas in a report issued by the University of Maine System on Advancing Maine: An Action Plan to Transform Maine's Economy.²

Even a cursory look at job listings on the TechMaine web site³ indicates that Maine businesses are in constant need of information systems professionals. In a time of high unemployment generally, Maine still has a substantial number of information technology employers actively looking for information technology professionals⁴ and many are interested in providing internships for IS and GIS graduate students.⁵ This same high demand is witnessed across the nation.

In a recent survey of companies in Maine with interests in computer science and information systems skills, respondents were asked: Please check any University of Maine System computer science or information system programs listed below from which your organization might have an interest in supporting internships or hiring graduates in the future.⁶ From among the 27 programs listed from across the University of Maine System campuses, the MS in “geographic information systems” was ranked third from the top for degree backgrounds desired by employers and other UMS geographic information systems programs also ranked high.

The evidence is clear. The information technology skills provided through the graduate courses and programs offered by the Spatial Information Science and Engineering faculty in the School of Computing and Information Science will continue to remain in high demand both across the nation as well as in Maine.

(2) Targeted Audiences Related to the Need for Graduate Education in this Field

The advanced knowledge provided by graduate-level information systems programs is needed across a wide range of commercial, non-profit and government settings. Individuals in all areas of private and public enterprise rely on information systems for communication, planning, control and decision support. Location and spatial relations have emerged as key critical concepts for organizing information across all sectors and throughout the broadest range of Internet applications. The existing *Graduate Certificate in*

¹ High Growth Industry Profile: Geospatial Technology, U.S. Department of Labor, http://www.doleta.gov/brg/Indprof/geospatial_profile.cfm

² Advancing Maine, The University of Maine System – A Key Economic Driver for Maine, <http://www.maine.edu/system/AdvancingMaine.php> (draft 9.10.10)

³ High Technology Jobs, Technology Association of Maine, <http://www.techmaine.com/technology-jobs>

⁴ Technology Employers Directory, <http://www.techmaine.com/employer-directory>

⁵ Company and Agency Internships, <http://spatial.umaine.edu/internships/>

⁶ Survey of Potential Actions to Increase the Number of Computing and Information System Graduates in Maine, Compiled Summary Results, *University-Business Information Technology and Computer Science Partnership*, Version: 24 Oct 2011 (available upon request)

GIS and the proposed *Master of Science in Spatial Informatics* will be marketed to people with strong computer science, math, science, and engineering backgrounds in addition to those who are working in research labs across the nation and those actively managing geographic information systems who need greater in depth knowledge of a domain in which they may have a job but not a strong foundational knowledge base. These programs might be further marketed to people with bachelor's degrees currently working for natural resource companies, transportation agencies, conservation groups, mapping and mobile technology companies, utilities, and high tech companies advancing the next generations of such technologies as well as those people accomplishing research across many disciplines that rely on spatial analysis and location tracking as a core skill in accomplishing their work.

(3) Similar Programs Offered by Other Universities

Geographic Information System Graduate Programs: Virtually all substantial geographic information science academic degree graduate programs in the U.S. are affiliated with member universities of the University Consortium for Geographic Information Science (UCGIS).⁷ The University of Maine was one of the seven founding members and the organization now boasts over 70 university and national research lab members. Only a small number of the programs offer entirely online a Graduate Certificate or MS degree in Geographic Information Science. The most significant competition would be the online programs offered through University of Southern California⁸ and Pennsylvania State University.⁹ A relatively complete listing of online graduate degree and certificate programs in geographic information science (and related titles) may be found at the UCGIS web site.¹⁰ Many of those shown are offered by lesser known academic degree programs. Our UMaine faculty members are extremely well known globally and have a high reputation within the geographic information science community. Therefore we believe we may readily compete for students in this arena and attract particularly those students that want strong theory, analytical and technical foundations taught by leaders in the field.

(4) Demand by Students:

A survey was accomplished of University of Maine Alumni as a potential sample of college graduates that might have an interest in pursuing online graduate degrees through the University of Maine. The responses were very favorable for both our GIS and Information Systems graduate programs.¹¹ The market is of course much larger than Maine alumni and spans the English-speaking globe with good Internet access.

When the cross-disciplinary sample of UMaine alumni were asked which single graduate program of their choice they would most like to take online from among a list of 78 choices, only nine other programs ranked above *geographic information systems*. We learned from the survey that interest in both our GIS and IS program areas is approximately evenly split between those that would prefer a graduate certificate versus a full master's degree program. There was also a significant population desiring to take only

⁷ University Consortium for Geographic Information Science, <http://www.ucgis.org/>

⁸ University of Southern California, MS Degree and Graduate Certificate in Geographic Information Science and Technology, <http://gis.usc.edu/>

⁹ Master of Geographic Information Systems, Pennsylvania State University, <http://www.worldcampus.psu.edu/MasterinGIS.shtml>

¹⁰ GIS Certificate and Master's Programs, Distance and Online Learning, UCGIS, http://www.ucgis.org/priorities/education/GIS_Cert+Masters_Prog/certificates.htm#DistanceLearning

¹¹ Survey of UMaine Alumni, *Graduate Course Distance Offerings: Preferred Programs and Delivery Methods*, Summary of Overall Results, February 2011 (available upon request)

occasional specific courses of interest. We learned further that approximately three times as many respondents replied that they could participate in an online live weekly discussion session in their early evening as opposed to other times of the day. Most respondents indicated a desire to view pre-recorded lectures at their leisure and participate in only one or no live sessions each week although approximately two-thirds of the positive respondents agreed or strongly agreed that they could participate in online live sessions if offered at an appropriate time.

5. A. Which campuses, agencies, organizations, institutions and individuals have you involved in the program?

The distance delivery methods to be used require only that place-bound graduate students have high speed Internet access and the technology does not require that they participate through the use of facilities provided by any specific campus, agency, or organization. However, one option involving other organizations is our graduate internship course that does involve a close working relationship and agreements on a company-by-company basis or agency-by agency basis. The details of the graduate internship course and the names of some of the companies we have worked with in the past may be found at <http://www.umaine.edu/msis/internships>. Distance students will have the opportunity to be engaged in a graduate internship course in their own community if they so desire.

We have ongoing discussions with the University of Southern Maine that is planning an *MS in Applied Geographic Information Systems* that will be offered primarily as an on-campus program in the Portland area. We have expressed a willingness to allow graduate students in that proposed program to enroll in our e-learning graduate courses originating from the Orono campus if appropriate to the student's overall program of study and approved by their graduate advisors. Similarly, if USM offers some GIS graduate courses by e-learning methods that MS-Spatial Informatics students desire to take, our UMaine graduate committee advisors will approve them for student's program of study if appropriate. The same applies to the proposed graduate e-learning programs in bioinformatics and digital curation originating from the Orono campus.

USM Contacts:

Matthew Bampton, Associate Professor, Geography, bampton@usm.maine.edu, and Vinton Valentine, Director of GIS, vvalentine@usm.maine.edu

B. Which campuses, agencies, organizations, institutions and individuals do you plan to involve in the program?

In addition to the above collaborative efforts, we will enable students in our University of Maine graduate IS and GIS programs to take graduate e-learning courses offered by any other UMS campus assuming that (a) the UMS faculty member teaching the course meets the requirements to be appointed as a UMaine graduate instructor, (b) the course is at the 400 level or above, and (c) the course is approved as appropriate by the student's graduate committee to be included on their UMaine graduate program of study.

Further, we offer a *Four Plus One* program whereby undergraduate students enrolled in appropriate information technology programs on any of the other UMS campuses may apply for conditional admission to our master's programs during their junior or senior year and take up to a full year of graduate courses through our distance course offerings prior to finishing their undergraduate degree. This can considerably shorten their time required to acquire an IS, SI or SIE graduate degree. See the details at <http://umaine.edu/msis/four-plus-one-program-and-conditional-admission-while-an-undergraduate/>

GIS Communications Facilitator across the UMS Campuses:
Tora Johnson, Director, GIS Service Center & Laboratory, University of Maine at Machias,
tjohnson@maine.edu, (207) 255-1214

C. How?

As described in the previous two sections.

6. What type and/or extent of support is presently available?

Background

From the previously mentioned UMaine Alumni survey results, we conclude that student demand for this and other e-learning graduate programs largely depends on the methods by which courses are offered. Given the empirical data gathered and in an attempt to maximize the online market for our existing IS and GIS programs and the proposed Spatial Informatics graduate program, we are adhering generally to the following principles in designing our course offerings.

1. To maintain a level of consistency and avoid duplicative work by faculty members, the course material and class sessions both for on-campus and online students will be identical in most cases. This ensures the materials covered in the courses will be always equally rigorous and up-to-date. An additional live weekly discussion session for online students will be required for most courses.
2. All class sessions whether lectures or discussion sessions will be video recorded. Both on-campus and online students will have access to these recordings.
 - a. *Pre-recorded Class Lectures:* Depending on the course and nature of the class materials, some instructors may choose to pre-record all or most lectures for some courses in advance. Typically, distance students will be expected to view the videos and submit assignments prior to a weekly live discussion session that is required or optional at the discretion of the instructor. To ensure that the videos are actually viewed, one device already used by one instructor is to make an oral assignment of a discussion question somewhere in each video lecture for which a short written response must be submitted by each student prior to participation in the end-of-week live discussion session.
 - b. *Contemporaneously Recorded Class Sessions:* In most courses, professors are likely to record the live class sessions with on-campus graduate students as they occur. Students at a distance may either participate in the class sessions remotely from anywhere on the Internet as the classes occur if they happen to be available at that time or they may view the recording at any later time before the required or optional discussion session.
3. Technologies
 - a. *Pre-recorded Videos:* For pre-recorded lectures, professors may select any recording software of their choice and several are already actively engaged in this process with no need for special facilities other than what has already been acquired.
 - b. *Contemporaneously Recorded Videos:* For day-to-day regular recording of class sessions we will use Connect Pro. All participating faculty members have Connect Pro accounts (cost of approximately \$150 per year per professor) plus a years worth of experience in using Connect Pro. Students and faculty find it far superior for our needs over Polycom and Tandberg systems that are limited in reaching the market population of students which may be located anywhere across the Internet. Connect Pro is also better suited technically in that little to no external technical support is required once a stable installed setup is achieved. The technology requires no scheduling of distant classrooms, provides multiple easily resized pod windows for providing multiple forms of communication and information, provides resolutions exceeding our needs, can be interfaced with digital tablets and smart boards for

drawing diagrams and writing equations, and is low cost in comparison to the alternatives. The technology is not perfect but it has proven sufficient to more than meet our live distance education broadcast and two-way audio and video needs.

- c. *Other Technologies:* **Web:** The syllabi and detailed daily assignments for each course are being hosted on the University of Maine server using WordPress at <http://www.umaine.edu/computingcoursesonline/> This interface provides a consistent interface for both on-campus and off-campus graduate students, allows professors to have ready control over their own web content and allows them to control access to or provide open access to their course materials as they see fit. **FirstClass:** The UMaine FirstClass system may be used readily for submission of assignments by enrolled students, to support a class discussion list and for delivery of course materials to students as appropriate. **Skype:** In the event that bandwidth is slow on a particular day or the audio is malfunctioning, professors can readily convert to a Skype Conference Call on the fly for students that may be participating live from a distance. This needs to be prepared in advance so that a conference call to the entire group can be made quickly. **Blackboard/WebCT/Moodle:** Professors have the option to use other web-based course support options but none have chosen to do so to date.

A. Personnel

Faculty: Courses taught by Spatial Information Science and Engineering faculty members will be sufficient for students to acquire any of four separate graduate programs offered by e-learning methods. These academic programs include:

- *Graduate Certificate in Information Systems (GC-IS) Existing* – see <http://www.umaine.edu/msis/curriculum-and-degree-requirements/>
- *Master of Science in Information Systems (MSIS) Existing* – see <http://www.umaine.edu/msis/curriculum-and-degree-requirements/> Note: the total number of courses offered online is currently insufficient
- *Graduate Certificate in Geographic Information Systems (GC-GIS) Existing* – see <http://spatial.umaine.edu/graduate-info/sie-graduate-info/>
- *Master of Science in Spatial Informatics (MSSI) Proposed*

The Master of Science and PhD programs in Spatial Information Science and Engineering are research-based and require an on-campus presence to pursue. Some courses to be included in the e-learning graduate programs are offered in other departments but those courses are not required.

The core faculty members included in teaching the four graduate programs listed above include: **M. Kate Beard-Tisdale**, Ph.D. (Wisconsin, 1988), Professor. Geographic information systems, spatial analysis, digital libraries.

Max J. Egenhofer, Ph.D. (Maine, 1989), Professor. Geographic database systems, spatial reasoning, GIS user interface design, research methodologies.

Nicholas Giudice, Ph.D. (Minnesota, 2004), Assistant Professor. Neurocognitive engineering, multimodal spatial learning, human computer interaction.

Reinhard Moratz, Ph.D. (Universitat Bielefeld, 1997), Associate Professor. Spatial knowledge representation in cognitive systems, qualitative spatio-temporal representation, human-robot interfaces, integration of spatial perception and description.

Silvia Nittel, Ph.D. (Zurich, Switzerland, 1994), Associate Professor. Spatial database management systems, data stream management systems, wireless geosensor networks, high performance distributed architectures.

Harlan J. Onsrud, J.D. (Wisconsin, 1982), Professor. Computer and information systems law, responsible conduct of research, cadastral systems.

Michael F. Worboys, Ph.D. (Birmingham, UK, 1980), Professor and Chair. Geographic information representation and reasoning, uncertainty, spatio-temporal information, human interaction issues.

Connie Holden (adjunct) Geographic information systems.

All of the faculty members listed above are tenured or tenure track except for Connie Holden who is a tenured faculty member at University of Maine at Augusta (Bangor Campus) and who regularly teaches our first level graduate courses in geographic information systems when we are able to fund her to do so.

All of the instructors above have taught courses by distance education by one method or another in the near or distant past with the exception of Nick Giudice who is the latest addition to our faculty and he is very interested in experiencing online teaching methods. By example, Max Egenhofer offers a course through pre-recording of all lectures and posting them for viewing prior to a Friday discussion session. Mike Worboys videotaped and posted lectures last semester for his students and is engaged in prerecording videos for lectures affiliated with a course based on his textbook. Silvia Nittel has successfully taught Java computer programming using live online distance technology methods and students responded that they found this method of class participation highly preferable to traveling to Orono. Kate Beard is teaching a current graduate course in which more than half the students are at a distance. Harlan Onsrud teaches a graduate course in Responsible Conduct of Research to graduate students at several research lab sites and has recently transitioned from use of Polycom to Connect Pro and found that students much prefer the latter. He also now regularly teaches a graduate information systems law course using Connect Pro. Connie Holden has extensive previous experience using a Polycom system to teach a graduate laboratory course in GIS but we gave it up years ago due to the substantially increased burden of servicing the students at a distance. Availability of reasonably priced downloadable student software for each class member and readily available distance education facilities in our own classrooms suggests that those increased burdens will now be substantially lessened.

There is no increased burden on the above faculty in terms of credit hour teaching load. All of the courses listed below are already being taught or are within the assigned teaching loads of the faculty. There will be an increase in burden in ensuring that the distance education technology is working smoothly and an increased burden to participate in an additional discussion session for each course each week if that is the model followed by the instructor. The increase in marketing burden for each of our faculty members will be primarily through increased use of our web site to sell our online program opportunities in addition to our on-campus programs (see the extensive use of videos on our web site at <http://spatial.umaine.edu/faculty/> and at <http://spatial.umaine.edu/student-project-videos/>) and to make others aware of the new online programs through the extensive numbers of conferences that the faculty normally attend throughout the year. Our goal is to make all of our graduate courses when offered on campus also routinely available online.

Technical Support: Because virtually all of our graduate courses will now be recorded by instructors on Connect Pro, it makes sense that a single individual should be assigned at the end of each day to access each of the instructor Connect Pro accounts to acquire the url's for the lectures recorded on that day and post the web links on a single web site for all of the courses or on separate websites designated for each course. This task is best supported through a teaching assistant in the department assigned to help support all of the courses in the department. See the attached budget for a teaching assistant to be supplied by the 24/7 Program for three years and, after that time, assuming that we are successful in greatly expanding enrollments of place-bound

new graduate students, we will request long-term support justified on the actual increased revenues to the university.

B. Facilities

Two conference rooms (Rooms 326 and 336) and one classroom (Room 136) in Boardman Hall are being equipped with a standard optimal Connect Pro hardware setup. In a conference room this consists of a minicomputer with small keyboard and small monitor and mouse for the instructor interface along with digital writing pad or Smart Board (as needed), video camera on the instructor, wall mounted minicomputer connected to a video camera focused on the classroom, daisy-chained microphones down the middle of the conference table and overhead projector for the class display. The cost for such a classroom setup is about \$6,000 per classroom and may be far less if overhead projectors and other facilities are already contained in the classrooms. Experience with our current Connect Pro classroom suggests our proposed setup will work well but we are currently experimenting with various configured options to thoroughly test and arrive at an optimal hardware and software configuration. See the attached budget for the costs to be borne by the 24/7 Program to enable these classroom setups.

C. Equipment

Other than the improved classroom facilities, we see little need for expanded additional equipment to serve distant graduate students. On-campus Spatial Information Science and Engineering students have access to state of the art labs and research facilities but these are used for funded on-campus research projects primarily. The distance students will be experiencing "all course work" and potentially internship experiences and thus will not need access to such specialized equipment typically.

D. Funding Sources

Ideally we would like to see a new cohort of approximately 20 highly qualified distance students enrolled in the MS Spatial Informatics graduate program each and every year. We believe that this will be highly dependent upon (a) aggressive Internet marketing and (b) ensuring that the initial cohorts have very good experiences and success so that we can use them to help sell the programs to others in future years. Part of ensuring a quality experience for the first few cohorts is providing quality equipment, infrastructure and support for broadcasting the lectures live and for ensuring that recordings of each class session are efficiently posted soon after each session. As mentioned previously, we envision having a single graduate student assistant post the url links each evening on a common web site for all of the classes offered that day. Both marketing and student support will mean a requirement for ongoing financial expenditures. In the first three years, this financial support will be provided by the 24/7 Program. After that time, funding for these needs should be continued based on proven ability to attract substantial numbers of new tuition paying place-bound graduate students. See the attached budget for the initially proposed expenditures on Internet marketing.

By following the above principles we believe we can best meet the demands as expressed by potential online students while ensuring a low cost and low maintenance approach that should be sustainable over time both technologically and financially.

E. Library Resources

All enrolled students have access to all electronic journals, databases and other resources made available through Fogler Library. Because the MS GIST is an online version of the more intense

on-campus research-focused *MS in Spatial Information Science and Engineering* degree, there are no additional library resources required. All enrolled tuition-paying distance students will have electronic access to all usual UMaine library resources from their homes and offices.

F. Other

Any software required by students will be listed in the relevant course syllabi and is typically available for a low fee for a limited period at a student discount rate. In some instances, specific hardware may be required in order to use available software (i.e. PC rather than Mac) but this has not been a significant hurdle for students currently enrolled in our distance courses.

G. What additional new costs are required in any or all of the above categories?

All predicted costs are included in the attached budget to be paid for through the 24/7 Program.

7. Briefly describe preliminary plans for regular program evaluations, formative and summative.

Formative Evaluation Strategies:

Formative assessment is a reflective process to enhance learning whereby feedback from learning activities is used to adapt teaching to meet students' needs. Many of us design our courses to consistently engage students in active learning and to redirect learning as a course progresses to allow us to see what material students truly understand and what they have missed. We don't envision changing our teaching styles much with our in-class students but the out-of-class distance students are likely to be more passive learners if they are primarily depending on viewing videos of the in-class active learning discussions and are doing assignments on their own. Thus we will need to pay particular attention to this issue in ensuring that students at a distance remain engaged. One mechanism we can use is that already described approach of requiring students to respond to short questions in writing to verify that they have read the assigned materials and watched the class videos prior to the end-of-week discussion sessions. In terms of formative assessment of the overall graduate degree programs our hope is that the Division of Lifelong Learning will be able to engage assessment specialists from the College of Education to do surveys, focus group sessions, and similar appropriate assessment activities during and near the end of each semester with students enrolled in the new online graduate degree programs as well as with the instructors to gain feedback on what was successful and/or less than successful in the online teaching approaches pursued. Such assessments would allow both faculty and students to correct missteps early on in order to improve the on-line instruction and learning experience. In the event that DLL is unable to accomplish this on an overall basis we will create appropriate survey and focus group instruments in consultation with similarly situated initiators of online learning graduate programs and carry out such assessments ourselves.

Summative Evaluation Strategies:

Summative assessment occurs at the end of a learning unit and determines whether a student was able to acquire the knowledge expected. In addition to normal grading of assignments, participation and final exams, some faculty regularly do a pre and post unit assessment. By example, this is accomplished in the Information Systems Law course with the answers openly discussed in the final session of the course because past experience has shown that certain assumptions that students make about the law coming into a course are simply wrong but tend to persist even after studying and discussing material in depth to the contrary. The post unit assessment helps ensure that the material has finally assimilated. In terms of summative evaluation of the success of a course at the end of the course, one standard method is of course

to receive anonymous student feedback from all of the students and this will of course be accomplished for all of the students. An online evaluation form system already exists. In terms of assessing whether an overall graduate degree online program has been successful we think needs to be evaluated ultimately based on student enrollments. Quality of the programs is very important in affecting enrollment numbers but the quality of the advertising and marketing of the programs is also extremely important. We would like to be visible on the first page when individuals search terms such as "masters degree in geographic information systems" or "MS Spatial Technologies." I am confident we can work with DLL to come up with specific measures in terms of how much Internet marketing was accomplished and whether we were able to acquire a good percentage return on those individuals that actually clicked to our programs to take a look.

8. Time Frame

Estimated Planning Time: Six months

Estimated implementation Plan: One year – most facilities, personnel and courses already in place

Estimate of Program Lifetime: Long-term


9. On what other campus, if any, will this program be available? What plans are there to insure transferability from other campuses into this program or to deliver this program to other campuses?

The graduate program will be open to students across the country and the globe. See the response to item 5 above in reference to collaborating with other UMS campuses.

10. Other Pertinent Data and/or Information


See the attached budget.

11. Submitted By:



Harlan J. Onsrud, Graduate Coordinator
Spatial Informatics Programs


1/26/11
Date



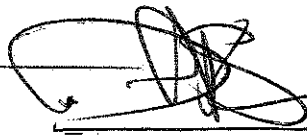
Michael Worboys, Director
School of Computing and Information Science

1/26/11
Date

Approved By:



Dr. Jeffrey E. Hecker, Dean
College of Liberal Arts and Sciences



-Daniel H. Sandweiss
Dean and Associate Provost for Graduate Studies

1/30/2012
Date 5/10/12

Dr. Susan Hunter, Provost
University of Maine

Date

Dr. Paul W. Ferguson, President
University of Maine

Date

Appendix

Proposed Budget for Implementation of MS Spatial Informatics

The budget that follows is a tentative budget. The proposed new online master's degree in Spatial Informatics is part of a package of two graduate degrees and two graduate certificate programs that have been approved for inclusion in the Project 7 Program. Project 7 is a University of Maine response to the call for significantly increasing the number of students in online graduate degree programs and the project is funded through strategic initiative funding returned from the University of Maine System. The goal is to offer a critical mass of graduate courses online so that potential students have a choice from among four different but closely related programs from which to choose.

It makes little sense to break out the funding for this specific degree from the other listed programs since there is substantial overlap between the existing graduate programs and the proposed degree and if all four are not funded as a group then it is likely that none will be offered entirely online.

Project 7 Graduate Program Implementation Budget

Submitted by: Spatial Information Science and Engineering Faculty, School of Computing and Information Science, University of Maine

The following three-year budget is intended to allow the following four graduate programs to be fully developed so that they may be offered in entirety through e-learning methods thereby allowing the following programs to be earned by place-bound distant students:

- *Graduate Certificate in Information Systems (GC-IS)*
- *Master of Science in Information Systems (MSIS)*
- *Graduate Certificate in Geographic Information Systems (GC-GIS)*
- *Master of Science in Spatial Informatics (MSSI)*

Each faculty member in Spatial Information Science and Engineering will have already converted the following courses to a distance format at no cost to the university prior to the end of the 2011/2012 academic year.

- SIE 505 - Formal Foundations for Information Science (Worboys) Credits: 3
- SIE 507 - Information Systems Programming (Moratz) Credits: 3
- SIE 512 - Spatial Analysis (Beard) Credits: 3
- SIE 515 - Human Computer Interaction (Giudice) Credits: 3
- SIE 525 - Information Systems Law (Onsrud) Credits: 3
- SIE 550 - Design of Information Systems (Egenhofer) Credits: 3
- SIE 555 - Spatial Database Systems (Nittel) Credits: 3

The total budget below is approximately \$50,000 per year over three years (or half that if teaching assistant support is not included). Assuming that the online sections of classes continually average fifteen students⁺ the assumption is made that the university will continue to provide the Spatial Informatics faculty with the ongoing resources of approximately \$29,000 per year for the teaching assistantship and marketing in order to keep serving these place bound students that would otherwise not attend UMaine nor attain graduate degrees in this critical needs area.

⁺ Ongoing income from new students = minimum tuition of \$418 per credit [assumes in-state tuition but could have significant out-of-state tuition] times 3 credits times 15 students = income of \$18,800 per course with little to no use of the university's physical facilities times typically 14 courses per year = \$263,000 per year

Item	Cost	Comments
Year 1 (2011-2012)		
Equipment Install – Room 326 Boardman	\$5950	See cost details in Table 2
Equipment Install – Room 336 Boardman	\$5950	See cost details in Table 2
Equipment Install – Room 136 Boardman	\$5950	See cost details in Table 2
Teaching Assistant	\$10,906	One semester. \$1511 times 4 months = \$6044 [plus] 9 credits times \$418 = \$3,762 [plus] \$1100 health. Total = \$10,906 Administrative, technical and teaching assistance support for all offered distance courses by the spatial informatics faculty. Example: See courses listed at http://www.umaine.edu/computingcoursesonline
Course Creation and Recording	\$6,600	SIE 575 Geographic Information System Computing Perspectives (Worboys) Credits: 3 [based on his textbook]
Course Conversion	\$6,600	SIE 509 - Principles of Geographic Information Systems (Holden) Credits: 3
Total	\$41,956	
Year 2 (2012-2013)		
Teaching Assistant	\$24,489	\$1511 times 9 months = \$13,599 plus 9 credits times 2 semesters = 18 credits times \$418 = \$7,524 plus \$2200 health Total = \$23,323 plus 5% = \$24,489
Google Ads	3,000	Annual ad budget for “online masters degree in GIS” and “online masters degree in information systems/science”
Course Conversion	\$6,600	SIE 509 - Principles of Geographic Information Systems (Holden) Credits: 3
Course Conversion	\$6,600	SIE 510 - Geographic Information Systems Applications (Beard) Credits: 3
Course Conversion	\$6,600	SIE 515 - Human Computer Interaction (Giudice) Credits: 3
Course Creation	\$6,600	SIE 552 - Database System Applications (Nittel) Credits: 3
Course Creation	\$6,600	SIE 580 - GIS Field Data Collection Methods (Holden) Credits: 3
Total	\$60,489	
Year 3 (2012-2013)		
Teaching Assistant	\$25,713	Total = \$24489 plus 5% = \$25,713
Google Ads	3,000	Annual ad budget for “online masters degree in GIS” and “online masters degree in information systems/science”
Course Conversion	\$6,600	SIE 554 - Spatial Reasoning (Egenhofer) Credits: 3
Course Conversion	\$6,600	SIE 570 - Spatial Cognition (Moratz) Credits: 3
Course Creation	\$6,600	ISY 590 – Computers, Ethics & Society (Onsrud) Credits: 3
Total	\$48,513	

Table 1 - Costs to Develop Ongoing Distance Courses for Four SIE Graduate Programs

Quantity	Item	Price	Total	Link
2	FoxConn NT535 Computer	\$174.99	349.98	http://www.newegg.com/Product/Product.aspx?Item=N82E16856119056&Tpk=foxconn%20nt535
2	2GB Ram	\$12.99	25.98	http://www.newegg.com/Product/Product.aspx?Item=N82E16820145228
2	160GB HDD	\$54.99	109.98	http://www.newegg.com/Product/Product.aspx?Item=N82E16822152302
1	Speakers	\$19.99	19.99	http://www.newegg.com/Product/Product.aspx?Item=N82E16836121020
1	Keyboard	\$26.99	26.99	http://www.tigerdirect.com/applications/SearchTools/item-details.asp?EdpNo=5058067&CatId=2679
1	Mouse	\$7.99	7.99	http://www.newegg.com/Product/Product.aspx?Item=N82E16826250005
1	VGA Amp	\$25.99	25.99	http://www.newegg.com/Product/Product.aspx?Item=N82E16817707059&cm_re=vga_amplifier_-17-707-059_-Product
1	VGA Wall Switch	\$8.09	8.09	http://www.amazon.com/Ports-VGA-Switch-Selector-Monitor/dp/B003DTZQFY
2	25' VGA Cable	\$13.99	27.98	http://www.newegg.com/Product/Product.aspx?Item=N82E16812816042
1	50' Cable Kit	\$64.45	64.45	http://www.amazon.com/Monster-CIT-MBK-50-Diameter-Management/dp/B000WNHD4Q/ref=sr_1_1?ie=UTF8&qid=1312813631&sr=8-1
2	Microsoft Webcam	\$45.99	91.98	http://www.newegg.com/Product/Product.aspx?Item=N82E16826105321
2	30' Ethernet Cable	\$16.97	33.94	http://www.newegg.com/Product/Product.aspx?Item=N82E16812107652
1	6 Power Outlet Box	\$17.99	17.99	http://www.lowes.com/webapp/wcs/stores/servlet/ProductDisplay?masthead=true&selectedLocalStoreBeanArray=[com.lowes.commerce.storelocator.beans.LocatorStoreBean%40314c314c%2C+com.lowes.commerce.storelocator.beans.LocatorStoreBean%4032043204%2C+com.lowes.commerce.storelocator.beans.LocatorStoreBean%4032bc32bc%2C+com.lowes.commerce.storelocator.beans.LocatorStoreBean%4033743374%2C+com.lowes.commerce.storelocator.beans.LocatorStoreBean%40342c342c]&langId=-1&Ntt=&URL=TopCategoriesDisplayView&firstReferURL=http%3A%2F%2Fwww.lowes.com%2Fwebapp%2Fwcs%2Fstores%2Fservlet%2FProductDisplay%3FlangId%3D-1%26storeId%3D10151%26catalogId%3D10051%26cid%3DSEARCH%26productId%3D3439194%26cm_mmc%3DSCE_gps_-gps_-gps_-Utilitech%25202160-Joule%25206-Outlet%2520General%2520Use%2520Surge%2520Protector%2520UTPB3105&zipCode=04473&y=0&x=0&isQvSearch=&elid=SEARCH&masterURL=TopCategoriesDisplayView&findStoreErrorURL=StoreLocatorDisplayView&productId=3439194&cm_mmc=SCE_gps_-gps_-gps_-Utilitech+2160-Joule+6-Outlet+General+Use+Surge+Protector+UTPB3105&catalogId=10051&NttParam=&storeId=10151&qvRedirect=-
1	20' Power Extension Cable	\$25.00	25	
1	USB 4port Hub	\$13.99	13.99	http://www.newegg.com/Product/Product.aspx?Item=N82E16817111976
1	Projector	\$949.00	949	http://www.bhphotovideo.com/c/product/720479-REG/Epson_V11H326020_VS400_XGA_Multimedia_Projector.html
1	PC Rolling Cart	\$440.00	440	
1	AV Projector Hookup	\$750.00	750	
	Microphones + Mixer		0	Supplied by IT(Serge Drage) Surplus Equipment
1	Lapel Microphone	\$189.99	189.99	http://www.radioshack.com/product/index.jsp?productId=2499357&numProductsPerPage=60
1	Presentation Remote	\$69.99	69.99	http://www.newegg.com/Product/Product.aspx?Item=N82E16833998032
1	Wacom Tablet	\$99.99	99.99	http://www.newegg.com/Product/Product.aspx?Item=N82E16823100057
1	Smartboard	\$2,000.00	\$2,000.00	
	Electric Shop Power Outlets	?		
	Technician Labor to Install & Test		600	
	Total		\$5,949.29	

Table 2 - Cost of Hardware Setup per Distance Education Room