



# APPLIED STATISTICS/STATISTICS GRADUATE STUDENT HANDBOOK

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## MISSION STATEMENT

The Department of Statistics has two primary interrelated objectives as it serves the University, the State, and beyond. First, we aim to provide both undergraduate and graduate students with strong degree programs and excellent instruction in probability, applied statistics, and theoretical statistics. Second, we aim to conduct and publish outstanding research while promoting the solid practice of statistics at the University of California and beyond.

# DEPARTMENT RESOURCES

## GRADUATE FACULTY ADVISOR; ASSOCIATE PROFESSOR

DR. WEIXIN YAO

Email: [weixin.yao@ucr.edu](mailto:weixin.yao@ucr.edu)

Phone: (951) 827-6007

## GRADUATE STUDENT SERVICES ADVISOR

MARGARITA ROMAN

Email: [mroman@ucr.edu](mailto:mroman@ucr.edu)

Phone: (951) 827-4716

# UNIVERSITY RESOURCES

## GRADUATE DIVISION

[University Office Building](#), Room 141

Phone: (951) 827-3313

## CNAS GRADUATE STUDENT

### AFFAIRS CENTER

[1140 Batchelor Hall](#)

Phone: 951-827-4224

(800) 735-0717

## R'WEB

## STUDENT BUSINESS SERVICES

## TEACHING ASSISTANT DEVELOPMENT PROGRAM (TADP)

## R'PANTRY

## INTERNATIONAL STUDENTS AND SCHOLARS OFFICE FINANCIAL AID OFFICE

## STUDENT HEALTH SERVICES

## HIGHLANDER ONE STOP SHOP (HOSS)

## THE WELL

## STUDENT HEALTH OFFICE

# M.S., STATISTICS

The Master of Science in Statistics degree emphasizes a broad understanding in Statistics and its application. The M.S. students are required to have fundamental statistical knowledge in probability theory, linear models and experimental design, have the ability to use fundamental statistical techniques to formulate problem and solution in diverse real-world application, the ability to use at least one statistical software package to conduct statistical data analysis and the ability to communicate with researchers in statistical community and other disciplines by using graphical methods to display and interpret information.

## ADMISSIONS

Students entering the Master's program must have completed a bachelor's degree with sufficient training in Mathematics and a strong background in Statistics or have taken the following undergraduate upper division courses or equivalent, covering basic areas of probability and statistics:

- STAT160A, 160B, 160C, Elements of Probability and Statistical Theory, 4 units each.
- STAT 161, Introduction to Probability Models, 4 units.
- STAT 170A, Regression Analysis, 4 units.
- STAT 170B, Design of Experiments, 4 units.
- STAT 171, General Statistical Models, 4 units.

Students must also meet the other requirements for admissions as specified by the Graduate Division. The program is Plan II (comprehensive examination) described in the Graduate Studies section of the catalog. No foreign language is required.

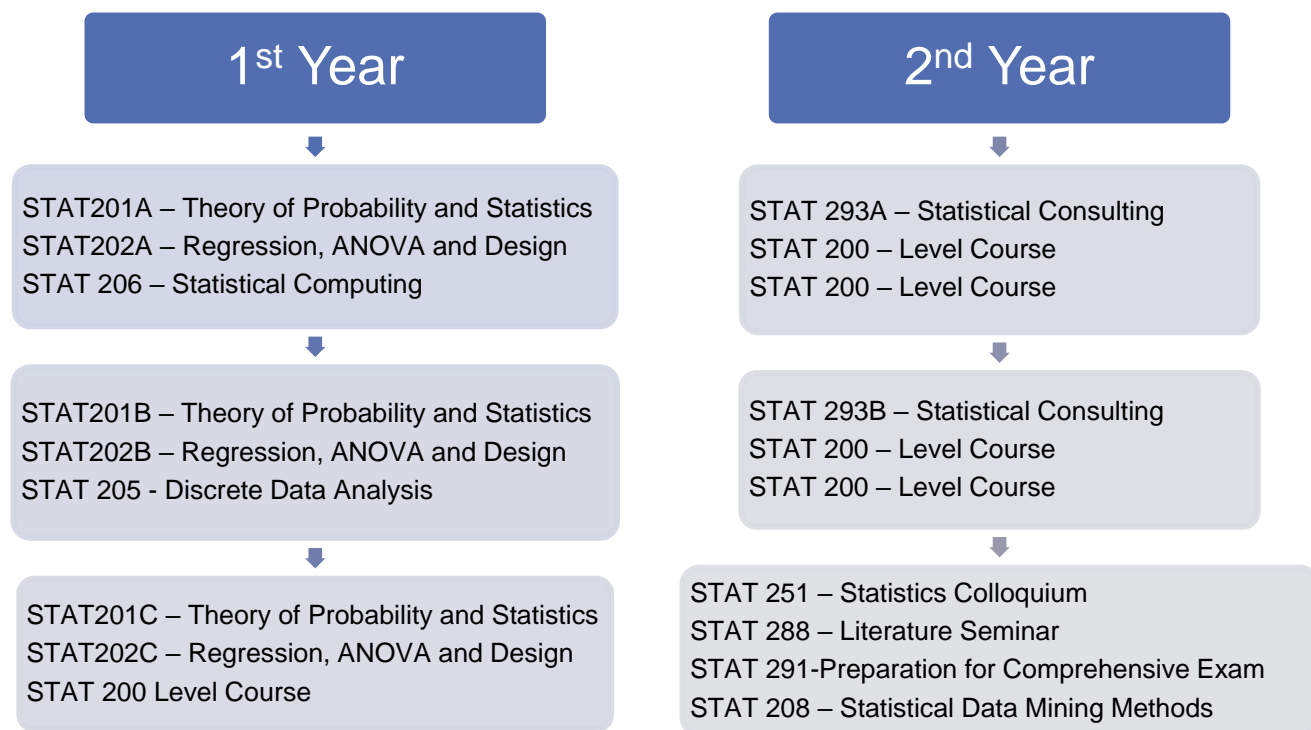
# THE M.S. REQUIREMENTS

The general requirements of the Statistics Graduate Program include:

- Completion of coursework: Graduate students in Statistics must have taken appropriate courses in Mathematics to give them the proper background for graduate work in Statistics. Important areas include Calculus (at least MATH 009A, MATH 009B, MATH 009C, and MATH 010A) and Linear Algebra (at least MATH 131).
- Course Requirements – 41 units
- Completion of written comprehensive qualifying exams

The normative time for completion of the M.S. degree requirements is 6 quarters (2 years) with minimum 41 quarter approved units of graduate (200 level) work.

## I. COMPLETE COURSE REQUIREMENTS



## II. COMPLETE COMPREHENSIVE EXAMINATIONS

MS students must pass a single MS level qualifying exam which consists of two types of questions: Theoretical and Methodological.

The written qualifying exam is offered two times in each year:

- First taking is at the beginning of Spring quarter and the
- Second taking is toward the end of Spring quarter.

**All second-year students in the program are required to take their first attempt of the exam at the BEGINNING of Spring quarter. The second exam in each year can only be taken by the students who fail to pass the exam in their first attempt at the beginning Spring quarter.**

Exceptions can be made based on the approval of Graduate advisor. No more than two attempts are allowed to pass the written exams.

If a MS student fails on their 2nd attempt, they will be dismissed from the program (see qualifying exam process policy on page 31). **Students must be enrolled or on Filing Fee status in order to take the exams.**

Students are advised to have command of the following courses; however, qualifying exams may include other topics aside from: STAT201ABC, 202ABC, 205, 206, and 293AB.

A program proposal is not required.

### **III. Professional Development Requirement:**

Two quarters of SAT 293 give students training in (a) the ability to use fundamental statistical techniques to formulate problem and solution in diverse real-world application; (b) the ability to use at least one statistical software package to conduct statistical data analysis; (c) the ability to communicate with researchers in statistical community and other disciplines by using graphical methods to display and interpret information.

### **IV. Satisfactory Academic Progress:**

For all students, evaluations of progress are carried out each spring by the Graduate Advisor, who is responsible for making specific recommendations to the Graduate Division concerning the student's progress. Students are notified in writing of the results of the annual evaluation, and copies are forwarded to the Graduate Division and kept in student's file.

### **V. Unsatisfactory Academic Progress:**

It is hoped that you will make satisfactory progress in your degree program. Failing to do so will have profound consequences for your career in graduate school. If your GPA drops below the minimum level of 3.00, if you have 12 or more units of "I" grades, or if your advisor feels that you are not advancing as you should, the Graduate Division can and will block your registration.

### **VI. Advancement to Candidacy in the Master's Program**

The forms for [advancement to candidacy](#) is available online on Graduate Division.

Completed applications are returned to [Margarita Roman](#) and processed through the [Graduate Advisor](#) and Graduate Division for approval. Students can't graduate with a Grade Delay or Incomplete grades.

## Petition to Change Degree Objective from the MS to the Ph.D.:

Applications to Change Degree Objective are submitted a year in advance and no later than January 5th for consideration to start the Ph.D. the following fall quarter. Two new letters of recommendation from UCR Statistics faculty are required with the application. The department will determine eligibility based on the following requirements: Pass comprehensive exams at Ph.D. level, excellent performance in classes, completion of Ph.D. required coursework and strong recommendation by faculty on student's ability to conduct research. The MS students would have to compete with new Ph.D. applicants and the final admission decision will be made by the department graduate admissions committee.

Forms Needed Towards End of Degree: There are several forms that M.S. students will need to complete, such as Advancement to Candidacy and Graduation forms. For international students, additional forms may include Optional Practical Training (OPT) and Curricular Practical Training (CPT).

Submit these forms to [Margarita Roman](#) (not the Graduate Advisor), at least two weeks before the deadlines to ensure time to process for review and approval by the Graduate Advisor. If forms are submitted less than two weeks, approvals may not be guaranteed. Avoid any delays and submit your forms early.

### Helpful Deadlines

|   |  |
|---|--|
| <b>MS advancement to candidacy due:</b> | First day of instruction of graduation quarter. <a href="#">See Graduate Divisions Deadlines</a>   |
| <b>Commencement Petition due:</b>       | <a href="#">See Graduate Divisions Deadlines</a>   |
| <b>CPT Application due:</b>             | At least two weeks before completion of degree.<br><br><a href="#">Learn more from the International Students and Scholars Office.</a>   |
| <b>OPT Application due:</b>             | 90 days in advance of your completion date and when you plan to begin work, and up to 60 days after your completion date.<br><br><a href="#">Learn more from the International Students and Scholars Office.</a> |

**(These forms will be voided if students do not pass comprehensive exams)**

## **THE PH.D. IN APPLIED STATISTICS**

The Doctor of Philosophy degree is awarded in recognition of high scholarly attainment as evidenced by a period of successful advanced study, the satisfactory completion of prescribed examinations and the development of an acceptable dissertation covering a significant, original aspect of Statistics.

Ph.D. students are required to demonstrate proficiency in fundamental areas in statistics including probability theory, statistical inference methodologies, statistical computing techniques, multi-disciplinary collaborations and can apply such knowledge to address complex problems in Applied Statistics.

Normative time to degree is 15 quarters (5 yrs.).

### **ADMISSIONS**

Students entering the program must have completed either a bachelor's degree or a Master's degree in Statistics, Computer Science, Mathematics, or some other quantitatively based discipline. Students lacking sufficient preparation for some statistics graduate classes must complete some preparatory work in Statistics, Computer Science, or Mathematics depending on their background. Students must meet the general requirements listed in the Graduate Studies section of the catalog.





# THE PH.D. REQUIREMENTS

The general requirements of the Applied Statistics Ph.D. Program include:

- Completion of coursework
- Completion of written comprehensive qualifying exams
- Completion of three quarters of teaching
- Completion of Oral Qualifying Exam
- Preparation of the Ph.D. dissertation
- Successful submission of Dissertation Defense

The normative time for Ph.D. completion is fifteen quarters (5 years). During the second academic year, students are encouraged to complete the passing of the written comprehensive exams. After passing the comprehensive exams, students should start thinking about their research project and identify a Major Professor to have sufficient time to prepare for the Oral Qualifying exam. Most coursework and preparation for written and oral qualifying examinations are expected to be completed during the first two years. The remaining 2-3 years are devoted to research, the writing and defense of the Dissertation, the participation in graduate seminars and additional coursework.

## Achieve the following goals:

1. During the first year, maintain a 3.5 GPA in order to retain Fellowship and in years 2-5 maintain a 3.00 GPA to retain TA/RA employment.
2. Pass the written and oral qualifying examinations before the beginning of fourth year.
  - International students should plan to advance to candidacy before the beginning of the 10th quarter to qualify for reduced NRT. Otherwise non-resident tuition will need to be paid by the student or PI on the next term until student advances to candidacy.
3. Prepare an original written Dissertation proposal.
4. Produce and submit a Dissertation by the end of your fifteenth quarter.

## I. COMPLETE COURSE REQUIREMENTS

1. Core Requirements:
  - STAT 202 A/B/C Regression, ANOVA, and Design - 12 units.
  - STAT 206 Statistical Computing - 4 units
  - STAT 207 Statistical Computing - 4 units.
  - STAT 208 Statistical Data Mining Methods (previously STAT 209A) - 4 units.
  - STAT210A/210B Advanced Theory of Probability and Statistics - 8 units.
  - STAT 288, Literature Seminar, 1 unit.
  - STAT 293 Statistical Consulting and Data Analysis. Two consecutive quarters, total 8 units.
2. 20 units of additional 200 level Statistics courses not graded S/NC, excluding STAT201A/B/C and STAT231A/B.
3. Substantive Fields: 4 units (or equivalent) in Substantive Field(s) with a minimum GPA of 3.00 appropriate to the student's interest. The requirement may be waived if the student already has the background in the Substantive area. Any of these courses will meet this requirement:

BIOL201, BMSC252, BPSC234, CS229, CS234, CS235, CS 238, ECON205C, ECON285E-K, EDUC212, EDUC213, EDUC218, EDUC234, EDUC287, GEN220, GEN 234, GEN240A, GEN240B, GEN 242, MGT202, MGT203, MGT205, MGT211, MGT233, MGT235, SOC203B.

Courses outside of the suggested list above would need to be approved by the Graduate Advisor.

No foreign language required.

## **II. COMPLETE TEACHING REQUIREMENT**

A minimum of three quarters of service as a Teaching Assistant regardless of whether financial support comes from Fellowship or Research Assistantships, etc. All students will participate in the Graduate Division's Teaching Assistant Development Program (TADP).

All new UCR Teaching Assistants must attend the mandatory new TA orientation. TADP offers one-in-person orientation per year. If you missed it but are planning on being a teaching assistant in the winter or spring quarter, you can make it up. Failure to attend the orientation will make you ineligible to TA at UCR. See the [TADP website](#) for schedules and contact information.

Each quarter, Statistics Department Teaching Assistants are required to attend a mandatory TA orientation conducted by the department. Failure to attend this orientation may result in the loss of your TA position. All Teaching Assistants are required to be available for work from the first day of the quarter through the last day of the quarter (last day of Final Exams week).

## **SPEAK TEST**

All international students must take the SPEAK test and obtain a passing grade before they can be appointed as a TA. Students receiving a "clear pass" on the SPEAK test (scores  $\geq 50$  out of 60) have no further requirements and can be appointed to TA positions. Students receiving a "conditional pass" (scores of 40-45) can be appointed as a TA for three quarters, but are required to take English classes at the Learning Center and retake the test. Their TA appointment is on a probationary basis with the approval of the Graduate Dean.

Students receiving a "no pass" (scores of 20-35) may not be appointed as a TA until they have retaken the test and obtained a clear or conditional pass. Contact the UCR Extension Center for more information regarding the SPEAK test: (951) 827-1701 ([esl@ucx.ucr.edu](mailto:esl@ucx.ucr.edu)).

### III. COMPLETE WRITTEN QUALIFYING EXAMINATIONS

Ph.D. students must pass a single Ph.D. level qualifying exam; which consists of two types of questions: Theoretical and Methodological. The written qualifying exam is offered twice each year. The first exam is offered at the beginning of Spring quarter and the second one is offered at the end of Spring quarter. All second-year students in the program are required to take their 1<sup>st</sup> attempt of the exam at the **BEGINNING of Spring quarter**. The second exam can only be taken by the students who failed their 1<sup>st</sup> attempt at the beginning Spring quarter. Exceptions can be made based on the approval of the Graduate advisor. No more than 2 attempts are allowed in order to pass the written exam. If a Ph.D. student fails their 2<sup>nd</sup> attempt but passed the MS exam in either their 1<sup>st</sup> or 2<sup>nd</sup> attempt and has not received an MS degree in statistics from another institution, he/she will complete the program with a MS degree. Otherwise the student will end the program without a degree (see the qualifying exam process policy on page 31). Students must be enrolled or be on Filing Fee status in order to take the exams.

Students are advised to have command of the following courses, however, qualifying exams may include other topics aside from: 210AB, 202ABC, 205, 206, 207, and 293AB.

To prepare for the written qualifying examinations, a student can register up to 6 units of STAT 291 (individual studies in coordinated areas) only during the quarters that the student participates in qualifying examinations.

After passing the written exams the student will work with advisor to prepare for the oral Examination. Advancing to Candidacy takes place when students complete all the course requirements for the Ph.D. program and passes the written and oral exams. We expect students to pass the written exams before the beginning of the third year and oral exams before the beginning of the fourth year.

### IV. ORAL QUALIFYING EXAM

The Oral qualifying examination will be conducted by the Qualifying Committee in accordance with the regulations set forth in the [UC Riverside Graduate Student Handbook](#). The Qualifying Committee, consisting of at least five members, nominated in consultation of the Graduate Advisor and the student's Major Professor, and will be officially approved by the Graduate Dean.

The Major Professor is the chair of the Qualifying Committee. One member of the Qualifying Committee, not from the Student's academic unit, will be designated as the outside member.

The Committee reads and evaluates the research proposal and conducts the examination. Oral exams typically last about 2-3 hours, consisting of a short (50 minutes) presentation of the research proposal by the student, followed by a question and answer period. No more than two attempts to pass the oral examination will be allowed. (See Oral Qualifying Exam Procedures)

## **V. WORK ON THE DISSERTATION**

The Dissertation Committee will be chaired by the student's Major Professor. Typically, three members of the committee will be selected (additional member may be added) from the faculty who were on the Oral Qualifying Committee. The student is required to submit a written dissertation proposal to the Dissertation Committee for comments and approval. Normally, it's in the format of an appropriate funding agency (e.g., NIH, NSF, etc.) and including detailed descriptions of the proposed research. For more information on the dissertation format, and how to submit an electronic copy visit [Graduate Division's online checklist](#).

## **VI. DISSERTATION DEFENSE**

Before the dissertation is given final approval, the student must meet with the Dissertation Committee for a public oral defense on the dissertation research in accordance with the regulations of the Graduate Division.

## **VII. MAINTAINING SATISFACTORY ACADEMIC PROGRESS**

Normative time for the Ph.D. degree in Applied Statistics is fifteen quarters (five years). Normative time is defined as the period of full-time registration required to earn the degree, assuming that the student enters with a bachelor's degree and has no course deficiencies or need to take any remedial work. For most programs at UCR, this falls between five and seven years. Because the Ph.D. is a research degree, the University gives programs considerable latitude in establishing degree requirements.

Students approved to change degree objective from the MS to the Ph.D. typically finish in 9 additional quarters. In the Applied Statistics Graduate Program the individual student's program of study is planned in consultation with the Graduate Advisor, who supervises the student's progress prior to the appointment of the major professor. After the student advances to candidacy, the dissertation committee oversees the student's progress in the final stages of his or her degree program. The students are expected to advance to candidacy by passing the written and oral qualifying examinations before the beginning of fourth year.

Student's evaluation of progress is carried out each academic year by the Graduate Advisor, who is responsible for making specific recommendations to the Graduate Division concerning the student's progress.

The Graduate Advisor may also approve exceptions to the normal time schedule occasioned by unusual circumstances. Students are notified in writing of the results of the annual evaluation, and copies are forwarded to the Graduate Division.

### **Unsatisfactory Academic Progress**

It is hoped that you will make satisfactory progress in your degree program. Failing to do so will have profound consequences for your career in graduate school and opportunities for receiving funding through the Program become severely limited. If your GPA drops below the minimum level of 3.00 (3.50 for Fellowship recipients), if you have 12 or more units of "I" grades, or if your advisor feels that you are not advancing as you should, the Graduate Division can and will block your registration.

## VIII. PROFESSIONAL DEVELOPMENT REQUIREMENT

1. STAT 293 gives students training in (a) the ability to use fundamental statistical techniques to formulate problem and solution in diverse real- world application; (b) the ability to use at least one statistical software package to conduct statistical data analysis; (c) the ability to communicate with researchers in statistical community and other disciplines by using graphical methods to display and interpret information.
2. Professional writing development: Students are trained to prepare a research proposal on topics relevant to the student's research area as part of their written qualifying exam.
3. **Pedagogy:** Ph.D. students are required to enroll in Teaching Assistant Development Program (TADP) Orientation to TA and enroll in STAT 302 during the quarter they teach. Three quarters of TA experience required.
4. **Obtaining an MS Degree While in the Ph.D.:** Students who have satisfied all requirements for the Master's degree, while completing the Ph.D. may apply for the MS degree.
5. **Change Degree Objective:** Students terminating the Ph.D. and satisfying the MS degree requirements can leave the program with an MS degree. Please see Margarita to complete a petition to change degree objective to graduate with an MS degree.

# **ADVANCING TO CANDIDACY**

## **PH.D. IN APPLIED STATISTICS**

### **ORAL QUALIFYING EXAM PROCEDURES**

#### **Nominating Qualifying Committee**

Five committee members are nominated which most are affiliated with the program and should normally be voting members of the UC Academic Senate. The first three faculty members are from the Statistics Department, the fourth faculty member is from a Substantive Field and the fifth member is designated as the “Outside Member” not holding an appointment in the student’s graduate program that will ensure fairness as ‘third party’. The outside member’s field may be unrelated to the student’s field of study and other committee members. Exceptions must be supported by a memo of justification from the Graduate Advisor.

#### **Notify Margarita Roman**

By completing the online [Wufoo form: Sign up for the Statistics Qualifying Exam](#) at least four weeks prior to the Qualifying Examination. The Qualifying Committee must be approved by the Graduate Advisor and the Graduate Division prior to the Oral Qualifying Examination.

- Note: International students need to advance to candidacy by the first day of instruction of fall quarter of the fourth year to qualify for reduced non-resident tuition. Otherwise non-resident tuition will need to be paid on the next term until student advances to candidacy.

Margarita will prepare the Report of the Qualifying Examination Form ‘3’ and give the form and the student’s academic file to the Chair of the student’s Qualifying Committee a few days before the oral exam.

Upon completion of the exam, the committee chair obtains the committee members’ signatures on the Form ‘3’ report and returns it to Margarita, who then forwards it to the Graduate Division. This must be done within 48 hours after the exam is completed. Advancement paperwork is then processed. Once completed, the student is charged an advancement to candidacy fee.

The Dissertation Committee Chair (and the rest of the committee, if possible) should be named at the time of the Oral Qualifying Examination to avoid a registration hold.

# QUALIFYING EXAM POLICY

## Process Policy

All graduate students must demonstrate their proficiency in statistical theory and methods by passing a comprehensive qualifying exam.

Students must be enrolled or on Filing Fee status to take exams for them to count.

There is a single qualifying exam for each student that they must pass – a PhD level qualifying exam for Ph.D. students and a M.S. level qualifying exam for M.S. students.

Both M.S. and Ph.D. comprehensive qualifying exams consist of two types of questions: Theoretical and Methodological. The MS level qualifying exam is a proper subset of the PhD level qualifying exam. Questions for the qualifying exams are composed by a qualifying exam committee within the Department.

Both M.S. and Ph.D. comprehensive qualifying exams are offered twice each year, the first one at the beginning of Spring quarter and the second one toward the end of Spring quarter.

All students are required to take their exam for the first time in the Spring of their 2nd year; however, exceptions can be made for well-prepared students.

Margarita will send out communication about signing up for the qualifying exam. If a student needs to withdraw from the exam that they signed up for due to certain circumstances, the student will need to inform Margarita and the graduate advisor at least one week in advance and obtain approval from the graduate advisor.

If any student fails their first attempt (either Not Pass or M.S. Pass for Ph.D. students and Not Pass for M.S. students) at the exam, they have the opportunity to take the entire exam one more time. No more than two attempts are allowed to pass the written exams. If a Ph.D. student fails on their 2nd attempt but received M.S. pass on either the first or the second attempt and has not received M.S. degree in statistics from elsewhere, he/she has earned the MS degree, but is out of the Ph.D. program. If a M.S. student fails on his/her 2nd attempt, he/she is out of the program without degree.

M.S. students can opt to take the Ph.D. qualifying exam if they are interested in changing their degree objective from M.S. to Ph.D. within one year after finishing the M.S. program. If an M.S. student is interested in going into the Ph.D. and passes the Ph.D. qualifying exam, the department admission committee will meet and recommend either for an approval or denial to change degree objective.

Ph.D. students can opt to take just the M.S. qualifying exam if they plan to change degree objective from Ph.D. to M.S. within two years of entering the Ph.D. program.

## **Feedback Policy**

The qualifying exam committee reads the exam and makes a Pass or Fail determination for each student.

Students taking either the M.S. or Ph.D. qualifying exam will be informed by the Graduate Advisor whether they passed or failed at M.S. or Ph.D. level.

Students can request a meeting with a suitable faculty member to discuss their performance on the qualifying exam. Particularly in the cases where a student has failed an exam, the Department encourages this meeting so that the student can understand what areas of the exam were poorly performed. A student's solution to an exam will be permanently retained as part of their student file.

## **Appeal Policy**

Graduate students who have failed an exam on their second attempt have the opportunity to appeal the failed decision. However, valid grounds for appeal are limited to three areas:

- 1) Evidence of a procedural error.
- 2) Evidence of non-academic criteria being used to evaluate academic work, including personal bias and violations of the campus nondiscrimination policy.
- 3) Evidence of medical and/or family hardships that interfered with their preparation and/or performance during the exam.

Students who wish to appeal should submit a written request for appeal, along with pertinent evidence that justifies the request, to the Graduate Advisor or the Department Chair within 6 weeks after the exam.

The written appeal request should, at a minimum, clearly specify the grounds for the appeal request. Additional supporting documentation, as pertinent, should be included in the appeal request.

The standing appeals committee including graduate advisor and two department faculty appointed at the start of each academic year, will review the appeal

request within 7 days of the submission date and vote on Accepting or Rejecting the appeal request.

In the cases where the appeal addresses areas (1) or (2) above, the Graduate Advisor or the Department Chair will immediately inform the student of the decision that was reached. If the appeal is approved, the student will be granted an opportunity to take either the next offering of the exam, or the offering after that. If the appeal is rejected, the student will be advised they have the right to appeal the decision to the Graduate Dean.



In the case where the appeal addresses area (3) above, the Graduate Advisor or the Department Chair will immediately inform the student and the Graduate Division of the Department recommendation that was reached. The student will also be informed that the Graduate Division will review and consider the Department recommendation and render a final decision on the appeal. If the Graduate Division approves the appeal, the student will be granted an opportunity to take the exam either at the next offering of the exam, or the offering after that. If the Graduate Division does not approve the appeal, the appeal process terminates.