

Graduate Student Guide

2018-2019

School of Computing and Information Science

CONTENT COVERAGE

Research Based Academic Degrees

Master of Science: Spatial Information Science and Engineering

PhD: Spatial Information Science and Engineering

Course or Project Based Academic Degrees and Programs

Master of Science: Spatial Informatics (distance only)

Graduate Certificate: Geographic Information Systems

Master of Science: Information Systems

Graduate Certificate: Information Systems

School of Computing and Information Science

University of Maine

5711 Boardman Hall, Rm 348

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1. Preface

1.1 Use of This Guide

This guide is for the use of those persons granted admission as graduate students in the School of Computing and Information Science at the University of Maine in certain specified programs. The guide captures the most recent policies in the School's graduate curricula and procedures.

These guidelines define the minimum that all graduate students must fulfill in the named programs in the School of Computing and Information Science (SCIS). Each student's advisory committee may impose additional requirements as set forth in their program of study.

Exceptions to the guidelines contained in this document may be made by majority vote of the Spatial Informatics / Information Systems Graduate Faculty. Items labeled in these guidelines as *recommendations* may be instituted or not by majority vote of the graduate students advisory committee.

In the event of a conflict between this guide and the rules and regulations of the Graduate School, the more restrictive provisions apply. If a student is in doubt as to which courses are required or what procedures should be followed, he or she is urged to consult with (1) his or her major advisor (also known as advisory committee chairperson or thesis advisor), (2) the program Graduate Coordinator, and (3) the Graduate School.

The term "graduate faculty" sometimes has different meanings as used in this document and the following abbreviations are sometimes used to indicate the meaning intended.

- GF 1 – SCIS Graduate Faculty (Faculty must have a tenure or tenure eligible appointment within the school in SIE or CS or a full-time appointment in the school in SIE or CS and meet the graduate faculty criteria for SCIS)
- GF 1a – SCIS Graduate Faculty affiliated with the Spatial Informatics or Information Systems Academic Programs (see <http://spatial.umaine.edu/faculty/> and <http://umaine.edu/msis/faculty/>)
- GF 2 – Cooperating SCIS Graduate Faculty (UMaine faculty members formally accepted as cooperating graduate faculty by SCIS; see <http://umaine.edu/scis/faculty-and-staff/#cooperating>)
- GF 3 – Other UMaine Graduate Faculty
- GF 4 – External Graduate Faculty (persons accepted by SCIS and the UMaine Graduate School to formally serve on the committees of graduate students)

See also the [SCIS Requirements for Appointment and Reappointment of Graduate Faculty](#)

1.2 Contact Information

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<http://umaine.edu/msis/>

2. Overview of the Graduate Programs

2.1 Academic Program Descriptions and Requirements

The official description of each of the following academic programs is provided in the official University of Maine online graduate catalog at the links as indicated below. Because the links in the official catalog are not persistent over time, we instead provide you with “bread crumbs” to find the appropriate requirements. Because the catalog is updated only once per year, we provide you also with the SCIS web site for the program where you can expect to find updates if any are being imposed.

Master of Science: Spatial Information Science and Engineering

Official University Catalog Description and Degree Requirements:

<http://gradcatalog.umaine.edu/> > choose current graduate catalog in pull down menu > choose Graduate Programs, Certifications, Specializations in left menu > choose Spatial Information Science & Engineering > consult Master of Science in Spatial Information Science and Engineering

Supplemental Information:

<https://spatial.umaine.edu/sie-graduate-info/#masters>

Master of Science: Spatial Informatics (Online Only Degree)

Official University Catalog Description and Degree Requirements:

<http://gradcatalog.umaine.edu/> > choose current graduate catalog in pull down menu > choose Graduate Programs, Certifications, Specializations in left menu > choose Spatial Informatics > consult Master of Science in Spatial Informatics

Supplemental Information:

<https://spatial.umaine.edu/sie-graduate-info/#masters>

PhD: Spatial Information Science and Engineering

Official University Catalog Description and Degree Requirements:

<http://gradcatalog.umaine.edu/> > choose current graduate catalog in pull down menu > choose Graduate Programs, Certifications, Specializations in left menu > choose Spatial Information Science & Engineering > consult Doctor of Philosophy in Spatial Information Science and Engineering

Supplemental Information:

<https://spatial.umaine.edu/sie-graduate-info/#phd>

Graduate Certificate: Geographic Information Systems:

Official University Catalog Description and Degree Requirements:

<http://gradcatalog.umaine.edu/> > choose current graduate catalog in pull down menu > choose Graduate Programs, Certifications, Specializations in left menu > choose Geographic Information Systems (Certificate)

Supplemental Information:

<https://spatial.umaine.edu/sie-graduate-info/#certificates>

Master of Science: Information Systems

Official University Catalog Description and Degree Requirements:

<http://gradcatalog.umaine.edu/> > choose current graduate catalog in pull down menu > choose Graduate Programs, Certifications, Specializations in left menu > choose Information Systems

Supplemental Information:

<https://umaine.edu/msis/curriculum-and-degree-requirements/#master>

Graduate Certificate: Information Systems:

Official University Catalog Description and Degree Requirements:

<http://gradcatalog.umaine.edu/> > choose current graduate catalog in pull down menu > choose Graduate Programs, Certifications, Specializations in left menu > choose Information Systems (Certificate)

Supplemental Information:

<https://umaine.edu/msis/curriculum-and-degree-requirements/#certificate>

2.2 Advisory Committees

The advisory committee for each graduate student should be formed at the beginning of the graduate program. The student's major advisor or thesis advisor acts as chairperson of this advisory committee and, for those pursuing a thesis, serves as chair of the examining committee for the final defense. The advisory committee guides the student on course work and the thesis.

Thesis and Project-Based Master's Degrees

The advisory committee for a thesis-based or project-based Master's student is composed of a minimum of **three** committee members of the University of Maine Graduate Faculty, at least **two** of whom must be SCIS Graduate Faculty affiliated with the Spatial Informatics or Information Systems Academic Programs (GF-1a).

Other graduate faculty members (GF-1 other, GF-2, GF-3 and GF-4) may serve as co-chair but not sole chair of a SCIS graduate student's advisory committee nor as sole major advisor of the thesis.

All Coursework Master's Degrees

For an all coursework Master's degree such as the MS Information Systems or MS Spatial Informatics, the graduate coordinator for the academic degree program serves as the chair (and entire membership) of the Advisory Committee to approve the program of study and ensure that all coursework requirements have been met. Students, at their discretion, may request an alternative major advisor and/or an expanded formal advisory committee.

Ph.D. Degree

The advisory committee for a Ph.D. student is composed of a minimum of **five** committee members of the University of Maine Graduate Faculty, at least **three** of whom must be SCIS Graduate Faculty affiliated with the Spatial Informatics or Information Systems Academic

Programs (GF-1a). At least one member of the committee should be from the UMaine Graduate Faculty other than the three members already mentioned (GF-1 other, GF-2 or GF-3). If a graduate faculty member external to the University (GF-4) does not sit on the committee, an examiner external to the University of Maine is strongly recommended (see Section 7.3.2 below) but this person is not an official member of the advisory committee.

Graduate Certificates

Because graduate certificates such as in *Geographic Information Systems* or *Information Systems* are all coursework, the graduate coordinator for that academic program serves as the chair (and entire membership) of the Advisory Committee to approve the program of study and ensure that all coursework requirements have been met. Students, at their discretion, may request an alternative major advisor and/or an expanded formal advisory committee.

Changes in Thesis and Project-Based Advisory Committees

All requests for changes in a graduate student's advisory committee must be submitted by email or in writing by the student's major advisor to the Graduate Coordinator for the academic unit. The Graduate Coordinator will review such recommended changes and, if approved, notify the Director of the Graduate School about the changes in the advisory committee. In the case that a Ph.D. candidate requests the exchange of the chair of his or her committee, the request if disputed by the current chair will be assessed by a three-person review board of graduate faculty appointed by the Director of the School of Computing and Information Science in consultation with the Graduate Coordinator. Any significant reconstitution of the committee of a candidate may require that the student pass a new proposal defense with the newly composed committee prior to continuing with his or her dissertation.

2.3 Academic Program Full Graduate Faculty

Program faculty must apply for and be accepted as full graduate faculty by the Graduate School in order to serve as the chair for a graduate student advisory committee. The criteria are formally established by the program faculty members in each academic unit. See the [SCIS Requirements for Appointment and Reappointment of Graduate Faculty](#)

Current full graduate faculty members suitable for serving as chair or a member of the graduate committee for students pursuing graduate programs in the School of Computing and Information Science covered by this guide are listed at <http://spatial.umaine.edu/faculty/> and <http://umaine.edu/msis/faculty/>

To determine if faculty members from other UMaine academic units are full graduate faculty members, please contact the graduate school.

2.4 Academic Program Associate Graduate Faculty

Associate Graduate Faculty members may serve as committee members on graduate advisory committees for the programs covered in this Guide but they cannot chair such a graduate committee nor does this person count towards the minimum number of committee members as set forth in Section 2.2 for either the Master's or PhD degree. As an example, an MS student thesis committee that included an Associate Graduate Faculty member would need to have a minimum of 4 total members. In cases where an Associate Graduate Faculty co-supervises a

graduate student in approximately equal amount with a Full Graduate Faculty member, that Associate Graduate Faculty member may serve as co-advisor of that student.

3. Additional Program Requirements

3.1 Program of Study

All graduate students must complete a formal *Program of Study*. The appropriate form may be downloaded from the Graduate School website at <https://umaine.edu/graduate/facultystaff-resources/> > Forms (in right column)

The *Program of Study* form must be completed by the end of the second semester of enrollment or before entering the second year of the graduate program. Completing the *Program of Study* with committee members' signatures helps ensure that course work will be completed in a timely manner and that students are ensured that the courses they take will count towards their degree. Students should keep a copy of the signed and dated Program of Study. If changes to the plan appear likely in the future but prior to the graduate school deadline, the plan may be filed in the student's folder in the School of CIS and not submitted formally by the School of CIS to the Graduate School until mandated by the Graduate School.

The coordinator for a graduate program is typically the sole signatory for all coursework master's programs such as the MS Information Systems, MS Spatial Informatics, Graduate Certificate in Geographic Information Systems and Graduate Certificate in Information Systems.

Students admitted to the PhD program with only a Bachelor's degree receive only the PhD degree upon completion of that program. While the program of study may encompass a much longer list of courses to be completed, it still needs to be filed before entering the second year of graduate study.

Once the Graduate School receives the *Program of Study*, it becomes the student's required curriculum. Changes in the *Program of Study* may be made by submitting to the Graduate School a *Change in Program of Study* form. Students and faculty should typically coordinate this revision process through the Administrative Support Supervisor, Karen Kidder.

3.2 Breadth Requirements

3.2.1 Breadth Requirements for Spatial Information Science and Engineering Graduate Degree Programs

The research-focused graduate degrees of *Master of Science: Spatial Information Science and Engineering* and *PhD: Spatial Information Science and Engineering* require that students take a breadth of coursework. Requiring students to take graduate courses across a range of topics is used to ensure that students have a comprehensive understanding of core information in the field and this requirement is used as a substitute for the comprehensive examination that many

institutions require prior to allowing MS and PhD students to move further in the graduate program.

The university catalog specifies the number and categories of breadth courses that must be met. See <http://gradcatalog.umaine.edu/> > choose current graduate catalog in pull down menu > choose *Graduate Programs, Certifications, Specializations* in left menu > choose *Spatial Information Science & Engineering* > consult either Master of Science or Doctor of Philosophy in Spatial Information Science and Engineering as appropriate.

The graduate courses actually meeting specified course breadth categories are set forth in the Annual Schedule of Classes. See Section 4 of this Graduate Student Guide.

Only those graduate courses listed as meeting a breadth area count towards the fulfillment of a breadth area. If equivalent graduate courses were taken elsewhere, the candidate can file a *Petition for Waiver of Breadth Requirement* form. The Breadth Area Coordinator evaluates the request and, if approved, signs the waiver form. Breadth Area Coordinators are:

- formal representations of spatial phenomena (Formal): Torsten Hahmann
- spatial cognition and computing (Cognition): Reinhard Moratz
- database systems (Database): Silvia Nittel
- geographic information systems (GIS): Kate Beard
- information law and policy (Law): Harlan Onsrud

3.3 Course Registration

Full-time registration for a graduate student is defined as *six or more degree hours per semester*. Doctoral students who have been admitted to candidacy and students in their final semester of study may maintain full-time enrollment status by registering for a minimum of one credit. All registration forms *must be signed by the student's adviser and must be delivered to the Administrative Support Supervisor (i.e. Karen Kidder) for the School of Computing and Information Science*, who will enter the registration. Graduate students who are on a research assistantship during the summer, must register for one credit.

4. Annual Schedule for SIE and MSIS Graduate Courses

The tables that follow are for primary courses offered in the *Spatial Information Science and Engineering* and *Information Systems* programs in the School of Computing and Information Science. The tables are a working schedule only. Use this schedule for planning purposes. Exceptions almost always apply so please check the official online University of Maine graduate course schedule each semester in MaineStreet.

Courses shown in blue are offered on campus but also *on-line asynchronously*. Typically distance students view the recorded class videos on their own schedule (a) prior to an online live discussion each week with the instructor and (b) prior to the assignment(s) due for that week.

Some instructors allow distance students to attend lecture sessions as well on-line live (i.e. synchronously). Some instructors may allow distance students to attend lectures [synchronously](#).

FALL SEMESTER 2018-2019							
Course	Credits	Instructor	Prereq	Required Courses			Breadth Designator – applies to SIE grad programs
				MS-SIE (Project)	MS-SIE (Thesis) PhD-SIE	MS-IS & MS-SI	
SIE 502 - Research Methods	1	Egenhofer	SIE 501		x		
SIE 505 - Formal Foundations for Information Science	3	Hahmann				x	Formal
SIE 507 - Information Systems Programming	3	Ranasinghe		x	x	x	
SIE 509 - Principles of GIS	3	Holden/ Beard					
SIE 512 - Spatial Analysis	3	Beard	statistics				GIS
SIE 516 - Virtual Reality Research and Applications	3	Giudice					Cognition
SIE 550 - Design of Information Systems	3	Egenhofer				x	Database
SIE 558 – Real-time Sensor Data Streams (2017 & alternate years)	3	Nittel	SIE 507 SIE 555				Database
SIE 559 - GeoSensor Networks (2018 & alternate years)	3	Nittel	SIE 507 or perm				
SIE 589 - Graduate Project	3	All		x			
SIE 590 - Information Systems Internship	3	Onsrud					
SIE 699 - Graduate Thesis	≥1	All			x		
INT 601 - Responsible Conduct of Research	1 x 3	Onsrud		x	x		
COS 490 Computers, Ethics and Society	3	Onsrud					

SPRING SEMESTER 2018-2019							
Course	Credits	Instructor	Prereq	Required Courses*			Breadth Designator – applies to SIE grad programs
				MS-SIE (Project)	MS-SIE (Thesis) PhD-SIE	MS-IS & MS-SI	
SIE 501 - Introduction to Graduate Research	1	Egenhofer			x		
SIE 503 – Principles of Experimental Design	3	Giudice					
SIE 510 - GIS Applications	3	Beard	SIE 509				GIS
SIE 515 - Human Computer Interaction	3	Giudice				x	Cognition
SIE 525 - Information Systems Law (on sabbatical)	3	Onsrud				x	Law
SIE 554 - Spatial Reasoning	3	Egenhofer	SIE 550				Formal
SIE 555 - Spatial Database Systems	3	Nittel	SIE 550				Database
SIE 557 – Database System Applications		Nittel	SIE 507				
SIE xxx- title (2018/19 & alternate yrs)	3	Ramasinghe					Cognition?
SIE xxx- title (2019/20 & alternate yrs)	3	Ramasinghe					Cognition?
SIE 589 - Graduate Project	3	All		x			
SIE 590 - Information Systems Internship	3	Beard					
SIE 598 – Formal Ontology	3	Hahmann					Formal
SIE 693 - Graduate Seminar	1	Egenhofer	SIE 502		x		
SIE 699 - Graduate Thesis	≥1	All			x		
INT 601 - Responsible Conduct of Research	1	Onsrud		x	x		

NOTES:

1. **Research Methods Course Series:** The required series of three 1-credit research courses for MSSIE (thesis) and PhD-SIE students proceeds as follows: *Year 1* (Spring Semester: SIE 501), *Year 2* (Fall Semester: SIE 502, Spring Semester: SIE 693). SIE 503 is often required additionally on the *Program of Study* for students that will be engaged in research involving experimental design and is recommended for all graduate students.

2. Minimum Programming Requirement: All students in all degrees must take SIE 507 in Python programming unless they already have significant Python or Java experience and obtain a waiver from the instructor. In the event of a waiver, another SIE course will be included on the student's program of study. The key goal of the beginners programming course is to get students started successfully to independently write programs. After students learn the fundamentals of programming in the context of a positive experience, they should be able to quickly learn other programming languages in the future either on their own or in other courses.

3. Breadth Areas and Requirements

The five breadth areas are:

- formal representations of spatial phenomena (Formal)
- spatial cognition and computing (Cognition)
- database systems (Database)
- geographic information systems (GIS)
- information law and policy (Law)

The breadth requirements are:

- *MS-SIE (project)* - one course each from four out of the five breadth areas
- *MS-SIE (thesis)* - one course each from three out of the five breadth areas
- *PhD-SIE* - one course each from four out of the five breadth areas
- *MS-IS* – there are NO breadth requirements
- *MS-SI* – there are NO breadth requirements

4. Proposed Courses: Proposed courses are offered first as SIE 598 courses. Planned future designator numbers for planned 598 courses are:

SIE 508 - Readings in GIScience (3 cr, alternate years upon demand)

SIE 517 - Readings in Spatial Learning & Navigation I (1 cr)

SIE 518 - Readings in Spatial Learning & Navigation II (1 cr)

5. Responsible Conduct of Research and Intellectual Property

5.1 Conduct in Accomplishing Research

Responsible conduct in the accomplishment of research is expected of all students, researchers and faculty. The required academic course of *INT 601 Responsible Conduct of Research* should be taken early in the graduate program of all students engaged in research.

Among important documents with which all researchers should be familiar include:

University of Maine Student Handbook <http://www.umaine.edu/handbook/>

UMS Student Conduct Code <http://www.maine.edu/pdf/conductcode.pdf>

UMaine Policy & Procedures on Alleged Misconduct in Research and other Scholarly Activities <https://umaine.edu/research-compliance/research-misconduct/>

UMaine Policies & Procedures for Financial Disclosures and Conflicts of Interest in Extramurally Sponsored Activities (PDF) <https://umaine.edu/research-compliance/financial-conflict-of-interest/>

Research Compliance: Protection of Human Subjects of Research
<https://umaine.edu/research-compliance/human-subjects/>

5.2 Intellectual Property Considerations

How rights in the work products of scholarly effort and research are distributed is set forth in the ***UMS Full Statement of Policy Governing Patents and Copyrights***
<http://www.maine.edu/pdf/intprop.pdf>

Note that the official policy is to encourage faculty and students to make their works accessible as possible by licensing articles and other works under an open access license whenever feasible. (Example: [Creative Commons Attribution 4.0 International License](#)). Students should also be aware that making your thesis or dissertation openly accessible in digital form through Fogler Library is a condition of graduation for students in the School of Computing and Information Science.

6. Thesis and Research Process

6.1 Review of Progress on Research Work

The advisor and the student's graduate committee are responsible for determining whether the graduate student meets the requirements for passing a thesis or dissertation.

It is highly recommended that thesis advisors and committee members take a proactive role in monitoring each graduate student's research progress in order to determine whether a student is on track within his or her program, to highlight exceptional accomplishments, to steer students, and in case of repeated deficiencies to recommend withdrawal from the graduate program.

6.2 Master's Degree Thesis Process (MS-SIE)

A thesis is required for the degree of Master of Science in Spatial Information Science and Engineering in the School of Computing and Information Science (thesis option). An initial thesis topic is indicated on the Program of Study, but the topic is likely to evolve or alter as the topic and alternative topics are explored.

A Master's thesis is a major written work resulting from comprehensive investigation and independent analysis of a topic germane to the specialized field of study. The goal of the thesis should be to extensively study a specific knowledge domain or phenomenon and provide significant incremental contribution of new knowledge to the field or produce a new interpretation of existing data or information.

Rules for thesis preparation are outlined in *Guidelines for Thesis Preparation*, which is available from the Graduate School. It is the student's responsibility to be familiar with the format(s) acceptable to the Graduate School.

6.2.1 Thesis and Oral Exam Requirements imposed by the School of Computing and Information Science Faculty

The student should consult with and work with his or her major advisor in writing the thesis. The student should feel free to consult with committee members and other faculty members as their research and writing progresses. After all segments of the thesis have been completed and revised to the substantial satisfaction of the student's major advisor, the draft thesis with an accompanying cover letter from the major advisor is delivered to all members of the committee. ***This complete thesis document must be in the hands of all committee members at least four weeks prior to any tentative final oral exam date.*** During the first two weeks of this period the committee must determine whether the thesis is sufficiently developed to allow an oral defense to be scheduled. Presuming that the scheduling of an oral defense date is allowed by the committee, written comments regarding the thesis will be forwarded by committee members to the student's advisor at any time up to and through the date of the oral defense.

A Master's degree thesis defense begins with an oral presentation by the student, which is advertised and open to the University community at large. This is followed by a closed session in which the student is expected to respond to additional questions and comments by the advisory committee members. Recording of the oral thesis or dissertation presentation is permitted with the explicit permission of the candidate and the advisory committee but must be limited to the duration of the candidate's presentation and should exclude the subsequent question-and-answer period and the following closed session with the advisory committee members. Students should allow ample time after their thesis defense to address or accommodate the comments of committee members.

6.2.2 Graduate School Thesis Requirements

At the beginning of the semester in which the graduate student plans to graduate, the student should download and follow the **Checklist for Graduate Degrees** acquired from the Graduate School (Student Center > Self Service > Degree Progress/Graduation > Apply for Graduation). Deadlines are set forth in the checklist for the application for graduation, notice of oral examination, signed tentative thesis acceptance form, final date for oral examination, signed final thesis acceptance form and similar requirements. It is highly recommended that each student should go through the forms with the School of Computing and Information Science Administrative Support Supervisor near the beginning of the semester in which the student intends to graduate to ensure that all requirements will be met.

A draft of the thesis, in a form acceptable for examination purposes, must be delivered to the Graduate School **at least 5 business days prior to the final oral examination**. A completed and signed *Tentative Thesis Acceptance Form* must accompany the thesis at this time.

After the oral exam and after corrections have been made and approved by all committee members and the thesis is in final form, the student needs to complete a *Final Thesis Acceptance Form*. This form must be submitted to the Graduate School with the final thesis before graduation.

6.3 Ph.D. Dissertation Process

6.3.1 Proposal Defense

A proposal defense is taken after the student has completed the course work listed on the approved Program of Study, and the thesis topic has been developed sufficiently to assess its value and to provide guidance for the doctoral student. The examination is given to determine whether the student's topic and methods are suitable and progress is satisfactory. The proposal defense tests the student's dissertation topic and related knowledge through oral and/or written examinations.

Prior to the proposal defense process, the student must prepare a dissertation proposal. The proposal should take the form required by the graduate advisory committee but typically the proposal will have the structure of the proposed thesis. A comprehensive initial bibliography is an integral part of the dissertation proposal.

The dissertation proposal will be completed and revised to the substantial satisfaction of the student's major advisor. The proposal and a cover letter from the major advisor are then delivered to all members of the committee. The graduate advisory committee members must be given a minimum of **two weeks** to determine whether the dissertation topic is sufficiently developed to allow the proposal defense process to commence. Presuming that the committee members agree that the topic is sufficiently developed to warrant defense, the proposal defense may be scheduled.

In conjunction with or prior to the oral proposal defense process, the student is expected to circulate to his or her committee course work accomplishments detailing courses completed and grades received as set forth on the completed Program of Study. A presentation is made by the candidate that reviews the proposed research goals and proposed methods to be pursued. The primary goal of the defense is to address the comments, questions, and concerns of the graduate advisory committee members. Recommendations regarding further examination requirements by advisory committee members will be delivered to the major advisor within a week after this defense. These recommendations may include revisions to the course work plan, revisions to the thesis focus, revisions to the committee membership, and similar matters.

After all required proposal defense requirements have been completed successfully, the major advisor will ensure that the *Admission to Candidacy Form* is filed with the Graduate School.

If a student is initially admitted to the PhD program without a master's degree or with a master's degree in an unrelated area and if the student completes all required courses for the doctoral program and successfully defends the proposal topic for the PhD, then the PhD proposal defense may be accepted by the PhD advisory committee as the project for a project-based masters degree.

6.3.2 Dissertation

The doctoral dissertation must demonstrate the candidate's mastery of the area of research, and must embody the results of an original investigation in the chosen field of study. It must give evidence of an exhaustive study of a spatial information science and engineering topic and must

be an authoritative statement of new knowledge on the subject or produce a new interpretation by rearrangement or re-analysis of existing data. The work must be a definite contribution to new knowledge of sufficient importance to warrant its publication.

Rules for preparing the dissertation are outlined in *Guidelines for Thesis Preparation*, which is available from the Graduate School. It is the student's responsibility to be familiar with the format(s) acceptable to the Graduate School. Reference books on writing a thesis or dissertation might also be consulted.

Articles in lieu of a Traditional PhD Dissertation:

In lieu of the traditional form of a dissertation, the graduate committee of a PhD candidate in the School of Computing and Information Science may approve a dissertation to take the form of a progression of three or more refereed articles in outlets approved by the committee. The candidate must be sole or lead author of any included article, the articles should be inserted in the dissertation with the final wording and figures in which they have been or will be published, the dissertation should include introduction and conclusion chapters explaining ties among the articles and the research progression and the candidate must ensure legal clearance for the articles prior to submission to publishers to ensure that the dissertation may be included in the University's open access digital thesis repository. The committee may choose to require acceptance for publication of one of the papers prior to defense of the dissertation proposal and admission to Candidacy.

Requirements imposed by the School of Computing and Information Science Faculty:

The student will consult and work with his or her major advisor in writing the thesis. The student should feel free to consult with committee members and other faculty members as the research and writing progress. After all segments of the thesis have been completed and revised to the substantial satisfaction of the student's major advisor, the draft thesis with an accompanying cover letter from the major advisor is delivered to all members of the committee. This completed draft document must be in the hands of all committee members **at least four weeks** prior to any tentative final oral exam date. During the first three weeks of this period the committee must determine whether the thesis is sufficiently developed to allow an oral defense to be scheduled. Presuming that scheduling of an oral defense date is allowed by the committee, written comments regarding the dissertation will be forwarded by committee members to the student's advisor at any time up to and through the date of the oral defense.

One month before the date that the candidate intends to submit the dissertation to his or her committee, it is highly recommended that the thesis advisor selects a faculty from another university as **external** examiner if there is no external graduate faculty member (GF-4) sitting on the committee. The external examiner should have no conflict of interest with the candidate or the advisor. Conflicts of interest include co-authorship, co-editorship, and joint research proposals (each over the last 48 months), as well as advisor-advisee relationships (lifetime). Upon submission of the thesis to the committee, the program Graduate Coordinator sends a copy of the thesis to the external examiner and requests a written evaluation to be returned within four weeks. The committee has a closed meeting at least one week prior to the scheduled defense to review any comments from the external examiner and to confirm the defense date.

A doctoral degree thesis defense begins with an oral presentation by the student, which is advertised and open to the University community at large. While this is a public forum, family members are generally discouraged from attending. This is followed by a closed session in which the student is expected to respond to additional questions and comments by the advisory committee members. Recording of the oral thesis or dissertation presentation is permitted but limited to the duration of the candidate's presentation and excludes the subsequent question-and-answer period and the following closed session with the advisory committee members. Students should also allow ample time after their thesis defense to address or accommodate the comments of committee members.

Graduate School Thesis Requirements:

At the beginning of the semester in which the graduate student plans to graduate, the student should download and follow the **Checklist for Graduate Degrees** acquired from the Graduate School (Student Center > Self Service > Degree Progress/Graduation > Apply for Graduation). Deadlines are set forth in the checklist for the application for graduation, notice of oral examination, signed tentative thesis acceptance form, final date for oral examination, signed final thesis acceptance form and similar requirements. It is highly recommended that each student should go through the forms with the School of Computing and Information Science Administrative Support Supervisor near the beginning of the semester in which the student intends to graduate to ensure that all requirements will be met.

A draft of the thesis, in a form acceptable for examination purposes, must be delivered to the Graduate School **at least 5 business days prior to the final oral examination**. A completed and signed *Tentative Thesis Acceptance Form* must accompany the thesis at this time.

After the oral exam and after corrections have been made and approved by all committee members and the thesis is in final form, the student needs to complete a *Final Thesis Acceptance Form*. This form must be submitted to the Graduate School with the final thesis before graduation.

7. Application for Graduation

Graduation is not automatic upon completion of all program requirements. Candidates for degrees must submit an *Application for Degree Form* to the Office of Student Records according to the following schedule:

By November 15, for degrees to be awarded in December

By March 15, for degrees to be awarded in May

By March 15, for degrees to be awarded in August, if candidates are planning to attend the May graduation ceremony

By July 15, for degrees to be awarded in August