# Table of Contents

Table of Contents 1

1. **Overview, Purview, and Resources** 9
   1.1 *Purpose and Purview of Program Handbook* 9
   1.2 *Graduate School* 10
     1.2.1 Graduate School Handbook 10
     1.2.2 Good Academic Standing 10
     1.2.3 Graduate School Fellowships 10
   1.3 *Other University Services and Policies* 10
     1.3.1 Registrar & Enrollment Services 10
     1.3.2 Employment and Benefits 11
     1.3.3 Disability Services 11
     1.3.4 Academic Misconduct 11
     1.3.5 General Human Resource Policies 11
   1.4 *State and Federal Policies* 12
     1.4.1 FERPA 12
     1.4.2 Federal and State Grants 12
     1.4.3 Visas & Immigration 12
     1.4.4 State (and University) Policies for Teaching 12
   1.5 *Department Administration and Staff* 12
   1.6 *Mathematics Graduate Office* 13
   1.7 *Program Handbook Overview* 13

2. **Graduate Studies Committee** 14
   2.1 *General* 14
   2.2 *Membership* 14
   2.3 *Responsibilities* 14
     2.3.1 Curricular Development and Oversight 14
     2.3.2 Advising and Teaching Practices 14
     2.3.3 Financial Support Policies 14
     2.3.4 Academic Evaluation of Graduate Students 15
     2.3.5 Financial Support 15
     2.3.6 Awards and Nominations 15
     2.3.7 Petitions and Transfers of Degree Programs 15
     2.3.8 Special Appointments 15
   2.4 *Student Interaction with the GSC* 16
# Table of Contents

2.4.1 Petitions for Program Exemptions 16
2.4.2 Applications for Financial Support 16
2.4.3 Travel and Other Funding Requests 16
2.4.4 General Program Concerns 17

3. **Advising and Graduate Faculty** 17
   3.1 Graduate Faculty Status and Nominations 17
   3.2 Primary, Secondary, and External Advising 18
   3.3 Advisor Roles 18
     3.3.1 Academic Advisor 18
     3.3.2 Department Advisor 18
     3.3.3 Faculty Advisor 18
     3.3.4 Dissertation Advisor 19
     3.3.5 Research Advisor 19
     3.3.6 Other Conventions 19
   3.4 Advisor Assignments and Elections 19
     3.4.1 Preliminary Advisor Assignments and Graduate Advising Committee 19
     3.4.2 Advisor Change Form 19

4. **Course Offerings and Enrollment** 20
   4.1 Curricular Levels and Numbering 20
     4.1.1 5000-Level 20
     4.1.2 6000-Level 20
     4.1.3 7000-Level 20
     4.1.4 8000-Level 20
     4.1.5 Subject Area Numbering 21
     4.1.6 Sequence Numbering 21
   4.2 Offering Schedules and Patterns 21
     4.2.1 By Academic Year 21
     4.2.2 Sequences, Semesters, and Sessions 22
     4.2.3 Weekly and Daily Schedule 22
     4.2.4 Faculty Availability and Enrollment Thresholds 22
   4.3 Courses without Letter-Grading 22
     4.3.1 Independent Study 23
     4.3.2 7000-Level .02-Sections 23
     4.3.3 Research 23
     4.3.4 Other S/U Courses 23
     4.3.5 Audited Courses 23
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4</td>
<td>University Enrollment Policies</td>
<td>24</td>
</tr>
<tr>
<td>4.4.1</td>
<td>Deadlines</td>
<td>24</td>
</tr>
<tr>
<td>4.4.2</td>
<td>Summary of Minimum Enrollments</td>
<td>24</td>
</tr>
<tr>
<td>4.4.3</td>
<td>Maximum Enrollments</td>
<td>24</td>
</tr>
<tr>
<td>5.1</td>
<td>Admissions</td>
<td>25</td>
</tr>
<tr>
<td>5.1.1</td>
<td>Admissions via Applications</td>
<td>25</td>
</tr>
<tr>
<td>5.1.2</td>
<td>Admissions via Transfers</td>
<td>25</td>
</tr>
<tr>
<td>5.1.3</td>
<td>Graduate Recruitment Committee</td>
<td>26</td>
</tr>
<tr>
<td>5.1.4</td>
<td>GSC Admission Decisions</td>
<td>26</td>
</tr>
<tr>
<td>5.1.5</td>
<td>Other Admissions</td>
<td>26</td>
</tr>
<tr>
<td>5.1.6</td>
<td>Admission Requirements and Expectations</td>
<td>27</td>
</tr>
<tr>
<td>5.2</td>
<td>Academic Standing and Remediation</td>
<td>27</td>
</tr>
<tr>
<td>5.2.1</td>
<td>Program Academic Standing</td>
<td>27</td>
</tr>
<tr>
<td>5.2.2</td>
<td>Program Progress Remediation</td>
<td>27</td>
</tr>
<tr>
<td>5.2.3</td>
<td>Petitions and Standards for Progress Remediation</td>
<td>27</td>
</tr>
<tr>
<td>5.2.4</td>
<td>Failing Expectations and Disenrollment</td>
<td>28</td>
</tr>
<tr>
<td>5.3</td>
<td>Financial Support Eligibility</td>
<td>28</td>
</tr>
<tr>
<td>5.3.1</td>
<td>Overview of Types of Support</td>
<td>28</td>
</tr>
<tr>
<td>5.3.2</td>
<td>Availability by Degree</td>
<td>28</td>
</tr>
<tr>
<td>5.3.3</td>
<td>Eligibility and Academic Standing</td>
<td>29</td>
</tr>
<tr>
<td>5.4</td>
<td>Intake: Headstart, Offices, IT, and Prior Credits</td>
<td>29</td>
</tr>
<tr>
<td>5.4.1</td>
<td>Headstart</td>
<td>29</td>
</tr>
<tr>
<td>5.4.2</td>
<td>Office Space and IT Support</td>
<td>30</td>
</tr>
<tr>
<td>5.4.3</td>
<td>Prior Course Credit</td>
<td>30</td>
</tr>
<tr>
<td>5.5</td>
<td>Graduation Requirements and Procedures for all Degrees</td>
<td>30</td>
</tr>
<tr>
<td>5.5.1</td>
<td>University Credit Hour and Residency Requirements</td>
<td>30</td>
</tr>
<tr>
<td>5.5.2</td>
<td>Applications to Graduate</td>
<td>31</td>
</tr>
<tr>
<td>5.5.3</td>
<td>Committee Membership</td>
<td>31</td>
</tr>
<tr>
<td>5.5.4</td>
<td>Scheduling and Attendance</td>
<td>32</td>
</tr>
<tr>
<td>5.5.5</td>
<td>Dissertation and Thesis Documents – Content, Integrity, and Evaluation</td>
<td>32</td>
</tr>
<tr>
<td>5.5.6</td>
<td>Dissertation and Thesis Documents – Technical Issues</td>
<td>32</td>
</tr>
<tr>
<td>5.6</td>
<td>Check-Out and Post-Graduation</td>
<td>33</td>
</tr>
<tr>
<td>6.1</td>
<td>Admission Policies and Requirements</td>
<td>33</td>
</tr>
<tr>
<td>6.1.1</td>
<td>Submission of Applications</td>
<td>34</td>
</tr>
</tbody>
</table>
TABLE OF CONTENTS

6.1.2 Expected Preparations and Application Requirements – Theoretical Track 34
6.1.3 Expected Preparations and Application Requirements – Applied Track 34

6.2 Time Expectations and Reinstatement 35
6.2.1 General Time Expectations 35
6.2.2 Leaves and Reinstatement 35
6.2.3 Continued Enrollment Beyond Time Expectations 35

6.3 Overview and Timeline of Pre-Candidacy Requirements 36

6.4 Qualifying Requirement – Theoretical Track 37
6.4.1 Overview 37
6.4.2 Subject Passes via Regular Course Completion 37
6.4.3 Subject Passes via Examination 37
6.4.4 Subject Pass via Sequence Substitution 38
6.4.5 Timeline and Evaluation of Requirements 38

6.5 Qualifying Requirement – Applied Track 39
6.5.1 Overview 39
6.5.2 Selection Rules for Qualifying Subjects 39
6.5.3 Timeline and Evaluation of Requirements 39

6.6 Breadth Requirement – Theoretical Track 40
6.6.1 Purpose and Selection Rules 40
6.6.2 Relation to Qualifying Requirement 40
6.6.3 Breadth Area and Sequence List 40
6.6.4 Time Expectations and Evaluation 41

6.7 Breadth Requirement – Applied Track 41
6.7.1 Selection Rules 41
6.7.2 Relation to Qualifying Requirement 42
6.7.3 Mathematics Breadth Area and Course List 42
6.7.4 Time Expectations and Evaluation 43

6.8 Foreign Language Requirement 43
6.8.1 Purpose and Options 43
6.8.2 Language Course Completion 43
6.8.3 Language Examination 43
6.8.4 Timeline and Reporting 43

6.9 Candidacy Examination 44
6.9.1 Overview, Purpose, and Scope of Examination 44
6.9.2 Application and Scheduling 44
6.9.3 Advisor as Committee Chair 44
## Table of Contents

6.9.4 Other Committee Members 45
6.9.5 Written Portion 45
6.9.6 Oral Portion 45
6.9.7 Result of Examination 46
6.10 Candidacy 46
   6.10.1 Definition and Time Expectations 46
   6.10.2 Three-Hour Enrollment 47
   6.10.3 Continuous Enrollment 47
6.11 Dissertation and Final Examination 47
   6.11.1 Summary of General Graduation Procedures 47
   6.11.2 Summary of Final Examination Rules and Guidelines 48
7. Master of Science 48
   7.1 Eligibility, Admission, and Option Overview 48
      7.1.1 Eligibility 48
      7.1.2 Options 49
      7.1.3 Admission and Credits 49
   7.2 Thesis Option 49
      7.2.1 Elective Coursework 50
      7.2.2 Algebra Requirement 50
      7.2.3 Analysis Requirement 50
      7.2.4 Master's Thesis & Examination: 50
   7.3 Non-Thesis Option 50
      7.3.1 Elective Course Work: 50
      7.3.2 Algebra Requirement: 50
      7.3.3 Analysis Requirement: 50
      7.3.4 Qualifying Examination Alternative: 51
      7.3.5 Master's Examination/Project: 51
   7.4 Candidacy Option 51
7.5 MS Electives 51
      7.5.1 List of Elective Courses 51
      7.5.2 Dual Use of Courses 52
8. Graduate Minor 52
   8.1 Overview, Eligibility, and Admission 52
      8.1.1 Eligibility 52
      8.1.2 Enrollment and Approval 52
   8.2 Requirements 53
8.2.1 General Requirements 53
8.2.2 Curricular Constraints 53
8.3 **Timeline, Transcript Designation, and Support** 53
 \hspace{.5cm} 8.3.1 Time and Enrollment Expectations 53
 \hspace{.5cm} 8.3.2 Gradforms and Transcript Designation 53
9. **Master of Actuarial and Quantitative Risk Management** 54
 \hspace{.5cm} 9.1 **Admission Policies and Requirements** 54
 \hspace{1.5cm} 9.1.1 Submission of Applications 54
 \hspace{1.5cm} 9.1.2 Expected Preparations and Application Requirements 54
 \hspace{1.5cm} 9.1.3 Tuition Deposit 55
 \hspace{.5cm} 9.2 **Fees, Support, and Eligibility** 55
 \hspace{.5cm} 9.3 **Time Expectations, Options, and Advising Sheets** 55
 \hspace{.5cm} 9.4 **Required Hours, Exams, and Courses** 55
 \hspace{1.5cm} 9.4.1 Financial Mathematics Prerequisite 55
 \hspace{1.5cm} 9.4.2 Required Hours 56
 \hspace{1.5cm} 9.4.3 Oral and Comprehensive Examinations 56
 \hspace{1.5cm} 9.4.4 Required Courses 56
 \hspace{.5cm} 9.5 **Elective Sequences and Courses** 56
 \hspace{1.5cm} 9.5.1 Elective Course Sequences 57
 \hspace{1.5cm} 9.5.2 Elective Courses 57
 \hspace{.5cm} 9.6 **Thesis, Practicum, and Internship Projects** 57
10. **Master of Mathematical Sciences** 58
 \hspace{.5cm} 10.1 **Admission Policies and Requirements** 58
 \hspace{1.5cm} 10.1.1 Submission of Applications 58
 \hspace{1.5cm} 10.1.2 Expected Preparation and Application Materials for All Tracks 58
 \hspace{1.5cm} 10.1.3 Preparation Specific to Tracks 59
 \hspace{.5cm} 10.2 **Degree Requirements and Time Expectations For All Tracks** 59
 \hspace{1.5cm} 10.2.1 Course Requirements 59
 \hspace{1.5cm} 10.2.2 Practical Experience 59
 \hspace{1.5cm} 10.2.3 Thesis Advisor and Thesis Writing 60
 \hspace{1.5cm} 10.2.4 Thesis Committee and Defense 60
 \hspace{.5cm} 10.3 **Course Requirements – Bioscience Track** 60
 \hspace{1.5cm} 10.3.1 Required Courses 60
 \hspace{1.5cm} 10.3.2 Allowed Substitutions of Required Courses 61
 \hspace{1.5cm} 10.3.3 Elective Courses 61
 \hspace{.5cm} 10.4 **Course Requirements – Educators Track** 61
# Table of Contents

10.4.1 Required Courses 61
10.4.2 Allowed Substitutions of Required Courses 62
10.4.3 Elective Courses 62

**10.5**  *Course Requirements – Computational Track* 62

10.5.1 Required Courses 62
10.5.2 Allowed Substitutions of Required Courses 63
10.5.3 Elective Courses 63

10.6  *Non-Thesis Exemption for Computational Track* 63

## 11. Financial Support 64

### 11.1  *Graduate School Fellowships* 64

11.1.1 Graduate School Terms and Responsibilities 64
11.1.2 Eligibility and Nominations 64
11.1.3 Program Policies for Graduate School Fellowships 65

### 11.2  *Graduate Associate Positions* 65

11.2.1 Overview and Typology 65
11.2.2 General University Policies and Rules 66
11.2.3 Policies and Stipend Levels for Departmental GA Positions 67
11.2.4 Regular Graduate Teaching Associateships 68
11.2.5 Regular Departmental Graduate Research Associateships 69
11.2.6 Regular Externally or Individually Funded Graduate Research Associateships 69
11.2.7 Overload GA Positions 70

### 11.3  *Summer Support and Student Associate Positions* 71

11.3.1 Student Associate Positions 71
11.3.2 Summer Enrollment and Partial Graduate Associate Positions 71
11.3.3 Common Types of Summer Support Positions 72
11.3.4 Departmental Summer Support Awards Process 72

### 11.4  *Miscellaneous Financial Support* 73

11.4.1 Travel Support 73
11.4.2 Office Support 73
11.4.3 Post-Graduation Lecturer Support 74

## 12. GTA and STA Responsibilities 74

### 12.1  *Types of Teaching Duties* 74

12.1.1 Recitation Instructor 74
12.1.2 TA Grader 75
12.1.3 Instructor of Record 75
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.1.4 Large Class Lecturer</td>
<td>76</td>
</tr>
<tr>
<td>12.2 <em>Teaching Assignments, Scheduling, Supervision, and Evaluations</em></td>
<td>76</td>
</tr>
<tr>
<td>12.2.1 Teaching Assignments and Scheduling</td>
<td>76</td>
</tr>
<tr>
<td>12.2.2 Supervision of Teaching Associates and Mandatory Meetings</td>
<td>77</td>
</tr>
<tr>
<td>12.2.3 Student Evaluation of Instruction of TAs</td>
<td>77</td>
</tr>
<tr>
<td>12.2.4 Faculty, Staff, and Peer Evaluation of Instruction of TAs</td>
<td>78</td>
</tr>
<tr>
<td>12.3 <em>Conduct, Reporting, and Student Relations</em></td>
<td>78</td>
</tr>
<tr>
<td>12.3.1 Professional Focus and Responsibility</td>
<td>78</td>
</tr>
<tr>
<td>12.3.2 Proper Interactions with Students</td>
<td>79</td>
</tr>
<tr>
<td>12.3.3 Privacy of Student Records</td>
<td>79</td>
</tr>
<tr>
<td>12.3.4 Student Complaints and Disruptive Students</td>
<td>80</td>
</tr>
<tr>
<td>12.3.5 Academic Misconduct</td>
<td>80</td>
</tr>
<tr>
<td>12.3.6 Disability Accommodations</td>
<td>80</td>
</tr>
<tr>
<td>12.3.7 Other Student Support</td>
<td>81</td>
</tr>
<tr>
<td>12.4 <em>TA Absences</em></td>
<td>81</td>
</tr>
<tr>
<td>12.4.1 Absences from TA Duties</td>
<td>81</td>
</tr>
<tr>
<td>12.4.2 Unexpected and Emergency Short-Term Absences</td>
<td>81</td>
</tr>
<tr>
<td>12.4.3 Planned or Foreseeable Short-Term Absences</td>
<td>82</td>
</tr>
<tr>
<td>12.4.4 Unplanned Long-Term Absence</td>
<td>82</td>
</tr>
<tr>
<td>12.4.5 Planned or Foreseeable Long-Term Absence and the GTAOC</td>
<td>82</td>
</tr>
<tr>
<td>12.5 <em>Additional TA Resources and Opportunities</em></td>
<td>83</td>
</tr>
<tr>
<td>12.5.1 Questions and Disputes about TA Policies</td>
<td>83</td>
</tr>
<tr>
<td>12.5.2 Office Resources</td>
<td>83</td>
</tr>
<tr>
<td>12.5.3 Course Office</td>
<td>83</td>
</tr>
<tr>
<td>12.5.4 Michael V. Drake Institute for Teaching and Learning</td>
<td>83</td>
</tr>
<tr>
<td>12.5.5 The Preparing Future Faculty (PFF) Program</td>
<td>84</td>
</tr>
<tr>
<td>12.5.6 Post-Doctorate Teaching Support</td>
<td>84</td>
</tr>
<tr>
<td>12.6 <em>Teaching Awards</em></td>
<td>84</td>
</tr>
<tr>
<td>12.6.1 Distinguished First-Year Graduate Teaching Associate Award</td>
<td>84</td>
</tr>
<tr>
<td>12.6.2 Phil Huneke Excellence in Teaching Award</td>
<td>84</td>
</tr>
<tr>
<td>12.6.3 ASC Graduate Student Award for Teaching Excellence</td>
<td>85</td>
</tr>
<tr>
<td>12.6.4 Graduate Associate Teaching Award</td>
<td>85</td>
</tr>
<tr>
<td>13. <em>Course Lists</em></td>
<td>85</td>
</tr>
<tr>
<td>13.1 <em>Graduate Minor Sample Curricula</em></td>
<td>85</td>
</tr>
<tr>
<td>13.1.1 Engineering &amp; Physics</td>
<td>85</td>
</tr>
<tr>
<td>13.1.2 Economics &amp; Finance</td>
<td>86</td>
</tr>
</tbody>
</table>
1. Overview, Purview, and Resources

On behalf of our Graduate Studies Committee (GSC) of the Department of Mathematics of the Ohio State University, we welcome all students seeking one of the graduate degrees offered by our program.

1.1 Purpose and Purview of Program Handbook

This document details requirements of our program for obtaining a degree as well as policies for graduate student financial support. Further, it seeks to provide information and guidance for students to successfully navigate requirements and policies set by the university.

At the core of graduate education is the intellectual interaction of faculty and students. Graduate faculty of our department teach mathematics in graduate courses and seminars, engage and guide students in mathematical research, and help provide a productive and supportive scientific and learning environment. In their roles as instructors, advisors, and committee members, faculty also set the performance standards for students.

This handbook reflects these standards and determines the mechanisms of oversight by our graduate faculty. Program requirements, rules, and policies in this document have been established and are continuously monitored by the GSC. The GSC can consider exemptions from program rules on an individual petition basis.

Graduate students need to be aware of other rules, policies, and regulations imposed by other entities. Many of these are not within the purview of our program and it is beyond the scope of this handbook to comprehensively itemize all of such policies here.

Nevertheless, some of the most relevant entities are briefly mentioned in the following sections of this introduction, both in order to make students aware of them and to delineate the scope of this document. Students are responsible for informing themselves about and complying with the details of policies and regulations outside our program.
1.2 GRADUATE SCHOOL

The Graduate School oversees all graduate education at the university. It has implemented numerous procedures and academic standards that apply to all graduate programs and graduate students on campus. It also provides several services and resources to graduate students and graduate programs.

1.2.1 Graduate School Handbook

The Graduate School Handbook (GSH) is maintained and updated by the Graduate School. It contains all university level rules and procedures pertinent to graduate education and is available online at [http://gradsch.osu.edu/handbook](http://gradsch.osu.edu/handbook).

Petitions for exemptions need to be directed to the Graduate School and require the support of advisors and the GSC in our program. Although some petitions for exemptions are routinely approved, many other exemptions are typically granted only in truly exceptional circumstances. Graduate School rules supersede any departmental rules, information, or decisions.

Various Graduate School rules concerning examination procedures are included in this program handbook for convenience. Students should, nevertheless, check for the latest updates in the GSH.

1.2.2 Good Academic Standing

The Graduate School also defines good academic standing at the university level. The most important condition is to maintain a cumulative graduate grade point average of 3.0 or higher in all graduate courses taken at Ohio State, including courses taken for graduate credit before entering our graduate program and graduate courses outside of mathematics.

Students may also lose good standing by failing examinations twice or for violations of various university policies. The GSH describes policies and procedures for warnings, remediation, probation, and dismissal of students who fail to maintain good standing. Students who are dismissed will not be allowed to enter any other graduate program at Ohio State.

1.2.3 Graduate School Fellowships

The Graduate School also sets and monitors policies for University, Enrichment, and Presidential Fellowships. These fellowships are contracts between the individual student and the Graduate School so that contractual obligations are mostly outside the purview of the department.

1.3 OTHER UNIVERSITY SERVICES AND POLICIES

Students also need to abide by policies and procedures of additional university entities. A few relevant examples are the following:

1.3.1 Registrar & Enrollment Services

Registration for courses is subject to numerous deadlines and fees. In order to maintain full-time or half-time student status, students need to be enrolled in the respective minimum
number of credit hours as determined by the Graduate School. Student status determines eligibility for graduate associate appointments, visa status, student health insurance, and other benefits. Students can find more detailed information at [https://registrar.osu.edu](https://registrar.osu.edu).

### 1.3.2 Employment and Benefits

Graduate Associate (GA) and Student Associate (SA) appointments are subject to university policies, including procedures for monthly, weekly, and hourly pay, various deductions for tax, retirement, insurance, and other student benefits, as well as enrollment and status requirements. GA appointments are subject to rules of the Graduate School and include special benefits which can be found at [https://hr.osu.edu/benefits/student-employee](https://hr.osu.edu/benefits/student-employee).

Health insurance information for students, regardless of employment, is provided at [https://shi.osu.edu](https://shi.osu.edu).

### 1.3.3 Disability Services

Students who require special accommodations due to disabilities should register with Student Life Disability Services and coordinate arrangements with our program. Policies, contacts, and other information can be found at [https://slds.osu.edu](https://slds.osu.edu).

### 1.3.4 Academic Misconduct

The Office of Academic Affairs (OAA) at OSU has established standards, policies, and procedures for preventing and handling academic misconduct. They are based on the university's [Student Code of Conduct](https://oaa.osu.edu/academic-integrity-and-misconduct/student-misconduct) and enforced by the [Committee on Academic Misconduct](https://oaa.osu.edu/academic-integrity-and-misconduct/student-misconduct). Students should familiarize themselves with these standards as they apply to conduct and practices in classrooms, exams, scientific communication, research articles, theses, and dissertations. More information and links are offered at [https://oaa.osu.edu/academic-integrity-and-misconduct/student-misconduct](https://oaa.osu.edu/academic-integrity-and-misconduct/student-misconduct).

### 1.3.5 General Human Resource Policies

The university and department are committed to ensuring a safe environment for all students, faculty, and staff, free of any form of discrimination or harassment. Everyone affiliated with the department or university is thus expected to abide by the respective university policies, including, in particular, the published policies on "Affirmative Action, Equal Employment Opportunity & Non-Discrimination/Harassment" posted at [http://hr.osu.edu/policy/policy110.pdf](http://hr.osu.edu/policy/policy110.pdf) and "Sexual Misconduct" posted at [http://hr.osu.edu/policy/policy115.pdf](http://hr.osu.edu/policy/policy115.pdf).

Moreover, all students are required to complete the Title IX training of the university. Information and links are available at [https://titleix.osu.edu](https://titleix.osu.edu).
1.4  **STATE AND FEDERAL POLICIES**

Students also need to be aware of relevant policies set by state and federal agencies outside of the university. The university and department can help students understand and navigate these. Here are a few pertinent examples:

1.4.1  **FERPA**

The Family Educational Rights and Privacy Act (FERPA) protects the privacy of student education records. Graduate students should keep in mind that this protects not only their own records and those of their peers, but also applies to the records of undergraduates they teach as teaching associates.

Further explanations of FERPA and procedures to comply with FERPA are provided by the university at the following web pages:

https://registrar.osu.edu/policies/FERPA.asp

https://registrar.osu.edu/policies/releaseinfo.asp


1.4.2  **Federal and State Grants**

Students supported by external grants may need to observe additional policies by granting agencies such as the NSF, NSA, NIH, or DOE. Students should confer with the P.I.s of the respective grants and inform themselves from resources made available from granting agencies.

1.4.3  **Visas & Immigration**

International students will need to comply with visa policies set by the US State Department and immigration policies set by the USCIS, as applicable. Students can direct questions to the Office of International Affairs on campus. For basic information and contacts visit https://oia.osu.edu.

1.4.4  **State (and University) Policies for Teaching**

The state of Ohio requires all teachers in public schools to be sufficiently proficient in oral English communication. This requirement is monitored by the ESL Spoken English Program of the university. All graduate students who are not native English speakers and who are seeking GTA support will need to comply with the university’s spoken English certification process. More information can be found at https://esl.ehe.osu.edu/programs/spoken-english-program/.

1.5  **DEPARTMENT ADMINISTRATION AND STAFF**

Graduate program procedures also need to coordinate and comply with the department’s Pattern of Administration (POA), established departmental policies and procedures, as well as decisions by the Executive and Advisory Committees.

The following departmental faculty and staff fulfill functions in our program:
**Regular Faculty**

Department Chair: Jean-François Lafont.1  
Graduate Studies Committee Chair: Barbara Keyfitz.2  
Vice-Chair for Graduate Studies: Thomas Kerler.2  
MAQRM Program Director: Chunsheng Ban.1  
Graduate Minor Chair: Barbara Keyfitz.2  
Language Coordinator: Andrzej Derdzinski.1  
GTA Absence Oversight Chair: Feride Tiglay.1  
Vice-Chair for Undergraduate Studies: Chunsheng Ban.1

**Primary Staff**

Graduate Program Coordinator: Erin Anthony.69  
Director for Undergraduate Instruction: William Husen.1  
Coordinator of the Office of TA Support: Dan Boros.9  
TA Scheduling Specialist: Jessica Wheeler.1011  
TA Offices & Logistics: John Lewis.361  
Human Resources: Dawn Jones.2272

1.6 **Mathematics Graduate Office**

All departmental aspects of the mathematics graduate program are managed by the Vice-chair for Graduate Studies (VC) and the Graduate Program Coordinator (GPC). Students who need assistance or have questions regarding policies and procedures described in this program handbook should contact our Graduate Office at

Room: Math Building (MA) 102    Phone: (614) 292-6274

or send an email to

grad-office@math.osu.edu (for current students)  
grad-info@math.osu.edu (for prospective students)

1.7 **Program Handbook Overview**

In Sections 2, 3, and 4, the policies, procedures, and infrastructure applying to all students and degrees of our program are described. This includes oversight by our Graduate Studies Committee, individual advising, course offerings, and enrollment policies.

The subsequent sections provide in detail the standards, requirements, and expectations for each degree offered by our program.

Sections 11 and 12 contain rules and policies regarding departmental financial support.
2. GRADUATE STUDIES COMMITTEE

2.1 GENERAL

The Graduate Studies Committee (GSC) oversees all academic aspects of the mathematics graduate program. The committee is recognized and required by the Graduate School and is the deliberating body representing the entire graduate faculty of our department.

2.2 MEMBERSHIP

The GSC consists of about 8 regular mathematics faculty, appointed each year by the chair of the department. The department chair also appoints the chair of the GSC.

In addition, the GSC includes two graduate students as representatives of the student body. The graduate student representatives are appointed by the VC, and they are excused from meetings in which petitions or performances of other individual students are discussed.

In addition, the VC, the GPC, and the Coordinator of the Office of TA Support serve as ex-officio (non-voting) members of the GSC.

2.3 RESPONSIBILITIES

The first general role of the Graduate Studies Committee (GSC) is to assure the academic quality and academic standards of our graduate program. Its second main role is to evaluate the academic merits of individual students. The following is a more detailed list of specific responsibilities and tasks that the GSC regularly assumes:

2.3.1 Curricular Development and Oversight

The GSC continuously monitors the academic performance and viability of our graduate degrees and graduate curriculum. The GSC establishes new degree programs or revises the structure and requirements of existing ones. It will also participate in the respective university and state approval processes. Similarly, the GSC creates or revises graduate courses as needed.

The GSC, further, decides each year on the graduate course offerings and staffing of graduate courses based on established patterns, need, and faculty input. Moreover, the GSC organizes and oversees departmental examinations that are part of degree requirements.

2.3.2 Advising and Teaching Practices

The GSC monitors general practices for advising students and teaching classes and may issue respective recommendations. The GSC also oversees the nominations of faculty members for graduate faculty status.

2.3.3 Financial Support Policies

The GSC works together with the department administration in establishing general policies that govern the award of financial aid as well as the terms and conditions for student recipients of such support.
2.3.4 Academic Evaluation of Graduate Students

Each spring semester the GSC reviews the academic performance of all graduate students in our program. The review is based on course work and exams by the student, progress towards fulfilling degree expectations, as well as information collected through a respective survey. The survey, usually conducted online, requires students to submit a self-assessment of their progress as well as their academic plans for the upcoming year. Advisors, in turn, submit assessment of their advisees’ performance and estimated examination dates in the same survey.

The GSC determines for each student whether academic progress has been satisfactory, decides on possible pre-conditions for continuation, and formulates expectations for the upcoming academic year. Further, the GSC decides on actions for students who do not make satisfactory progress.

Students and their respective advisors are informed about the outcomes of the academic performance review in a letter from the GSC Chair.

2.3.5 Financial Support

The GSC decides on financial support from departmental sources for continuing graduate students. During the annual performance review teaching associateships for the upcoming academic year are decided. Summer support is also decided by the GSC.

The GSC also decides on the award of semester long departmental fellowships through a competitive application process. Finally, the GSC considers applications for funding of student travel and tuition for course credits beyond departmental policies.

2.3.6 Awards and Nominations

The GSC determines the winners and finalists of the Phil Huneke Distinguished Graduate Teaching Associate Award and oversees the First Year Graduate Teaching Associate Award each year. The GSC also oversees decisions for nominations for the Graduate School’s Presidential Fellowships and other departmental nominations based on academic merits.

2.3.7 Petitions and Transfers of Degree Programs

The GSC considers petitions by individual students that request exemptions from any of the program rules set in this handbook. It also advises the VC regarding support of student petitions to the Graduate School.

Moreover, the committee decides on transfers between different master’s degrees or degree tracks and transfers from the PhD degree program to a master’s program.

2.3.8 Special Appointments

The GSC also appoints or confirms, at appropriate times during the semester, key faculty to whom special responsibilities pertaining to current graduate students are entrusted. Examples include the Graduate Minor Chair, chairs of the qualifying examination committees, selection committees for Presidential Fellowships, or lead faculty for each of our master’s degrees and tracks.
2.4 STUDENT INTERACTION WITH THE GSC

This section describes several processes in which graduate students interact with the GSC.

2.4.1 Petitions for Program Exemptions

Petitions for exemptions from program requirements should be discussed with the student’s advisor. It is also advisable to consult with the GSC Chair or VC regarding existing precedent and viability before submissions. A petition needs to include the following:

a) A written request by the student, clearly explaining which of the program requirements is requested to be waived or modified. The petition letter should also include a well thought out justification for the request.

b) A letter of support from the student’s current primary advisor. The letter should make it clear that the advisor has been consulted, approves/disapproves of the proposed petition, and provide explanations for a support decision.

Both documents need to be submitted by email to the GSC Chair and the Mathematics Graduate Office (grad-office@math.osu.edu).

Once the submission is complete the GSC Chair will put the petition on the GSC agenda, depending on the meeting schedule and other committee priorities. The GSC Chair may also use other formats of deliberation, such as e-mail or video conferencing, depending on circumstances. The discussion will exclude graduate student representatives and faculty with conflicts of interest, such as advisors.

The GSC decision on a petition is communicated in writing (usually via e-mail) to the student and advisor by the GSC Chair.

2.4.2 Applications for Financial Support

Continuing students submit their applications for financial support as a teaching associate during the academic year and for departmental summer support in the same submission process as the academic performance review. Applications and self-assessments must be submitted by every student through an online interface early in the spring semester. Links and details are announced by the Graduate Office each year.

Each application also requires a subsequent submission by the current primary advisor. The department does not grant continuation of financial support without a complete application.

Students who want to compete for semester-long departmental fellowships which carry no teaching duties also apply for these through an online system. The submission will, similarly, require the advisor to submit a letter of support.

Depending on available funds, a competition is held late in the spring semester for the upcoming academic year. Additional funding permitting, a second competition is opened during the fall semester for the upcoming spring semester. Links and details are announced by the Graduate Office.

2.4.3 Travel and Other Funding Requests

Requests for special funds require both a student application and a support letter from the advisor as described for regular petitions in 2.4.1 above. For travel funding, students should submit their application online at
https://math.osu.edu/travel-support-application.

Other special funding requests such as extraordinary tuition coverage should be submitted as petitions. Deliberations and notifications are handled as per the petition process described in 2.4.1.

2.4.4 General Program Concerns

Students or groups of students who have concerns or suggestions about general policies or procedures in our program should contact the graduate student representatives to bring these to the attention of the GSC. Students are also encouraged to contact the GSC Chair or the VC with such concerns.

3. Advising and Graduate Faculty

All graduate students are required by the Graduate School to have an advisor. This section explains which faculty can serve as advisors, various functions and responsibilities of advisors, and procedures for advisor assignments.

3.1 Graduate Faculty Status and Nominations

In order to serve as an advisor, a faculty member needs to have graduate status with the university's Graduate School. Category P graduate faculty standing is required to serve on PhD committees and Category M for master's committees.

All tenure-track/tenured faculty with majority appointment in the mathematics department are automatically nominated for the PhD, MS, and MMS degrees upon entry or upon request. For assistant professors this usually implies that our department is the tenure initiating unit (TIU) as defined by university rules. Nominations are, by default, for the highest available category for each degree. These policies apply to both main and regional campus faculty.

Tenure-track and tenured faculty from other OSU departments may request the GSC to be nominated for graduate faculty status in one of our degrees. The request typically requires a CV, a rationale, as well as the demonstrated interest of a specific mathematics graduate student who wishes to work with them.

The nominations for graduate faculty status for the MAQRM degree are approved by the GSC on an as-needed basis.

Non-tenure-track and associated faculty as well as post-docs and lecturers are not eligible for graduate faculty status but may assist an official advisor in the supervision of theses and serve as additional non-voting members on committees.

Emeritus faculty may ask the GSC and the department chair to apply to the Graduate School for continued graduate faculty status after retirement. Generally, the department will grant such a request only for the purpose of completing the dissertation or thesis of a student already under the supervision of the faculty member at the time of retirement.
3.2 PRIMARY, SECONDARY, AND EXTERNAL ADVISING

Students may have multiple advisors with different roles at the same time. However, every student must have an assigned primary advisor who is the administrative contact for both the Graduate School and the department for the purpose of approvals, evaluations, inquiries, notifications, and chairing committees. Specific responsibilities of primary advisors, regardless of advisor role, include the following:

- Discusses study plan and approves course enrollments.
- Submits assessment of academic progress in the department’s annual evaluation of graduate students.
- Submits letters of support for petitions to the GSC.
- Serves as chair on Graduate School examination committees (if applicable).
- Signs various other university forms and petitions.

Secondary advisors should have graduate faculty status in an OSU unit which may be different from the mathematics department.

Faculty without OSU affiliations cannot serve as advisors or committee members. Faculty who leave OSU may request the GSC and Graduate School to remain co-advisor to current post-candidacy PhD or master’s students. A member of the graduate faculty for the respective degree will need to agree to serve as the primary advisor.

3.3 ADVISOR ROLES

Part of each advisor assignment is also the role that an advisor is expected to play. Below is a list of advisor designations available in the university’s student information system. For each formal role, the use in our program is explained with a more detailed description of the advising relationship it entails:

3.3.1 Academic Advisor

The main responsibilities of the Academic Advisor are to confer with beginning students about their study plans, approve their course enrollments, and help with the selection of research topics and advisors. Academic Advisors are normally not expected to work on research with the student or serve as committee chairs.

3.3.2 Department Advisor

The main role of the Department Advisor is to provide non-scientific guidance to the graduate advisee. This differs from the Academic Advisor in that this is used only as a secondary assignment and involves more intensive mentoring responsibilities that may go beyond strictly academic advice.

3.3.3 Faculty Advisor

The Faculty Advisor designation is for advisors directing master’s theses or master’s examinations in one of our master’s degrees and serving as chair on the respective examination committees.
3.3.4 Dissertation Advisor

The Dissertation Advisor prepares PhD students for their candidacy examination, supervises their dissertation research, and serves as chair on doctoral level committees.

3.3.5 Research Advisor

Research Advisors also supervise research of PhD or master’s students, but in a secondary role. Typical situations include the supervision of research projects that are not meant to lead up to theses or dissertations, advisor relationships required by an externally funded grant, or co-advisorship alongside a primary Faculty or Dissertation Advisor.

3.3.6 Other Conventions

The Academic Advisor is often also referred to as the Preliminary Advisor. The term Thesis Advisor is sometimes used for either the roles of Faculty or Dissertation Advisors. Normally, the designations Academic, Faculty, and Dissertation Advisors are used for primary assignments and the designations Department and Research Advisor for secondary assignments.

3.4 Advisor Assignments and Elections

3.4.1 Preliminary Advisor Assignments and Graduate Advising Committee

Every incoming student is assigned an Academic Advisor by the VC. In the case of PhD students, the assignments are usually decided in individual discussions with the VC during the intake process. For master’s students, typically one faculty member is assigned to each degree track to serve for all students in that track.

The collective of all preliminary advisors is the Graduate Advising Committee (GAC). The VC serves as the chair of the GAC and, in this function, can make changes to the preliminary advisor assignments due to faculty availability or special student requests.

3.4.2 Advisor Change Form

In order to elect a thesis advisor, a student needs to submit an Advisor Change Form to the department’s Graduate Office. The form has to be signed by the new advisor and the role of the new advisor indicated using the conventions from Section 3.3. The form is available in the Graduate Office and needs to be approved by the VC before the change is entered.

The form also needs to be submitted if the advising faculty member remains the same but the role of advising changes (for example, from Academic Advisor to Dissertation Advisor). Program requirements dependent on electing thesis advisors are considered met only upon the submission and approval of the form.

In situations in which the completion of the change form is not feasible the advisor change can also be made via email through the Graduate Office. Students need to adhere to respective instructions assuring that the student, the new advisor, and the VC all provide their consent for the change.
4. COURSE OFFERINGS AND ENROLLMENT

4.1 CURRICULAR LEVELS AND NUMBERING

The level of a mathematics graduate course is indicated by the first digit in the course number. Thus, graduate courses are referred to as 5000-level through 8000-level courses depending on the career level of the intended audience.

4.1.1 5000-Level

Courses numbered from 5000 to 5999 are dual career courses open to both undergraduates and graduates. All required and elective mathematics courses for our master's degree are at the 5000-level and, conversely, most 5000-level courses appear in some of our master's requirements. These courses typically include regular homework as well as midterm and final exams.

None of our 5000-level courses count toward any PhD requirements. However, beginning PhD students may elect these courses with consent of the advisor in special circumstances. This includes, for example, the Math 5201-5202 or Math 5111-5112 sequences for students who would benefit from further preparations before entering the respective doctoral level sequences.

4.1.2 6000-Level

6000-level courses primarily aim to provide first and second year PhD students with foundational knowledge and skills in doctoral level topics. The courses will normally include regular graded homework assignments as well as some amount of in-class testing.

Almost all 6000-level courses can be used to fulfill PhD qualifying or breadth requirements. Conversely, all courses contributing to the qualifying requirements are at the 6000-level. See Section 6 for details.

Requirements for the master's degrees allow students with strong backgrounds to use specified 6000-level courses as substitutes for required 5000-level courses with the permission of the advisor and instructor. Similarly, undergraduates with exceptionally strong preparations can be admitted with permission of the instructor, advisor, and VC.

4.1.3 7000-Level

This group of courses aims to serve more advanced PhD students with strong 6000-level preparations. The courses usually still require significant graded homework or project assignments, at least in the pre-candidacy sections.

Master's and undergraduate students need to petition the GSC to enroll and will be granted enrollment only in the most exceptional cases. Undergraduates may also need to submit a petition to the Graduate School.

4.1.4 8000-Level

Course numbers between 8000 and 8899 are reserved for topics courses, which aim to introduce students to specific research areas. All topics courses are letter graded. The required preparation level as well as the required work may vary considerably from course
to course. Students should confer about course expectations with the instructor and advisor before enrolling.

4.1.5 Subject Area Numbering

The second digit in the course number of a graduate course generally indicates the wider subject area. Exceptions are 5000-level courses that are also used as honors courses.

- **0** = Foundations: Logic, Set Theory.
- **1** = Algebra: Abstract, Number Theory, Algebraic Geometry, Lie Theory.
- **2** = Analysis: Real, Complex, Functional, Probability, Ergodic Theory.
- **4** = Differential Equations: Ordinary, Partial.
- **5** = Discrete Mathematics: Combinatorics, Graph Theory.
- **8** = Topology: General, Algebraic, Differential.

4.1.6 Sequence Numbering

Most graduate courses are part of a year-long sequence, consisting of a fall semester course and a follow-up spring semester course. Any two courses with successive course numbers (that is, \(N\) and \(N+1\)) belong to such a sequence, with the exception of the logic courses 6001-6004. Conversely, almost all courses belonging to the same sequence are numbered successively. Exceptions are the pairs 6411-6451 and 7711-7721, which are also considered sequences.

4.2 Offering Schedules and Patterns

This section explains scheduling patterns of letter-graded graduate courses with set syllabi that the department and GSC have traditionally followed.

4.2.1 By Academic Year

5000 and 6000-level courses are normally offered every academic year. Some exceptions with less regular offerings include Math 5451, 5756-5757, and logic courses Math 6001-6004. Priority is given to courses that are required for any of our degrees.

7000-level courses are normally only offered every other year. Courses scheduled to be offered in academic years with fall semester in an odd calendar year and spring semester in an even year (for example, AY17/18) are:

Math 7141-7142, 7211-7212, 7452-7453, 7651-7652, 7711-7721, 7851-7852

The course numbers offered in even-odd academic years are the following:

Math 7121-7122, 7161-7162, 7221-7222, 7412-7413, 7611-7612, 7811

Actual offerings may differ due to previously cancelled courses or unusual demand.

Topics courses at the 8000-level are determined each year by the GSC from faculty submissions and based on student need and interest.
4.2.2 **Sequences, Semesters, and Sessions**

Each graduate course is offered at most once in an academic year. For course sequences the first course in a sequence is offered in the fall semester and the second, follow-up course in the spring semester.

Stand-alone courses are scheduled each year by the GSC considering possible dependencies on other courses and student needs. All fall and spring courses are offered for the full semester sessions only.

Only a select few graduate courses are scheduled during the summer term depending on demand and availability. The only courses usually considered for a possible summer offering are Math 5221, 5251, 6151, 6152, special topics courses, or courses in mathematical finance.

4.2.3 **Weekly and Daily Schedule**

All graduate courses numbered above 6000 are scheduled in standard 55-minute time slots between 9:10am and 3:55pm and meet three times a week (Monday, Wednesday, Friday) for three credits with the following exceptions:

- The 5-credit qualifying courses Math 6111, 6112, 6211, and 6212 meet daily in standard 55-minute slots, alternating between lecture and recitation sections.
- The 4-credit courses Math 6601 and 6602 consist of three lecture hours scheduled following the regular pattern as well as a one-hour lab component scheduled with GSC approval.
- The 4 credit courses Math 6251 and 6252 follow a specially GSC approved schedule.

Weekly schedules for the Math 5111-5112 and Math 5201-5202 sequences are parallel to those of the respective 6000-level 5 credit hour courses, and required 3 credit hour courses in the MMS program follow the same meeting pattern as other 3 credit hour 6000-level courses. Other 5000-level courses may follow different schedules.

The GSC also maintains a master schedule of time slots for all graduate courses that attempts to minimize time conflicts. The GSC Chair communicates this schedule to the department’s scheduling staff.

4.2.4 **Faculty Availability and Enrollment Thresholds**

All course offerings are also subject to annual GSC approval, faculty availability, minimum enrollment rules, and departmental needs or constraints.

The minimum enrollment threshold for 5000-level courses to run is 11 students, 6000 and 7000-level courses require at least 6 enrolled students to run, and topics courses need at least 8 students.

The department starts making cancellation decisions on July 15 for the following autumn semester and on November 15 for the following spring semester, beginning with topics courses.

4.3 **Courses without Letter-Grading**

There are several types of courses and enrollments that are graded on a satisfactory/unsatisfactory (S/U) basis or otherwise do not require a letter grade. Failing an S/U course does not affect the cumulative graduate GPA but may affect other enrollment
requirements and inform later committee decisions. Most will require individual permissions by the instructor before enrolling.

4.3.1 Independent Study

Graduate students may enroll in individual studies classes with graduate faculty in our department using the 6193 or 7193 course numbers. Students should look up the class number of the professor they want to enroll with at the Graduate Office and enter the number on the Course Enrollment Permission form, also available at the Graduate Office.

*It is important to double check the class number to avoid erroneous enrollments with other faculty.*

Students can enroll in up to 9 hours with an individual faculty member for each class number. That is, up to 18 hours of independent study with one professor. Each student needs to negotiate credit hours, meeting arrangements, and expectations with the instructor before enrolling.

Uses of independent study classes include preparations for upcoming classes, study of topics not covered in regularly offered classes, exploration of possible research topics and advisors, as well as directed research preparations.

4.3.2 7000-Level .02-Sections

Nearly all 7000-level classes are divided into a .01-section and a .02-section. The .02-sections are S/U graded while the .01-sections are letter graded. Moreover, the .02-sections are open only to post-candidacy students in mathematics and require instructor permission. Requirements for a satisfactory grade are determined by the instructor and may be based on different assessment components than those used for the letter graded sections. For example, presentations may replace homework assignments and quizzes.

4.3.3 Research

Students conducting research for a master's thesis can enroll in Math 6999 with their advisor. Similarly, post-candidacy students working on their doctoral dissertation should normally enroll in Math 8999 with their advisor.

The department routinely creates sections for these course numbers during regular semesters for each graduate faculty member, and enrollment with the respective advisor can normally be done online without special permissions. Students should contact the Graduate Office for assistance in the case the needed sections are not available.

4.3.4 Other S/U Courses

Other S/U courses are Math 6191, 6998, 7998, and 8998. These are reserved for special activities and projects. Students should consult with the VC or GSC Chair before enrolling.

4.3.5 Audited Courses

Supported graduate students in our program are strongly discouraged to audit courses and may do so only with special permission from the advisor and VC. Audited courses do not count towards any graduation, credit, or enrollment requirements set by the university or our program.
However, they do incur tuition costs at regular rates. Students auditing courses on departmental support and without permission are expected to reimburse the department for the added tuition costs.

### 4.4 University Enrollment Policies

This section aims to provide only a brief overview of various university rules for course enrollments that students should be aware of. Details can be found on respective university web pages or documents.

#### 4.4.1 Deadlines

The university registrar publishes deadlines for adding and withdrawing from classes for each semester and session on the registrar’s web pages. The Graduate School very rarely grants exemptions from these rules.

Moreover, supported students will need to be enrolled for required minimum hours one week before the start of classes in order to avoid late fees or delays in their appointments.

Students should settle on their curriculum as early as possible, carefully consider contingencies, and make sure that their enrollments recorded on the university system reflect their intentions.

#### 4.4.2 Summary of Minimum Enrollments

There are numerous situations in which a minimum number of hours are required to maintain a service or a status. More details about appointment types and the respective enrollment requirements can be found in Section 11. The following are the most important examples:

- **Graduate Associate appointments (GRA, GTA, GAA):** For pre-candidacy and master’s students, 8 hours are required in autumn and spring semesters and 4 hours in the summer. The minimum for post-candidacy students is 3 hours for all terms.

- **University Fellowship appointments (PF, UF, GE, DUF, etc.):** For pre-candidacy and master’s fellows, 12 hours are required in autumn and spring semesters and 6 hours in the summer. The minimum for post-candidacy students is 3 hours for all terms.

- **Student Associate Appointment (SRA, STA):** These do not require any enrollment.

#### 4.4.3 Maximum Enrollments

Maximum enrollment for graduate students without permission is 18 hours during the autumn and spring semesters and 12 hours during the summer. Students who need to enroll in more hours should confer with the VC and obtain permission from their advisor using a Course Enrollment Permission form.

Enrollment hours beyond the required minimum hours for post-candidacy students and during summers are also restricted by departmental funding policies, as well as permissions by advisors and PI’s.
5. **GENERAL POLICIES AND PROCEDURES**

5.1 **ADMISSIONS**

All admissions to any of our degree programs are decided and approved by either the *Graduate Recruitment Committee* (GRC) or the GSC, depending on circumstances as described below. Individual faculty in the department may contribute recommendations and offer funding but cannot make admission decisions themselves. By default, admission decisions are also only for a specified degree track (subplan) and any change of tracks within the same degree program requires the respective committee approval.

5.1.1 Admissions via Applications

The department invites applications for admission to the autumn semester for the PhD, MMS, and MAQRM degrees each year. The deadline for full consideration is typically mid-December with some late applications considered at later stages of the admission process.

There are no spring or summer admissions for the PhD and MMS degrees, but, depending on enrollments, the department may open applications for spring admissions in the MAQRM degree.

The department does not open applications or actively recruit for the mathematics MS or MA degrees.

Applications need to be submitted via the online system provided by the university’s Office of Graduate and Professional Admissions (OGPA). This includes OSU undergraduate students. See Section 5.1.2 for applications of students who have been previously admitted to another OSU graduate program.

All applicants, regardless of graduate degree, must fulfill all Graduate School requirements. These include the completion of a 4-year bachelor’s degree, a minimum 3.0 cumulative GPA on 4.0 scale (or 75% of the grade scale) of the last advanced degree, and proof of English proficiency by achieving minimum scores on the TOEFL or IELTS tests. Our program considers the GPA and English requirements as hard rules and will not submit petitions for exemptions to the Graduate School. However, the department has petitioned for exceptionally strong international applicants who graduated from highly competitive 3-year undergraduate programs.

Access to the OGPA system and further information about general admission requirements can be found at


5.1.2 Admissions via Transfers

Students who have already been admitted to a graduate program at OSU need to submit a Transfer of Program form via gradforms.osu.edu.

Transfer requests that are decided on by the GRC require the full set of application materials, including statements, letters, scores, and transcripts that should be submitted via a special portal of the OGPA system by the advertised deadlines.
In exceptional circumstances students may submit transfer requests that are decided on by the GSC outside of the regular admission process. Students should contact the GSC Chair for requisite materials.

5.1.3 Graduate Recruitment Committee

The GRC membership is determined each year by the department chair. It consists entirely of mathematics graduate faculty and is chaired by the VC. The committee is typically divided into several subcommittees, each of which is responsible for the review of applications to a respective degree track. The GRC is responsible for admission decisions for the following applicant groups and situations:

- All applications submitted through the OGPA system.
- All applications or transfer requests to the PhD program, including those from students currently in the MS, MMS, or MAQRM programs.
- Transfer requests to master’s degrees from OSU graduate students who are not currently in our program.
- Transfer requests, usually during the summer, from students who have been admitted to one of our degree programs but have not yet started classes.

As admission decisions for students in the above categories are in the purview of the current GRC, applications or transfer requests may not be considered if the committee is not in session.

5.1.4 GSC Admission Decisions

The following are the circumstances in which the GSC may grant admission to degrees and degree tracks:

- All transfer requests of students currently in our program to one of our master's degree programs.
- Changes of tracks (subplans) of current graduate students in our program within the same degree (plan) and same degree level (doctoral/master).

If the GRC is not in session the GSC may decide on transfer requests to master’s programs from non-math students if there is a reason for an off-cycle admission.

5.1.5 Other Admissions

Mathematics PhD students who are in good standing and who are making satisfactory progress may pursue and complete the standard mathematics MS degree upon the approval from the VC.

Doctoral students from other OSU programs who are in good standing and who have sufficient coursework may earn a mathematics MS degree or mathematics Graduate Minor with the approval of the VC. For the MS degree, a student is required to declare an advisor among the mathematics graduate faculty and for the minor a student needs the approval of the Graduate Minor Chair.
5.1.6 **Admission Requirements and Expectations**

Admission requirements and expectations apply primarily to applications and transfer requests handled by the GRC. These may vary depending on the procedural needs of the GRC, performances of previous admissions, competitiveness of the degree, or shifts in standards in the program requirements. Requirements and expectations are posted and updated on the web sites of the OGPA and the mathematics department.

Admission expectations aim to make sure that students have the needed preparations in order to succeed in the required curriculum of the respective degree track. General prerequisites and expectations for each degree or degree track are outlined at the beginning of the respective section for each degree below.

### 5.2 Academic Standing and Remediation

#### 5.2.1 Program Academic Standing

Good academic standing with the Graduate School is defined in the GHS and outlined in Section 1.2.2. Good academic standing within the mathematics graduate program requires a student, additionally, to meet all time expectations for fulfilling requirements for the intended degree as stated in this document.

#### 5.2.2 Program Progress Remediation

Students exceeding certain types of time expectations may apply for progress remediation status with the GSC. This status allows students to correct delays in their academic progress while remaining in the program. Moreover, students in progress remediation will still be reported to the Graduate School to make "reasonable progress" towards their degree.

Progress remediation does not pause or delay time expectations for later requirements. That is, students may have less time to complete future graduate career stages.

Moreover, the status of progress remediation is granted only for a single semester and normally results in a reduction of stipend level for departmentally supported students.

#### 5.2.3 Petitions and Standards for Progress Remediation

Students who anticipate delays in their academic progression may petition the GSC for remediation status before the start of the respective semester following the procedures in Section 2.4.1. The advisor letter of support should address the chances of completing the missing requirements during the extra semester and provide a study plan. The strength of the advisor's support and the overall performance of the student will be important factors in the GSC's decision.

The types of delays that have qualified for consideration of progress remediation status and their limits are the following:

1) Missing the third-semester deadline for qualifying requirements for doctoral students. At most one semester of remediation is granted.

2) Missing the third-year deadline for passing candidacy for doctoral students. At most one semester of remediation is granted.
3) Missing the sixth-year deadline for graduation for doctoral students. At most two semesters of remediation are granted. Continued financial support is dependent on available funds as well as subject to college and university rules.

Progress remediation is normally not granted to master’s students.

5.2.4 Failing Expectations and Disenrollment

Students who are not in good academic standing with the program and who have not been granted progress remediation will be considered as failing expectations. A student who is failing expectations will not be supported financially by any department position even if the Graduate School considers the student to still be in good standing.

Pre-candidacy doctoral students who fail expectations will also not be allowed to progress to candidacy and, hence, will not be able to complete a PhD degree in our program. These students will normally not be permitted continued enrollment except for completion of a master’s thesis with approval from the GSC.

Post-candidacy and thesis-option master’s students who fail program expectations due to missing graduation deadlines but have fulfilled all requirements except for the completion of a dissertation or thesis are considered ABD/ABT. The GSC may allow ABD/ABT students to continue to enroll in order to complete their degree without financial support. However, enrollment must be continuous for autumn and spring semesters. Moreover, the advisor needs to continue to supervise the student’s thesis work and assure the GSC of satisfactory progress during the annual evaluation or when requested. See also Section 6.2.3.

The department will start procedures to revoke permission to enroll as outlined in the GSH for any ABD/ABT student who ceases to make credible progress towards graduation or fails to continuously enroll. Moreover, an ABD/ABT student will normally be reported as not making reasonable progress in response to any inquiry by the Graduate School.

5.3 Financial Support Eligibility

5.3.1 Overview of Types of Support

The three main types of support are Graduate Associate (GA) positions, Student Associate (SA) positions, and Graduate School Fellowships (GSF). GA and SA positions are further distinguished by duties in either research, teaching, or administration. The respective acronyms are GRA, GTA, GAA, SRA, STA, and SAA.

GA and UF positions are subject to rules of the Graduate School laid out in Sections IX and X of the GSH, including minimum hours for enrollment. Students in SA positions are not permitted to enroll. Stipend levels depend on the type of position, the degree program, and the student’s academic progress. See Section 11 below for details.

5.3.2 Availability by Degree

Financial support by the department is offered only to students enrolled in the PhD or the MMS degree. Students who were originally admitted to the PhD program but want to leave with a master’s degree may petition the GSC for another semester of support to complete their MS requirements.
Normally, offers of financial support are made during the admission process to all PhD and MMS students.

Students enrolled in the MAQRM degree as well as non-mathematics students enrolled in our MS degree or our Graduate Minor are not eligible for departmental support.

5.3.3 Eligibility and Academic Standing

Students need to be both in good academic standing with the Graduate School as well as comply with all program rules and expectations in order to be eligible for any of the GSF, GA, or SA positions. Good standing with the Graduate School is outlined in Section 1.2.2 and good standing within the program is described in Section 5.2.

Students in progress remediation as described in Section 5.2.2 may be eligible for support at minimal stipend levels (O-Level). Students who fail program expectations for their intended degree are not eligible for departmental financial support.

5.4 INTAKE: HEADSTART, OFFICES, IT, AND PRIOR CREDITS

5.4.1 Headstart

Headstart is a preparatory program for incoming PhD and MMS students which is scheduled in the four weeks immediately preceding the start of classes. It has the following three types of components:

*GTA Training:* The training is a non-negotiable prerequisite for any type of GTA appointment. Absences of more than one or two days are not permitted. Supported incoming students without teaching duties in their first years (fellows, GRAs) may elect to post-pone the training to the following year.

*Preparatory Courses:* PhD students are strongly recommended to attend classes that prepare them for their upcoming core course requirements. In the theoretical track these are courses in abstract algebra and real analysis that provide background at the 5000 level for the 6111-6112 and 6211-6212 sequences. Similar preparatory courses or activities for the applied track will focus on the 6601-6602 sequence.

These courses also serve as a diagnostic tool to identify students who may not be sufficiently prepared for a 6000-level sequence and would benefit from first attending a 5000-level sequence. Incoming master’s students are encouraged to attend seminars, mini-courses, reading or other activities that may be offered during Headstart as appropriate for their degree program.

*Mandatory Orientations:* These may include academic orientations by and intake meetings with the VC, immigration check-in and immigration health screenings for international students, ESL tests for non-native speakers, employment intake, as well as Title IX and other HR training events. The schedules of orientations will be announced by the Graduate Office and attendance is taken during all of these events.

Attendance of the Headstart program is strictly required from students who hold a GTA appointment in their first year. Non-attendance or partial attendance for supported students without teaching duties requires permission from the VC.

Students not attending the full Headstart program will typically have significantly more difficulties with their first-year classes and adjustments to the program. They will also forfeit
Headstart stipends and benefits, and they will be responsible for making up for missed mandatory orientations. Based on these experiences and constraints, non-attendance is strongly discouraged.

5.4.2 Office Space and IT Support

PhD and MMS students who are supported as Graduate Associates by the department or graduate faculty in the department or are university fellows are eligible for office space and IT support offered by the department.

Office space is assigned by designated department staff. MMS and beginning PhD students will usually be given a desk in a larger shared office. Post-candidacy students may request smaller offices shared by only two students.

Supported students will also have access to shared computers in their offices and access to departmental IT support.

MAQRM students, MS students from other departments, and students without support are not eligible for office space or office computer access.

5.4.3 Prior Course Credit

PhD students who have previously earned an accredited master's degree may request 30 hours to be added to their graduate credits. These will count towards the university required minimum 80 hours for a PhD degree.

Courses taken outside of OSU cannot be counted towards any of the degree program requirements. This includes, for example, the PhD qualifying and breadth requirements as well as the required and elective courses in the master's programs.

Students who have previously completed any of the Math 6111, 6112, 6211, or 6212 courses at OSU with an A- or better may have these counted towards their qualifying requirements upon petition to the GSC. However, previously completed OSU courses cannot be counted towards breadth requirements.

More generally, previously taken OSU courses are counted towards a requirement in any of our degree programs only if there are no other courses available to fulfill the respective requirement.

5.5 GRADUATION REQUIREMENTS AND PROCEDURES FOR ALL DEGREES

This section summarizes the most important Graduate School requirements and procedures for graduation with any of our graduate degrees. Students should carefully read and follow the items listed on the Graduate School web page for Final Semester Procedures and Timelines.

5.5.1 University Credit Hour and Residency Requirements

Students will need to have completed a minimum of 30 graduate credit hours for a master's degree and 80 hours for a doctoral degree. See Section 5.3.3 above for transfer of graduate credits from previous programs.

The following are examples of courses that count towards these graduate credits:

- Regular graduate courses at the 5000+ level at Ohio State taken as a graduate student.
• Independent study and research classes such as Math 6193, 7193, 6999, or 8999.

• 4000-Level courses from other programs with the permission of the department and advisor.

The following courses do not count towards graduate credits:

• German 6101 or 6102, Russian 6171 or 6172, French 6571 or 6572.

• ESL courses in EDU-TL.

• Undergraduate courses other than the ones above.

Students must be registered for a minimum of 3 hours during the term of graduation for any degree. Moreover, students who transfer from other schools should make sure to fulfill the residency requirements about minimal number of credits and minimal number of terms to be completed at OSU. See the GSH for details.

5.5.2 Applications to Graduate

Students intending to graduate during a given term must submit an application to graduate by the third Friday of the term, regardless of degree, track, or career path, via the online form at

gradforms.osu.edu.

All graduation requirements must be fulfilled before submission. This includes the following:

• All dissertation and thesis committees must have been determined and entered.

• All course and project requirements for master's degrees must be fulfilled.

• Advising Forms for MAQRM degree must have been signed off by the advisor and submitted to the Graduate Office ahead of time as well.

If requirements are missing the application will be denied by the department. Applications submitted after the Graduate School deadline are normally not accepted.

Students who applied to graduate in a given term but find that they cannot complete their dissertation or thesis during this term may have their application withdrawn or use the End of Semester option.

5.5.3 Committee Membership

All committee members need to have the appropriate graduate faculty status (see Section 3.1). The department also requires the Dissertation or Thesis Advisor to have graduate status in the respective mathematics program and assume the role of chair of the examination committee.

Besides the advisor and chair, the other committee members may be from other OSU departments but need to have appropriate graduate faculty status.

Specifically, master's examination committees require two M status graduate faculty members, and the doctoral final oral and dissertation examination committees require three P status graduate faculty members. For the doctoral final oral examination, the Graduate School, further, determines a Graduate Faculty Representative (GFR).
These mandatory members decide on whether an examination has been completed satisfactorily or not.

Students can petition the Graduate School via gradforms.osu.edu to have further faculty members added to the committees. These members may assist in the administration of the examination but will not participate in determining the outcome of the examination. The additional members do not have to have Graduate Faculty status but need to have appropriate background and are normally restricted to associated and visiting faculty (with doctoral degrees) at the mathematics department.

5.5.4 Scheduling and Attendance

Oral examinations must be scheduled during regular university business hours. They may be scheduled during all terms, including all summer sessions, as well as weekdays during which classes are not in session but which are not university holidays.

Attendance of oral examinations by other faculty and graduate students is determined by the advisor in consultation with the student and committee.

Customarily, the first hour of a doctoral oral examination is announced to be public and the second hour restricted to the examination committee. Attendance of master’s examinations is typically restricted to the committee and specially invited guests. Advisors who would like to significantly deviate from these customs should inform the GSC chair.

Students also need to comply with all scheduling and video conferencing policies prescribed in the GSH.

5.5.5 Dissertation and Thesis Documents – Content, Integrity, and Evaluation

Dissertation and thesis documents need to be submitted to committee members (including the GFR) at least two weeks before the planned oral examination. The submitted version of the document must be at a stage of preparation comparable to an article submitted for publication (despite it being, somewhat misleadingly, called a “draft” in the GSH).

In particular, the document must not have any incomplete sections, all figures and a complete bibliography must be included. The submitted document must contain a complete and rigorous treatment of the results on which the committee evaluation is based. It must also adhere to all academic and ethical standards of published work, such as properly crediting prior work or cited text by other scholars.

It is the responsibility of the student to make sure committee members have a satisfactory understanding of the dissertation or thesis and be available for any needed explanations. Students are expected to promptly respond to questions and incorporate feedback from committee members. At the time of the oral examination the document should have been sufficiently vetted and updated so that a final submission and approval by the committee by the university deadline can be expected.

5.5.6 Dissertation and Thesis Documents – Technical Issues

Final documents need to adhere to formatting guidelines provided by the Graduate School and pass their formatting check. The document should also conform with technical standards customary in the respective sub-discipline of mathematics.
LaTeX templates for doctoral dissertations and master’s theses conforming with Graduate School guidelines are available through the Mathematics Graduate Office.

All final documents need to be submitted to and will be made publicly available by the OhioLink Electronic Theses & Dissertations Center (ETD). Theses and dissertations may also be entered into national archives such as ProQuest/UMI by the university. Students have the option to submit a request via gradforms.osu.edu to delay the publication of the final document to allow time for publishing papers.

Finally, all master’s theses and doctoral dissertations will be linked to the department’s web page, and students will be requested to submit their thesis titles and abstracts to the Graduate Office.

5.6 Check-Out and Post-Graduation

Students who have completed their graduate career in our program should clean their office space and turn in their office keys. Supported students who depart our program without completing an intended degree should also inform the department’s HR Office and GTA support staff as early as possible about their plans.

Moreover, graduating students should inform the Graduate Office of their immediate, post-graduation career plans. Former graduates are, further, strongly encouraged to respond to requests by the university and our department to keep their contact and career information updated in order to build a strong alumni network.

Students interested in lectureships at our department after graduation should contact the Director of Undergraduate Studies as early as possible.

6. Doctor of Philosophy

The Doctor of Philosophy (PhD) is the flagship degree of our program with the largest enrollment and the highest academic standards. Graduates have acquired a sophisticated body of knowledge over a broad range of areas in mathematics and demonstrated the ability to conduct independent and original research in their chosen discipline.

The PhD degree program is divided into two specializations (sub-plans), namely, the Theoretical Mathematics Track and the Applied Mathematics Track. They differ in admission expectations as well as some of the pre-candidacy program requirements. At the same time other pre-candidacy requirements, general policies, as well as candidacy and research expectations are identical. The tracks are currently not designated on students’ transcripts.

Any rules, policies, and expectations mentioned in this section apply to both degree specializations unless it is explicitly noted that it pertains to only one of them.

6.1 Admission Policies and Requirements

Admissions to the PhD program are for autumn semesters only and only by application. All applications need to be received by the advertised deadlines for full consideration. Admissions are granted only upon positive review by the GRC during the annual admission process in the spring semester.
6.1.1 Submission of Applications

Students who are not already graduate students at OSU need to submit a full application through the OGPA system and fulfill all Graduate School requirements for admission as outlined in Section 5.1.1.

Students who have already been admitted to a graduate program at OSU need to apply for a program transfer as noted in Section 5.1.2 and should submit all materials to the OGPA system. This includes master's students in our program and students who have already graduated from a graduate program at OSU. In all cases applicants will need to choose which of the two specializations they want to be considered for.

6.1.2 Expected Preparations and Application Requirements – Theoretical Track

Applicants to the Theoretical Mathematics Track should present the following preparations and materials in their applications:

- Strong preparations in Real Analysis and Abstract Algebra, at a level comparable to our Math 5201-5202 and Math 5111-5112 course sequences.
- Substantial upper division or higher coursework in other mathematical subjects.
- Three letters of recommendations from faculty that evaluate mathematical ability and research potential.
- Submission of a recent score on the GRE Subject Test in Mathematics that is within our typical range of admissions. Applicants may submit petitions to have this requirement waived in special circumstances. *(This requirement has been suspended for Autumn 2021 admissions)*
- Acceptable English skills that plausibly predict OPA certification within one year.

6.1.3 Expected Preparations and Application Requirements – Applied Track

Applicants to the Applied Mathematics Track should present the following preparations and materials in their applications:

- Preparations in Real Analysis of at least one semester at a level comparable to our Math 5201-5202 course sequence.
- Strong background in Linear Algebra, including abstract concepts, basic linear algorithms, and spectral theory.
- Introductory level scientific computing comparable to Math 3607 in our program.
- Additional coursework in other mathematical sciences and exposure to undergraduate research are not required but considered favorably.
- Three letters of recommendations from faculty that evaluate mathematical ability and research potential.
- Submission of a recent score on the GRE Subject Test in Mathematics that is within our typical range of admissions. Applicants may submit petitions to have this requirement waived in special circumstances. *(This requirement has been suspended for Autumn 2021 admissions)*
- Acceptable English skills that plausibly predict OPA certification within one year.
6.2 **TIME EXPECTATIONS AND REINSTATEMENT**

6.2.1 General Time Expectations

Doctoral students are expected to complete all dissertation requirements, including satisfactory examinations and final document approval, by the end of their sixth year of study in the program.

The *effective start date* for this time limit is normally identical with the date of matriculation in our mathematics PhD program and independent of prior enrollments in undergraduate or graduate programs or degrees earned in these.

For special admissions that do not occur through the regular application process, other effective start dates may be determined by the department. This typically pertains to students who are also given significant credit towards their pre-candidacy requirements at the time of matriculation and are thus expected to be at the level of a second-year student when they enter the program.

6.2.2 Leaves and Reinstatement

On occasion, a student who left the PhD program before candidacy while maintaining good standing and adequate progress may seek to reenter the program. In order to be readmitted, the student should submit a petition to the GSC that includes their prior academic record in our program, justifications for having previously completed pre-candidacy requirements counted, as well as a proposal for an effective start date for the six-year time limit.

Typically, students in good standing are reinstated in the year of study they would have entered at the time when they started their leave, and all pre-candidacy requirements are counted. The GSC may, however, deviate from this default if, for example, the leave period was unusually long, the pre-candidacy requirements have changed during the leave, or there are concerns about the student’s academic abilities.

Students who left the program without a degree after passing candidacy (ABD) and seek to be reinstated are required to also find a dissertation advisor to support their petition to the GSC and need to retake the candidacy examination following all rules and procedures required by the Graduate School. The GSC will also determine time expectations for a returning ABD student which would typically be three years after retaking the candidacy examination.

6.2.3 Continued Enrollment Beyond Time Expectations

Students may request to be allowed enrollment beyond time expectations with special permission by the GSC. This requires a student to submit a petition to the GSC for *every* autumn and spring semester of additional enrollment. The petition needs to include a letter of support by the advisor detailing recent progress and a plan towards completion of the dissertation.

The GSC decision may include special time expectations, stipulations for reporting, as well as recommendations for a Graduate School performance letter. If a student makes no credible progress towards the completion of a dissertation and a performance letter was already sent, the student may be barred from reenrollment.
Financial support as a Graduate Associate may be extended on a semester-by-semester basis and upon petitions to the GSC throughout the seventh year with stipends at the probationary O-level. The petition for extended financial support must provide credible evidence and testimony by the advisor that the dissertation can be completed during the time of support.

Such extended support is also contingent on pertinent college and university rules in regard to funding of graduate students beyond time expectations.

Students beyond their seventh year of study are not eligible for departmental financial support as Graduate Associates, regardless of academic progress, advisor support, or stipend level. Thus, even students who have been granted continued enrollment by the GSC are responsible for their own subsistence, tuition fees, health insurance, and benefits normally covered by a Graduate Associateship.

### 6.3 Overview and Timeline of Pre-Candidacy Requirements

The career of a PhD student is divided into two portions separated by the candidacy examination. During the pre-candidacy period students will need to complete a fixed set of program requirements, while post-candidacy students are expected to focus entirely on their dissertation research.

*All* program requirements must be completed before applying for the candidacy examination. Any applications for candidacy of students with pending requirements will be denied by the department. The deadline for passing the candidacy requirement is the summer at the end of the third year of study.

a) The *Qualifying Requirement* tests and ensures that students have strong working knowledge and competence in core areas of mathematics. The general deadline for completion is the end of the autumn semester of the second year of study. See Sections 6.4 and 6.5 for more details.

b) The *Breadth Requirement* serves to expose students to a range of areas of mathematics that may not be within their narrow area of research. Students are expected to complete this within the first 2 years of study. See Sections 6.6 and 6.7.

c) For the *Foreign Language Requirement* students need to prove their ability to read and understand a scientific text in one of three foreign languages with the help of a dictionary. This requirement should be completed as early as possible to allow time for failed exams or courses. Details about the process are given in Section 6.8.

d) The *Invitations Requirement* states that all students need to be enrolled in the Invitations to Mathematics/Problem Solving activities each semester until they have officially declared a dissertation advisor.

e) *Advisor and Committee*: Doctoral students should have officially declared a dissertation advisor by the beginning of their third year. The advisor will serve as chair of the candidacy examination committee. Before applying for the candidacy examination, the three remaining members of the committee also need to have consented to serve upon request by the student.

f) All *ESL and Oral Proficiency Requirements* must be completed before candidacy by all students whose native language is not English, regardless of funding.
In addition, students are strongly recommended to have accrued at least 63 graduate credits before entering candidacy, either by taking courses in our program or from transfer graduate credits, in order to be able to complete the university requirement mentioned in Section 5.4.1.

6.4 Qualifying Requirement — Theoretical Track

6.4.1 Overview

In order to fulfill the qualifying requirement, a student in the Theoretical Mathematics Track needs to receive a PhD Pass in each one of four subject requirements. The four subject requirements correspond to the courses

Math 6111, Math 6112, Math 6211, and Math 6212

in Real Analysis and Abstract Algebra, with the option of one sequence substitution.

A PhD Pass can be earned in each subject either by taking the respective course or by passing a respective qualifying examination.

In addition to a PhD Pass in one of these courses and examinations, a student may also earn a (lesser) Master Pass which does not count towards the Qualifying Requirement but may be counted towards the MS requirements.

The content and syllabi of these courses can be found in the university course catalog as well as the departmental course web pages.

6.4.2 Subject Passes via Regular Course Completion

A student can earn a Pass in a given subject from the four above by completing the respective semester course with a grade of A or A-. Completion of a course with a grade of B+ counts as a Master Pass in the subject.

Note that Math 6111 and Math 6211 are offered every autumn semester, thus providing two opportunities for a student to earn a Pass in these subjects by course grades within the regular deadline. Since Math 6112 and Math 6212 are offered in spring semesters there is only one such opportunity within the 3-semester deadline.

6.4.3 Subject Passes via Examination

The department offers a qualifying examination for each of the four subjects once a year in mid-to-late August on separate days. The possible outcomes of each examination are a PhD Pass, a Master Pass, or a Fail.

Each examination is approximately two hours long and closed-book. It is in scope and content similar to a final examination of the respective course. Detailed syllabi can be found on the department web pages.

The examinations are designed, administered, and graded by respective departmental committees. The chairs of these committees are appointed by the GSC chair and the committees are overseen by the GSC. The examinations are open to PhD students who have not yet completed the autumn semester of their second year. It is not open to students past their second year or students in other degree programs, including our master’s students.
6.4.4 Subject Pass via Sequence Substitution

One of the four subject requirements can be substituted and fulfilled by completing a year-long sequence chosen from the following list:

- Math 6221-6222 (Complex Analysis)
- Math 6251-6252 (Theory of Probability)
- Math 6411-6412 (Differential Equations)
- Math 6501-6502 (Combinatorics and Graph Theory)
- Math 6601-6602 (Num. Methods in Scientific Comp.)
- Math 6701-6702 (Diff. Manifolds/Diff. Geometry)
- Math 6801-6802 (Algebraic Topology)

A sequence will count as a Pass for the substituted subject if a student has earned at least a grade of A- in both courses of the sequence.

Only one such sequence substitution is allowed, so at least three subject requirements need to be fulfilled by course completion or examination as in Sections 6.4.2 and 6.4.3 above. The two courses used to substitute for one subject must be from the same sequence. However, these two courses do not need to be taken consecutively or during the same academic year.

6.4.5 Timeline and Evaluation of Requirements

All students need to complete their qualifying requirement by the end of the autumn semester of their second year.

This provides each student with four attempts at passing the Math 6111 and Math 6211 subject requirements (2 by course, 2 by examination) and three attempts at the Math 6112 and Math 6212 requirements (1 by course, 2 by examination). Students using the substitution option may (re)take the first course of a sequence for a passing grade in the autumn semester of their second year if they received a passing grade for the second course of the sequence during the previous spring semester.

Unsuccessful attempts on a subject requirement are not counted against a student, but, for the purpose of the qualifying requirement, are considered equivalent to not taking a course or examination.

Students who have not passed the qualifying requirements at the beginning of their second year and who are not certain that they will complete missing requirements during the autumn semester need to submit a petition to the GSC well before November 15th if they seek to be granted a one-semester extension of the qualifying requirement deadline. The petition will need to include a convincing plan for the fulfillment of the requirement during the spring semester as well as a justification from the advisor. Extensions beyond the spring semester second year are not granted.
6.5 Qualifying Requirement – Applied Track

6.5.1 Overview

In order to complete the qualifying requirement a student in the Applied Mathematics Track needs to receive a PhD Pass in each of five subjects chosen from three components. Rules for selecting the subject that can be counted are described in Section 6.5.2.

For four of the subjects the only option to earn a PhD Pass is to take the respective course with a grade of A or A-. Only one subject may be fulfilled via achieving a PhD Pass in one of the qualifying examinations described in Section 6.4.3.

6.5.2 Selection Rules for Qualifying Subjects

The three components for the selection of subjects are a mandatory course in scientific computing, a qualifying subject from the Theoretical Mathematics Track, as well as three further courses to be chosen from a list. Specifically, all of the following need to be fulfilled:

a) PhD Pass in Math 6601 (Scientific Computing 1) via course option.

b) PhD Pass via course or examination in one of the following subjects:
   • Math 6111 (Abstract Algebra 1)
   • Math 6112 (Abstract Algebra 2)
   • Math 6211 (Real Analysis 1)
   • Math 6212 (Real Analysis 2)

c) PhD Passes in three of the following subjects. Only the course option may be used, and subjects need to be different from the one chosen in b) above:
   • Math 6602 (Scientific Computing 2)
   • Math 6411 (Ordinary Differential Equations 1)
   • Math 6451 (Partial Differential Equations 1)
   • Math 6111 (Abstract Algebra 1)
   • Math 6112 (Abstract Algebra 2)
   • Math 6211 (Real Analysis 1)
   • Math 6212 (Real Analysis 2)

6.5.3 Timeline and Evaluation of Requirements

The deadline for completing the qualifying requirements is the end of the autumn semester of the second year as well. Procedures for petitioning an extension of the deadline into the second semester of the second year of study are the same as in Section 6.4.5.

The rules in Section 6.5.2 provide greater flexibility in scheduling courses counting towards this requirement. It is thus less likely that extensions need to be sought on the basis that some courses are only offered in spring semester.
6.6 Breadth Requirement – Theoretical Track

6.6.1 Purpose and Selection Rules

The breadth requirement seeks to ensure that graduates master not only their eventual field of specialization but also develop the breadth, versatility, and maturity expected from mathematicians working in academic professions that traditionally require a PhD-degree.

The selection rules, referring to the course list in Section 6.6.3 below, are as follows:

a) Choose three of the five breadth areas.

b) Within each of the three chosen breadths areas choose one course sequence.

c) In each of the three chosen course sequences pass two distinct courses in the sequence with a grade of B+ or better.

Note that the last condition is equivalent to passing all of the courses of a sequence with a B+ or better, with the exception of the logic course sequence. Courses within a sequence do not have to be taken consecutively and may also be taken in different academic years. A course with an insufficient grade for the breadth requirement may be repeated with the permission of the instructor.

6.6.2 Relation to Qualifying Requirement

A course or course sequence used to fulfill a qualifying subject requirement either via the course completion option (Section 6.4.2) or the sequence substitution option (Section 6.4.4) may simultaneously be used to fulfill a breadth requirement.

However, passing a qualifying examination in a given subject cannot be counted as the equivalent of taking a respective course towards the breadth requirement.

6.6.3 Breadth Area and Sequence List

Besides the selection rules in Section 6.6.1, students should also keep the offering patterns from Section 4.2.1 in mind. Students with advanced preparation at the 6000-level have the option to take courses at the 7000-level.

Area 1-T Sequences [Algebra]

♦ Math 6111-6112 (Abstract Algebra)
♦ Math 7121-7122 (Number Theory)
♦ Math 7141-7142 (Algebraic Geometry)
♦ Math 7161-7162 (Lie Groups)

Area 2-T Sequences [Analysis]

♦ Math 6211-6212 (Real Analysis)
♦ Math 7211-7212 (Functional Analysis)
♦ Math 7221-7222 (Ergodic Theory)

Area 3-T Sequences [Differential Equations]

♦ Math 6411, 6451 (Differential Equations)
♦ Math 7412-7413 (Ordinary Differential Equations)
♦ Math 7452-7453 (Partial Differential Equations)

**Area 4-T Sequences [TOPOLOGY/GEOMETRY]**
♦ Math 6801-6802 (Algebraic Topology)
♦ Math 6701-6702 (Differential Manifolds & Geometry)
♦ Math 7851-7852 (Differential Topology)
♦ Math 7711, 7721 (Riemannian & Kähler Geometry)

**Area 5-T Sequences [ALTERNATE TOPICS]**
♦ Math 6001-6004 (Advanced Mathematical Logic)
♦ Math 6501-6502 (Combinatorics and Graph Theory)
♦ Math 6251-6252 (Theory of Probability)
♦ Math 6221-6222 (Complex Analysis)
♦ Math 7651-7652 (Appl. Complex Variables & Asymptotics)
♦ Math 7611-7612 (Computational Partial Differential Equations)

6.6.4 Time Expectations and Evaluation

Students are expected to have their breadth requirements completed by the end of the spring semester of their second year of study.

Progress on and status of completion of the breadth requirement is reviewed by the GSC during the annual evaluation of graduate students (See Section 2.3.4). Students and advisors should address the likelihood of passing the requirement. In case there is a chance the student will not be able to complete the requirement by the deadline, a petition should be submitted to the GSC sufficiently early during the spring semester.

**6.7 BREADTH REQUIREMENT – APPLIED TRACK**

6.7.1 Selection Rules

In order to fulfill the breadth requirement, a student in the Applied Mathematics Track needs to pass 7 individual courses numbered at 6000 or above with a grade of B+ or better. The rules for selecting these breadth courses are as follows:

a) Six of the courses need to be from the list of mathematics courses in Section 6.7.3.

b) At least three of the courses selected in a) need to be from three distinct areas as defined in the list of Section 6.7.3.

c) An additional non-mathematics course with at least 2 credit hours needs to be selected from the list in Section 13.2.
As opposed to the requirement for the Theoretical Mathematics Track, course selections do not need to be complete sequences. Students should also carefully consult with advisors and instructors about required preparations for the non-mathematics course chosen in c).

6.7.2 Relation to Qualifying Requirement

A course used to fulfill a qualifying subject in Section 6.5.2 may simultaneously be used to fulfill the breadth requirement. However, passing a qualifying examination as in Part b) of Section 6.5.2 cannot be counted as the equivalent of taking a respective course towards the breadth requirement.

6.7.3 Mathematics Breadth Area and Course List

**Area 1-A Courses [ALGEBRA]**
- Math 6111, 6112 (Abstract Algebra)
- Math 7121, 7122 (Number Theory)
- Math 7141, 7142 (Algebraic Geometry)
- Math 7161, 7162 (Lie Groups)

**Area 2-A Courses [ANALYSIS]**
- Math 6211, 6212 (Real Analysis)
- Math 7211, 7212 (Functional Analysis)
- Math 7221, 7222 (Ergodic Theory)

**Area 3-A Courses [DIFFERENTIAL EQUATIONS]**
- Math 6411, 6451 (Differential Equations)
- Math 7412, 7413 (Ordinary Differential Equations)
- Math 7452, 7453 (Partial Differential Equations)

**Area 4-A Courses [TOPOLOGY/GEOMETRY]**
- Math 6801, 6802 (Algebraic Topology)
- Math 6701, 6702 (Differential Manifolds & Geometry)
- Math 7851, 7852 (Differential Topology)
- Math 7711, 7721 (Riemannian & Kähler Geometry)

**Area 5-A Courses [PROBABILITY]**
- Math 6251, 6252 (Theory of Probability)

**Area 6-A Courses [SCIENTIFIC COMPUTING]**
- Math 7611, 7612 (Computational Partial Differential Equations)
Area 7-A Courses [COMBINATORICS & GRAPH THEORY]
- Math 6501, 6502 (Combinatorics and Graph Theory)

Area 8-A Courses [APPLIED COMPLEX VARIABLES & ASYMPTOTICS]
- Math 7651, 7652 (Appl. Complex Variables & Asymptotics)

6.7.4 Time Expectations and Evaluation
As for the Theoretical Mathematics Track, students are expected to have their breadth requirements completed by the end of the spring semester of their second year of study.
Also, policies for GSC supervision and petitions for extensions are identical to those described in Section 6.6.4.

6.8 FOREIGN LANGUAGE REQUIREMENT

6.8.1 Purpose and Options
The foreign language requirement tests the ability to read (with the aid of a dictionary) a scientific text in one of three available foreign languages. The requirement can be fulfilled in the chosen language either by course completion or by examination. The selection process thus involves the following two steps:

a) Choose one of the available languages, namely French, German, or Russian.

b) Decide whether to complete the requirement in the chosen language by course completion or examination and follow the instructions in the respective section below.

6.8.2 Language Course Completion
Students with little to no prior knowledge of the chosen language can fulfill their language requirement by passing German 6101, German 6102, Russian 6171, Russian 6172, French 6571 or French 6572 with a grade of B or better. Students should plan early enrolling in these courses as they are often offered only during the summer term.

6.8.3 Language Examination
Students who have sufficient familiarity with their chosen language can fulfill their requirement by passing an examination instead. It involves the translation of a passage from a mathematical text submitted by the department’s Language Coordinator and graded by the appropriate language department.

Students who want to pursue this option should contact the Graduate Office and the department’s Language Coordinator for procedural details and scheduling. Students may also request textbooks or articles from the Language Coordinator. Contact information of language examination coordinators in the three departments are available either in the Graduate Office or on respective web pages.

6.8.4 Timeline and Reporting
This requirement should be completed before the start of the third year of study. Students with Graduate School fellowships are urged to enroll in language courses during their first summer while still on fellowship support.
Students who take the language examination need to confirm with the Graduate Office to make sure test results have been properly communicated and recorded.

6.9 CANDIDACY EXAMINATION

6.9.1 Overview, Purpose, and Scope of Examination

The Candidacy Examination aims to assess a student's preparedness to engage in independent research for the purpose of writing a doctoral thesis in mathematics. This includes vetting of a dissertation research proposal and testing of adequate mathematical skills and knowledge to carry out the proposed research.

If deemed appropriate by the committee, the examination may also extend to the mastery of topics generally expected from any doctoral candidate in mathematics or a respective subarea, even if these lie outside of a narrow set of dissertation research questions.

The examination must include a written portion and an oral portion. It has to comply with both university rules and procedures detailed in Sections VII.4-7 of the GSH, as well as the formats and rules prescribed by the mathematics program in the following sections.

Passing the candidacy examination is a necessary condition for achieving candidacy status in the following semester. In addition, students need to be in good standing and fulfill university residency and enrollment requirements. The examination needs to be retaken after five years on candidacy status by students who have been permitted by the GSC to remain enrolled beyond the program time expectations.

6.9.2 Application and Scheduling

The examination may be scheduled at any time deemed appropriate by the advisor, during the same times and days allowed for other Graduate School examinations as explained in Section 5.4.4.

Applications for the candidacy examination need to be submitted three weeks before the oral portion of the examination via gradforms.osu.edu. At the time of application all pre-candidacy requirements listed in the previous sections need to have been fulfilled without exception. Applications submitted with missing requirements or less than three weeks before the oral portion will be denied by the mathematics department.

The written portion of the examination may be started before the application but should be limited in length and scope by the advisor. Advisors and students who plan to extend the written portion to a period of more than one semester should consult with the GSC chair.

6.9.3 Advisor as Committee Chair

The examination committee is chaired by the candidate's dissertation advisor. As chair, the advisor is responsible for the coordination of both portions of the examination. Particularly, the advisor approves dates for issuing, submitting, and evaluating the written part, as well as the times and format of the oral part. The advisor also chairs the oral portion and approves its scheduling.
6.9.4 Other Committee Members

Besides the advisor, the examination committee must include three additional authorized members of the Graduate Faculty, who are approved on the Application for Doctoral Candidacy form and who vote on the outcome of the examination. These members may also hold Category M instead of P status and may also be from other departments with the permission of the GSC chair or VC.

In addition to the four authorized members, the committee can further include members who help in the oral examination but who do not vote on the outcome of the examination. Subject to petition to the Graduate School and permission of the GSC, nonvoting members do not have to be Graduate Faculty and may, for example, be post-docs who have previously taught or directed the student.

6.9.5 Written Portion

The written portion of the examination has the form of a dissertation research proposal, including a substantive mathematical exposition of background materials, a set of research questions, a realistic strategy to pursue them, as well as results of preliminary investigations, if available.

The write-up should contain an abstract and a list of references, including original research articles that are considered standard preparations in the respective area of research. The proposal document should be at least 10 pages in length in standard article format and should normally not exceed 15 pages (excluding bibliography and appendices). It should also be prepared using professional mathematical typesetting tools such as LaTeX or TeX.

The written proposal must be submitted to the committee members in its final form at least \textit{one week} before the oral examination is scheduled to allow adequate time for review. After submission, the student should remain available in order to respond to questions, concerns, and suggestions for revisions.

More extensive revisions should be reported to the GSC and may require the examination to be halted. If, based on the evaluation of the written portion, the advisor or another member of the committee see no possibility for a satisfactory overall performance, the student and committee should inform the GSC chair and follow the university procedures outlined in Section VII.5 of the GSH.

6.9.6 Oral Portion

The oral portion is divided into two parts. The first part is a presentation mandated by the mathematics program and the second part is the official examination satisfying the requirements of the Graduate School for the oral portion. All members of the candidacy examination committee need to be in attendance for both parts.

The first part is a prepared presentation by the candidate about the submitted dissertation research proposal, which should be at least 20 minutes and no more than 40 minutes long. Additional attendance during this part is determined by the advisor in agreement with the student and committee.

The first part should, generally, be scheduled right before the second part during regular university business hours. It may be followed by a brief period of questioning, particularly by attending non-committee members who will not participate in the second part. Significant
deviations from this format should be discussed with the GSC chair and approved by the GSC before the examination.

The second part needs to fulfill all requirements stipulated in Section VII.6 of the GSH. In particular, this part needs to be between one and two hours in duration. Attendance is restricted to examination committee members. Moreover, the entire time needs to be devoted to the questioning of the candidate and all members are expected to fully participate in the questioning.

There are no restrictions set, either by our program or the university, on the scope or type of questioning. It may make references to or request further clarifications of the preceding presentation or written portion, but it may also test mathematical background not directly related to the research proposal.

Video conferencing rules for either part should follow guidelines in the GSH. Approvals of petitions in regard to video conferencing given by the Graduate School extend to both parts and do not require an additional petition to the GSC.

6.9.7 Result of Examination

Immediately following the second part, authorized committee members decide, in absence of the student, the outcome of the examination. The student should be informed as soon as the decision is reached.

The Candidacy Examination Report is to be completed via gradforms.osu.edu by all voting committee members on the same or the following business day. If a student does not pass the examination the advisor should submit copies of the written examination to the Mathematics Graduate Office and inform the GSC Chair and the VC of the details of the examination.

Assuming the student is permitted a second attempt at the examination, Graduate School rules require a Graduate Faculty Representative (GFR). All procedures provided in the GSH for including the GFR and conducting a second attempt at the examination should be carefully followed. A second failure of the candidacy examination results in the automatic dismissal of the student from the Graduate School, which also bars the student from enrollment in other graduate programs on campus.

6.10 CANDIDACY

6.10.1 Definition and Time Expectations

In order to achieve or maintain candidacy status, a student must have completed the candidacy examination during the previous term, be in good standing with the Graduate School and the mathematics program, and fulfill all other requirements defined in Section VII.7 of the GSH. A student on candidacy status is also referred to as a “post-candidacy student” or a “doctoral candidate”.

During candidacy, a doctoral candidate is expected to focus entirely on the original research and writing required for the completion of a dissertation. Students need to be on candidacy status in order to defend their dissertation and graduate.

Although there is no program specific time-limit for the candidacy period, it should be within the overall time expectations of our doctoral program, which typically constrains the
candidacy time period to about three years. The Graduate School limit for the candidacy period is five years, after which a supplemental candidacy examination must be passed.

The following university and mathematics program level requirements apply to all doctoral candidates:

6.10.2 Three-Hour Enrollment

Post-candidacy students are required to enroll themselves for exactly 3 credit hours of courses every autumn and spring semester with the university registrar. Enrollment in the summer is not required.

Normally, students enroll in 3 hours of Math 8999 with their dissertation advisor. Students who require additional coursework towards their research preparations may instead enroll in three hours of mathematics courses at the 7000 or 8000-level with permission of the dissertation advisor.

Enrollment in other types of courses as well as enrollments beyond three hours requires special permission by the department. Students on departmental support may petition the GSC for tuition fee waivers of such course if they are academically justified. They may also ask the department to enroll in such courses with advisor permission provided they reimburse tuition fees to the department.

Students on external grant support need to negotiate with the respective P.I. about additional enrollments.

6.10.3 Continuous Enrollment

Post-candidacy students are required to be enrolled for three hours during every autumn and spring semester. Leave semesters are not allowed, unless under special circumstances such as medical issues, and only with permission from the Graduate School. For detailed rules on leaves see Section VII.8 of the GSH.

6.11 DISSERTATION AND FINAL EXAMINATION

6.11.1 Summary of General Graduation Procedures

Students and advisors should carefully read and follow instructions given in Section 5.4 as well as references to other rules given therein for general university and departmental procedures required for graduations and final examinations.

The final doctoral examination should be completed within the time expectations laid out in Section 6.2, and students need to submit an application on gradforms.osu.edu at the beginning of the intended term of graduation.

Before applying to graduate, students need to be in good standing with both the university and our program, have maintained or reinstated their candidacy status, and have fulfilled all residency and credit hour requirements detailed in the GSH. Moreover, students should have found an examination committee and the dissertation document should be sufficiently far along to predict timely submission to and approval by committee members.
6.11.2 Summary of Final Examination Rules and Guidelines

All rules and procedures of the GSH regarding the final document and final oral examination for doctoral students need to be observed. As noted already in Section 5.4.5, the dissertation document needs to be at an acceptable state of completion and has to be submitted to all committee members (including the GFR) at least two weeks before the oral examination.

Graduate School rules require that the examination takes place during regular university hours. It is limited in time to two hours, of which at least one hour needs to be devoted to questioning of the candidate. The time for a prepared presentation by the student is limited to 30 minutes and questions by visitors not on the committee are restricted to this portion of the examination.

Committee members may ask the candidate to present material in additional depth, or to extrapolate on aspects of the public presentation or any other aspect of the work completed toward the degree. The Graduate School has no restrictions on attendance during any portion of the examination.

The customary format in our program is that the first hour of the examination is open to the public and the second hour is restricted to committee members only. Moreover, the public portion usually consists of a presentation as well as further elaborations on parts of the presentation as directed by committee members. The second portion, closed to the public, is dedicated to questioning by the committee mainly about the dissertation research. The discussion may also probe conceptual background, investigate relevance of results and their connections with other lines of mathematical research, as well as expand on possible future research questions.

Advisors who would like to significantly deviate from this format should discuss this with the GSC Chair. The decision on passing the final oral examination should be reached immediately after the examination by the Final Oral Examination Committee.

7. Master of Science

7.1 Eligibility, Admission, and Option Overview

The Master of Science (MS) degree is associated with the standard mathematics graduate program, which also includes the PhD degree described in Section 6. Its requirements overlap with the PhD pre-candidacy requirements and the Candidacy Option for the MS degree is linked to our PhD degree. The main purpose of the degree is to provide or recognize thorough preparations for doctoral studies in mathematics.

7.1.1 Eligibility

The Master of Science (MS) degree is open to all students pursuing a doctoral degree in mathematics-related disciplines at OSU.

This includes, in particular, PhD students in our program who either would like to earn a master’s degree along the path towards their PhD degree or who will not complete their intended PhD degree but still want to leave our program with a master’s degree recognizing completed coursework and examinations.
In addition, undergraduate students enrolled in the OSU Mathematics Honors Track who wish to pursue the Master’s Option of that track may apply to be admitted to the MS program in order to complete a combined MS/BS degree as described in Section VIII.1 of the GSH.

Students in other master’s programs at OSU are not eligible to enroll in the MS degree. This also excludes students in our MMS and MAQRM programs. Moreover, our program does not admit students who are not currently enrolled at OSU to the MS degree.

7.1.2 Options

The following three master’s degree options are available as possible routes to earn an MS degree:

a) The Non-Thesis Option requires proficiency in analysis and algebra at the beginning doctoral (6000) level, the completion of substantial course work, as well as an examination or take-home project.

b) The Thesis Option requires proficiency in analysis and algebra only at the 5000 level and slightly less coursework. However, candidates need to write and defend a substantial thesis following Graduate School rules.

c) Doctoral students in mathematics can also earn the MS degree via Candidacy.

The requirements and procedures for each option are described in the following sections.

7.1.3 Admission and Credits

Current mathematics PhD students in good standing can simply submit applications to graduate via gradforms.osu.edu for any of the three options. All requirements for the respective master’s option need to have been fulfilled before submitting an application.

PhD students at OSU in other disciplines need to first find a graduate faculty member with M-status in the standard mathematics program who is willing to serve as advisor and chair of the examination committee. Moreover, a study plan for fulfilling the requirements should have been designed and discussed with the advisor. Students may take advantage of the Dual Degree option provided by the Graduate School and described in Section VIII.2 of the GSH. Once the plan of study has been decided, the student should confer with the VC and our Graduate Office before submitting an application to graduate via gradforms.osu.edu.

Undergraduate students who wish to pursue a combined MS/BS degree should, similarly, find a mathematics faculty advisor and design a study plan. Students should then contact the GSC Chair and submit their application and study plan in writing to the GSC with a support letter from their advisor. It is recommended that undergraduates begin this process as early as possible to allow sufficient time to earn the required graduate credits.

7.2 Thesis Option

This option is the one most frequently chosen by doctoral students outside of mathematics. It has the most lenient course requirements but involves a mandatory thesis that has to be written and defended according to Graduate School standards. Specifically, students need to fulfill all of the requirements listed below:
7.2.1 Elective Coursework
At least 30 credit hours need to be completed from the list of MS elective courses provided in Section 7.5 below. A grade of C- or better must be earned in courses used toward these credits.

7.2.2 Algebra Requirement
Fulfill one of the following:
   a) Complete the Math 5111-5112 sequence with grade of B or higher in each course and a B+ average or higher in the sequence (10 Credit Hours), or
   b) Complete the Math 6111-6112 sequence with grade of B or higher in each course and a B+ average or higher in the sequence (10 Credit Hours)

7.2.3 Analysis Requirement
Fulfill one of the following:
   a) Complete the Math 5201-5202 sequence with a grade of B or higher in each course, and an average of B+ or higher in the sequence (10 Credit Hours), or
   b) Complete the Math 6211-6212 sequence with a grade of B or higher in each course, and an average of B+ or higher in the sequence (10 Credit Hours)

7.2.4 Master's Thesis & Examination:
Students need to follow all requirements set by the Graduate School for master's degree thesis options outlined in Section 5.4 above and described in detail in Section VI of the GSH. The department sets no further program requirements on the form or content of the master's thesis and examination beyond those set by the Graduate School.

7.3 Non-Thesis Option
Course requirements for this option are more demanding, with mandatory courses at the doctoral level as well as higher credit and grade thresholds for electives. Although a thesis is not required it also involves a pro-forma examination or project satisfying Graduate School requirements. Typically, only mathematics PhD students elect this option.

7.3.1 Elective Course Work:
At least 32 credit hours need to be completed from the list of MS elective courses provided in Section 7.5 below. Each course used towards these credits must be passed with a grade of B- or better. Moreover, the course selection must include at least one two-semester sequence.

7.3.2 Algebra Requirement:
Fulfill both of the following:
   a) Complete the Math 6111 course with a grade of B+ or higher.
   b) Complete the Math 6112 course with a grade of B+ or higher.

7.3.3 Analysis Requirement:
Fulfill both of the following:
a) Complete the Math 6111 course with a grade of B+ or higher.
b) Complete the Math 6112 course with a grade of B+ or higher.

7.3.4 Qualifying Examination Alternative:

Mathematics PhD students may fulfill any of the four course requirements stated in Sections 7.3.2 and 7.3.3 by completing the respective qualifying examination with either a PhD Pass or a Master's Pass. For details about the qualifying examinations see Section 6.4.3 above.

Other students who are eligible for the MS option will need to petition the GSC in order to be allowed to participate in the qualifying examinations and make use of this alternative. Petitioning students should provide evidence that they have a realistic chance of passing a respective examination.

A passed qualifying examination cannot be counted towards the elective course work required in Section 7.3.1.

7.3.5 Master’s Examination/Project:

Students need to follow the requirements set by the Graduate School for master’s examinations for the non-thesis options described in detail in Section VI.2 of the GSH. There are no further program requirements on the form or content of the master’s examination beyond those set by the Graduate School. In particular, it is left up to the examination committee whether this should be in the form of a paper, project, or a sit-down examination.

7.4 Candidacy Option

PhD-students who have satisfactorily completed their candidacy examination can apply for the MS-degree without any further program requirements. The student will still need to submit an application to graduate via gradforms.osu.edu and be enrolled for at least 3 hours during the term they earn the master’s degree.

7.5 MS Electives

Below is the list of elective courses than can be used towards the requirements in Sections 7.2.1 and 7.3.1 above. Non-mathematics and undergraduate students should consult with their mathematics advisors before enrolling in courses numbered 6000 and above to make sure they have the required background.

7.5.1 List of Elective Courses

All courses on the list are letter (A-F) graded. In particular, S/U graded courses, such as 6191, 6192, 6999, and 7193 cannot be used towards elective requirements. Petitions to the GSC to have other letter graded coursework counted needs to be submitted before enrolling into the courses.

♦ Math 5051 (Introduction to Mathematical Logic)
♦ Math 5101, Math 5102 (Linear Math in Finite & Infinite Dimensions)
♦ Math 5111, Math 5112 (Algebra 1 & 2)
♦ Math 5201, Math 5202 (Introduction to Real Analysis 1 & 2)
- Math 5221 (Introduction to Complex Analysis)
- Math 5401, Math 5402 (Applied Differential Equations 1 & 2)
- Math 5601 (Essentials of Numerical Methods)
- Math 5602 (Computational Partial Differential Equations)
- Math 5630, Math 5631 (Life Contingencies 1 & 2)
- Math 5632 (Financial Economics)
- Math 5651 (Mathematical Modeling of Biological Processes)
- Math 5702 (Curves and Surfaces in Euclidean Three Space)
- Math 5801 (General Topology and Knot Theory)
- Stat 6302 (Theory of Statistical Analysis)
- Stat 6801, Stat 6802 (Statistical Theory I & II)
- All 6000 & 7000 level letter graded mathematics courses.

7.5.2 Dual Use of Courses

Analysis and algebra courses used to fulfill the subject requirements in Sections 7.2.2, 7.2.3, 7.3.2, or 7.3.3 can simultaneously be counted towards the elective requirements in Sections 7.2.1 and 7.3.1. Thus, a student who has completed all analysis and algebra requirements by coursework will have already fulfilled 20 credits towards the respective elective requirement.

8. GRADUATE MINOR

8.1 OVERVIEW, ELIGIBILITY, AND ADMISSION

The Graduate Minor (GM) in Mathematics provides an opportunity for graduate students from other departments on campus to have their graduate coursework in mathematics recognized without committing to a regular master's degree. Students interested in this option should contact the Graduate Minor Chair (GMC) of our program.

8.1.1 Eligibility

The GM is open to fulltime doctoral students in good standing in any graduate program at OSU. Other graduate or advanced degree students (JD, MD, MS, MA, etc.) may be considered in special circumstances via a petition to the Mathematics GSC. The petition should include a study plan, evidence of sufficient preparation for the proposed curriculum, as well as letters of support of the advisor of the home department and the GMC.

8.1.2 Enrollment and Approval

Before enrolling, students need to submit a study plan together with a current Advising Report to the GMC for approval. Study plans that fall within the recommended curricula provided in Section 13.1 and for which a student has sufficient preparations are normally approved by the GMC. The GMC chair may also delegate approval to the GSC in cases that do not follow established standards.
Once approved, the GMC informs the GSC and VC and the student enters the study plan on gradforms.osu.edu. Previously taken courses may be counted towards the GM requirements.

8.2 REQUIREMENTS

8.2.1 General Requirements

The GM requires a minimum of 15 credit hours of graduate level courses in mathematics at the 5000 level or above. All courses should be entered into the departmental advising sheet and approved by the GMC. Moreover, all letter graded courses must be completed with a grade of B or better and other courses with an S (satisfactory).

8.2.2 Curricular Constraints

The following special rules need to be fulfilled by the study plan submitted for the GM:

- The study plan needs to contain at least 4 courses in mathematics at 5000 level or higher. That is, a study plan with only three 5 credit hour courses is not valid.
- At most 3 credit hours of S/U graded courses may be counted toward the required 15 credits. These include independent studies courses (Math 6193, 7193) as well as the .02-sections of 7000-level courses.
- At least 9 credits need to be earned from letter graded courses at the 5000 and 6000 level.
- Graduate research or internship courses (Math 6191, 6998, 6999, 7998, 8998, 8999) cannot be counted towards the GM.
- Group study courses (Math 5194, 6194) are generally also not permitted. If such a course is taught at a similar level of mathematics and with a comparable rigor of letter grading, such a course may be counted upon petition to the GSC.

8.3 TIMELINE, TRANSCRIPT DESIGNATION, AND SUPPORT

8.3.1 Time and Enrollment Expectations

Students are normally expected to complete their coursework within 3 years of their applications and to be continuously enrolled as a fulltime graduate student during that time. Minor exemptions may be approved by the GMC. The GSC monitors, with the help of the GMC, completion times and rates for the GM and decides on special cases, such as leaves and extensions by more than a year.

8.3.2 Gradforms and Transcript Designation

Once all courses on the study plan have been completed with the required grades, the student returns to gradforms.osu.edu and the previous GM submission. There the student checks the box indicating that they request the GM transcript designation and submits. After further approval by our department and the Graduate School, the designation will appear on future OSU transcripts. At the time of the final submission the student still needs to be in good standing and pursuing a major degree.
9. MASTER OF ACTUARIAL AND QUANTITATIVE RISK MANAGEMENT

The Master of Actuarial and Quantitative Risk Management (MAQRM) is a professionally-oriented degree, serving mainly students with career interests in the financial industry with focus on quantitative risk management, the actuarial and insurance industry, as well as related business sectors.

9.1 ADMISSION POLICIES AND REQUIREMENTS

Admissions to the MAQRM program are generally considered for both autumn and spring semesters. All students seeking admission need to apply by the advertised deadlines for full consideration. Admissions are granted only upon positive review by the GRC subcommittee for the MAQRM.

9.1.1 Submission of Applications

Students who are not already graduate students at OSU need to submit a full application through the OGPA system as outlined in Section 5.1.1 and fulfill all Graduate School requirements for admission. Students who have already been admitted to a graduate program at OSU need to apply for a program transfer as described in Section 5.1.2 and should submit all materials via the OGPA system.

Undergraduate students may apply to be admitted to the MAQRM program in order to complete a combined MS/BS degree as described in Section VIII.1 of the GSH. Admission decisions for these students will be made by the MAQRM Program Director and the VC.

9.1.2 Expected Preparations and Application Requirements

Applicants to the MAQRM program should present the following preparation and materials in their applications:

- Strong coursework in advanced calculus, including multivariable calculus.
- Solid preparation in calculus-based probability, statistics, and elementary economics at the level of our Math 4530, Stat 4201, Econ 2001, and Econ 2002 courses.
- Cumulative undergraduate GPA of 3.3 (or 82.5% on the grade scale) or better.
- Proficiency in a computer programming language, such as C++, Python, or Java, is strongly recommended.
- Background in interest theory and actuarial sciences is recommended but not strictly required. Incoming students are generally expected to have passed the Financial Mathematics (FM) Exam.
- Strong scores for the GRE general test. The GRE subject test is not required but may be considered favorably.
- Three reference letters from writers qualified to judge the applicant’s academic and professional abilities.
- Statement of Purpose describing professional goals in the finance and actuarial fields.
9.1.3 Tuition Deposit
Students accepting our offers of admission will be required to pay an advertised tuition deposit before being able to matriculate. The tuition deposit will be applied to later tuition charges.

9.2 Fees, Support, and Eligibility
MAQRM students are responsible for their own subsistence, tuition costs, as well as additional program fees as applicable. Current fee tables are available at https://registrar.osu.edu/FeeTables/MainFeeTables.asp.

Students are not eligible for support through Graduate Associate positions from the mathematics department. This means, in particular, that students supported through a GA position in another mathematics degree program cannot simultaneously enroll in the MAQRM program.

Non-university positions as well as appointments outside the College of Arts and Science are permitted as long as they do not interfere with adequate progress towards the degree and comply with university regulations.

9.3 Time Expectations, Options, and Advising Sheets
Students in the MAQRM program are expected to enroll as full-time students during regular semesters and complete all their graduation requirements at the end of their fourth regular semester of study. Exceptional time schedules require the prior approval of the advisor and GSC at the beginning of the first semester of study.

The MAQRM degree offers both a non-thesis and a thesis option. Students should decide on which option they elect by the beginning of their second semester of study.

Students who elect the thesis option are expected to have selected a thesis advisor before the start of their third regular semester. The thesis is to be written in the second year of study, during which the student enrolls in Math 6999 with the advisor. It should be completed by the spring break of the second year.

The thesis document and defense need to comply with all university and department rules as outlined in Section 5.4.

All MAQRM students, regardless of option, need to regularly confer with their advisor about their study plans and update their Advising Sheets - which is also required for the approval of their applications to graduate.

9.4 Required Hours, Exams, and Courses
9.4.1 Financial Mathematics Prerequisite
Students should have passed the Financial Mathematics (FM) Exam administered by the Society of Actuaries (SOA) and the Casualty Actuarial Society (CAS) by their first semester of study.
Students who did not pass the exam are required to take Math 3618 (Theory of Interest) in their first semester and pass the course with at least a grade of B. This course does not contribute towards graduate credits or program requirements.

9.4.2 Required Hours

Students in the thesis option need to complete at least 30 credits of required or elective coursework, in addition to at least 3 hours of Math 6999.

Students in the non-thesis option need to complete at least 33 credits of required or elective coursework.

9.4.3 Oral and Comprehensive Examinations

Students in the thesis option need to complete a thesis defense as prescribed by Graduate School rules and outlined in Section 5.4 above.

Students in the non-thesis option are required to satisfactorily complete the two-part comprehensive examination. Each part of the examination is approximately 2 hours long and tests one of two areas chosen by the student. Students can choose from the following six subjects:

1. Financial mathematics and economics
2. Stochastic calculus with applications in finance
3. Predictive modeling
4. Numerical analysis
5. Life contingencies
6. Loss models

The two comprehensive exams will simultaneously fulfill the requirement of the Graduate School master's examination requirement.

9.4.4 Required Courses

Students must pass all four courses below with a grade of C- or better by the end of their fourth regular semester of study. All required courses are for 3 credit hours. Students should plan ahead and confer with their advisor about scheduling the practicum course, which should be taken within the first two regular semesters of study.

♦ Math 5632 (Financial Economics for Actuaries)
♦ Stat 6301 (Probability for Statistical Inference)
♦ Stat 6302 (Theory of Statistical Analysis)
♦ Math 5194 (Group Study: Practicum in AQRM)

9.5 Elective Sequences and Courses

All students need to fulfill both of the following two requirements. Any of the courses below count towards the total credits for elective courses.
9.5.1 Elective Course Sequences

Students must choose 2 or 3 of the following year-long course sequences. Each course carries 3 credit hours and each regular sequence 6 credit hours. Between 12 and 18 credit hours can be counted towards electives from this block of courses.

- Math 5635, 5636 (Stochastic Calculus for Finance)
- Math 5630, 5631 (Life Contingencies)
- Math 5633, 5634 (Loss Models)
- Math 5637 (Topics in Risk Management – once repeated)
- Math 5601, 5602 (Numerical Analysis)

9.5.2 Elective Courses

Students need to choose from the following list of approved elective courses in order to complete the hour requirement in Section 9.4.2. Listed courses are for 3 credit hours if not indicated otherwise.

**Mathematics**

- Math 5201 (Real Analysis 1) 5 credits
- Math 5202 (Real Analysis 2) 5 credits
- Math 5401 (Applied Differential Equations 1)
- Math 5402 (Applied Differential Equations 2)
- Math 5603 (Numerical Linear Algebra)

**Statistics**

- Stat 5740 (Introduction to SAS) 2 credits
- Stat 6450 (Regression Analysis) 4 credits
- Stat 6540 (Applied Stochastic Processes 1)
- Stat 6550 (Time Series) 2 credits
- Stat 6560 (Applied Multivariate Analysis)
- Stat 6605 (Applied Survival Analysis)

9.6 Thesis, Practicum, and Internship Projects

Students in the thesis option will typically develop a thesis project from questions and topics that arise during the practicum course. Mentors assigned during the practicum may serve as members on the thesis committee if they are graduate faculty at OSU with at least M status. Mentors without graduate faculty status may serve as additional members on the committee upon petition to the Graduate School.

The thesis project may, however, also be independent of the practicum or emerge from experiences during an internship. Thesis students should consider demonstrated training and marketability for future employers when choosing a thesis topic.
10. MASTER OF MATHEMATICAL SCIENCES

The Master of Mathematical Sciences (MMS) prepares students both for professional careers that require specific mathematical skills and doctoral programs in the broader mathematical sciences or related interdisciplinary fields. The degree program is divided into three tracks with separate specializations which are designated on students’ transcripts. The three tracks are named Mathematical Biosciences, Mathematics for Educators, and Computational Sciences, occasionally also abbreviated as the Bioscience Track, Educators Track, and Computational Track.

The program emphasizes interdisciplinary work, providing students with exposure not only to mathematical foundations but also to at least one area of application outside of mathematics. Moreover, all students are required to complete a substantial independent project as part of formation.

Thus, in general, only the thesis option is open to MMS students. The only allowed exemption is described in Section 10.6.

10.1 ADMISSION POLICIES AND REQUIREMENTS

Students are admitted to the MMS only for autumn semesters. All students seeking admission need to apply by the advertised deadlines for full consideration. Admissions are granted only upon positive review by the GRC subcommittee for the respective MMS track.

Currently, MMS admissions have been paused pending further evaluation of the degree program by the GSC.

10.1.1 Submission of Applications

Students who are not already graduate students at OSU need to submit a full application through the OGPA system as outlined in Section 5.1.1 and fulfill all Graduate School requirements for admission. Students who have already been admitted to a graduate program at OSU need to apply for a program transfer as noted in Section 5.1.2 and should submit all materials via the OGPA system.

10.1.2 Expected Preparation and Application Materials for All Tracks

Applicants to the MMS program should present the following preparation and materials in their applications regardless of the track.

- Strong coursework in advanced calculus including multivariable calculus.
- Solid preparations in linear algebra.
- Students whose native language is not English and who seek financial support as GTAs need to submit proof of English oral proficiency. This may be a TOEFL iBT Speaking score of 28 or higher and IELTS Speaking score of 8.5 of higher, or previously having passed the OSU Oral Proficiency Assessment (OPA) with a score of 4.0 or higher.
- The GRE general test is required for international students and strongly recommended for domestic students. The GRE subject test in mathematics is not required.
- Three reference letters from qualified writers who can judge the applicant’s academic abilities, including the ability to work on independent projects.
• A Statement of Purpose, which should explain the choice of specialization based on the applicant's interdisciplinary interest(s) or background.

10.1.3 Preparation Specific to Tracks

Applicants should meet the following additional expectations depending on which track they apply to.

• Applicants for the Educators Track should have a broader formation in theoretical mathematics. Additional courses may include abstract algebra, real analysis, topology, geometry, or topics in discrete mathematics. Courses in education and pedagogy or prior teaching experience may be helpful but are not required.

• Applicants for the Bioscience Track should have a solid background in differential equations at the undergraduate level. Training in additional applied mathematics topics, undergraduate research, and computational skills are considered favorably. Background in the life sciences may be helpful but is not required.

• Applicants for the Computational Track should have a solid background in applied mathematical topics such as differential equations as well as some computational experience. Generally, applicants are also expected to have experience in a physical or engineering science.

10.2 Degree Requirements and Time Expectations for All Tracks

10.2.1 Course Requirements

Required and elective courses, as well as specific credit hour requirements, are listed separately for each specialization track in the following sections. A student will need to pass all required and elective courses in the respective specialization with at least a grade of C- by the end of the spring semester of the second year.

The total credits earned from required and elective courses must be at least 30 semester credit hours. Independent studies, group studies, and research hours from unapproved courses not on the lists below do not count towards the required 30 hours of course work.

10.2.2 Practical Experience

Students in all tracks are expected to work on a project related to their specialization over the summer between the first and second year under the supervision and mentorship of a graduate faculty member. The outcomes of the project normally serve as the basis for the thesis that is written during the second year of study.

MMS students are expected to confer with their assigned advisor and other faculty during the spring of their first year to find suitable mentors and projects before the start of the summer term. Project mentors may also be graduate faculty members from other units on campus, assuming that a mathematics advisor participates in the supervision. In fact, interdisciplinary advising is strongly encouraged in this degree program.

If available, students may also use external internships with projects or research activities related to the specialization and contributing to a potential thesis topic. The organization of such internships would be the responsibility of the student and would need to be in consultation with the advisor in order to count towards this expectation.
Formal summer enrollment for the practical experience is not required.

10.2.3 Thesis Advisor and Thesis Writing

All MMS students are expected to have elected a thesis advisor by the start of the autumn semester of their second year of study. This requires the submission of a signed advisor change form indicating the thesis advisor as Faculty Advisor.

The thesis advisor needs to be a graduate faculty member (category M level or higher) in the mathematics department. Post-doctoral and associated faculty members may assist in mentoring theses but cannot serve as advisors or voting committee members.

Thesis research and thesis writing will occur during the second year and should be completed at the end of the spring break of the second year. During this time students should generally be signed up for at least one credit hour of Math 6999 with the supervising thesis advisor. Generally, but not necessarily, the thesis will build on the practical experience in the previous summer.

10.2.4 Thesis Committee and Defense

Students and committee members need to comply with all requirements set by the Graduate School for master degree thesis options outlined in Section 5.4 above and described in detail in Section VI of the GSH.

As for the practical experience, it is strongly encouraged to select an interdisciplinary thesis committee in which the second committee is a graduate faculty member from another unit. Typically, both committee members will have been involved in the summer project.

10.3 Course Requirements – Bioscience Track

10.3.1 Required Courses

All students in the Bioscience Track need to complete the following courses. Each listed course is 3 credit hours if not indicated otherwise and the total number of credits for all required courses is 26.

Mathematics

♦ Math 5401 (Applied Differential Equations I)
♦ Math 5402 (Applied Differential Equations II)
♦ Math 5601 (Essentials of Numerical Methods)
♦ Math 5602 (Computational Partial Differential Equations)
♦ Math 5651 (Mathematical Modeling of Biological Processes)

Molecular Genetics

♦ MOLGEN 5660 (Integrated Molecular and Cellular Biology for Non-Biologists) 5 credits

Statistics

♦ Stat 6301 (Probability for Statistical Inference)
♦ Stat 6302 (Theory of Statistical Analysis)

10.3.2 Allowed Substitutions of Required Courses

The following substitutions of required course sequences by 6000-level courses are allowed. Enrollment in these advanced courses requires the permission of the advisor, who should carefully evaluate and discuss the needed preparations. Normally, full course sequences should be substituted rather than individual courses.

♦ The Math 5401, 5402 courses may be replaced by Math 6411, 6451.
♦ The Math 5601, 5602 courses may be replaced by Math 6601-6602.

10.3.3 Elective Courses

Students in the Bioscience track are required to take additional elective courses subject to the following requirements.

1) All elective courses must be chosen from those listed in Section 13.3.
2) Electives must include at least two courses.
3) The number of credit hours of electives must add up to at least 5 credit hours.
4) At least one elective course must be from a life science program, namely, BIOCHEM, BIOMED, EEOB, MOLGEN, or PUBH-EPI.

10.4 Course Requirements – Educators Track

10.4.1 Required Courses

The following are required courses in mathematics for all students in the Educators Track. Unless indicated otherwise each listed course carries 3 credit hours and they add to a total of 17 credit hours.

Mathematics

♦ Math 5101 (Linear Mathematics in Finite Dimensions)
♦ Math 5152 (Introduction to Number Theory with Applications)
♦ Math 5201 (Introduction to Real Analysis 1) 5 credits
♦ Math 5702 (Curves and Surfaces in Euclidean Three Space)
♦ Math 5801 (General Topology and Knot Theory)

In addition, students are required to choose two courses from the following education courses for an additional 6 credit hours.

Education and Human Ecology – Teaching & Learning

♦ EDUTL 7715 (Learning Progressions in Mathematics Education)
♦ EDUTL 7716 (Conceptual and Procedural Knowledge in Mathematics Education: Theory, Research, and Controversy)
♦ EDUTL 7717 (Teaching Mathematics)
10.4.2 Allowed Substitutions of Required Courses

The following substitutions of required courses and course sequences are allowed with permission of the advisor. Advisors should carefully evaluate course prerequisites and the student’s preparations before giving permission to enroll in 6000-level courses.

♦ The Math 5101, 5152 may be replaced by the Math 5111-5112 sequence or by the Math 6111-6112 sequence.
♦ Math 5201 may be replaced by Math 6211.
♦ Math 5801 may be replaced by Math 6801.
♦ Math 5702 may be replaced by Math 6701.

10.4.3 Elective Courses

Students in the Educators Track are required to take additional elective courses subject to the following requirements.

1) All elective courses must be chosen from those listed in Section 13.4.
2) Electives must include at least two courses.
3) The number of credit hours of electives must add up to at least 7 credit hours.
4) Students cannot get elective credit for both Math 5221 and Math 5251. Only one of the two courses can be counted.
5) Only one credit hour of the STAT 5301 course can be counted towards the credit requirement in 3) above.

10.5 COURSE REQUIREMENTS – COMPUTATIONAL TRACK

10.5.1 Required Courses

All students in the Computational Track need to complete the following mathematics courses. The required courses are 3 credit hours each and total 18 credit hours.

Mathematics
♦ Math 5401 (Applied Differential Equations I)
♦ Math 5402 (Applied Differential Equations II)
♦ Math 5601 (Essentials of Numerical Methods)
10.5.2 Allowed Substitutions of Required Courses

The following substitutions of required courses and course sequences are allowed with permission of the advisor. Advisors should carefully evaluate course prerequisites and the student’s preparations before giving permission to enroll in 6000 and 7000-level courses.

- The Math 5401-5402 sequence may be replaced by the Math 6411, 6451 sequence.
- Math 5601 may be replaced by Math 6601
- Math 5602 may be replaced by Math 7611

10.5.3 Elective Courses

Students in the Computational Track are required to take additional elective courses subject to the following requirements.

1) All elective courses must be chosen from those listed in Section 13.5.
2) Electives must include at least three courses.
3) The number of credit hours of electives must add up to at least 12 credit hours.
4) At least two electives must be from the same sub-specialization as indicated by the groups of courses below.

10.6 Non-Thesis Exemption for Computational Track

In special circumstances students in the Computational Track may be exempted from writing a thesis and be allowed to graduate using the non-thesis option. The following requirements need to be met by a student in order to be eligible for the non-thesis exemption.

1) A rationale for this exemption needs to be submitted to the GSC with a support letter from the advisor.
2) The student needs to accumulate 21 (instead of 12) credit hours in electives.
3) Selection of a sub-concentration among the topics listed in Section 13.5 and committee member with expertise in the sub-concentration.
4) A master’s examination that contains both a written and an oral portion. The written portion should be a 2-3 week-long, interdisciplinary project. The oral portion should include a discussion and inquiry about the project but should be shorter than a thesis defense.
5) An application to graduate with a master’s non-thesis option that includes both a written and an oral portion.
11. **FINANCIAL SUPPORT**

11.1 **GRADUATE SCHOOL FELLOWSHIPS**

Numerous types of fellowships (GSF) are provided by the OSU Graduate School. Most are granted to incoming students through the University and Enrichment Fellowship competition during the recruitment process. In addition, students can compete for Presidential Fellowships twice a year.

11.1.1 Graduate School Terms and Responsibilities

Fellowships are contracts between the individual student and the Graduate School. The Graduate School also determines and monitors the terms and conditions of the fellowship. The most important include the following.

1) Fellows need to maintain good academic standing with the GS (see Section 1.2.2).

2) Generally, fellows may not hold any other appointments and are expected to focus entirely on their academic program. Students may petition to hold up to a 25% Graduate Associate appointment or equivalent position under special circumstances.

3) Master’s and pre-candidacy students need to enroll in at least 12 credit hours during autumn and spring semesters and in at least 6 credit hours during summer terms.

4) Post-candidacy students need to enroll in at least 3 hours during every term during the support period.

5) Students with multi-year recruitment fellowships need to have passed candidacy and maintain a cumulative graduate grade point average of at least 3.6 to be able to activate their dissertation year support.

All GSFs cover tuition and stipend at levels indicated in the Graduate School offer letters to the student. GSFs also come with no special duties other than the expectation of strong academic progress. The complete set of terms, conditions, and benefits can be found in the GHS, fellowship guidelines published by the Graduate School, and offer letters.

11.1.2 Eligibility and Nominations

Nominations of applicants for recruitment fellowships are decided by the GRC during the regular admissions process and submitted in January of each year in compliance with Graduate School rules. Criteria may include the academic strength of an applicant, considerations of diversity, and the likelihood of success of the nomination.

Nominees will normally have to meet all Graduate School criteria for University and Enrichment fellowships. Waivers for low grade point averages are used rarely and only in highly exceptional cases.

Competitions for Presidential Fellowships occur in March and October of each year. Complete application materials need to be submitted about 2 weeks before the Graduate School deadline to the Mathematics Graduate Office. All applicants need to meet the requirements of the Graduate School for a nomination, which include having passed candidacy and maintaining a cumulative graduate grade point average above 3.6.
A GSC sub-committee decides which applying doctoral students in our program will be nominated as well as the required ranking of nominations if there are several nominations. Usually, instructions will be sent to graduate students and advisors in early March and early October explaining the departmental process.

11.1.3 Program Policies for Graduate School Fellowships
Since GSFs are primarily a contract between the Graduate School and the student, the role of the mathematics graduate program is merely to provide instructions, advise and facilitate. The involvement of our program is normally limited to the following:

1) Nominations as described in Section 11.1.2.
2) Request the Graduate School to activate the dissertation year support of a multi-year upon request by the student to the VC.
3) Assist communication between fellows and the Graduate School, if necessary.
4) Report on satisfactory academic progress upon direct and explicit inquiries by the Graduate School.
5) Provide stipend supplement to some recruitment fellowships as stated in individual offer letters from the department.
6) Support petitions to hold additional minor scholarships or positions that do not interfere with academic progress as determined by the GSC or VC.

Additional departmental policies regarding GSFs are as follows:
1) The department assumes no responsibility for monitoring a fellow’s compliance with terms and conditions of a GSF. Repercussions from non-compliance are entirely the responsibility of the student and the Graduate School.
2) Fellowship support does not pause time to degree expectations in our program. Any year on fellowship support counts as a year of study toward the graduation deadlines.
3) If a student does not graduate at the end of the dissertation year of a multi-year recruitment fellowship or a Presidential Fellowship but is still within program time expectations, the student remains eligible for regular departmental financial support.
4) The department generally does not support petitions to retain GSFs after failing minimal Graduate School requirements such as grade point averages. Exemptions are considered only in highly exceptional circumstances that are beyond the control of the student such as medical emergencies or clerical errors that are demonstrably not the student’s fault. The department does not provide justifications for poor academic performance.

11.2 GRADUATE ASSOCIATE POSITIONS

11.2.1 Overview and Typology
Graduate Associate (GA) positions are the most frequently used form of financial support for graduate students in our department and on campus. They are a special category of employment that provides various graduate student-specific benefits and protections. GA
appointments are subject to numerous university and departmental policies. Moreover, GA positions are distinguished by employment level, type of duties, and funding sources.

There are two employment levels for GA positions used in our department. The most common are 50% GA appointments which are referred to in the following sections as regular GA positions. In addition, 25% GA appointments will be referred to as partial GA positions.

Moreover, GA appointments are divided into Graduate Teaching Associate (GTA), Graduate Research Associate (GRA), and Graduate Administrative Associate (GAA) positions depending on the nature of the primary duties attached to the respective employment.

Finally, GA appointments are distinguished by the funding sources from which their stipends, benefits, and tuition are paid. The two main categories are departmental resources and external funding. As for fellowships, the entity providing the funding also defines the duties attached to a GA appointment, determines stipend levels, sets policies, administers contracts, and monitors compliance in accordance with university and department rules.

11.2.2 General University Policies and Rules

GA positions are subject to rules described in the GSH as well as various university policies that concern employment, benefits, and tuition fee waivers. The most pertinent are outlined in the following list. For more detailed, up to date, and accurate information, the GHS and other university documents should be consulted.

1) The nominal weekly workload for regular GA positions is 20 hours and 10 hours for partial GA positions. Duties not directly contributing towards academic progress should never exceed these nominal hours assuming a reasonably performing student.

2) Stipends for GA positions are paid at the end of each month. Appointments are 4.5 months in length for autumn and spring semesters and 3 months for the summer term. Start and end dates are published by the university each year. All payments are via direct deposit and require students to have an active US bank account.

3) Students need to be in good standing with the Graduate School to hold any type of GA position. See the GHS and Section 1.2.2.

4) International students will need to have valid student (F-1) visas. Incoming international students should start the visa application immediately after the I-20 is issued. For extensions and other issues students may contact the OIA (see Section 1.4.3).

5) To hold regular GA positions, master’s and pre-candidacy students need to enroll in at least 8 hours in autumn and spring semesters and 4 hours during the summer term.

6) Post-candidacy students need to be enrolled in 3 hours during every term in a regular GA position.

7) Minimum hours for partial GA appointments are half of those for regular GA positions.

8) A regular GA position requires a minimum stipend set by the Graduate School. Full tuition costs (at the level of graduate in-state fees) and benefits must be covered by the same funding source. The minimum stipend for a partial GA position is half of the minimum stipend for a regular one, and the associated fee waivers cover only 50% of the tuition.
9) A student who has held regular GA positions during consecutive autumn and spring semesters of the same academic year is entitled to a tuition fee waiver of program and advisor approved courses during the summer immediately following this 9-month regular GA support. The tuition costs are charged to the funding source of the respective prior GA support. Students need to be enrolled for the minimum GA hours in order for the fee waiver to be activated, even without holding a GA position.

10) GA positions during autumn and spring semesters also include an 85% subsidy of student health insurance premiums during autumn and spring semesters. Premiums paid during a 9-month GA appointment cover health insurance during the following summer, even if the student is not in a GA appointment. For detailed information use contacts given in Section 1.3.2.

11) GA appointments do not accrue sick leave or vacation time.

11.2.3 Policies and Stipend Levels for Departmental GA Positions

The following additional policies by our department apply to all GA positions that are fully or partially funded from department sources.

1) Students must make satisfactory progress or be granted progress remediation status within either the mathematics PhD or MMS program. Students failing expectations as well as graduate students from other programs on campus or in other degree tracks are not eligible to hold departmentally funded GA positions, regardless of associated duties.

2) All course enrollments funded by a GA position need to contribute to the student’s progress toward the intended degree and require the consent of the advisor. Enrollment for post-candidacy students is limited to three hours during autumn and spring semesters.

3) Enrollments not meeting the criteria in 1) require special permissions by both the advisor and VC and must not interfere with academic progress. Moreover, the student must reimburse the department for any additional tuition costs incurred due to such enrollments.

4) Students on GA appointments are generally not allowed to hold other employment. Exemptions require special permission by the advisor and VC. Such additional employment must not interfere with academic progress or GA duties. If duties include teaching assignments, permissions also need to be sought from the Coordinator of the Office of TA Support or the Director of Undergraduate Instruction.

5) Students in progress remediation will not be granted exemptions for additional employment.

6) Normally all appointments during autumn and spring semesters are for regular GA positions and all appointments during the summer term are for partial GA positions.

7) The department will generally not support petitions to retain GA positions for students who fail to maintain good academic standing with the Graduate School. Exemptions and policies are the same as in item 4) of Section 11.1.3.

Stipends for regular GA appointments are determined by stipend levels. The monthly pay for each stipend level is determined each academic year by the department chairs depending on
FINANCIAL SUPPORT

Budgetary constraints and incentive policies. The stipend level for an individual student is, in turn, determined by the student’s academic standing, intended degree, and career stage in the program. Stipend levels are not adjusted in the middle of a semester but are changed only after passing a requirement in a prior term. The stipend levels and their qualifying criteria are, in increasing order of salary, as follows:

**O Level** Applies to all supported students in progress remediation as defined in Section 5.2.2. In addition, this pay level is applied to students who did not pass their Oral Proficiency Assessment before the start of their second year of study. The VC and GSC may also impose this pay level on students who have been negligent or performed poorly in their prior GA duties. The stipend is identical with the minimal stipend required by the Graduate School to hold a GA appointment.

**MMS Level** Applies to all MMS students in good standing and meeting program expectations.

**PhD-M Level** Applies to all beginning doctoral students in good standing and meeting program expectations.

**PhD-P Level** Applies to doctoral students in good standing and meeting program expectations who have passed all their qualifying requirements.

**PhD-C Level** Applies to doctoral students in good standing and meeting program expectations who have passed their candidacy examination.

11.2.4 Regular Graduate Teaching Associateships

Regular Graduate Teaching Associate (GTA) positions are made available and fully funded by the department of mathematics each autumn and spring semester. Awards of GTA positions are made either through the admission process for the first year of study or through the annual evaluation and renewal process for continuing students, which is conducted by the GSC each spring semester.

Students will receive offer letters from the department that specify any expectations, terms, and conditions beyond those that apply to all GTA appointments. Typically, all offers are for 9-month positions including an autumn and a spring appointment. In some cases, such as for students in program remediation or students leaving the program, offers may also be for only one semester and reappointments for an additional semester will require GSC approval.

Students need to fulfill the following eligibility criteria to be considered for GTA positions:

1) Satisfactory completion of the GTA training during the Headstart program.
2) Compliance with all GTA responsibilities listed in Section 12.
3) Reasonable performance in prior GTA appointments.
4) Application for a GTA position through the annual review of graduate students conducted by the GSC each spring.
5) Compliance with the contingencies, expectations, terms, and conditions set in the GSC offer letter.
11.2.5 Regular Departmental Graduate Research Associateships

Contingent on budgetary constraints, the department usually offers several types of regular GRA positions to selected students. Since the availability of departmental funds may vary significantly from year to year, the number of these GRA positions may also differ greatly each year. Due to higher teaching demand during the autumn semesters most semester-long departmental GRA positions are scheduled for the spring semester.

The available types of departmental fellowships, listed next, are distinguished by award-mechanism, funding source, and length.

*Tibor Radó Graduate Fellowships* (TRF) may be awarded to any new students during recruitment. A TRF covers the 9-month period of autumn and spring semesters at standard GA stipend levels and may include summer support.

*Tibor Radó Semester Fellowships* (TRS) are also awarded to new students but provide support for only one semester.

*Special Graduate Assignments* (SGA) are identical to TRS positions in length and eligibility but are awarded to continuing students.

*N. Wayne and Mary Louise Rhodus Graduate Semester Fellowships* (RGF) are one semester appointments at regular GA levels for US citizens who work in the areas of numerical analysis and computational mathematics. RGFs may be offered to both incoming and continuing graduate students.

Offers of TRF, TRS, and recruitment RGF awards are decided by the VC with guidance by the GRC during the admission process. Criteria include budgetary considerations, merit, and diversity.

SGA and RGF awards for continuing students are awarded during competitions conducted by the GSC. Announcements will be made by the VC and Graduate Office with deadlines and instructions to apply. An application will generally require a research or study proposal, an updated vita, and a letter of support from the advisor. Applying students must fulfill all requirements for GTA positions mentioned in Section 11.2.4.

Applications will be scored by all faculty members of the GSC, resulting in an academic ranking for each competition. Advisors do not score their own students and other conflicts of interests are similarly avoided. The GSC discusses for each competition which scoring criteria to consider. These may include merit, academic need, and equity. Final funding decisions will be made by a GSC sub-committee based on the academic ranking.

Typically, only doctoral students are considered for SGA positions. RGF positions are sometimes also awarded to MMS students if available.

Students who are awarded an SGA or RGF through a competition will be required to submit a report on their academic activities at the end of the semester of support. Reports will be made available to the GSC and may be disseminated publicly. Students who fail to submit a report are found to be in breach of the GRA contract and, consequently, may be denied further departmental GA support.

11.2.6 Regular Externally or Individually Funded Graduate Research Associateships

GRA positions may also be funded from non-university sources such as federal research or training grants, fellowships and scholarships issued by US agencies or foreign governments,
or support from non-governmental organizations. Moreover, GRAs may be supported by other university sources that are managed by or at the discretion of individual faculty members, such as start-up and special project funds.

As for any GA, an external or individual funding source supporting a GRA will also need to cover minimal stipend, (in-state graduate) tuition costs, and benefits. Students who receive scholarships that cover stipends but cannot cover tuition should contact the Graduate Office to apply for a matching tuition fee waiver through the Graduate School.

All GRA appointments must also comply with all policies in Section 11.2.2.

It is critical that sponsoring faculty members communicate clearly to any student they support on a GRA their expectations and plans in regard to academic progress, specific duties, absence policies, stipend levels, and course enrollments. The department normally takes no part in communicating or monitoring appointment expectations and duties and does not assume any responsibilities for miscommunications between faculty and students.

Sponsoring faculty must inform the department ahead of each semester of their intent to support a student on a GRA position. This requires an email be sent to the TA Scheduling Specialist with CC to the Coordinator of the Office of TA Support as well as grad-office@math.osu.edu (see Section 1.5). The email notification must be received by

**July 15th** for the following autumn semester and

**November 15th** for the following spring semester.

The department may disallow GRA support if this notification is not received by these deadlines to be able to manage its teaching assignments.

Finally, sponsoring faculty members are also signatories on GRA contracts and other requisite approvals.

### 11.2.7 Overload GA Positions

In rare circumstances domestic graduate students may be permitted to hold GA appointments at a 75% employment level, which may also mix types of duties. This option is not open to international students due to standard visa restrictions. Examples of added duties include extra teaching assignments, organizational tasks for grants or institutes, or the preparation of special scholarly and instructional materials.

Basic criteria that need to be met before a student is considered for an overload GA appointment are as follows:

1) There is a departmental demand for the additional duties that cannot be met at the same level by other types of hires.

2) The student is making strong academic progress and the progress is not likely to be impeded by the additional duties.

3) The student is especially qualified for the additional duties.

Permission for an overload appointment requires a letter from the prospective supervisor of the additional duties describing the workload, their importance to the departmental mission, and the qualifications of the student. In addition, the advisor needs to submit a letter affirming the student’s strong academic progress and consenting to the extra duties.
Overload GA positions must be individually approved the VC and GSC chair. Students whose regular base appointments are departmentally funded research positions are unlikely to be approved for overload appointments.

11.3 **Summer Support and Student Associate Positions**

11.3.1 **Student Associate Positions**

As for GA positions, Student Associate (SA) appointments are divided into Student Teaching Associate (STA), Student Research Associate (SRA), and Student Administrative Associate (SAA) positions depending on duties. SA appointments may further be distinguished by their funding source as well.

Per university guidelines an SA position should only be used to bridge an off-term for GA appointments. Consequently, SA positions, regardless of funding source, will be awarded only during summer terms and only to students who do not enroll in classes. Conversely, any financial support offered during the summer to students who do not enroll will be in the form of an SA position.

SA salaries are computed hourly and require the regular submission of timesheets by students. Approval of timesheets and instructions for submitting hours falls to the respective supervisor, administrator, or sponsoring faculty member associated with the funding source. Payments are biweekly according to university published schedules.

All students on departmentally funded SA positions must also maintain good standing with the Graduate School and meet the expectations of our program. Students in progress remediation may be considered for departmental SA positions with special GSC approval.

Students on departmentally funded SA positions are generally not permitted to hold other significant fellowships, scholarships, or academic employment, including supplementary GA or SA appointments. Exemptions may be granted by the VC with permission by the advisor.

11.3.2 **Summer Enrollment and Partial Graduate Associate Positions**

Students who receive financial support during a summer term while enrolling in classes need to be employed in partial or regular GA positions. Tuition for students on a partial GA may be covered via the summer fee waiver provision given in item 9) of Section 11.2.2, provided the student has been supported as a regular GA in the prior autumn and spring semesters.

If tuition for a summer GA appointment is covered through department funds, all courses a student enrolls in must be approved and essential for the student’s progress towards the intended degree. Allowed courses include the following:

1) Regular letter graded mathematics courses.

2) Enrollments required for Graduate School examinations.

3) Required ESL courses for international students.

4) Courses to fulfill the PhD foreign language requirement.

Additional courses may be justified as essential and requested to be covered by departmental funds through a GSC petition. Enrollment in independent study and research hours, other than those needed for Graduate School examinations, is normally not permitted.
For externally or individually funded GA positions during the summer, tuition should be covered by the same non-departmental source rather than charged to the department whenever possible or as part of relevant budget plans.

All university and departmental policies listed in Sections 11.2.2 and 11.2.3 need to be followed where applicable. Moreover, as noted for SA positions in Section 11.3.1, students on departmentally funded GA positions are generally not permitted to have other significant income from academic sources and departmental approval is required for any exemptions.

11.3.3 Common Types of Summer Support Positions

Contingent on budgetary constraints and availability of funds, the department offers financial support each summer to qualified continuing graduate students in the form of SA or partial GA positions, depending on enrollment status. All SA and GA positions are subject to departmental and university rules and policies mentioned in previous sections.

Stipends for departmental research (SRA or partial GRA) positions are normally only slightly above the minimum for a 3-month partial GA appointment or half the O-Level monthly pay. Students in these positions are expected to work on their research or degree requirements for at least 10 weeks over the summer term. Further reporting and attendance stipulations in the offer email need to be read and followed carefully. Misuse of these summer awards may impact eligibility for future financial support.

Stipends for teaching (STA or partial GTA) positions are usually at least 50% higher than those for research positions but entail teaching duties. The number of teaching positions available each year may vary with teaching demand but is generally much smaller than the number of students seeking summer support. For this reason, no double load teaching appointments are offered during the summer. Students in teaching positions are expected to be available for teaching duties during the entire summer term and need to comply with all departmental policies for STA and GTA positions listed in Section 12.

Normally, several students are supported on SRA or GRA positions through start-up funds or external grants of their advisors or external training grants managed by faculty members in our department. As for regular GRA positions it is critical that advisors communicate to supported students their expectations and plans about academic progress, specific duties, absence policies, stipend levels, and course enrollments. These may be different from standards of departmental support and will not be monitored or managed by the department.

11.3.4 Departmental Summer Support Awards Process

PhD and MMS students seeking departmental summer support need to apply during the annual review process in the spring semester. In their applications students can submit preferences for teaching versus research positions and indicate their enrollment plans. Students and advisors also indicate other possible sources of support in the survey.

The first step in the organization of summer support is to identify all students who can be supported on non-departmental sources, such as fellowships, grants, or internships, as well as students who are not applying or who are not eligible for support. This portion is mainly the responsibility of the VC and Math Graduate Office.

The GSC will then consider the remaining students for summer support based on academic merit and past teaching performance. The academic criteria include meeting all milestones of the intended degree, performance in classes and examinations, research progress, and a
positive evaluation by the advisor. Teaching criteria include performance as a teacher, experience, and reliability. Decisions whether to award teaching or research support will take into consideration the submitted preferences but also performance in each area. A student who performs poorly in one area may be denied either type of summer support even if the performance in the other area is reasonable.

The GSC decision process is typically divided into two phases. Applications of students who solidly meet all academic and teaching criteria by customary standards and who are unlikely to receive other funding may be granted by a GSC subcommittee in an early phase. The subcommittee normally includes the GSC chair, the VC, and the Coordinator of the Office of TA Support, but may also include other GSC faculty members.

Applications of students whose qualifications require further review or whose funding opportunities require more time to be clarified are considered for funding by the full GSC in a second, later phase.

Research summer positions are generally only awarded to doctoral students. MMS students with outstanding academic records, who are US citizens, and who work in computational mathematics may also be considered for Rhodus funded research positions.

Students will be informed of departmental summer financial support via emails from the VC. The emails contain stipulations about the offered summer appointments and all students need to agree to the terms before being hired.

11.4 MISCELLANEOUS FINANCIAL SUPPORT

Students in the PhD and MMS degrees have access to further forms of infrastructural and financial support, several of which have already been indicated in earlier sections.

11.4.1 Travel Support

The department has a limited amount of funds that allow students to travel for academic purposes, such as conferences, workshops, collaborations, or job interviews. Instructions for applications are given in Section 2.4.3. The customary lifetime cap for a doctoral student is $1,000 which may be exceeded in exceptional and strongly justified cases. Students are expected to exhaust all other means of financing their travel, such as student support by conference organizers or advisor grants, before applying to have residual costs covered by the department.

Supported students need to follow all university travel policies for university pre-approval, purchase and reservation procedures, choices of approved transportation and lodging, as well as reimbursements.

11.4.2 Office Support

As noted in Section 5.4.2, supported students are provided with shared office space in the mathematics department. Pre-candidacy doctoral and master’s students are typically assigned larger shared offices. Post-candidacy students may apply to have a desk in a smaller office shared by only two students.

Assignments of offices and policies for office occupants are issued by the TA support group. Students in shared offices are expected to respect the workspace of their peers. This includes adhering to basic hygiene and building safety rules, managing the noise level during
discussions, and locking rooms to prevent theft and breaches of privacy. Office space should also not be treated as a replacement home. Thus, overnight sleeping in offices and pets are not permitted. Installations of appliances and larger pieces of furniture require the inspection and permission of the department’s building coordinator.

Students may have their office privileges revoked by the Coordinator of TA Support and the VC upon repeated or egregious violations of office space policies. Students should contact the Coordinator of the Office of TA Support and the building coordinator for details and questions about office space.

Most offices have shared computers, and all have wireless internet access. All students have access to the department’s IT support group, which is part of ASC’s computer support system. Requests for computers and software support may also be submitted to the OCIO where appropriate.

Supported students may also have limited access to basic office supplies depending on their current employment status and current department policies. All university equipment and supplies should be used solely for university business purposes.

11.4.3 Post-Graduation Lecturer Support

Students who expect to require additional time to find employment after graduation are encouraged to contact the Director of Undergraduate Instruction about lecturer positions in our department. Typically, preference is given to former GTAs of ours as they are familiar with our courses, teaching practices, and procedures, assuming they have shown a reasonable level of teaching performance and reliability.

Generally, though, hiring decisions for post-graduation lecturer positions are outside of the purview of the graduate program and based mainly on the teaching needs of the department.

12. GTA AND STA RESPONSIBILITIES

12.1 TYPES OF TEACHING DUTIES

There are four general types of teaching duties to which a GTA or STA can be assigned, which are defined in the following sections. All appointments are for 20 hours work per week. Basic descriptions of the duties involved are provided in each section but may vary between courses.

12.1.1 Recitation Instructor

Recitation instructor (RI) is the most common teaching assignment for TAs. An RI leads one or more recitation sections attached to a larger lecture. In these classes, an RI clarifies the content discussed in lecture and assists students in problem-solving techniques. In addition, RIs are expected to hold 3 or 4 office hours per week to meet students individually as well as 2 hours per week for tutoring as assigned by Math-Stats Learning Center (MSLC) staff.

The remainder of the 20-hour weekly commitment involves preparing to teach, preparing assessment materials as required and supplemental materials as desired, proctoring exams as required, assisting with the grading of exams, keeping up-to-date and accurate student
records, responding to departmental and university inquiries on student performance, and assisting with final course grade determinations for students.

RIs follow course policies and instructions set by the lecturers of a course. RIs also report to the instructors on overall progress of students, communicate concerns or complaints by undergraduate students to the lecturer, and message course policies and standards to students consistent with those set forth by the instructor. Overall, lecturers and RIs should work as a team with clearly defined responsibilities and coherent communication.

The schedule of class times and contact hours may vary. The most common assignment during autumn and spring semesters involves two recitation classes, each meeting twice a week. Another assignment consists of 3 recitation classes each meeting once a week. RI assignments during the summer normally include only one class. A typical recitation class has around 30 enrolled students.

12.1.2 TA Grader

TA graders are assigned to one or more courses without instructional student contact and may work for one or more instructors. Normally, there are considerably fewer grader than RI positions available.

Responsibilities of graders include grading homework papers and quizzes for one or more professors in one or more courses. Additional duties may include a limited number of office hours to meet with students to explain homework assignments as well as creating additional materials such as detailed homework solutions for distribution in class. The time per week spent on grading, office hours and solution writing should not exceed 16 hours on average.

In addition, graders need to be available for 4 hours of tutoring duties per week in one of the department’s tutor rooms as assigned by MSLC staff.

12.1.3 Instructor of Record

A TA who is assigned as an instructor of record normally teaches both the lecture and recitation portions of a class of about 30 students for a total of 5 contact hours. During autumn and spring semesters such duties may be available for evening classes. During summers instructors of records may teach only the lecture portion of a class, while another TA teaches the recitation portion.

For coordinated courses, the instructor of record needs to follow policies, instructions, course schedules, exams, and syllabi set by the faculty coordinator. If the course is not coordinated the TA needs to put all these aspects in place in accordance with department policies and existing syllabi.

Besides the instructional contact hours, the 20-hour weekly commitment involves preparing to teach, preparing assessment materials as required and supplemental materials as desired, proctoring and grading exams, keeping up-to-date and accurate student records, responding to departmental and university inquiries on student performance, and determining final course grades. Instructors of record are also expected to schedule 3 office hours per week, but do not have additional tutoring duties. If applicable the instructor of record also coordinates duties with an assigned grader or TA.
12.1.4 Large Class Lecturer

On rare occasions, highly experienced TAs may be offered to serve as a lecturer in a large, coordinated lecture class in cases in which these positions cannot be filled by faculty lecturers. Course numbers range from Math 1075 through 2177 and the enrollment in an assigned lecture class is typically between 120 and 240 students. Lecture classes meet 3 times a week and teach new concepts, definitions, and theorems.

The lecturer works under the supervision of the course coordinator and may be asked to assist in writing assessments and determining final grade guidelines. The lecturer is responsible for carrying out departmental and university policies with respect to student concerns. Lecturers are expected to hold 3 or 4 office hours per week, but do not have additional tutoring obligations.

Moreover, lecturers communicate with and supervise the group of TAs assigned to their lecture section and are responsible for the timely and accurate submission of students’ final letter grades. In lecture/recitation format, the lecturer and TAs normally share responsibility for the grading of all exams.

12.2 Teaching Assignments, Scheduling, Supervision, and Evaluations

This section mainly describes the responsibilities and purview of the Office of TA Support (OTAS) group as well as the responsibilities of TAs toward faculty instructors and other departmental administrators.

12.2.1 Teaching Assignments and Scheduling

Graduate students who have been approved by the GSC to hold GTA or STA positions are assigned to available teaching duties as described in Section 12.1 by the OTAS group in consultation with the Director of Undergraduate Instruction.

Students may submit requests for teaching assignments, including the type of duties, special schedules, or particular classes, to the OTAS with sufficient time before the start of classes. However, assignments of duties will also depend on availability of classes, qualifications of the TA, and various other circumstances.

Most students will be assigned RI duties during autumn and spring semesters. Grader positions are awarded only in particular situations or if there is an excess demand for graders. First year international students who have not yet passed their Spoken English requirements will normally be given grader positions. Priority for grader positions is also given to students who face obstacles to regularly attending classes due to physical limitations, planned medical procedures, childbirth, or similar circumstances.

Students may also request grader positions for other reasons, such as longer professional absences. Since these have lower priority, students planning academic absences should also seek any available non-teaching support. A student may also be assigned to a grader position based on criteria of instructional fit and qualifications regardless of preferences and personal circumstances.

Instructor of record positions are mainly assigned as summer positions and only rarely as evening classes. TAs for this position must have served as a recitation instructor for at least one semester and should have demonstrated a high level of reliability and competency in
teaching. Lecturer positions for graduate students are exceptional and require the highest level of experience, reliability, and teaching performance.

In the scheduling of teaching assignments, OTAS staff considers time conflicts and time preference submitted by graduate students via the respective OTAS scheduling form. Tutoring hours attached to teaching duties are scheduled by MSLC staff accordingly.

Teaching assignments and class times are communicated to students by the TA Scheduling Specialist. Requests to change assignments should be submitted to OTAS staff as early as possible with sufficient time before the start of classes in order to be considered.

12.2.2 Supervision of Teaching Associates and Mandatory Meetings

The formal supervisor of all departmental GTAs and STAs is the VC, who is also signator on GTA contracts and determines procedures for timesheet approvals of STAs. The day-to-day supervision of all TAs is delegated to the OTAS coordinator and staff. The VC works with the OTAS coordinator to set policies and organize procedures. The VC also mediates or decides disputes between OTAS and individual students if they cannot be resolved otherwise.

All TAs must be responsive to inquiries and instructions concerning teaching duties by OTAS staff as well as the Director of Undergraduate Instruction. Furthermore, OTAS staff may inspect teaching performance and require additional training. Finally, OTAS staff may also relay concerns and complaints by instructional faculty to the TA.

TAs are expected to promptly follow-up on inquiries, requests, and calls for meetings by the assigned faculty instructors. They should also contact and meet instructors without prompting at the start of semester to discuss and clarify course policies and collaborative routines. Moreover, TAs assigned to departmentally coordinated courses need to follow all policies, instructions, and procedures issued by course coordinators and participate in course-wide organizational meetings, if applicable.

GTAs are also required to participate in departmental meetings that are scheduled two days before the start of the autumn semester. These include general meetings for all instructors as well as orientations for new GTAs. During semesters without departmental meetings, GTAs still need to be available on the first day of classes of each semester for any meetings scheduled by instructors or coordinators.

12.2.3 Student Evaluation of Instruction of TAs

All GTAs other than graders are required to conduct two types of student evaluations for each of the courses or sections they are teaching. The first is the standard Student Evaluation of Instruction (SEI) which is administered by the university and collects student feedback through online forms. The second is the Departmental Student Evaluation of Instruction (dSEI) which is issued by the OTAS group in our department. Both surveys contain 10 questions on various aspects of the delivered instruction as well as text space for written comments.

GTAs need to follow OTAS instruction for pick-up, distribution, and collection of the dSEI forms toward the end of each semester. Failure to conduct SEI and dSEI surveys precludes graduate students from the departmental assessment of teaching competence. As a result, students with missing SEI and dSEI results are likely not to be considered further for summer STA or GTA positions. Renewal of regular GTA support may also be affected as non-compliance will be considered negligence and cause for reduced stipends (see O Level in Section 11.2.3) and, possibly, discontinuation of support.
In addition to the SEI and dSEI surveys, the department offers *Early Student Evaluations* (ESEs) which are conducted around the fourth week of classes. These surveys are similar in scope to the dSEIs but provide instructors feedback early enough to allow for adjustments and corrections. ESEs are required for new GTAs, who will receive evaluations materials automatically from OTAS staff. Experienced GTAs may request ESE materials from OTAS but are not required to conduct these evaluations.

All GTAs are encouraged to discuss the results of their SEI, dSEI, or ESE surveys with OTAS staff as needed.

12.2.4 Faculty, Staff, and Peer Evaluation of Instruction of TAs

Faculty lecturers are normally expected to observe the teaching of recitation instructors assigned to their lectures at least once per semester, submit an evaluation form to OTAS, and discuss their observations with the TA. GTAs should feel free to contact their lecturers to ask about such an observation and subsequent discussion.

OTAS staff observes all new instructors at least once during their first semester of teaching and provides confidential feedback to help GTAs adjust to their teaching duties. Follow-up observations may be scheduled by OTAS as needed or at the request of a GTA. In addition to classroom observations, GTAs may request OTAS to arrange to be videotaped but should give at least a one-week advance notice.

Finally, beginning GTAs may also ask to be paired with an advanced graduate student, who has volunteered to serve as a GTA peer mentor. A GTA peer mentor would also be able to observe classroom teaching and provide feedback as well as general advice on teaching in a more informal setting.

12.3 Conduct, Reporting, and Student Relations

This section provides guidelines for general conduct of TAs in their teaching duties. It also addresses interactions of TAs with students, administrators, and other entities or persons. Most of these guidelines are covered in greater detail during the mandatory Headstart training and need to be followed by all TAs.

12.3.1 Professional Focus and Responsibility

Classes should be carefully planned, and the entire available time efficiently used. TAs should never end a class early and always have additional material available in case a class runs faster than anticipated. TAs should use class time exclusively for the discussion of mathematics relevant to the lecture. No other topics outside of mathematics should be talked about during classes, especially not potentially controversial issues (politics, social matters, religion, etc).

All assessments should be graded and returned to students as promptly as possible. Homework and quizzes should be graded and returned at the next class period. Exams ideally should also be returned at the next class period, or as instructed by the lecturer or the course coordinator. Final exams are never returned to students but are kept by the lecturer or instructor of record for one year. Students can review their finals and receive a copy from the instructor upon request.
TAs are expected to attend (punctually) office hours and tutoring hours, and fully devote their time and attention to students’ questions during these hours. Moreover, TAs should respond to email inquiries by students and instructors promptly and professionally.

12.3.2 Proper Interactions with Students

TAs should avoid any conflicts of interest or the appearance of conflicts of interest. In particular, TAs should avoid all social, financial, or similar relationships with students that are enrolled in their classes. Moreover, TAs should be mindful of their authority and power over students in their classes and avoid any language and actions that may be perceived as an abuse of this power, including favoritism, misconduct, and sexual harassment.

TAs must comply with all Title IX policies and training requirements by the university (see Section 1.3.5). Furthermore, TAs need to immediately report any occurrences, suspicions, or accusations of sexual misconduct or sexual harassment involving students or instructors to the Director of Undergraduate Instruction. The university and the department do not tolerate any incidents of sexual misconduct or harassment.

TAs should also make continuous efforts to keep classes, office hours, and tutoring free of bias and discrimination, either toward individual students or groups of students. Firstly, TAs themselves certainly must not engage in any language or actions discriminating against or demeaning students on the basis of race, ethnicity, gender, origin, sexual orientation, faith, disability, appearance, or other personal attributes. TAs should be aware that bias can be expressed in subtle ways from the way students are responded to or called on, to the types of examples chosen in class. TAs are encouraged to make use of training on implicit bias and related topics offered by the university.

TAs may also encounter situations in which racist, sexist, or ethnocentric attitudes are expressed by other students in the class, causing hostility and disruption in the learning environment. TAs should attempt to encourage civility between students and discourage offensive behavior or language from students. If the situation in a class becomes too difficult for a TA to handle, the TA should contact the Coordinator of OTAS or the Director of Undergraduate Instruction.

Even absent of conflicts of interests or biases against groups, TAs should avoid picking favorites among students in a class or singling out individual students for issues with their performance.

12.3.3 Privacy of Student Records

The department is firmly committed to protecting the privacy of student information and grades. All instructional staff need to understand and comply with all aspects of the Family Educational Rights and Privacy Act (FERPA). For university information, procedures, and policies about FERPA see the links provided in Section 1.4.1.

FERPA is a federal law that governs access to student educational records among various entities. It requires, among other policies, that students’ educational record information be shared only upon requests with university officials with legitimate educational interests. Parents of an adult student may not have the student’s consent to share educational records and, thus, should not be given access before consent is verified.
Normally, educational records should not be shared with anyone except the instructor and coordinator of the course, advisors of the student, counselors in the Mathematics Counseling Office, or department faculty who serve as studies committee chairs or administrators.

Record requests from these designated department members should be followed up promptly. Educational information should only be sent via verifiable OSU email addresses and never sent to non-OSU addresses, even if it is the apparent email of the student.

If a TA is not sure about the legitimacy of an educational record request or the correct procedure to follow up on a request, the TA should contact the Director of Undergraduate Instruction for guidance before sharing any information.

12.3.4 Student Complaints and Disruptive Students

In the event that a student has a disagreement with a TA about instructional expectations, delivery, or assessment, the TA may first attempt to resolve the complaint as it concerns the class the TA is teaching. If the complaint is about instructional issues or policies of an accompanying lecture, the TA may communicate the student’s complaint to the lecturer.

If no resolution can be found, the TA should involve OTAS staff for guidance on issues within the class taught by the TA and direct a complaining student to the Director of Undergraduate Instruction for issues with the lecture.

TAs should respond promptly to inquiries from a vice-chair or the Director of Undergraduate Instruction concerning a student complaint and provide accurate and complete information as requested.

In some classes, TAs may also encounter disruptive or even disturbed students. In situations where disruptions are minor but ongoing a TA may ask students to change their behaviors. If this is not feasible or successful, TAs should contact OTAS staff for help and guidance in handling the situation. If a student is clearly disturbed or appears threatening, the TA should involve OSU Public Safety and in more imminent situations also OSU campus police.

12.3.5 Academic Misconduct

TAs should report suspicions that a student may have committed an act of academic misconduct, such as cheating on a quiz or test, immediately to the Director of Undergraduate Instruction. The TA should gather as much information and documentation about the incident as possible and involve the lecturer of the course if applicable.

Incidents should be reported even if the TA is unsure of the severity of the misconduct or considers the incident to be minor. TAs should also remain available to assist in COAM procedures. See Section 1.3.4 for more information on academic misconduct.

12.3.6 Disability Accommodations

Some students may require special support or accommodations due to physical or mental impairments. TAs should direct students expressing such needs to register with the university’s Student Life Disability Services (SLDS) and inform the lecturer of any such requests (see also Section 1.3.3).

Any accommodations, such as extra time on exams or special learning aids, should be handled through the SLDS process. TAs should promptly follow up on all SLDS requests and cooperate on arranging all accommodations requested and scheduled through SLDS.
Moreover, TAs should work with students with disabilities in a supportive, respectful and professional manner.

12.3.7 Other Student Support

Students who require advice on their course selection in mathematics or seek career counseling can be directed to the Mathematics Counseling Office. Hours and location are available on the mathematics department’s web site.

The Student Advocacy Center of the university offers a wide range of services, including help with financial difficulties, support with legal issues including appeals and petitions, and other crisis management support. The university’s Counseling and Consultation Services provide students with a range of mental health support services.

12.4 TA Absences

12.4.1 Absences from TA Duties

TAs are expected to attend to all assigned TA duties as scheduled. A TA must never cancel a class. If the need for an absence arises a TA must report the absence to the OTAS as early as possible, even if the class is not canceled and substitutes have been found. Failing to report absences, failing to properly manage an absence, failing or delaying required notifications, or failing to obtain requisite permissions will be considered irresponsible conduct and a dereliction of duties that may result in the immediate termination of the TA appointment or loss of future TA support.

The following sections describe departmental policies and procedures that all TAs need to follow in case they need to be absent from their TA duties for a limited amount of time for any type of reason, ranging from unforeseen medical issues to planned professional absences.

The policies depend on the duration of an absence and distinguish between short-term and long-term absences. A short-term absence is defined as the loss of one day of teaching recitations or an evening class or the loss of two daily, individually taught classes. Any absence that results in more missed classes is considered a long-term absence.

Additionally, absence policies and procedures are distinguished according to whether an absence is planned or was foreseeable, or whether the absence is unplanned and unexpected.

12.4.2 Unexpected and Emergency Short-Term Absences

If a GTA has an immediate and unplanned need for a one-day absence, such as illness or delay in travel, or anticipates such an absence OTAS staff should be notified of the absence or the possibility of an absence as quickly as possible.

In case of emergency absence, that is, a reason for an absence arising less than 8 business hours before the TA’s class time, the TA should immediately email TAemergency@math.osu.edu.

If unable to do so, the TAs should immediately contact the Main Office at 614-292-4975. In addition, the TA needs to complete the "GTA Absence Form" shortly after the absence and return the form to OTAS.
12.4.3 Planned or Foreseeable Short-Term Absences

In case of a planned or foreseeable short-term absence, such as shorter conference travel or unmovable doctor's appointments, students should inform OTAS staff as early as possible and make arrangement for covering all TA duties. This usually includes finding substitute TAs for instruction and tutoring hours, providing needed information to instructors, and arranging grading tasks, as necessary.

The Coordinator of OTAS and the lecturer, if applicable, need to agree to arrangements and absences. TAs should also complete the "GTA Absence Form" before the planned absence.

12.4.4 Unplanned Long-Term Absence

An unplanned long-term absence is a long-term absence for reasons that are not foreseeable until shortly before the required leave, such as medical issues, family emergencies, or highly exceptional academic opportunities.

A TA in need of an unplanned long-term absence must notify and seek permission from the OTAS coordinator as well as the VC at the earliest possible time. Undue delays or failure in informing the department of an unplanned absence may negatively impact future TA support and possibly result in termination of the TA appointment.

Depending on the situation, a TA may be asked to help with substitute arrangements or provide information required for planning the absence. TAs must not make any such arrangements without the permission or knowledge of the department.

12.4.5 Planned or Foreseeable Long-Term Absence and the GTAOC

This section covers absences that are long-term as defined in Section 12.4.1 but for which the reasons for the absence could be known ahead of time. This includes, for example, professional conferences, scientific workshops, or scheduled, non-emergency medical procedures that extend over several days.

Any such absences or absences from final examination duties require prior departmental approval through the GTA Absence Oversight Committee (GTAOC). The GTAOC is chaired by a faculty member of the GSC appointed each year by the GSC. In addition, the committee consists of the Vice-chair for Undergraduate Studies, the Director for Undergraduate Instruction, and the Vice-chair for Graduate Studies. The Coordinator of OTAS serves as an ex-officio member of the committee for consultation but without voting privileges.

Students requesting a planned long-term absence need to submit a petition to the chair of the GTAOC at least one month before the intended start of the absence. The petition needs to contain the following information and items:

1) A petition letter from the student that provides the exact dates and a justification of the absence.

2) A plan for substitutes for any TA duties, including teaching classes, grading, proctoring, office hours, and tutoring. The plan requires prior approval by the OTAS coordinator.

3) Approval by the lecturer of the course and the course coordinator if applicable. The TA also needs to give prior notification to MSLC staff regarding tutoring hours.

4) In the case of absences due to academic reasons a letter of support from the advisor addressing the GTA’s academic justification.
5) For non-academic absences, any additional documentation verifying the reason for the absence, such as a doctor’s letter, should be submitted.

12.5 ADDITIONAL TA RESOURCES AND OPPORTUNITIES

12.5.1 Questions and Disputes about TA Policies

TAs may direct remaining questions or clarifications about policies regarding their TA employment to OTAS staff and the instructors of their assigned classes. If these inquiries do not provide the needed answers or leave ambiguity, TAs may also contact a vice-chair or the Director of Undergraduate Instruction. TAs should not rely on hearsay from other students and TAs about department and university policies.

If TAs have concerns or disagreements with departmental policies, they may consider contacting the student representatives on the GSC or submitting petitions for changes in policy directly to the GCS and VC.

12.5.2 Office Resources

As noted in Section 5.4.2, all GTAs will have assigned office space, access to computers and IT support, as well as access to office supplies. Normally, office hours should be held in assigned offices. At the same time, TAs should also be mindful of other graduate students sharing the same office who may be disturbed by excessive noise. If a situation requires additional space to hold office hours TAs may contact OTAS or other department staff for finding other spaces.

TAs may be asked to print quizzes and similar handouts for their recitation classes. The printing and office supply space in the department has copying machines available for this purpose. TAs should allow sufficient time before classes for printing since copiers may be in use or out of service shortly before the start of a class.

12.5.3 Course Office

The Mathematics Course Office provides instructors with textbooks for courses and helps with the distribution of printed exams in large lecture courses. Staff at the Course Office can also help with various forms, including the completion of the SLDS forms for special accommodations of students. The location and opening hours of the Course Office can be found on the department’s web pages.

12.5.4 Michael V. Drake Institute for Teaching and Learning

The Michael V. Drake Institute for Teaching and Learning is a university center that aims to integrate and enhance teaching and learning efforts across campus. The Drake Institute provides a wide range of activities through its instructor and teaching support programs.

The institute provides specific advice on the design of courses, instructional methods, and evaluative opportunities for TAs. In addition, TAs planning careers in academia may benefit from workshops on such topics as developing a teaching portfolio, writing teaching statements, and developing effective interviewing skills. For more information visit

12.5.5 The Preparing Future Faculty (PFF) Program

Preparing Future Faculty (PFF) is a program administered by the OSU Graduate School which pairs local liberal arts universities with graduate students who may be interested in teaching at a small school. The Graduate School invites applications for the program annually and matches students with faculty mentors in the same discipline. A PFF participant from OSU would typically visit the partnering school several times, often "shadowing" their mentor throughout their daily activities.

This experience has proven to be very beneficial to graduate students of ours. For more information visit

https://gradsch.osu.edu/preparing-future-faculty.

12.5.6 Post-Doctorate Teaching Support

Former students who recently received their PhD degree from our program may apply for lecturer and other teaching positions in our department. Interested students should contact the Director of Undergraduate Instruction for availability and terms of appointments. Although employment is not guaranteed, preference is given to former students with a reasonable teaching record in our program. Depending on need master’s students who have previously worked as TAs in our program may also be considered for post-graduation teaching positions.

12.6 Teaching Awards

Graduate students who serve as TAs have several opportunities to compete for teaching awards at the departmental, college, and university level. This section provides brief descriptions of the most common awards.

12.6.1 Distinguished First-Year Graduate Teaching Associate Award

The First-Year GTA Award is a departmental award for GTAs in their first year of teaching in a non-grader position. This may be the second or later year of study for graduate students with non-teaching support in the initial years of study in our program. Students must be in good academic standing with the Graduate School and make satisfactory academic progress in our program.

Approximately four awardees are proposed each year by the Coordinator of OTAS in consultation with the Director of Undergraduate Instruction based on student evaluations and class observations. The awards are approved by the GSC chair and the VC.

12.6.2 Phil Huneke Excellence in Teaching Award

The Phil Huneke Excellence in Teaching Award is also an annual departmental award that is open to graduate students in our program who have been teaching for more than a year. Students need to be in good academic standing and make adequate academic progress toward their degree in our program. Normally, to be considered, students must be teaching during the semester in which the competition is conducted. Moreover, students who have won this award before are usually not considered for a second award.

The awards process is conducted by the GSC, typically starting with soliciting all members of the department for nominations. The GSC then selects a group of eligible finalists, mainly
based on nominations and results from student evaluations. The teaching of each finalist is observed by two or three members of the GSC, who submit scores, rankings, and comments to the committee. Based on these submissions and further discussions in the GSC, between two and four awardees are chosen each year.

Winners and finalists of the Phil Huneke Award, as well as winners of the First-Year GTA Award are usually announced during an annual department event and winners receive cash prizes or gift cards.

12.6.3 ASC Graduate Student Award for Teaching Excellence

*College of Arts and Sciences Graduate Student Award for Teaching Excellence* is the highest teaching award provided by the college. All graduate students in good standing in an ASC program who have served in any instructional capacity and have served as a GTA for at least 2 semesters within the previous 2 years are eligible to apply.

The competition is conducted once a year with deadlines in March and normally results in two awards among all nominations from the college. Details about the nomination process can be found at

https://artsandsciences.osu.edu/academics/graduate-students/awards.

12.6.4 Graduate Associate Teaching Award

The Graduate Associate Teaching Award (GATA) is the highest university-level recognition of excellence in teaching for GTAs on campus. The competition is administered by the OSU Graduate School once a year and normally results in 10 awards. Nominees need to have served as a GTA for at least one semester and must be in good academic standing. Repeated nominations are possible and, in fact, encouraged. However, previous GATA winners are not eligible to compete for a second award.

Detailed information about the award, nomination materials, and deadlines can be found at

https://gradsch.osu.edu/gata.

13. **Course Lists**

13.1 **Graduate Minor Sample Curricula**

The following sample curricula fulfill the requirements for the Graduate Minor as stated in Section 8. They are normally approved by the Graduate Minor Chair for students with sufficient mathematical preparation. For each sample curriculum its name suggests a likely major of a student pursuing the minor. However, this does not exclude students from other majors from electing the same study plan.

13.1.1 Engineering & Physics

Students should have a background in advanced calculus, linear algebra, and differential equations at the upper division undergraduate level.

First year: Math 5101 and Math 5102

Second year: Math 5756 and Math 5757
Third year: Math 5451

13.1.2 Economics & Finance

Required background for this option includes calculus, theory of interest, and probability theory at the undergraduate upper division level.

First year: Math 5632
Second year: Math 5633 and Math 5634
Third year: Math 5635 and Math 5637

13.1.3 Philosophy & Foundations

Students should have background in advanced calculus and linear algebra at the upper division undergraduate level.

First year: Math 5111 and Math 5001
Second year: Math 5201 and Math 5051
Third year: any Math 6001-6004 course

13.1.4 Life Science Majors

This curriculum assumes a background in calculus and linear algebra at the upper division undergraduate level, as well as exposure to topics in the life sciences. Five the following six suggested courses would also constitute a valid study plan.

First year: Math 5401 and Math 5402
Second year: Math 5660 and Math 5602
Third year: Math 5651 or Math 6601

13.1.5 Statistics

The following curricula consist of a common set of three courses, suggested to be taken in the first and second year, as well as a set of one or two additional courses that depend on the student’s interests and further specialization. Doctoral students in statistics should have all prerequisite preparation. The common courses are:

First & second year: Math 5201, Math 5202, and Math 5101

The possible additional courses are by specialization as follows:

Discrete Data Analysis and Optimization:
Third year: Math 6501, Math 5601, or Math 5603

Shape Analysis:
Third year: Math 5702, Math 6701, or Math 6702

Nonparametric Function Estimation:
Third year: Math 5102, Math 5601, or Math 5603

Probability:
Third year: Math 6501, Math 6502, or Math 8250
13.1.6 Computer Science

Students are expected to have solid background in calculus and linear algebra at the upper division undergraduate level. There are three proposed curricula depending on the student's sub-specialization and interests.

*Computational Geometry and Topology:*
  - First year: Math 5701 and Math 5801
  - Second year: Math 6501 and Math 6502
  - Third year: Math 8710 or 8800

*Distributed Computing/Temporal Logic:*
  - First year: Math 5051 and any one of Math 6001-6004
  - Second year: Any one of Math 6001-6004
  - Third year: Math 6251 and Math 6252

*Nonparametric Function Estimation:*
  - First year: Math 5201 and Math 5202
  - Second year: Math 6251 and Math 6252
  - Third year: One of Math 6501, Math 6502, or Math 7211

13.2 External Breadth Electives for PhD Applied Track

The following list contains all non-mathematics courses allowed in Step c) of Section 6.7.1 in order to fulfill the breadth requirement for the Applied Track of the PhD program.

All listed courses have at least 3 credits unless indicated otherwise. Students should make sure to have adequate preparation before enrolling in any of these courses.

*Biochemistry:*
  - BIOCHEM 5613 (Biochemistry and Molecular Biology I)
  - BIOCHEM 5614 (Biochemistry and Molecular Biology II)
  - BIOCHEM 5615 (Biochemistry and Molecular Biology III)

*Evolution, Ecology, and Organismal Biology:*
  - EEOB 7220 (Modeling in Evolutionary Ecology) 4 credits

*Molecular Genetics:*
  - MOLGEN 5607 (Cell Biology)
  - MOLGEN 5608 (Genes and Development)
  - MOLGEN 5623 (Genetics and Genomics) 2 credits
  - MOLGEN 5630 (Plant Physiology)
  - MOLGEN 5700 (Systems of Genetic Analysis)
  - MOLGEN 5701 (DNA Transactions and Gene Regulation)
Public Health – Epidemiology:
- PUBH-EPI 6410 (Principles of Epidemiology)
- PUBH-EPI 6411 (Biological Basis of Public Health)
- PUBH-EPI 6436 (Infectious Disease Epidemiology)

Statistics:
- STAT 5301 (Intermediate Data Analysis I) 4 credits
- STAT 5302 (Intermediate Data Analysis II)
- STAT 6510 (Survey Sampling Methods)
- STAT 6520 (Applied Statistical Analysis with Missing Data)
- STAT 6530 (Introduction to Spatial Statistics) 2 credits
- STAT 6540 (Applied Stochastic Processes)
- STAT 6550 (Statistical Analysis of Time Series)
- STAT 6560 (Applied Multivariate Analysis)
- STAT 6570 (Applied Bayesian Analysis) 2 credits
- STAT 6605 (Applied Survival Analysis)
- STAT 6610 (Applied Nonparametric Statistics)
- STAT 6615 (Design and Analysis of Clinical Trials) 2 credits
- STAT 6620 (Environmental Statistics) 2 credits
- STAT 6625 (Statistical Analysis of Genetic Data)
- STAT 6650 (Discrete Data Analysis) 2 credits

Computer Science:
- CSE 5243 (Introduction to Data Mining)
- CSE 5331 (Foundations II: Data Structures and Algorithms) 2 credits
- CSE 5339 (Intermediate Studies in Algorithms) 2 credits
- CSE 5441 (Introduction to Parallel Computing)
- CSE 5449 (Intermediate Studies in Parallel Computing) 2 credits
- CSE 5523 (Machine Learning and Statistical Pattern Recognition)
- CSE 5526 (Introduction to Neural Networks)
- CSE 5541 (Computer Game and Animation Techniques)
- CSE 5543 (Geometric Modeling)
- CSE 5544 (Introduction to Data Visualization)
- CSE 5545 (Advanced Computer Graphics)
- CSE 6331 (Algorithms)
Computational Electromagnetics:
♦ ECE 5510 (Introduction to Computational Electromagnetics)
♦ ECE 6010 (Electromagnetic Field Theory I)
♦ ECE 7010 (Electromagnetic Field Theory II)
♦ ECE 7011 (Computational Electromagnetics)

Computational Fluid Dynamics and Aerodynamics:
♦ AAE 5615 (Introduction to Computational Aerodynamics)
♦ AAE 6771 (Viscous Fluid Flow: Laminar and Transitional)
♦ AAE 8802 (Advanced Mathematical Methods in Engineering)
♦ AAE 8873 (Advanced Computational Fluid Dynamics)

Signal Processing:
♦ ECE 5200 (Introduction to Digital Signal Processing)
♦ ECE 5206 (Medical Imaging and Processing)
♦ ECE 5460 (Image Processing)
♦ ECE 6202 (Stochastic Signal Processing)
♦ ECE 7200 (Signal Processing)

Computational Mechanics:
♦ MECHENG 6505 (Intermediate Fluid Dynamics)
♦ MECHENG 6507 (Intermediate Numerical Methods)
♦ MECHENG 7511 (Computational Fluid Dynamics)
♦ MECHENG 8518 (Advanced Mathematical Methods in Mechanical Engineering)

13.3 List of Elective Courses – MMS Bioscience Track

Biochemistry
♦ BIOCHEM 5613 (Biochemistry and Molecular Biology I)
♦ BIOCHEM 5614 (Biochemistry and Molecular Biology II)
♦ BIOCHEM 5615 (Biochemistry and Molecular Biology III)

Biomedical Engineering
♦ BIOMED 6000 (Scientific Methods in Biomedical Engineering) 1 credit

Evolution, Ecology, and Organismal Biology
♦ EEOB 7220 (Modeling in Evolutionary Ecology) 4 credits
COURSE LISTS

Molecular Genetics
- MOLGEN 5607 (Cell Biology)
- MOLGEN 5608 (Genes and Development)
- MOLGEN 5623 (Genetics and Genomics) 2 credits
- MOLGEN 5630 (Plant Physiology)
- MOLGEN 5700 (Systems of Genetic Analysis)
- MOLGEN 5701 (DNA Transactions and Gene Regulation)

Public Health
- PUBH-EPI 6410 (Principles of Epidemiology)
- PUBH-EPI 6411 (Biological Basis of Public Health)
- PUBH-EPI 6436 (Infectious Disease Epidemiology)
- MATH 5421 (Mathematics of Infectious Disease Dynamics)

Statistics
- STAT 6540 (Applied Stochastic Processes)
- STAT 6194 (Topics in Mathematical Statistics) 2-5 credits
- STAT 6625 (Statistical Analysis in Genetic Data)

Mathematics
- MATH 5101 (Linear Mathematics in Finite Dimensions)
- MATH 5102 (Linear Mathematics in Infinite Dimensions)
- MATH 5201 (Introduction to Real Analysis I) 5 credits
- MATH 5202 (Introduction to Real Analysis II) 5 credits
- MATH 6251 (Theory of Probability I) 4 credits
- MATH 6252 (Theory of Probability II) 4 credits
- MATH 6411 (Ordinary Differential Equations I)
- MATH 6451 (Partial Differential Equations I)
- MATH 6601 (Numerical Methods in Scientific Computing I)

13.4 LIST OF ELECTIVE COURSES – MMS EDUCATORS TRACK

Mathematics
- All letter graded MATH courses offered at the 5000-Level and 6000-Level

Statistics
- STAT 5301 (Intermediate Data Analysis I) 4 credits
- STAT 5302 (Intermediate Data Analysis II)
♦ STAT 6201 (Mathematical Statistics) 4 credits
♦ STAT 6301 (Probability for Statistical Inference)
♦ STAT 6302 (Theory of Statistical Analysis)
♦ STAT 6801 (Statistical Theory I) 4 credits
♦ STAT 6802 (Statistical Theory II) 4 credits

13.5 List of Elective Courses – MMS Computational Track

Computational Methods
♦ CSE 5441 (Introduction to Parallel Computing)
♦ CSE 5449 (Intermediate Studies in Parallel Computing) 2 credits
♦ MATH 7611 (Computational Partial Differential Equations I)
♦ MATH 7612 (Computational Partial Differential Equations II)
♦ MATH 8610 (Topics in Applied Mathematics)

Computational Electromagnetics (Electrical & Computer Engineering)
♦ ECE 5510 (Introduction to Numerical Methods for Electromagnetics)
♦ ECE 6010 (Electromagnetic Field Theory I)
♦ ECE 7010 (Electromagnetic Field Theory II)
♦ ECE 7011 (Computational Electromagnetics)

Computational Fluid Dynamics & Aerodynamics (Aeronautical & Astro Engineering)
♦ AAE 5615 (Introduction to Computational Aerodynamics)
♦ AAE 5771 (Viscous Fluid Flow: Laminar and Transitional)
♦ AAE 8802 (Advanced Mathematical Methods in Engineering)
♦ AAE 8873 (Computational Fluid Dynamics)

Signal Processing (Electrical & Computer Engineering)
♦ ECE 5200 (Introduction to Digital Signal Processing)
♦ ECE 5460 (Digital image processing)
♦ ECE 5602 (Medical Imaging)
♦ ECE 6200 (Digital Signal Processing)
♦ ECE 6202 (Stochastic Digital Signal Processing)

Algorithms & Graphics (Computer Science & Engineering)
♦ CSE 5331 (Foundations II: Data Structures and Algorithms) 2 credits
♦ CSE 5339 (Intermediate Studies in Algorithms) 2 credits
♦ CSE 5541 (Computer Game and Animation Techniques) 2 credits
COURSE LISTS

♦ CSE 5543 (Geometric Modeling)
♦ CSE 5544 (Introduction to Scientific Visualization)
♦ CSE 5545 (Advanced Computer Graphics)
♦ CSE 6321 (Computability and Complexity)
♦ CSE 6331 (Algorithms)

Computational Mechanics (Mechanical Engineering)
♦ MECHENG 6505 (Intermediate Fluid Dynamics)
♦ MECHENG 6507 (Intermediate Numerical Methods)
♦ MECHENG 7511 (Computational Fluid Dynamics)
♦ MECHENG 8518 (Advanced Mathematical Methods in Mechanical Engineering)