

GRAD HANDBOOK

FALL 2025
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Rice University

Department of Computational Applied
Mathematics and Operations Research



Contents

1. Introduction

2. Directory

3. Getting Started

4. Financial Support

5. The CMOR Graduate Curriculum

**6. Master's Thesis and Qualifying Examination for
Admission to PhD Candidacy**

Appendix A: CMOR Policy on Student Computing

Appendix B: Title IX Information

Appendix C: Checklist to Candidacy

Section 1

Introduction

This guide to graduate study in the Department of Computational Applied Mathematics and Operations Research (CMOR) contains information about exams, monetary support, required and recommended courses, and regulations and rules for the various degree programs. It is intended to supplement the *General Announcements* <https://ga.rice.edu> by providing a more detailed description of the CMOR graduate program.

In addition to being in agreement with the regulation stated in this departmental handbook, students must also be in agreement with the General Announcements and the Code of Conduct (*which is in the GA*).

In case there is conflicting information, university-wide regulations take precedence over department-wide regulations, which take precedence over research group-wide regulations.

In doubt, students should seek help first at the department level (graduate program administrator, graduate committee chair, advisor, and/or department chair) and then at the central administration level (Office of Graduate and Postdoctoral studies).

This handbook is the result of an ongoing attempt by the faculty to codify and make readily available to students the rules, requirements, and general approach to the graduate education of our department. Please do not hesitate to notify the faculty about areas that need clarification or strengthening.

—The Graduate Committee

Directory

Department of Computational Applied Mathematics & Operations Research

Illya V. Hicks, Chair

Faculty

Thomas G. Anderson	thomas.anderson@rice	DCH 2006	EXT: 5821
Shuvomoy Das Gupta	shuvomoy.das.gupta@rice	DCH 3022	EXT: 5192
Maarten de Hoop	mdehoop@rice	DCH 2035	EXT: 5723
Matthias Heinkenschloss	heinken@rice	DCH 3088	EXT: 5176
Illya V. Hicks	ivhicks@rice	DCH 3020	EXT: 5667
Shiqian Ma	shiqian.ma@rice	DCH 3090	EXT: 5744
Guodong Pang	gdpang@rice	DCH 2009	EXT: 5666
Sebastian Perez-Salazar	sebastian.perez.salazar@rice	DCH 3021	EXT: 5193
Beatrice Riviere	riviere@rice	DCH 3019	EXT: 4094
Andrew Schaefer	andrew.schaefer@rice	DCH 2036	EXT: 4178
Richard A. Tapia	rat@rice.edu	DCH 3073	EXT: 4049
Lu Zhang	lz82@rice	DCH 2003	EXT: 5831

Other Faculty

Randy Davila	Randy.r.davila@rice	
Jiaxing Liang	jiaxing.liang@rice	DCH 3023
Anastasiya Protasov	anastasiya.n.protasov@rice	DCH 3085
Samira Saedi	samira.saedi@rice	
Eylem Tekin	eylem.tekin@rice	DCH 3086
Darius Walczak	darius.walczak@rice	
Maryam Zaghian	maryam.zaghian@rice	

Postdoctoral Research Staff

Puyao Ge	puyao.ge@rice	DCH 2002
Elizabeth Hawkins	elizabeth.hawkins@rice	DCH 2001
Antti Kykkanen	antti.kykkanen@rice	DCH 2037

Su Li		DCH 2002
Michelli M.C. Oliveira	michelli.oliveira@rice	DCH 2002
Sivaramakrishnan (Siva) Ramani	sivar@rice	DCH 2038
Jaewook Suh	jaewook.suh@rice	DCH 2001
Alyssa Taylor-Lapole	alyssa.lapole@rice	DCH 3018
Trevor Teolis	trevor.teolis@rice	DCH 2037
Samuel Q. Van Fleet	sam.van.fleet@rice	DCH 2004
Duygu Vargun	duygu.vargun@rice	DCH 3018

Administrative Staff

Fran Moshiri Senior Department Administrator	fran@rice	DCH 2112	EXT: 5627
Brenda Aune Accountant and Department Coordinator	brenda7@rice	DCH 2111	EXT: 5722
Latreece McKinney Graduate Program Coordinator	lsm4@rice	DCH 2110	EXT: 6724
Jennifer Trevino Communications and Academic Coordinator	jaloquez@rice	DCH 2109	EXT: 6310
Sandra Beckmeier Staff Assistant	sb168@rice	DCH 2117	EXT: 4805

Staff Assignments:

Fran Moshiri is the Senior Department Administrator and is responsible for the overall administration of the department. Her office is in 2112 Duncan Hall.

Brenda Aune is the Accountant and Department Coordinator and handles graduate and undergraduate payroll, purchasing, expense reports and reimbursements. Her office is in 2111 Duncan Hall.

Latreece McKinney is the Graduate Program Coordinator. She handles graduate matters such as recruiting, registration, degree requirements, qualifying exams, PhD candidacy and graduation. Her office is in 2110 Duncan Hall.

Jennifer Trevino is the Communications and Academic Coordinator. In addition to being the CMOR Webmaster, Jennifer handles departmental publications and document production. She also provides administrative support to the department faculty in academic and teaching/course related matters. Her office is in 2109 Duncan Hall.

Sandra Beckmeier is the Staff Assistant. In addition to providing the department with basic clerical support, she supports the colloquium program and other departmental events and functions.

CMOR Committees:

Doctoral Committee:

- Matthias Heinkenschloss, Chair
- Shuvo Das Gupta
- Illya Hicks
- Sebastian Perez-Salazar
- Lu Zhang

Professional Master's Committee:

- Eylem Tekin, Chair
- Matthias Heinkenschloss
- Illya Hicks
- Gordon Pang
- Beatrice Riviere

Undergraduate Committee:

- Andrew Schaefer, Chair
- Thomas Anderson
- Maarten de Hoop
- Shiqian Ma
- Anastasiya Protasov
- Richard Tapia

Other Departmental Committees:

- Colloquium: Thomas Anderson (chair), Shuvo Das Gupta, Sebastian Perez-Salazar, Lu Zhang
- Culture: Anastasiya Protasov (chair), Matthias Heinkenschloss, Illya Hicks, Richard Tapia, Eylem Tekin

- Awards & Visibility: Beatrice Riviere (chair), Maarten de Hoop, Shiqian Ma, Gordon Pang, Andrew Schaefer

Section 3

Getting Started

Arrival: The first thing to do upon arriving on campus is to see Latreece McKinney, the Graduate Program Administrator. Her office is in 2110 Duncan Hall. She will explain the process of obtaining an ID card and a parking sticker, establish a paycheck schedule, and otherwise smooth the student's adjustment to campus life.

Advising: There will be a new PhD orientation before classes start. In addition, all CMOR faculty are available to meet with first-year PhD students to discuss course selection and for academic advising. Because the selection of first-year courses impacts the choice of qualifying exams, all students are expected to discuss course selection with one or two faculty members before classes begin. If a student has identified a research area, then the student should discuss course selections with a faculty member in that research area. Otherwise, any faculty member is a good source of advice, and faculty members welcome interactions with graduate students. After a thesis advisor has been acquired, the student will discuss course selection and other academic issues primarily with the advisor.

In addition, at the beginning of the second semester of the first year of study, all students will meet with the Graduate Committee Chair and/or the Departmental Chair to assess their academic progress. A written progress assessment will be provided to all students at the end of their first year.

Graduate students normally register during the first week of classes. Registration is performed using the Rice University student and faculty self-service system called ESTHER. ESTHER can be accessed by all students and faculty via the web at <http://esther.rice.edu>. Access information for ESTHER will be provided to beginning graduate students prior to arrival at Rice. **Students are required to discuss their curriculum choices with a faculty member** to help ensure that the student's choices and plans are in tune with the various requirements for his or her degree program.

Note that courses can be added after the first week - a course can be added for free until the end of the 2nd week. The student will not be able to add classes after the 2nd

week. Classes can be dropped until the 7th week of the semester; **consult the academic calendar for EXACT dates**. Therefore, the schedule established in the first week is not set in stone and can be adjusted for quite a while. However, the semester is only 15 weeks long, so it is encouraged not to take too long in the selection process. The faculty member who advised the student on course selection and the course instructor should approve any drop or add.

The First Year: The goal for the first year of the PhD program is to ensure that students get started on research and build a basic core knowledge through coursework. So, during the first year, students focus on two things: (1) finding a research adviser and starting research, (2) completing a majority of the 'Introductory Courses' (see Section 5) and passing the Qualifying Exams (see Section 6).

Finding an Advisor: Most students have an idea of possible research advisors before arriving at Rice, but students should also explore research opportunities provided by other CMOR faculty. Thus, in addition to coursework, students are expected to meet with multiple possible advisors and discuss possible research projects, attend their group meetings, talk to their students, attend the CMOR colloquium, the graduate lunch seminar, etc. Students should do lots of reading (papers and books), and ideally start to work on one or two very specific open research questions to get a better sense of research in a specific area. In many cases, students find a strong match with an advisor during the first semester, so that they can begin working on an initial project during the second semester. All students must identify an advisor no later than the end of the second semester.

Coursework: CMOR has a system of required courses and distribution courses to which students must conform. The course system is described in Section 5. The Department also encourages students to take graduate-level courses in other departments such as the Mathematics, Computer Science, and Statistics Departments. Outside courses (at the graduate level) will count toward the semester hour requirement of the PhD degree. Non-thesis ("professional") master's degrees, such as the Master in Computational and Applied Mathematics (MCAAM), limit the courses that count towards professional master's degrees because of the shorter time to degree. See the Programs of Study section in the General Announcements <https://ga.rice.edu> for more details.

Some entering students have acquired enough background that they have no need for some CMOR introductory courses. For most students, however, the introductory courses are worthwhile. An even deeper background coursework is advisable for some students.

Computers: Access to computers is essential for graduate study in CMOR. Every graduate student is provided with a fully networked desktop workstation. In addition, graduate students have access to the various research computing facilities at Rice University.

On arrival at Rice, every graduate student is assigned an account on the departmental computing system. The CMOR system consists of several desktop workstations and file servers in offices and in the Pearlman lab (3132 Duncan Hall); administrative computers (PC's); and peripherals (printers), linked wirelessly and by Ethernet, and to the outside world through the campus fiber optic backbone. The Rice Office of Information Technology maintains a list of software that current Rice students can obtain for free. The list can be viewed here <https://kb.rice.edu/69000>.

CMOR graduate students have access to various campus-wide research computing facilities (see Center for Research Computing at <https://oit.rice.edu/research-computing>). Access to these facilities is typically provided in connection with a faculty-sponsored research project.

English proficiency and technical writing: Ability to write and speak English competently is essential for successful academic work at Rice, and in fact has become essential for scientific careers worldwide. The Department reinforces its commitment to fostering speaking and writing skills in the following three ways:

1. It is required that all non-native English speakers whose TOEFL scores are near or below the official admission criterion (currently 600) should 1) retake the TOEFL and 2) enroll in an ESL class least one semester. If the student is required to take these steps, they must do so to receive their stipend.
2. The Engineering Division offers communication and professional development courses, such as *ENGI 600 Graduate Communications Seminar*. In addition, the

Rice Program in Writing and Communication <https://pwc.rice.edu> provides workshops, seminars, and consultations to provide graduate students with tools and to gain a deeper understanding of academic communication.

3. The Rice Office of International Students & Scholars (OISS) <http://oiss.rice.edu> offers a number of free English and Culture classes. Additionally, Rice's ESL (English as a Second Language) Program <http://esl.rice.edu> offers non-native speakers of English the opportunity to improve their language skills. Foreign students are strongly encouraged to take advantage of these opportunities.

And So On... Other helpful information on life as a graduate student can be found in the Graduate Student Association (GSA) pages. The URL for GSA is:

<http://gsa.rice.edu>

The student will also want to check out the library (Fondren Hall) and Valhalla, the graduate student pub.

Section 4

Financial Support

Rice is somewhat unusual in that relatively few graduate students support themselves by teaching. Almost all CMOR graduate students receive stipends and tuition waivers – either from the university, or from an external research grant awarded to a CMOR faculty member, or from Graduate Fellowships awarded to the student. As a result, the chief business of graduate school, for most of our students, is preparing for and learning to carry out research in computational applied mathematics and operations research.

Rice University funds support most incoming PhD students during the first year of study. This support includes a stipend and tuition. At the beginning of each year, additional payments for fees, health insurance, and parking, to name a few, are required.

A limited number of teaching assistantships (TAs) are available to those who wish to acquire teaching experience. Since some evidence of teaching competence is a prerequisite for entry-level academic positions, CMOR graduate students who wish to eventually become professors should take advantage of this opportunity to enhance their vitae in this important way. TAs hold recitation sessions and provide other support for introductory courses – such as CMOR 302 (Matrix Analysis), CMOR 304 (Differential Equations in Science and Engineering), CMOR 350 (Stochastic Models), and CMOR 360 (Introduction to Operations Research and Optimization). TAs must participate in the teaching workshop organized by the George R. Brown School of Engineering and Computing at the beginning of every fall semester. *All CMOR graduate students in the PhD program are required to participate in this teaching workshop at the beginning of their second year.*

The National Science Foundation, many Government Agencies, and Foundations offer Scholarships, Fellowships, and other funding opportunities for graduate students. Some of these opportunities are listed on the CMOR webpage <https://cmor.rice.edu/academics/graduate-programs/phd-program/funding-aid> and on the George R. Brown School of Engineering and Computing webpage <https://engineering.rice.edu/academics/student-awards-scholarships/graduate-awards-scholarships>. Graduate students are strongly encouraged to seek out these opportunities. The application process is a valuable learning experience. Being awarded one of these prestigious fellowships is a great enhancement to the student's vitae, and many of these fellowships carry a higher stipend level than that offered by the CMOR department. Faculty members, especially advisors, will provide guidance and help in the selection of appropriate opportunities and in the application process.

The CMOR department asks students to perform some service, usually in the form of grading homework and exams for courses. At the beginning of each semester, the graduate committee assigns most graduate students as graders to various courses. *Grading is an important responsibility and is not to be taken lightly.* Grading is not only a service, but also an important learning experience for graduate students. Failure to perform grading duties adequately may jeopardize future support. If, for some reason, a student feels unable to grade in the assigned course, they should inform the graduate chair so that the chair can attempt to reassign the student.

Stipends for first-year students cover their entire first year, from August 16 to August 15 of the following year. In virtually all cases, stipends funded by research grants also cover the full year and not just the academic year. Graduate study in CMOR is usually a full-time year-round activity! Summers are extremely valuable work time, because there is the opportunity to perform research without the distractions of coursework, grading, etc.

If a student wishes to absent themselves from Rice during the summer, either to take on an internship or for another activity, the student must coordinate this activity with the student's advisor and must inform the Graduate Program Administrator as early as possible to make sure this absence is coordinated with the student's research and so that good use can be made of the stipend funds that are not needed.

Some university funds may be available to support students in subsequent years of graduate study. However, in general, students in the CMOR department obtain their support from research grants after the first year. The opportunity to do research is an integral part of graduate training. *Each **student** is responsible for identifying this opportunity, deciding which of the faculty to work with, and approaching him/her about support (and a project!).* While the department is not in a position to guarantee a research assistantship with one of the faculty, CMOR has been very successful in placing students with professors throughout its 50+ year history. The professors always have projects underway; therefore, more often than not, they are looking for research assistants. Since our faculty has been vastly more successful than the average math department in raising research money, very few students have had any trouble finding an intellectual berth with a stipend. The coursework over the first two or three years will help familiarize the students with the professors and vice versa. Enthusiastic participation in a student's early classes, meeting with professors to learn about possible research projects, and visiting professors' research group meetings, are by far the best way to find a faculty member (or to have him/her find you) who will direct the student's initiation as a scientist to the mutual benefit of everyone.

As a matter of University policy, Rice does not offer financial support to non-thesis ("professional") master students. Accordingly, transfer from the PhD program to the non-thesis master's program implies repayment of any financial aid received from Rice. This restriction does not apply in the case of transfer to the thesis master's program (MA degree). In years past, a small number of these students have chosen to make such a transfer as a way of leaving the PhD program without a PhD but with a master's degree. Students who choose to transfer from the PhD program to the MA (master's with thesis) program will not be subject to repayment of previous financial aid.

If financial aid, beyond what the department has arranged, is needed, the student may contact the Financial Aid office for information about loan programs for graduate students.

Section 5

The CMOR Graduate Curriculum

Computational and Applied Mathematics is a rapidly evolving and essentially interdisciplinary field. The most fascinating work in CMOR often involves surprising combinations of ideas from various parts of mathematics, statistics, computer science, physical sciences, engineering, as well as many other disciplines.

CMOR faculty members **established a core curriculum** designed to ensure breadth of exposure to all areas of computational and applied mathematics, as represented by the Rice faculty, and depth of preparation in a disciplinary area. Both the core and the disciplinary curricula evolve as faculty and student interests change.

The current curriculum consists of (i) five required courses, also called introductory courses, which every CMOR PhD student must complete; (ii) distribution courses of which CMOR PhD students must complete a minimum of three courses, one out of each area; and (iii) elective courses, of which CMOR PhD students must complete a minimum of one three-credit lecture courses. Both the five introductory courses and the three distribution and elective courses must be completed before a student advances to PhD candidacy status. The introductory courses, the distribution courses, and the one elective should not be taken as Pass/Fail.

In some cases, these requirements may not be appropriate because of prior, equivalent coursework. The graduate committee will consider such exceptions as they arise. Our intent is not to construct rigid constraints, but rather to ensure that every CMOR PhD has a broad grounding in applied mathematics and operations research. The course of study described here should accomplish this goal for almost all CMOR students, insofar as it can be accomplished at Rice.

Introductory Courses

Purpose: To expose each CMOR student to the range of computational and applied mathematics and operations research as represented by the faculty and to serve as the foundation for all further work.

Timing: Students should attempt to complete most introductory courses within the first year of graduate study and complete all introductory courses by the end of the second year of graduate study. All introductory courses must be completed prior to advancement to PhD candidacy.

Introductory Courses

- CMOR 500: Analysis (Fall)
- CMOR 520: Computational Science (Fall)

and three out of the following four courses

- CMOR 524: Advanced Numerical Analysis (Fall)
- CMOR 530: Iterative Methods for Systems of Equations and Unconstrained Optimization (Spring)
- CMOR 541: Linear and Integer Programming (Fall)
- CMOR 554/STAT 552 Applied Stochastic Processes (Spring)

Students who plan to take CMOR 554/STAT 552 Applied Stochastic Processes should consider taking CMOR 552/STAT 581 Mathematical Probability in their first fall semester.

The qualifying exams are based on the introductory courses. Therefore, selection of introductory courses and choice of the Area Exam are typically determined by the research area(s) you are inclined to pursue in your PhD studies. See Section 6 for more details.

Exceptions: In some cases, an alternative selection of courses might suit a student's needs better than the required list. An example is a result of a previous study. A student may develop an alternative program of coursework with the help of faculty members and present it to the Graduate Committee for its approval prior to taking the

alternative course. The alternative course of study should respect the intent of the required list by achieving comparable breadth. An approved copy of the student's curriculum should go in their graduate student file. Alternative course selection does not change qualifying exam requirements. Thus, in particular, if a student plans to replace an introductory course on which a qualifying exam is based, the student should consult with faculty members, the graduate committee, and the course instructor, and consider auditing the introductory course to stay informed of specific course material, course assignments, and course exams. In particular, if a student plans not to take CMOR 500, the student should consult with faculty members, the graduate committee, and the course instructor, and consider auditing the course. Moreover, the student should consider taking a course from Area A (listed below) instead of CMOR 500 in order to satisfy the Area A Distribution Course requirement as part of the petition to waive the CMOR 500 requirement.

Distribution Courses

Purpose: To provide further exposure to a wide range of topics and ideas and to guide the beginning of concentration on a specialty.

Timing: Three distribution courses, one from each area, should be completed during *the first three years* of graduate study. All three courses must be completed before advancement to PhD candidacy.

Exceptions: Same as for the required courses.

Distribution Courses: Students must take three courses, one course from each of the following three areas. A course can only be used to satisfy one course requirement. For example, a course that is counted as an introductory course cannot be counted as a distribution course.

Area A — (Courses with emphasis on Foundations and Theory)

- CMOR 501: Applied Functional Analysis*
- CMOR 504: Graph Theory*
- CMOR 505: Partial Differential Equations I

- CMOR 507: Applied and Computational Microlocal Analysis*
- CMOR 526: Foundations of Finite Element Methods*
- CMOR 532: Optimization Theory*
- CMOR 534: Intro to Partial Differential Equation Based Simulation and Optimization
- CMOR 552/STAT 581: Mathematical Probability I*
- CMOR 554/STAT 552 Applied Stochastic Processes
- 500 level MATH courses with advisor approval

Area B — (Courses with emphasis on Algorithms and Computation)

- CMOR 521: High Performance Computing
- CMOR 523: Numerical Methods for PDEs*
- CMOR 524: Advanced Numerical Analysis
- CMOR 525: Numerical Linear Algebra
- CMOR 527: Discontinuous Galerkin Methods for Solving Engineering Problems*
- CMOR 530: Iterative Methods for Systems of Equations and Unconstrained Optimization
- CMOR 531: Convex Optimization*
- CMOR 533: Numerical Optimization*
- CMOR 536: Optimization with Simulation Constraints
- CMOR 537: Computer-assisted Algorithm Design for Optimization and Machine Learning*
- CMOR 541: Linear and Integer Programming
- CMOR 543: Combinatorial Optimization*
- CMOR 544: Stochastic Optimization*

Area C — (Courses with emphasis on Modeling and Applications)

- CMOR 510: Modeling Mathematical Physics
- CMOR 551 Simulation Modeling and Analysis
- CMOR 555: Stochastic Control and Applications
- CMOR 567: Optimization for Energy Systems*

- CMOR 615: Theoretical Neuroscience I: Biophysical Modeling of Cells and Circuits
- ECE 533/CMOR 553/STAT583: Intro. to Random Processes and Applications
- STAT 502: Neural Machine Learning I
- STAT 503: Topics in Methods and Data Analysis
- STAT 514: Introduction to Biostatistics
- STAT 519: Statistical Inference
- 500 level courses offered in the schools of Natural Sciences and Engineering with advisor approval

Note that an asterisk by a distribution course is a course recommended by a faculty member.

Elective Courses

Purpose: Complete preparation for research in one of the CMOR disciplines.

Timing: Throughout graduate study, but concentrated in the first three years. Students are required to take at least one three-credit lecture course as an elective, chosen with advisor approval. This course must be completed before advancement to PhD candidacy.

Preparation and Exceptions: Enrollment in these courses typically requires completion of one or more required or distribution courses, or the equivalent. A program for each student will be developed in consultation with advisor(s). Some courses in other departments require preparation beyond what is outlined here.

Graduate Research Projects (CMOR 590 / CMOR 591)

Purpose: Study in a focused area of research related to CMOR directed by one or more faculty members.

For a graduate student to register for CMOR 590/591 Graduate Research Projects, the student has to find a CMOR faculty member who is willing to supervise the course. This

faculty member has to provide an outline of the work to be performed, identify required reading, and determine credit hours and a grade policy before the beginning of the semester. This faculty member also assigns the final grade. Graduate students cannot consider themselves registered until they get permission from the CMOR faculty member supervising the Graduate Research Project.

MA or PhD students who have an advisor and identified an MA/PhD thesis project should enroll in CMOR 800 for their thesis research.

Timing: Typically towards the middle or latter part of graduate study.

Preparation and Exceptions: Graduate Research Projects are typically arranged between faculty members and a limited number of students. The faculty member will explicitly describe expectations for successfully completing the Graduate Research Project at the start of the course.

Satisfactory Course Performance

For a satisfactory performance in their coursework, students enrolled in the CMOR PhD program are expected to maintain a B (3.00) average in the CMOR required introductory and distribution courses. In addition, Rice's rules specified in the General Announcements apply.

Colloquia and Seminars

In addition to the program of course work detailed above, department colloquia and seminars form an essential part of graduate education. *All students are expected to attend the regular department colloquia.* These talks, generally given by speakers from outside Rice, describe current research at the frontiers of applied and computational mathematics. Therefore, they give graduate students an overview of the breadth of the field's discipline. Interested students are encouraged to meet individually with the visiting speakers.

CMOR students are also expected to attend the Graduate Research Seminar. These talks, generally given by fellow students and CMOR faculty, are both less formal and more introductory than the department colloquia. They also provide opportunities for new students to identify potential faculty advisors.

Rice has student chapters of the Institute for Operations Research and the Management Sciences (INFORMS) <https://connect.informs.org/rice-university/home> and of the Society of Industrial and Applied Mathematics (SIAM) <https://siam.rice.edu/>. These student chapters organize a variety of events on topics of interest to researchers and practitioners and provide a good window into life after graduate school and excellent networking opportunities. All students are strongly encouraged to join one or both of these student chapters and attend their events.

The Graduate Research Seminar and presentation at Rice student chapter meetings also provide opportunities for students to practice their research presentation skills and to receive feedback.

Grader and TA Training

The George R. Brown School of Engineering and Computing requires that all graders and TAs complete training.

1. Graders: All graduate graders will be required to complete annual compliance training covering Rice policies and federal regulations.
2. TAs: All graduate TAs who have contact with UG students will be required to complete the School of Engineering and Computing's GTA Training Workshop once every three years.

All CMOR graduate students in the PhD program are required to participate in the annual compliance training at the beginning of every fall semester, and all CMOR graduate students in the PhD program are required to participate in the TA teaching workshop at the beginning of their second year.

Note: Students may be required to take this workshop again at a later date.

Rice Responsible Conduct of Research

All graduate students are required to complete the Collaborative Institutional Training Initiative (CITI) online Responsible Conduct of Research (RCR) training course before their first semester at Rice. See <https://sparc.rice.edu/>.

Incoming students who do not meet this requirement may not receive payments from Rice.

Departmental Policy on Graduate Student Vacations

All graduate students are reminded of the official Rice policy on vacations and absences from the General Announcements

“Active participation in required academic activities (for example, laboratory work in certain science and engineering programs) is a basic condition for continued financial support. Students who are absent from such required activities for two contiguous weeks without permission and without mitigating circumstances may be subject to termination of financial support. In addition, they may be judged to be not making adequate academic progress. Thus, if absences have to occur, they must be pre-arranged with the student's supervisor, except for medical and family emergencies, in which cases, timely notification is required. Graduate advisors and programs should be aware of unexplained student absences and must provide immediate written warnings when students are not present and carrying out required academic activities for more than one week.”

Section 6

Qualifying Examinations, the Master's Thesis, and Admission to PhD Candidacy

Advancing to PhD candidacy requires:

- completion of required course work.
- satisfactory performance on two written Qualifying Examinations: 1) Analysis Exam and 2) Area Exam,
- completion and defense of a Master's Thesis with the grade "satisfactory, PhD" given by the Master's Thesis Committee,
- completion and defense of a PhD proposal.

The Qualifying Exams: The Analysis exam is based on material taught in CMOR 500. The two-part Area exam is based on material taught in CMOR 524/530/541/554, and students have to answer questions from two of the four courses - CMOR 524, 530, 541, and 554. These written exams will be given during a two-day period after the end of classes in the fall term, usually in early January of the following year, and during a two-day period after the end of classes in the spring term, usually at the end of the final exam period. The exam schedule is designed so that students can take the Analysis exams and (parts) of the Area exam soon after they have completed the relevant coursework. Exact dates for the qualifying exams will be announced in the fall and spring semesters, respectively.

A guideline for selecting three courses out of the four (CMOR 524, 530, 541, and 554) is the following. Students inclined to choose a continuous mathematics research direction (e.g., PDEs, numerical linear algebra, and PDE-based optimization) should generally consider taking CMOR 524 as a priority. Students inclined to choose nonlinear optimization as their research direction should generally consider taking CMOR 530 as a priority. Students inclined to choose discrete optimization as their research direction should generally consider taking CMOR 541 as a priority. Students inclined to choose stochastic analysis should generally consider taking CMOR 554 as a priority. Students are encouraged to consider this decision seriously and to seek the

counsel of faculty members reflected in these options. Students must finalize their selection of which two courses they want to include in their Area Exam during their second semester by **April 1st**. In addition to introductory courses, students may also select other courses in their first year to additionally prepare them for the research area(s) they are inclined to pursue. Since courses are typically only offered either in the fall semester or in the spring semester, a course plan for the first year should be made before fall courses begin. Again, students are encouraged to consider this decision seriously and to seek the counsel of faculty members reflected in the three options before classes begin.

To encourage students to take qualifying exams early, students can attempt the Analysis Exam and (parts) of the Area Exam at the end of their first semester. Failure to pass the exam will be without penalty; a 'fail' result will simply be discarded. The student will then be required to take the exam again in the spring, as if for the first time.

Students take all remaining Qualifying Examinations immediately after the end of classes of the spring semester of their first year. Only one retake is permitted. This typically takes place the next time the exam is offered. The exam retake has the same time duration as the original exam. The course selection made by a student for the first time he/she take the Area Exam must be used in the retake.

Qualifying exams will have a similar scope and nature as final exams in the respective courses. However, they will be administered only to CMOR graduate students and will have no bearing on the course grades.

The Exam Committees: Each exam will be overseen by a committee of present, former, and possibly future instructors. The current course instructors will participate in the design of the exams, but the end product will be the work of the exam committees.

Students facing the Qualifying Exams are strongly encouraged to form study groups to present course material to each other, to tackle homework problems as well as unassigned problems and old exams, and in general, take an active role in making this fundamental material their own.

Master's Thesis: Ideally, a student should complete and defend his/her Master's Thesis by the end of the spring semester of their second year. A committee headed by a thesis advisor will supervise the thesis. Thesis topics and scope will be agreed upon between the student and his/her thesis advisor. It will usually be chosen to make the likelihood of completion in the suggested time frame as high as possible. By the end of the fall semester in the second year, the committee should be constituted and the topic chosen. These choices are to be reported to the Chair of the Graduate Committee and the Graduate Program Administrator.

The Engineering Division offers *ENGI 600 Graduate Communications Seminar*, and the Rice Program in Writing and Communication <https://pwc.rice.edu> provides workshops, seminars, and consultations to help graduate students with thesis writing and presentations.

The thesis committee will assign to the defense one of four grades: (1) pass MA, pass PhD Proposal, (2) pass MA, continue PhD studies, (3) pass MA, discontinue PhD studies, and (4) fail MA. These grades, like the pass/fail in the Qualifying Exams, represent the judgment of the committee as to the suitability of the student to continue in the PhD program.

For the approval to petition for PhD candidacy, an MA Thesis grade of “pass MA, continue PhD studies” is required.

Students who receive a grade of “pass MA” from the master's thesis committee and who have completed all coursework required for the MA degree will receive the MA degree at the immediately following commencement. A failure in the MA thesis defense will result in no degree being awarded and no invitation to continue in the CMOR graduate program being issued.

A student who has previously completed a Master's Thesis in another department or at another university may petition the graduate committee to waive the Master's Thesis requirement. A written request for a waiver, along with three copies of the thesis, should be submitted to the Graduate Committee after the student passes the written qualifying exams, but no later than the end of the first week in the second Fall semester. This petition should briefly explain the topic and contribution of the thesis;

the student may be asked to give an oral presentation about this work. A waiver will be granted provided the Graduate Committee judges that the thesis meets the standard of the CMOR " pass MA, continue PhD studies" grade for MA theses; otherwise, the student must write an MA thesis. Those who obtain waivers will still have the option to receive an MA degree later as an automatic MA at the approval of PhD candidacy.

The PhD Thesis Proposal: The PhD Thesis Proposal may be an extension of the MA Thesis or may be completely independent. Ordinarily, the proposal will be a separate document, and its defense a separate exam. In exceptional cases, a student may petition the Graduate Committee to have the Master's Thesis also count as the PhD Thesis Proposal. This petition needs to be filed well before the Master's Thesis defense. The petition has to document that all members of the master's thesis committee support the petition and have agreed to serve on the PhD thesis committee. A doctoral thesis committee has a slightly different makeup than a master's committee. Check your General Announcements for regulations. The Master's Thesis will also be considered the PhD Thesis Proposal, provided that the student's petition is approved by the Graduate Committee and that the Master's Thesis Committee awards the grade "satisfactory, PhD" to the Master's Thesis defense.

Exceptions: Exceptions to these rules will be handled on an individual basis according to the grievance procedures outlined below. Amongst these exceptions is the delay in the completion of the Master's Thesis. Such extensions should be requested in a letter to the Graduate Committee stating the reasons for the extension (beyond the second semester of the second year). The student's MA thesis advisor will be asked for concurrence in this particular exception. For example, it may in some cases be reasonable to extend the date of the MA Thesis Defense if it has been agreed between the student, the MA thesis committee, and the Graduate Committee that the MA Thesis will do double duty as a PhD Thesis Proposal. However, the student and thesis committee should take into account the risk that the added time and effort may not lead to PhD candidacy.

PhD Candidacy Timeline: Per Rice University regulations, candidates must achieve candidacy before the beginning of their ninth semester. Any deviations from this

schedule must be approved by the CMOR graduate committee and by the Office of Graduate and Postdoctoral Studies. See Latreece McKinney for forms and procedures.

PhD Committee Meetings: It is the student's responsibility to schedule a thesis committee meeting at least once per calendar year to update the thesis committee on progress to date. Students are advised to carefully consider feedback from the committee in addition to their thesis advisor in shaping their evolving thesis research agenda.

Annual Evaluations: All continuing students will be subject to an annual progress review regardless of their status. **All graduate students are required to fill out an annual progress report by the beginning of every fall semester.** In addition, comments will be solicited from the Department Chair, thesis advisor, and thesis committee. This information will be combined with course grades, where appropriate, into a written annual evaluation. If the gathered progress information reveals a failure to progress, then the annual evaluation will include goals for the student to achieve within an explicitly stated timeline. The annual evaluation will describe the consequences of not meeting these goals. Exceptional consequences may include loss of Good Standing, and students may be subject to academic probation, separation, or dismissal as described in the General Announcements.

Research Advisor Transitions: Occasionally, a student and/or their research advisor may decide that it is in the student's best interest to find an alternative research advisor. In this case, it is appropriate for both parties to be aware of the situation in a timely fashion. This decision should not be taken lightly as it may have serious repercussions in terms of progress towards graduation, may impact ongoing research projects, and may cause disruption in continued funding and support for the student. Because of these issues, students are strongly advised to consult with their research advisor and the Department Chair.

In some situations, a research advisor may terminate financial support for a student. This should be done in full consultation with the Department Chair. Adequate notice should be provided to the student to enable them to consider alternative sources of support.

Grievance: All requests for exceptions or variances from the policies outlined above should be addressed to the Graduate Committee and delivered to the Chair of this committee. Grievance letters should state precisely what exception or variance is requested and detailed reasons given to support the request. Either the Graduate Committee or the full faculty will decide the issue, as appropriate.

For University Policy on Dispute Resolution, Petitions and Appeals, Grievances, and Problem Resolution, go to the General Announcements graduate section under Rights and Responsibilities. (<https://ga.rice.edu/graduate-students/rights-responsibilities/>)

Typical Timeline for a Doctoral Student in CMOR

YEAR 1	
Objectives: 1) Complete most if not all of the introductory courses. 2) Commit to an advisor with whom you can conduct research during the summer and beyond. 3) Successfully pass the qualify exams.	
Semester I and II	
Fall Semester	Begin to investigate advisor with whom you can conduct research during the summer and beyond.
Spring Semester:	Commit to an advisor with whom you can conduct research during the summer and beyond. The final objective is to successfully pass the qualify exams.

YEAR 2	
Objectives: 1) Find a master's thesis topic, decide on a committee and defend the master's thesis before the end of the spring semester. 2) Review the list of distribution courses to begin successfully eliminating them from your coursework. 3) Register for topics courses relevant to your research interests.	
Fall Semester	1) with the assistance of your advisor, define your Master's committee. 2) See the GA for requirements of a master's thesis committee.
Spring Semester:	1) conduct research 2) write the thesis, and 3) schedule a public defense.
YEAR 3 (and Beyond)	
Objective: 1) Any required or distribution and elective courses not already completed in year 1 or year 2 should receive primary attention.	

- 2) Continue to register for topics courses relevant to your research interests as suggested/approved by your advisor.
- 3) Under the supervision of your advisor prepare poster sessions, presentations for professional meetings and/or papers for publication.
- 4) Conduct research and meet regularly with your advisor to update your research progress.
- 5) Comply with the regulations outlined in the General Announcements regarding attaining Approval of Candidacy for the doctoral degree and final defense presentation.

Appendix A

CMOR Policy on Student Computing

The CMOR department provides computing resources to students for the purposes of research and education. The acquisition, operation, and maintenance of the computing resources are supported by university and faculty research funds. This policy provides students with guidelines on the proper usage of the computing resources. Any doubts about appropriate usage should be resolved by query to the System Administrator or the faculty Computer Committee.

- 1) All graduate students in the MA, MCAM, and PhD degree programs can have accounts on the CMOR system. New graduate students should fill out a form, available from the graduate program administrator, to request the creation of new computer accounts.

A faculty sponsor can request accounts for undergraduate students or non-CMOR graduate students who are involved in a faculty-sponsored research or educational project. To obtain such an account, a student must submit a request form with the signature of a faculty sponsor.

- 2) Students may use the office desktop equipment to
 - read and write email
 - create and maintain a personal webpage
 - browse the Web for educational and research purposes
 - perform teaching functions (grading, TA work, etc.)
 - perform research on faculty-led projects (includes thesis research)

In all cases, research-related use has priority.

- 3) Students may use non-desktop departmental equipment (printers, scanners, computing, and file servers...) to
 - perform research on faculty-led projects (includes thesis research)
 - perform teaching functions (grading, TA work, etc.)
 - store small amounts of information unrelated to their research projects, including email and a personal web page.
- 4) Personal copying and printing on department machines are not encouraged. Personal documents can be fulfilled at the RMC copy center or Fondren Library. Occasionally, students may find the need to print academic material. Please ask Latreece McKinney (or any other staff member) for assistance – there is a \$0.10 per page charge to be collected at the time copies are made.
- 5) Students may not use departmental equipment to
 - play computer games, chat online, and things of a similar nature unrelated to the educational and research missions of the university;
 - store, print, or process significant amounts of information of a purely personal nature or unrelated to the educational and research missions of the university, without reimbursing the department as outlined in item 4.
- 6) Termination of computer accounts: A CMOR graduate student's account will be terminated one year after the student's enrollment as a CMOR student has ended. Former students who continue their collaboration with the faculty after graduation can retain their accounts upon the request of a faculty member. The account for an undergraduate student or a non-CMOR graduate student will be terminated six months after the student's involvement in a faculty-sponsored project has ended
- 7) In addition to the specific policies outlined above, students are bound by the Rice policy for Appropriate Use of Computer Resources, which can be found on the web at <https://vpit.rice.edu/AUP.aspx>.

- 8) The system administrator will respond to infractions of these policies in consultation with appropriate faculty. Response to serious infraction may include closing of the guilty party's account.

Appendix B

Title IX Information

Rice encourages any student who has experienced an incident of sexual, relationship, or other interpersonal violence, harassment or gender discrimination to seek support. There are many options available both on and off campus for all graduate students, regardless of whether the perpetrator was a fellow student, a staff or faculty member, or someone not affiliated with the university.

Students should be aware that when seeking support on campus, most employees are required by Title IX to disclose all incidents of non-consensual interpersonal behaviors to Title IX professionals on campus who can act to support that student and meet their needs. The therapists at the Rice Counseling Center and the doctors at Student Health Services are confidential, meaning that Rice will not be informed about the incident if a student discloses to one of these Rice staff members. Rice prioritizes student privacy and safety, and only shares disclosed information on a need-to-know basis..

If you are in need of assistance or simply would like to talk to someone, please call Rice Wellbeing and Counseling Center, which includes Title IX Support: 3311/(713) 348-3311.

Policies, including Sexual Misconduct Policy and Student Code of Conduct, and more information regarding Title IX can be found at safe.rice.edu.

Appendix C

CMOR Department - Checklist to Ph.D. Candidacy

Student Name: _____ Year Entered Program: _____

Student ID #: _____

1. Advisor:

Introductory Courses (Required)

Course	Semester	Credit	Grade	*Transfer Credit	**Course Waived or Substituted
CMOR 500					
CMOR 520					
3 of the 4 Courses Taken:					
CMOR 524					
CMOR 530					
CMOR 541					
CMOR 554/STAT 552					
Notes:					

Distribution Courses (3 Areas - 1 Course from each Area. See Handbook)

Course	Semester	Credit	Grade	*Transfer Credit	**Course Waived or Substituted
Area A					
Area B					
Area C					

2. Qualifying Exams:

Analysis

Date:	P/F:
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Area Exams

Exam, Date:	P/F:
Exam, Date:	P/F:

3. Master's Thesis

- a. Advisor:
- b. Date:
- c. Committee Members:

4. Date of Master's Defense:

- a. Date Degree Conferred:

Doctoral Candidacy

Doctoral Candidacy must be achieved before the beginning of the 9th semester.

All required and area courses must be completed and a proposal of research goals must be presented to an approved committee for acceptance.

5. Doctoral Thesis

- a. Advisor:
- b. Date:
- c. Committee Members:
- d. Topic of Research:

6. Date of Proposal:**7. Date of Doctoral Defense:**

This form is intended to be a checklist for Candidacy only. It is the responsibility of the student to read the General Announcements and their Graduate Handbook and to fulfill ALL of the requirements spelled out in each.

* For Transfer Credit attach a copy of the documents submitted to the Registrar for transfer credit approval.

** Initials of advisor + approval of Graduate Committee

Students entering with the MA degree may be evaluated case-by-case by the Graduate Committee to waive the MA requirement.

