



MARQUETTE
UNIVERSITY

HELEN WAY KLINGLER
COLLEGE OF ARTS AND SCIENCES

**COMPUTATIONAL MATHEMATICAL
AND STATISTICAL SCIENCES
PROGRAM HANDBOOK
2024-2025**

Department of Mathematical and Statistical Sciences

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Introduction

This informal Handbook has been prepared to answer many of the questions new and continuing graduate students may have regarding the various rules, regulations, and expectations relative to their academic program. Not all questions of every graduate student can be answered here and, indeed, one purpose of this Handbook is to encourage students to ask questions early and often. Be sure to consult your graduate program's entry and the Graduate School policies section in the most recent Graduate Bulletin, as well as note the various deadlines in the Graduate School's Academic Calendar¹. In addition, ask your fellow graduate students, your professors, the director of your graduate program, or the Chairperson of the MSSC Graduate Committee.

In summary, each year you should familiarize yourself with your graduate program's entry in the Graduate Bulletin, the various Graduate School Academic Calendar deadlines, and if you are in the Computational Mathematical and Statistical Sciences program, the contents of this Handbook.

The Graduate Committee

Activities and Responsibilities

The Department of Mathematical and Statistical Sciences (MSSC) Graduate Committee consists of its Chairperson and at least three other MSSC faculty members. This committee is responsible for oversight of all graduate programs in the Department. The Committee evaluates applications and makes recommendations pertaining to the admission of new students in the department's graduate programs. The MSSC Graduate Committee advises the Graduate School as to which individuals should be awarded university-funded Teaching Assistantships (TA), Research Assistantships (RA), or Tuition Scholarships (TS). The MSSC Graduate Committee assigns to incoming graduate students a faculty advisor who, in consultation with the Graduate Committee, must **approve the student's course of graduate study**. The Graduate Committee supervises the construction, administration, and evaluation of its graduate program examinations. The Committee is responsible for reviewing the academic performance of each graduate student in all the Department's programs at the end of each semester. Current membership of the Committee is always available in the Department Main Office. The Committee often delegates some duties to the various faculty members who are the directors of graduate studies (DGS) for MSSC graduate programs.

The MSSC Graduate Programs

Degrees Offered

The Department of Mathematical and Statistical Sciences offers a wide range of graduate programs in accord with the breadth of the disciplines it encompasses. The Department offers both the Master of Science (M.S.) and the Doctor of Philosophy (Ph.D.) degrees. The

¹ <https://www.marquette.edu/mathematical-and-statistical-sciences/graduate-program-overview.php> (MSSC programs)
<http://bulletin.marquette.edu/grad/policiesofthegraduateschool/> (overall academic policies) and
<https://www.marquette.edu/central/registrar/calendars-exams-schedules.php>, last accessed May 6, 2024.

M.S. degree may be pursued through several avenues: Applied Statistics (APST), Computational Mathematical and Statistical Sciences (CMPS), or Mathematics for Secondary School Teachers (MSST). The MSSC Department offers jointly with the Department of Biology and the Medical College of Wisconsin, the M.S. degree in Bioinformatics (BIIN). The Ph.D. is offered in Computational Mathematical and Statistical Sciences. The Ph.D. in Computational Mathematical and Statistical Sciences spans the entire breadth of the department's research interest, as well as potentially other application areas. Whenever discussing the M.S. degree, this Handbook will address the Computational Mathematical and Statistical Sciences program. For information on the APST, BIIN, or MSST, please see their respective Graduate Bulletin listings.

Summary information for the Applied Statistics program is available online at <https://bulletin.marquette.edu/graduate/applied-statistics-ms/>, for the Bioinformatics Program, more information is available at <https://bulletin.marquette.edu/graduate/bioinformatics-ms/> and for Mathematics for Secondary School Teachers, MSST, consult <https://bulletin.marquette.edu/graduate/teacher-education-med/>.

Admission Requirements

Admission to the Computational Mathematical and Statistical Sciences Master's program requires an undergraduate degree in mathematics, statistics, or a related field such as engineering or an area of science, with at least a minor (3 courses beyond a full three-semester calculus sequence, preferably including linear algebra) in mathematics, and proficiency in a high-level computer language. In addition to the prerequisites for admission into the Master's program, admission to the doctoral program requires demonstrated promise for original research. Evidence for promise of original research might include, in addition to undergraduate or graduate records, copies of papers written, or projects submitted and evaluations of participation in undergraduate or graduate research programs. For those students entering the doctoral program from the Computational Mathematical and Statistical Sciences Master's program, the Master's thesis or essay will be considered as evidence of the ability to search for and synthesize source materials relative to the intended field of doctoral research. Successful completion of a Master's degree in no way guarantees admission into the doctoral program. A successful Master's student must reapply formally for admission to the doctoral program.

The Master's Program

This program is designed to accommodate the student seeking either a Master's or eventually a doctoral degree. Individuals in this program must complete a minimum of 30 semester credit hours. The program requires completion of the 15-semester credit hour Computational Mathematical and Statistical Sciences core, which consists of MSSC 6000, MSSC 6010, MSSC 6020, MSSC 6030, MSSC 6040, and one additional computational course approved by advisor. Only one credit of MSSC 6090 can count toward the minimum of 30 semester credit hours. For a complete list of the requirements, see the Graduate Bulletin.

Program Learning Outcomes

- Apply advanced concepts related to discipline coursework to solve theoretical or applied problems.
- Synthesize research publications in their area.
- Demonstrate communication skills appropriate for presenting research to peers and interdisciplinary colleagues.

Course of Study

In all of the Department's Master's programs, the student must follow a course of study prepared in cooperation with the student's advisor and approved by the Graduate Committee. For the Computational Mathematical and Statistical Sciences program, the Department Main Office has "Graduate Student Program" forms for internal departmental use. A copy of the Graduate Student Program form must be completed at the beginning of each Computational Mathematical and Statistical Sciences student's graduate study. The form is kept in the Department files and must be updated regularly, with the Graduate Committee's approval.

There are two Master's program study options: Plan A (Thesis) or Plan B (Essay). Under Plan A, a thesis, 6 semester credit hours of thesis credit, and 24 semester credit hours of coursework are required. At least 12 semester credit hours of the course work must be taken at the strictly graduate 6000, or higher, level. Under Plan B, 30 semester credit hours (usually 10 courses) and a non-credit essay are required. The Plan B essay should reflect the student's ability to synthesize source materials relating to a particular area of research or professional practice. An open-door oral presentation of the essay is required. Under Plan B, at least 15 of the 30 semester credit hours must be at the 6000, or higher, level.

Students will automatically enter under Plan B (Essay) and will need to negotiate with their advisors and the Graduate Committee if they wish to transfer to Plan A (Thesis). This transfer is accomplished by completing the plan form available in the Graduate School and obtaining the required signatures of approval.

Master's Thesis (Plan A)

The thesis must be an original contribution to the discipline for which six hours of credit are awarded. The student in due time (normally at the end of the student's second or the beginning of their third semester of study) should ask a faculty member to serve as thesis advisor. The thesis advisor need not be the student's academic advisor. After adequate planning, the student should submit the outline of the thesis form, available from the website <https://www.marquette.edu/grad/forms.php>. This form will be routed to the thesis advisor for approval it, then to the Graduate Committee Chairperson and the Dean of Graduate School. The Graduate School office will inform the student that the outline has been fully approved, and a thesis committee appointed. After submitting the outline and obtaining approvals, the student registers for thesis credit at the next registration period². Details concerning thesis

² MSSC 6999. Master's Thesis. 1-6 cr. hrs. S/U grade assessment. Prereq: Cons. of dept. ch.

format requirements and deadlines are available in the forms section of the Graduate School website and the Graduate School's Academic Calendar³, respectively. Before the thesis is in final form, it must be submitted in a readable form to all members of the thesis committee for their constructive criticism several weeks before the defense. A thesis must be original work (i.e., **free of plagiarism; plagiarism includes submitting as one's own the ideas or work of another, regardless of whether that information is used verbatim or in paraphrased form**).

After a successful public thesis defense and any required changes are made, an electronic copy of the completed Master's thesis must be submitted online, on or before the deadline listed in the Academic Calendar. Although the student holds the copyright of the thesis, the thesis is considered a public document by Marquette University and may be placed in the Marquette University library, used by students and faculty, or otherwise released to the public. *Thesis Directives*, found at

<https://www.marquette.edu/grad/forms.php>

should be used as a guide. Advice: As you read the professional, peer-reviewed published literature in your research field, look carefully at the manuscript organization, overall formatting, the formatting of tables, formatting of figures, the use of legends, the formatting of graphs, citation style, word choice, *etc.*, of high-quality published papers. These papers act as a guide on how YOU should write *professional* prose, e.g., your Master's thesis.

Master's Essay (Plan B)

In the second year of Master's study, the student should select a topic of interest and ask a faculty member to serve as their essay advisor. The essay advisor need not be the student's academic advisor. The student and the essay advisor should agree upon a time frame so that the essay can be submitted to the advisor well in advance of the Graduate School deadline for submission (consult the Graduate School Bulletin!), allowing time for corrections and/or revisions. The essay should be approximately 25-30 typed pages long. The essay must be well written, free of spelling and grammatical errors, with carefully drawn illustrations (where appropriate). The level of presentation should be accessible to other graduate students in the subject area. The essay may, but need not, incorporate original research (i.e., your own new results). It must, however, synthesize the results of the current literature (at least 5 sources) in its subject area, and it must be original work (i.e., **free of plagiarism; plagiarism includes submitting as one's own the ideas or work of another, regardless of whether that information is used verbatim or in paraphrased form**). Essays must be acceptable to the department in style and composition. Formatting of essays is at the discretion of the department. *Thesis Directives*, found at <https://www.marquette.edu/grad/forms.php>, may be used as a guide. Citation of articles and

³ See "Master's program forms and directions", "Thesis Directives" via <http://www.marquette.edu/grad/forms.php> and the Graduate School Academic Calendar which is available as a hyperlink under <https://www.marquette.edu/central/registrar/calendars-exams-schedules.php>

books and other matters of style should conform to a style consistent with publications in the area of the essay. Advice: As you read the professional, peer-reviewed published literature in your research field, look carefully at the manuscript organization, overall formatting, the formatting of tables, formatting of figures, the use of legends, the formatting of graphs, citation style, word choice, *etc.*, of high-quality published papers. These papers act as a guide on how YOU should write *professional* prose, e.g., your Master's essay.

Graduation

In the semester that the student anticipates graduating, the student must file for graduation through Checkmarq ahead of the date listed in the Academic Calendar. In addition, the student must submit a "Master's Program Planning Form" and "Outline Form" as found at <https://www.marquette.edu/grad/forms.php>. These forms must be submitted with all signatures before the calendar deadline. The student must also advertise their thesis or essay at least two weeks prior to the defense/presentation through the Department office. Before the essay is in its final form, it must be submitted in a readable form to all members of the essay committee for their constructive criticism several weeks before the presentation.

After a successful presentation of the essay and the essay committee approves the final version of the essay, the student must submit the "Essay Approval Form" also found on the Graduate School Forms page. The final approved PDF of the thesis/essay is uploaded with the Approval form at the time of submission. The Program Planning, Outline, and Approval forms will be routed to the necessary persons for signature. The student must obtain all appropriate signatures and the form must be submitted to the Graduate School office on or before the date listed in the Academic Calendar. Failure to adhere to any of the deadlines will prevent the student from graduating in that semester. The university and the department will retain final approved copies of Theses and Essays for use by the public as reference or instructional materials.

The Doctoral Program

The Ph.D. Degree

The degree of Doctor of Philosophy in Computational Mathematical and Statistical Sciences is conferred upon recognition that a significant original research project has been successfully completed. The major criterion for deciding whether a candidate's research merits the Ph.D. degree is the judgment that all or part of the doctoral dissertation would be acceptable for publication as an original research article by a respected journal in the dissertation's area of research.

Program Learning Outcomes

- Modify, adapt, or construct methods, techniques, and software for addressing significant problems in the field of Computational Mathematical and Statistical Sciences.
- Conduct original research that results in a major written scholarly work in the Computational Mathematical and Statistical Sciences. Synthesize research publications in their area of specialization.

- Demonstrate communication skills appropriate for presenting research to peers, teaching college-level courses, or collaborating with interdisciplinary colleagues.

Residency Requirement

The Graduate School's residency requirement is designed to immerse doctoral students in the campus community of scholars. The residency requirement must be satisfied in the department in which the student is seeking a doctoral degree. The residency requirement is met when a student completes nine credits of coursework, or its equivalent per term, for two terms within an 18-month period, or alternatively, completes at least six credits of coursework, or its equivalent per term, for three terms within an 18-month period. Plans for the residency must be included on the *Doctoral Program Planning Form* (see below). The credit load necessary to meet the six- or nine-credit requirement may be met by coursework alone or coursework in conjunction with dissertation credits (departmental seminars or faculty-directed independent study courses may also be employed to satisfy the coursework requirement).

Career Skills Requirements

Students beginning their Ph.D. programs in Fall 2024 and beyond at Marquette must complete three career skills requirements. Requirements are satisfied by one or more of approved courses, workshops, or practical experiences in each category, as approved by the Graduate School. Completion of the following skills will be noted on the student's transcript.

1. Career Discernment: Students will be able to identify and prepare for career pathways that are consistent with their values.
2. Communication: Students will be able to communicate their ideas and scholarship effectively to audiences beyond those in their discipline.
3. Diversity, Equity, and Inclusion: Students will understand the importance of and how issues of diversity, equity, and inclusivity are relevant to their career pathways.

See <https://www.marquette.edu/grad/career-skills-phd-core.php> for more details.

Course of Study

On entering the program, each student is assigned an academic advisor by the Graduate Committee and, with the advisor's assistance, must prepare a plan of study for his/her first two years. The initial academic advisor is not necessarily the student's dissertation advisor. The two-year plan of study is recorded on the Department's "Informal Computational Mathematical and Statistical Sciences Program Planning Form," available from the Department's Main Office, a copy of the form is also included in this Handbook's Appendix. The plan of study is to guide the student's program through the completion of the Comprehensive Examination before they determine their dissertation advisor and the remainder of the requirements for their degree.

After successful completion of the Comprehensive Examination, a doctoral student must submit to the Graduate School paperwork that commits their formal program of study. This

formal program of study should be defined, in cooperation with an advisor, and submitted via the Graduate School's *Doctoral Program Planning* Form. The formal program of study first requires approval by the department's Graduate Committee and is then submitted to the Graduate School for approval. The total program, exclusive of 12 dissertation semester credit hours, will contain a minimum of 45 semester credit hours of approved course work beyond the bachelor's degree, including the 15-credit Computational Mathematical and Statistical Sciences core, which consists of MSSC 6000, MSSC 6010-MSSC 6040, and 2 credits of MSSC 6090, Research Methods/Professional Development, and one additional computational course approved by the advisor and graduate chair. Note: There are two different versions of MSSC 6090, **approved programs of study are to include the two different MSSC 6090 offerings**. Approved doctoral programs of study will normally include 6 semester credit hours of coursework outside the department and no more than 12 credits in 5000-level courses. No more than 9 credits of 6995/8995 independent study may be counted in the 45 credit hours of approved coursework. Twelve hours of dissertation credits (MSSC 8999) are also required beyond the 45 credit hours.

The Doctoral Committee

The student's Doctoral Committee is formed as soon as possible after successful completion of the basic course work and the Comprehensive Examination; by which time the student should be sure as to the area in which he/she will do research. It will be the student's responsibility to choose, with the advisor's help and the guidance of the Graduate Committee, the potential members of the Doctoral Committee. The dissertation advisor will normally be a faculty member with a majority appointment in MSSC.

For students admitted into the Computational Sciences (CMPS) doctoral program under MSCS: Dissertation Committees must have at least four members, including at least three MSSC faculty or COSC faculty that used to be MSCS faculty. With encouragement to have the committee broadly represent MSCS disciplines. For students admitted into the Computational Mathematical and Statistical Sciences (CMPS) doctoral program under MSSC: Dissertation Committees must have at least four members, including at least three of which have majority appointments in MSSC. With encouragement to have the committee broadly represent MSSC disciplines. The dissertation committee chair is one of the "at least three" faculty.

It is common for a Doctoral Committee to have at least one faculty member from another Marquette department or, in some instances, a faculty member at an institution other than Marquette University. Participating faculty from outside the Department may also serve on the committee, and, in some rare cases, direct dissertations. The Doctoral Committee is submitted to and appointed by the Graduate Committee Chairperson but is formally appointed by the Chairperson of the Department after consultation with the Graduate and Executive Committees. The Doctoral Committee is a departmental body whose members will normally serve as the student's Qualifying Examination Committee and Dissertation Committee as well as conduct the student's Defense of Dissertation, all on behalf of the Graduate School. The Chairperson of the Doctoral Committee normally serves as the student's Dissertation Advisor.

Language Requirements

No foreign language is required by the program.

Examinations

Comprehensive Examination

This is a written examination based on the Computational Mathematical and Statistical Sciences core. It is to test the student's ability to integrate the core material, solve problems of some difficulty, and demonstrate a readiness for doctoral research. This examination is given by the Graduate Committee every August and may be offered again in January.

Qualifying Examination

This is an oral examination, administered by the student's Doctoral Committee. The Qualifying Examination is used to determine whether the student is adequately prepared to begin research for the dissertation. Questions in the Qualifying Examination may be wide-ranging, dealing with topics of general background and background in the intended field of study. Most of the examination, however, will center on a dissertation proposal – an outline of proposed dissertation research. It is common for the committee to expect an in-progress draft of the dissertation prior to the qualifying exam.

Advancement to Candidacy

Advancement to candidacy for the doctoral degree is considered only after successful completion of the Comprehensive Examination, completion of all course work and residency specified in the Doctoral Program Planning Form, and successful completion of the Qualifying Examination.

Defense of Dissertation (Final Oral Examination)

When the student approaches the completion of his/her dissertation, arrangements should be made for an oral dissertation defense. An official program announcing the defense is then prepared by the student and the department and published by the Graduate School. The proposed program must be submitted to the Graduate School at least two weeks before the date of the defense. The defense of the dissertation will be conducted by the Dissertation Committee, but at minimum be conducted by at least four qualified faculty members, at least three of whom are on the candidate's Doctoral Committee and in the MSSC Department. A successful defense of the dissertation constitutes the final requirement for a doctoral degree and makes the candidate eligible for the official conferral of the degree upon successful submission of the written dissertation.

Formal Deadlines

Students intending to pursue a Ph.D. are expected to complete the following requirements within the stipulated period:

Comprehensive Examinations

A full-time doctoral student must complete the core courses within the first two years of study while a part-time student must complete them within the first three years of study. The comprehensive examination consists of three parts: (i) MSSC 6000, (ii) MSSC 6010 & MSSC 6020, and (iii) MSSC 6030 & MSSC 6040. All Ph.D. students are required to attempt at least two parts of the exam on their first try. Full-time students in the doctoral program must attempt each part of the comprehensive examination no later than the Fall offering before their third year of beginning their graduate studies in this department, while part-time students must attempt each part no later than the Fall offering before their fourth year. A student who completes the core courses before two years or has credit transferred for them must take each part of the comprehensive exam at the first offering after completion or awarding of core course credit. If unsuccessful in the first attempt, a student may sit for each part of this exam one additional time at the next offering.

Doctoral Committee

All students must submit at least four names, including at least three of which that have majority appointments in MSSC (including the advisor), of the proposed members of the Doctoral Committee on the form in the Appendix to the Chairperson of the Graduate Committee within one semester of completion of the Comprehensive Examination.

Doctoral Planning

All students must submit the Doctoral Program Planning Form to the Graduate School, with a copy provided to the Chair of the Graduate Committee, within one month of approval of the Doctoral Committee.

Qualifying Examination

All students must attempt the Qualifying Examination within one year of completion of the Comprehensive Examination. Students are urged to consult the Doctoral Committee at the time of its formation and thereafter, to ascertain the Committee's expectations for that examination.

Failure to meet any of these deadlines can result in the suspension of financial aid and/or removal from the program, except in extenuating circumstances. Students must submit a formal request to the Chair of the Graduate Committee at least 14 days in advance of any deadline for an exception. Student progress in satisfying these deadlines will be evaluated each semester in conjunction with the student's review by the Graduate Committee. Each semester the Graduate Committee will provide either a satisfactory or unsatisfactory evaluation of a student's progress. Upon an evaluation of unsatisfactory progress, a memo will be sent to the student and Research Advisor (or Graduate Chairperson) listing the reason for the unsatisfactory progress evaluation and steps to return to satisfactory progress. A first semester of unsatisfactory progress will serve as a warning. A student with unsatisfactory progress for a second semester may be placed on a waitlist for an assistantship.

The Ph.D. Dissertation

The dissertation is the primary degree requirement and must make a significant contribution to increase human knowledge. After advancement to candidacy, normally during the first semester in which dissertation credits are taken, the student must submit a dissertation outline to the dissertation advisor on the *Outline for Dissertation, Thesis, Professional Project, or Essay* form that is available on the Graduate School forms website⁴. If approved by the dissertation advisor, the outline will be submitted for approval to the Graduate Chair who on behalf of the Department Chairperson then forwards the outline to the Dean of the Graduate School. On this outline form is also a list of the members of the Dissertation Committee, which normally consists of the Doctoral Committee. If the outline is approved by the Dean of the Graduate School, it will be returned to the Chairperson of the Doctoral Committee and the student will be informed by the Graduate School Office that it has been approved. When the student begins research for the dissertation, each member of the Doctoral Committee offers direction. Usually, however, the student works most closely with the dissertation advisor who, as such, normally serves as Chairperson of the Doctoral Committee. **The dissertation advisor and student should consider convening periodic meetings of the Doctoral Committee so that the student may brief them of their ongoing progress.** For dissertation deadlines, the student should consult the Graduate School Academic Calendar⁵ and the Chairperson of the Graduate Committee. For the required proper format of the Ph.D. dissertation as well as other requirements of the Graduate School relative to the submission of the dissertation, the dissertation defense program, the public defense of the dissertation, the final form for the dissertation, application for graduation, and electronic submission of the dissertation, the student should examine reasonably soon after his/her advancement to candidacy, the various Graduate School publications in the “Doctoral program forms and directions” area of the Graduate School forms website⁶

- Dissertation Directives
- Announcement for Public Defense of the Dissertation
- Dissertation Checklist
- Publishing Through MU’s Raynor Memorial Library

At the conclusion of the student’s work, the Dissertation Committee evaluates the dissertation, possibly seeking the opinion of specialists outside of the Department to assist in making a judgment. When the dissertation is approved by the Doctoral Committee, it is submitted to the Graduate School.

Dissertation Credits

Normally, students register for dissertation credits (MSSC 8999) after Advancement to Candidacy but not before passing the Comprehensive Examination. A student must register for a total of twelve dissertation credits; note: a student cannot register for more than twelve dissertation credits. A student may register for the twelve dissertation credits at one time or over several semesters before graduation.

⁴ <http://marquette.edu/grad/forms.php>, last accessed May 7, 2024.

⁵ The Graduate School Academic Calendar is available as a hyperlink under <https://www.marquette.edu/central/registrar/calendars-exams-schedules.php>

⁶ <http://marquette.edu/grad/forms.php>, last accessed May 7, 2024.

Course Load

Maximum Course Loads

A graduate student may register for no more than 13 credit hours during any one semester or 7 credit hours during an individual summer session, but no more than 13 credits for the entire summer term. The norm is 9 credits in an academic year semester.

Graduate Assistants

During the semesters their assistantships are in effect, Graduate Assistants may register for no more than 10 credits in a fall or spring semester and seven credits for each of the summer sessions (but no more than 13 credits for the entire summer term). Student award letters state the maximum number of credits which may be paid for in a particular semester by the tuition scholarship, if any, that is included with the assistantship.

Full-time Status

A student taking 7 semester credit hours of coursework or registered for full-time continuous enrollment is considered a full-time student. Note that audits are NOT counted in determining full-time or part-time status. A student, who must maintain full-time status, say for visa, scholarship, or loan requirements, needs to consider this fact before withdrawing from a course or switching to audit.

Academic Review

At the end of each semester, each student's progress is reviewed by the Graduate Committee and the Graduate School. Graduate students are expected to maintain a quality point average of at least 3.00. Doctoral students are also expected to strictly adhere to the deadlines for completion of examinations, *etc.* In addition, Graduate Assistants are reviewed on the basis of the performance of their duties - see the University Graduate Assistant Handbook. Unsatisfactory progress in one semester will result in a warning letter to the student and their advisor. Further unsatisfactory progress may result in being placed on a wait list for any department-recommended financial aid and potentially being dropped from the Graduate School.

Continuous Enrollment

All degree-seeking graduate students must be continuously enrolled each semester in the academic year, except summer sessions, in order to maintain graduate student status. Accordingly, all degree-seeking graduate students must enroll in either (1) advisor-approved course work, (2) thesis or dissertation credits, or (3) one of the continuation enrollment courses, as described in the Graduate Bulletin. Any student failing to be continuously enrolled in consecutive fall/spring semesters must petition for readmission upon return and is assessed a readmission fee and fees for each semester missed. See the Graduate School Bulletin for details.

Should a student need to interrupt their graduate studies, they should consult the Graduate Bulletin for guidance on requesting a leave of absence.

Time Limitations

A full-time student in the Computational Mathematical and Statistical Sciences program is expected to complete all requirements for a Master's degree in two years and a doctoral degree in five years. A student taking much longer than these expected degree completion times may be considered making less than satisfactory progress. The Graduate School has maximum time deadlines by which a student must complete all requirements for a Master's or doctoral degree. These deadlines are within six years (for a Master's degree) or within eight years (for a doctoral degree) of initial registration in the program. Applications for extension must be made to the Graduate School, with the cooperation of the Graduate Committee. The department does not normally support students on assistantships beyond their fifth year.

Teaching and Learning Seminar

All department graduate assistants are expected to attend this seminar; attendance is a condition of employment for TAs and RAs, unless waived. Topics related to teaching and/or the graduate program are investigated, with contributions from faculty and "senior" students. A student taking a full course load need not formally register for credit to attend the seminar. However, the seminar is a convenient way to maintain full-time status for those taking two courses only, either by registering for one credit or by attending as a condition of continuous enrollment. However, students may register for only one credit in any academic year. This seminar is offered every Fall semester.

Marquette–UWM and Marquette–Medical College of Wisconsin Course Work

Marquette University has agreements with both the University of Wisconsin–Milwaukee (UWM) and with the Medical College of Wisconsin (MCW) that enable graduate students to take courses at these institutions as part of their programs. The course being taken at the host institution must not be available at Marquette. *Normally*, no more than six credits taken at UWM or MCW can be counted toward degree completion at Marquette, unless the courses are taken as part of a joint program. Students must apply for admission to the host institution as a special student; the application fee is waived. A Marquette student must complete the appropriate registration form, found online on the [Graduate School forms website](#)⁷, then obtain their adviser's approval, and finally submit the completed form to the Graduate School. This will register the student for the course GRAD 6933 (UWM course) or GRAD 6945 (MCW course), both of which are variable title and variable credit courses that reflect the title and number of credits of the course at the host institution. The student must also register for the course at the host institution. Tuition is only paid at the home institution for the GRAD 6933 or GRAD 6945 course. Only degree-seeking graduate students in good standing are eligible to participate. This program is not intended for students in joint programs such as bioinformatics, biomedical engineering, and healthcare technologies

⁷ As of May 7, 2024, these forms are under the menu item "Registration: Courses Taken by Marquette Students for Marquette Credit at Other Institutions"

management, where the courses between Marquette and MCW are cross-listed. Note that UWM and MCW academic calendars are typically different from Marquette's academic calendar. *The student should be aware that UWM and MCW have registration deadlines that are different from Marquette's registration deadlines, a student should consult with their academic advisor far in advance of any one deadline and obtain the necessary approvals.*

The Faculty

As described in the preceding sections, each graduate student in the Master's program must choose a thesis advisor (Plan A) or an essay advisor (Plan B) who will supervise the student in the research and writing of the Master's thesis or Master's essay. Any faculty member may be approached with this request and the student must convince the faculty member to agree to it, **but the choice of the thesis or essay advisor must be approved by the Graduate Committee.** For those students who intend to continue beyond the Master's degree toward the Ph.D., it is strongly advised that the thesis or essay advisor be chosen from among those research-active faculty members who could also serve, in the future, as the Ph.D. dissertation advisor.

When the doctoral student is reasonably sure as to the area of his/her research activities he/she will choose, with his/her advisor's help and the assistance of the Graduate Committee, the potential members of his/her Doctoral Committee should be identified.

A list of MSSC faculty members, their research areas, and recent publications is available on the department website at www.mssc.mu.edu.

International Students

Students on Study Visas

Marquette's Office of International Education (OIE) is located on the fourth floor of Holthusen Hall on the Marquette University campus. The OIE's United States of America telephone number is 414-288-7289. Marquette's non-immigrant foreign-born students should report to OIE as soon as they arrive on campus. OIE is the main source of information and assistance for international students and, by stopping there first, the international student will save time and trouble settling into a routine at Marquette.

Immigration regulations continue to change. For up-to-date information, please consult with the Office of International Programs as well as routinely check your Marquette University email account for important messages!

Course Loads

Every international student admitted on a student visa must register for a full-time course load. A student taking seven credit hours, or registered for full-time continuous enrollment (see the Graduate Bulletin), is considered to be a full-time student. Note that audits are NOT counted in computing hours for full-time or part-time status.

Language Difficulties

International students in the MSSC Computational Mathematical and Statistical Sciences programs have presented a minimum language examination score, such as a TOEFL-iBT (Internet-based Test of English as a Foreign Language) score of at least 90. The Computational Mathematical and Statistical Sciences program's TOEFL-iBT threshold score is higher than the Marquette University Graduate School minimum for admission.

Presenting a TOEFL score above the admission threshold level does not necessarily indicate that the student has the required proficiency in the English language -- especially with respect to listening comprehension and speaking/pronunciation. Fluency in these areas is an absolute necessity, not only for the graduate student's academic success (our programs involve many courses, seminars, colloquia, and oral exams, in which participation involves, primarily, the spoken word) but also because the program requires significant written artifacts (a Master's thesis, Master's essay, or doctoral dissertation) that is verbally defended or presented. It is the graduate student's responsibility to correct any language deficiencies he or she may have. Here are some suggestions:

- a. All new international students' language skills should have been evaluated by the Office of International Education during the week of orientation. New foreign students should seriously consider taking one or more ESL (English as a Second Language) courses during the fall and spring semesters of their first year of study, even if this is not required.
- b. Check early and often with the Chairperson of the Graduate Committee concerning the development of English language skills. Seek his/her advice and assistance, as well as that of other professors and fellow graduate students.
- c. As a student, contribute to in-class discussions. Ask questions when you do not understand what the lecturer has said or when you would like clarification or further explanation. Answer questions addressed to you or the class by the instructor or by fellow students. Do not remain mute to avoid being embarrassed by less-than-perfect English. Your professors will be quite sympathetic to language problems; many have been in similar situations themselves in the past.
- d. Participate actively in the Teaching and Learning Seminar.
- e. Actively seek out other opportunities to practice English. For example, make it a habit to speak only using English while you are on-campus, and seek out other opportunities to practice speaking and listening to English, such as participating in Marquette's Toastmasters group, listening to English language news broadcasts, volunteering to present and answer questions on regular basis in a research group or a journal reading group, *etc.*

Academic Integrity/Honor Code

To remain a credible and viable institution, Marquette University must uphold the highest standards of personal conduct and professionalism. In particular, this means that from the outset, our graduate students are expected to adhere to a strict code of academic integrity⁸.

It is not feasible to enumerate all possible instances of academic dishonesty, but any such enumeration would include: inappropriate use of natural language processing tools, downloading code, solutions, or materials from the web and submitting them as your work, cheating on examinations or class projects in various ways, improperly obtaining examination questions, plagiarizing the work of others, forging signatures, falsifying records, and impersonating a candidate taking an examination. Each of these instances constitutes a conscious act of deception and may be penalized in many different ways, ranging from a failing grade on a particular examination or project to expulsion from the University. See also the Academic Integrity section of the Graduate Bulletin.

If you are uncertain as to what is proper and ethical in a particular situation, consult your advisor or the Chairperson of the MSSC Graduate Committee.

Miscellaneous

Housing

There is a limited number of one-bedroom and efficiency apartments available on campus. However, most graduate students live off-campus in private housing. Information about accommodations, both on and off campus can be obtained from the Office of Residence Life, M. Carpenter Tower, Room 203, 1032 W Wisconsin Ave, telephone number 414-288-7208.

Health

The Marquette University Medical Clinic, located in the southeast corner of the Schroeder Complex, telephone 414-288-7184, is available. Graduate students will be seen but are charged a fee for service although health insurance may cover part of this cost. However, the Marquette University Medical Clinic is unable to bill your insurance, you would need to do the submission to your insurance yourself. Graduate students may also pay the per-semester health fee anytime during the semester to access the Medical Clinic core services and obtain reduced pricing on non-core services⁹. Contact the Medical Clinic for more information. The Medical Clinic is equipped to diagnose and treat many outpatient conditions (please consult the “Services” area of their website). Students with medical problems requiring specialized care will be referred to appropriate resources.

Counseling

The Marquette University Counseling Center, on the second floor of Holthusen Hall, 1324 W. Wisconsin Avenue, telephone 414-288-7172, provides individual, group, and outreach

⁸ <https://bulletin.marquette.edu/policies/academic-integrity/>, last accessed May 7, 2024.

⁹ <http://www.marquette.edu/medical-clinic/fees.shtml>, last accessed May 7, 2024.

services to assist students with academic, career, personal, and interpersonal concerns. The Center is staffed by professional counselors, psychologists, a consulting psychiatrist, and trained, student paraprofessional program assistants. Counseling services are free of charge and strictly confidential.

Physical Recreation

Memberships in the Helfaer Tennis Stadium and Recreation Center (525 N. 16th Street, telephone 414-288-6976) and the Rec Plex (915 W. Wisconsin Avenue, telephone 414-288-7778) are available to graduate students and, for a fee, their families on a semester or yearly basis. The combined recreational facilities have indoor air-conditioned tennis courts, swimming pools, handball/racquetball courts, basketball courts, volleyball courts, squash court, badminton courts, fitness/weight rooms, pro shop, locker rooms, an outdoor recreation center (where you can rent camping equipment, skiing equipment, *etc.*), jogging lane, golf driving range, saunas, whirlpools, steam rooms, and a fitness assessment center. Many of our faculty members and graduate students use the Rec Center or Rec Plex. They are a great place to unwind.

Pi Mu Epsilon

This national mathematics honorary society consists of both graduate students and advanced undergraduates. Its purpose is to support and further the mathematical interests of its members by providing an informal atmosphere in which to get together and discuss ideas. Although there is a faculty advisor, Pi Mu Epsilon is strictly a student organization, and its activities are determined by its student members through their elected club officers. All MSSC graduate students are encouraged to join.

Association of Women in Mathematics (AWM)

The Association for Women in Mathematics was created to encourage women and girls to study and pursue careers in the mathematical sciences, promote equal opportunity and the equal treatment of women and girls in the mathematical sciences. See <https://awm-math.org/> for more details.

Colloquia

The Department supports a colloquium program that offers graduate students an excellent opportunity to get acquainted with various branches of Mathematical and Statistical Sciences at a research level. There is, on average, about one talk per week by an invited speaker and an effort is made to represent varied interests. In addition to its value as an intellectual stimulus, the speaker series also helps students meet distinguished scientists from various parts of the world in the informal gatherings associated with the visit. You are strongly encouraged to attend as many of these colloquia (and the pre-colloquium coffee hour and any post-colloquium functions) as possible. Do not become discouraged if you “get lost” soon after the start of some colloquium lectures. Many of our faculty members will be in the same situation!

Library

The University's Library System consists of over one million volumes in two facilities. The Library System also provides faculty and students with access to various electronic journals and databases. In addition, the holdings of the University of Wisconsin-Milwaukee, the Medical College of Wisconsin, and the Milwaukee Public Library systems as well as OCLC services are available to Marquette faculty and students.

Computing Facilities

Information Technology Service (ITS) provides support for numerous PC laboratories around campus. For example, ITS provides support for the PC labs in the Raynor Library as well as provides academic use licensed software systems for download at no cost to Marquette students, please consult the ITS software web pages. High-performance computing is available through the Raj cluster, a 7,808 compute cores and 48 GPUs HPC system built with HP blades. For more information about Marquette's HPC cluster, see <https://www.marquette.edu/high-performance-computing/>

Departmental facilities for students include a network of workstations, servers, and PCs.

Milwaukee

Marquette is an urban university, centrally located near downtown Milwaukee, easily accessible by car and bus, several major public transit routes pass through the campus. The nearby freeway connects Marquette to all points of the greater Milwaukee area, with its population of well over a million. Major airlines and railroads serve the city and Chicago's O'Hare airport is but an hour's drive. Marquette University has its own art museum, the Patrick and Beatrice Haggerty Museum of Art, and theatre, the Evan & Marion Helfaer Theatre. In addition to Marquette, Milwaukee is the home of the University of Wisconsin-Milwaukee and several other private colleges. Milwaukee offers a rich cultural life including performances by the Milwaukee Symphony, the Milwaukee Repertory Theater, the Florentine Opera, the Milwaukee Ballet, and other arts groups. Marquette's own Theater Department provides excellent productions at a very affordable price. The lakefront Milwaukee Art Museum, with the spectacular Calatrava addition, offers a lively and varied permanent collection. There are numerous film societies and cinema series offering a wide variety of films at quite reasonable prices. Night clubs feature rock and blues entertainment - - summer there are a multitude of free outdoor music venues within walking distance of campus, e.g., Jazz in the Park, River Rhythms, etc. as well as free outdoor movies. Milwaukee is home to the world's largest music festival, Summerfest.

The Marquette Golden Eagles basketball team, of course, offers diversion for the sports fan, as do professional sport teams, the Milwaukee Bucks (basketball), the Milwaukee Brewers (baseball), and the Milwaukee Admirals (ice hockey). Milwaukee offers some recreational advantages such as an Olympic speed skating training rink, a large marina on Lake Michigan for boating and sailing, and numerous public golf courses and tennis courts. Milwaukee is close to many skiing resorts. Milwaukee County has a large and diverse park system. Some parks afford spectacular views of Lake Michigan. The park system includes a horticultural conservatory, The Domes, located in Mitchell Park within walking distance of Marquette, as well as botanical gardens and a large, ingeniously landscaped zoo. Frederick Law Olmsted,

best known for the design and creation of Central Park in New York and the U.S. Capitol grounds in Washington, D.C., designed three Milwaukee parks, Lake Park (with its Lion Bridges), River Park (now Riverside Park), and West Park (now Washington Park) as well as Newberry Boulevard connecting Lake and River Parks. Milwaukee has seen the return of its beer gardens and the resurgence of craft breweries and distilleries.

Ethnic groups are strong in Milwaukee, and their various cultures, from specialty restaurants down to dancing groups, contribute color and variety to life in the city.

Appendix: Forms

Program of Study Form

Name First Semester in Program Year 202?

Intended Degree Plan (if M.S. student) Assigned Advisor Dr.

Coursework

The program requires completion of the 18 credit hour **Computational Mathematical and Statistical Sciences Core**

	<u>Credits</u>	<u>Sem.</u>	<u>Year</u>	<u>Grade</u>
MSSC 6000 Scientific Computing	<input type="text"/> 3 <input type="text"/>	Spring	202?	<input type="text"/>
MSSC 6010 Computational Probability	<input type="text"/> 3 <input type="text"/>	Fall	202?	<input type="text"/>
MSSC 6020 Statistical Simulation	<input type="text"/> 3 <input type="text"/>	Spring	202?	<input type="text"/>
MSSC 6030 Applied Mathematical Analysis	<input type="text"/> 3 <input type="text"/>	Spring	202?	<input type="text"/>
MSSC 6040 Applied Linear Algebra	<input type="text"/> 3 <input type="text"/>	Fall	202?	<input type="text"/>
Approved Elective <input type="text"/>	<input type="text"/> 3 <input type="text"/>	Fall	202?	<input type="text"/>

If an M.Sc. student: Plan A requires 30 credit hours (including 6 **Thesis** credit hours) plus a **Thesis**.

MSSC 6999 Master's Thesis (enter total credits so far) Summer 202?

If an M.Sc. student: Plan B (default at admission) requires 30 credit hours including 6 additional credit hours (to be added below), may include an MSSC 6090, plus a noncredit **Essay** and oral presentation.

If a Ph.D. student, in addition to the Core, courses needed to prepare for or complement the Core courses (5000 number or above courses) and background for entering the desired research area should also be part of this Plan. Ph.D. students must also take 12 credits of MSSC 8999. Students are generally not allowed to enroll in MSSC 8999 until they have passed the comprehensive exam.

If a Ph.D. student, the seminar **MSSC 6090** (1 credit) must be taken **twice**, plus 12 **Dissertation** credits.

MSSC 6090 First Time (May be taken as M.S. elective)	<input type="text"/> 1 <input type="text"/>	Fall	202?	<input type="text"/>
MSSC 6090 Second Time (only for Ph.D. students)	<input type="text"/> 1 <input type="text"/>	Spring	202?	<input type="text"/>
MSSC 8999 Doctoral Dissertation (enter total credits so far)	<input type="text"/>	Summer	202?	<input type="text"/>

Additional Courses (Course number and title)

	<u>Credits</u>	<u>Sem.</u>	<u>Year</u>	<u>Grade</u>
Elective 1 <input type="text"/>	<input type="text"/>	Fall	202?	<input type="text"/>
Elective 2 <input type="text"/>	<input type="text"/>	Fall	202?	<input type="text"/>
Elective 3 <input type="text"/>	<input type="text"/>	Fall	202?	<input type="text"/>
Elective 4 <input type="text"/>	<input type="text"/>	Fall	202?	<input type="text"/>
Elective 5 <input type="text"/>	<input type="text"/>	Fall	202?	<input type="text"/>
Elective 6 <input type="text"/>	<input type="text"/>	Fall	202?	<input type="text"/>
Elective 7 <input type="text"/>	<input type="text"/>	Fall	202?	<input type="text"/>
Elective 8 <input type="text"/>	<input type="text"/>	Fall	202?	<input type="text"/>
Elective 9 <input type="text"/>	<input type="text"/>	Fall	202?	<input type="text"/>
Elective 10 <input type="text"/>	<input type="text"/>	Fall	202?	<input type="text"/>
Elective 11 <input type="text"/>	<input type="text"/>	Fall	202?	<input type="text"/>

Signature MSSC Department Grad Chair _____ Date Signed

Approved Denied

Comprehensive and Doctoral Exams (for Ph.D. Students)

Formal Deadlines (Taken from the 2022-2023 Handbook for CMPS Students):

a. Comprehensive Examinations: Students in the doctoral program must attempt these examinations within two years if full-time or three years if part-time of beginning their graduate studies in this department, and must complete them within two and one-half years of beginning their studies. A student that completes the core courses early or is given credit for them must take the comprehensive exam at the first Fall offering after their completion or awarding of credit.

<u>Month</u> and <u>Year</u>	<u>Pass/Fail</u>	<u>Month</u> and <u>Year</u>	<u>Pass/Fail</u>
Month (August) 202?	() ()	Month (January) 202?	() ()

b. Doctoral Committee: All students must submit at least four names, including at least three of which have majority appointment in MSSC, of the proposed members of the Doctoral Committee to the Graduate Committee within one semester of completion of the Comprehensive Examination.

Doctoral Committee is approved on () ()

Tentative Dissertation Title: () ()

<u>Committee Member Name</u>	<u>Committee Role</u>	<u>Department</u>
Member 1 () ()	() Chair ()	Mathematical and Statistical Sciences
Member 2 () ()	() Member ()	Mathematical and Statistical Sciences
Member 3 () ()	() Member ()	Mathematical and Statistical Sciences
Member 4 () ()	() Member ()	Mathematical and Statistical Sciences
Member 5 () ()	() ()	
Member 6 () ()	() ()	
Member 7 () ()	() ()	

c. Doctoral Planning: All students must submit the Doctoral Program Planning Form to the Graduate School within one month of approval of the Doctoral Committee.

Doctoral Planning form Submitted on () ()

d. Doctoral Qualifying Examination (DQE): All students must attempt the DQE within one year of completion of the Comprehensive Examination. Students are urged to consult the Doctoral Committee at the time of its formation and thereafter, to ascertain the Committee's expectations for that examination.

Doctoral Qualifying Examination Date () ()

e. Remaining items: Typically, the Dissertation Outline needs to be completed and submitted to the Graduate School within one year of completing the DQE. Dissertation Outline () ()

All students need to announce their defense date to the Graduate School at least two weeks in advance.

Announcement of Defense Date () ()

Committee members should receive your Dissertation at least two weeks before the final defense.

Dissertation submitted to Committee Mem () ()

Final Defense Date () ()

Note: Failure to meet any of these deadlines (may be considered making below satisfactory progress) can result in the suspension of financial aid and/or removal from the program, except in extenuating circumstances.

Additional Comments:

What you would like the MSSC Graduate Committee to know about your plan of study in the program and or research plan including accomplishments or challenges.

Additional Comments: ()

Sample Programs of Study

Entering student with a Mathematics background but less Computational background

Fall Year 1	Spring Year 1
COSC 1010 Intro to Computer Programming (4) (or MSSC 5700 Theory of Probability (3)) MSSC 5780 Regression Analysis (3) MSSC 6040 Applied Linear Algebra (3)	MSSC 6030 Applied Mathematical Analysis (3) MSSC 6250 Statistical Machine Learning (3) (or MSSC 5710 Mathematical Statistics (3)) MSSC 6000 Scientific Computing (3)
Fall Year 2	Spring Year 2
MSSC 6010 Computational Probability (3) MSSC 6240 Design & Analysis of Scientific Experiments (3) MSSC 6995 Independent Study (3)	MSSC 6020 Statistical Simulation (3) Required computational Course (3) MSSC 6090 Research Seminar (1) MSSC 6995 Independent Study (2)

Entering student with Statistics background but less Computational background

Fall Year 1	Spring Year 1
COSC 1010 Intro to Computer Programming (4) (or MSSC 5540 Numerical Analysis (3)) MSSC Elective MSSC 6010 Computational Probability (3)	MSSC 6000 Scientific Computing (3) MSSC 6020 Statistical Simulation (3) MSSC 6030 Applied Mathematical Analysis (3)
Fall Year 2	Spring Year 2
MSSC 6240 Design & Analysis of Scientific Experiments (3) MSSC 6040 Applied Linear Algebra (3) MSSC 6995 Independent Study (3)	Required computational Course (3) MSSC 5760 Time Series or Elective (3) MSSC 6250 Statistical Machine Learning (3) MSSC 6090 Research Seminar (1)

Entering student with Related Field background but less Mathematical or Statistical background

Fall Year 1	Spring Year 1
MSSC 570 Theory of Probability (3) MSSC 5780 Regression Analysis (3) MSSC 6040 Applied Linear Algebra (3)	MSSC 5710 Mathematical Statistics (3) MSSC 6000 Scientific Computing (3) Required computational Course (3)
Fall Year 2	Spring Year 2
MSSC 6010 Computational Probability (3) MSSC 6240 Design & Analysis of Scientific Experiments (3) MSSC 6995 Independent Study (3)	MSSC 6020 Statistical Simulation (3) MSSC 6030 Applied Mathematical Analysis (3) MSSC 6090 Research Seminar (1) MSSC 6995 Independent Study (2)

Entering student well prepared in Mathematics, Statistics, and Computation

Fall Year 1	Spring Year 1
MSSC 6010 Computational Probability (3) MSSC 6040 Applied Linear Algebra (3) MSSC 6995 Independent Study (3)	MSSC 6000 Scientific Computing (3) MSSC 6020 Statistical Simulation (3) MSSC 6030 Applied Mathematical Analysis (3)
Fall Year 2	Spring Year 2
MSSC 6240 Design & Analysis of Scientific Experiments (3) MSSC 6995 Independent Study (3) MSSC 6999 Master's Thesis (3)	Required computational Course (3) MSSC 6090 Research Seminar (1) MSSC 6995 Independent Study (2) MSSC 6999 Master's Thesis (3)

MSSC DocuSign Forms (for graduate students):

- Independent Study Form – 6995: <https://tinyurl.com/MSSC6995>
- Independent Study Form – 8995: <https://tinyurl.com/MSSC8995>
- Request Permission Number: <https://tinyurl.com/RequestPermission>
- CMPS Ph.D. Comprehensive Exam: <https://tinyurl.com/CompExamRequest>
- Advisor Selecting/Changing: <https://tinyurl.com/SelectAdvisor>
- CMPS Dissertation Committee: <https://tinyurl.com/CommitteeMakeup>
- Doctoral Program Planning Form: <https://tinyurl.com/DPPF-MU>
- CMPS Summer Research Fellowship Proposal: <https://tinyurl.com/MSSC-CSSRF>
- MSSC Desk Request: <https://tinyurl.com/MSSC-desk>
 - Available Desks: <https://tinyurl.com/MSSC-desks>