Statistics & Data Science

The University of Arizona

Statistics & Data Science Graduate Interdisciplinary Program

Graduate Student Handbook

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Important Websites

The Statistics & Data Science website contains important information about the graduate program, including news, contacts, and program events. http://stat.arizona.edu/

GradPath information page. Students submit all forms electronically through GradPath. It's vital that students know how to access GradPath via UAccess Student. https://grad.arizona.edu/gsas/gradpath

The Graduate College website contains information pertinent to the degree certification process http://grad.arizona.edu/

The University's General Catalog contains a wide array of information on Academic Policies and Requirements http://catalog.arizona.edu/

UAccess hosts employment, teaching, financial and enrollment information

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http://uaccess.arizona.edu/

Many classes use the university online class management system, D2L
http://d2l.arizona.edu/

The Student Union provides many facilities and services
http://union.arizona.edu/

International Student Programs and Services
https://international.arizona.edu/students

Student Affiliation for Publications and Presentations

Statistics & Data Science student's' affiliation (for publications or presentations) is "Statistics & Data Science Interdisciplinary Program", with the address "Mathematics Building 520, 617 N. Santa Rita Ave., PO Box 210089, Tucson, AZ 85721." This is true even though your advisor (who may be a co-author on your work) may have a separate, departmental affiliation (e.g. Department of Mathematics).

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THE UNIVERSITY OF ARIZONA®

Statistics & Data Science Graduate Interdisciplinary Program Graduate Student Handbook

Welcome

Welcome to the Statistics & Data Science (SDS) Graduate Interdisciplinary Program (GIDP)!

The educational goal of this Program is to produce active and creative researchers and practitioners who will develop statistical and data science techniques and practical innovations to advance the subject matter in modern science. Such an interdisciplinary focus requires strong analytical and computational skills, in addition to a deep knowledge of the discipline from which new research problems arise. Developing this level of expertise is a challenging goal and requires sincere dedication on the part of our students. To a large extent, your level of commitment to your program will determine your success as a future statistician and data scientist. So, welcome, and best of luck in your graduate training!

Using this Handbook

This handbook describes the Program's current regulations and procedures as well as the various requirements that must be met for the Ph.D. and M.S. degrees, the Ph.D. Minor and the Graduate Certificate in Statisticsa & Data Science. Please use the links provided in this handbook to review up-to-date information on Graduate College and Statistics & Data Science (SDS) GIDP policies. *It is GIDP policy that the student holds final responsibility for being aware of and responding to all GIDP and Graduate College policies, requirements, formats, and deadlines as they pertain to progression towards and completion of their degree.* Please refer to the Graduate College website, http://grad.arizona.edu/new-and-current-students, for information on academic services, policies, and procedures.

If you have any questions about the program, please contact Melanie Bowman, Graduate Program Coordinator, at bowmanm@arizona.edu.

The Statistics & Data Science GIDP: Program Overview

Degree Options

The Graduate Interdisciplinary Program (GIDP) in Statistics & Data Science at the University of Arizona focuses and enhances statistical training and research across the UA campus. It administers Doctor of Philosophy (Ph.D.) (regular track and statistical informatics track) degrees, Master of Science (M.S.) degree, Accelerated Master's degree, as well as a Graduate Certificate and a Ph.D. Minor in Statistics & Data Science.

In addition to coursework and research opportunities, Statistics & Data Science Graduate students also have access to a variety of seminars, colloquia featuring distinguished invited speakers, special lecture series, workshops, and conferences sponsored by the Statistics & Data Science GIDP.

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Our Faculty

The Statistics & Data Science Program boasts a diverse and distinguished research faculty who hail from a variety of campus units, including departments in the Colleges of Agriculture & Life Sciences, Education, Engineering, Management, Public Health, Law, Medicine, Science, Social & Behavioral Sciences, and the BIO5 Institute. Students can select an advisor from a list of faculty with a wide range of trans-disciplinary studies in both theoretical and applied statistics and data science. A complete list of our faculty and their research interests is available on the program website (stat.arizona.edu).

Program Administration

Graduate Interdisciplinary Programs

The Statistics & Data Science Program is one of 20 GIDPs at the University of Arizona. The University of Arizona's GIDPs transcend departmental boundaries by facilitating cutting edge teaching and research where traditional disciplines interface. GIDPs report directly to the Provost through the Faculty Director of GIDPs.

Statistics & Data Science Graduate Interdisciplinary Program

The Statistics & Data Science GIDP is administered by an Executive Committee. The Executive Committee is chaired by the Program Chair and includes six faculty members and the Program Coordinator.

The duties of the Chair are to:

● convene and preside at meetings of the Executive Committee to be held not less than once a semester; (once a month is standard)

● help guide the efforts of the Executive Committee in acquiring University and other external resources to support the full functioning of the GIDP and effectively manage the budget and financial resources of the Program;

● convene and preside at meetings of the larger GIDP in Statistics & Data Science at least once per year and otherwise as needed;

● prepare Promotion & Tenure and Continuing Review documentation for faculty members of the GIDP according to University policies and procedures;

● monitor and update catalogue and other copy of all GIDP curricular and promotional materials; and

● with the advice and counsel of the Executive Committee, appoint and supervise the Standing Committees of the GIDP.

The Executive Committee assists the Chair in providing general oversight and direction for the GIDP, via the following activities:

● providing advice and counsel to the GIDP Chair regarding appointments to GIDP committees,

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- preparing and submitting an annual review of Program activities and accomplishments to the Director of Graduate Interdisciplinary Programs,

- ruling on any curriculum matters brought by GIDP students,

- promoting interdepartmental awareness and supporting education and research related to the field of Statistics and Data Science,

- advising the Director of Graduate Interdisciplinary Programs and the Vice President for Research on issues pertinent to the GIDP and to the field of Statistics and Data Science, and

- reviewing these Bylaws annually to ensure that the GIDP structure remains modern, pertinent, and operable.

Four members of the Executive Committee serve as chairs for the Program's standing committees, (1) Recruitment and Admissions, (2) Curriculum, (3) Colloquia and Forums, and (4) Examinations Committee. The Program Vice Chair oversees   the annual progress report, and the annual assessment and represents the program in place of the Chair as needed.

The current members of the Statistics GIDP Executive Committee may be found on the Program Administration page of the program website (https://stat.arizona.edu/statistics-data-science-administration).

Student Participation in Program Administration

At the beginning of each school year, the Students in the Statistics and Data Science Graduate Program under the direction of the current Grad Rep(s) will select a representative from among their peers to serve a two-year term. The first year, the student is the Graduate representative-Elect and assists the Graduate Representative. The Representative-Elect then steps into the role of Representative for the second year of the term.

The primary duties of the Graduate Representative are:

- To bring the concerns of the students in the Program to the attention of the Chair of the Program, and vice versa

- Help the Program management develop Program policy as needed.

- Assist with the organization of the annual recruitment workshop in the Spring semester and other Program activities when appropriate.

- Organize at least 1 student meeting per semester (2 are strongly recommended).

The student meetings, as organized by the Graduate Representative, are a system of peer-to-peer mentoring in which students at different stages of their academic careers in the Program come together to

discuss questions, share experiences, and give each other advice about their academic and professional development.

SDS students are encouraged to work with the Executive Committee to improve any aspect of the Program, including, but not limited to, examinations, application processes, course requirements and electives, and research and funding opportunities. *To ensure that messages are not lost, students should direct comments through the Graduate Representative*. If there is a conflict of interest or some other complication that prohibits this path of action, please contact the Program Coordinator to discuss.

Changes to the Program
All changes to the Statistics & Data Science policy will be promptly shared with students via the student email list serv.

Student Rights and Responsibilities
Students are entitled to the following rights as members of the Statistics & Data Science GIDP:

- Right to representation through a Graduate Student Representative
- Right to appeal as outlined in Appendix 5: Student Appeals
- Right to clear information on all degree requirements
- Right to clear information on program progress through
    - consistent assessments,
    - meetings with faculty advisors at least once per semester, and
    - timely feedback (maximum 6 week turn-around) on degree requirements
- Right to prompt notification of changes in Program policy via the student listserv

Students are responsible for

- Conducting themselves professionally in all university-related activities, including all interactions with students, faculty, staff, and university visitors
- Regular participation in SDS colloquia, seminars, community meetings, professional development seminars and other program events.
- Making Satisfactory Academic Progress (Appendix 1)
- Meeting the other expectations of the Graduate College and the Statistics & Data Science GIDP as outlined in this Handbook

Responsibility for meeting Statistics & Data Science GIDP and University requirements ultimately rests with the student – students should not expect reminders of deadlines from the program.

SDS students are also expected to abide by all relevant ethical and academic standards of the University.

Academic Integrity: https://deanofstudents.arizona.edu/policies/code-academic-integrity

Responsible Conduct of Research: http://www.orcr.arizona.edu/

1. The Statistics & Data Science Doctorate and Masters Programs

The following information applies to Doctorate, Masters, and Accelerated Master's Students. Students undertaking the Graduate Certificate or the PhD Minor should refer to Sections 2 and 3 of this handbook.

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Graduate College Requirements for PhD and MS students

A significant portion of the process for obtaining a graduate degree involves the proper handling of University mandated paperwork and requirements. The departmental requirements and the graduate college requirements are not necessarily one and the same. Both entities must be satisfied to obtain a graduate degree. Graduate College requirements, such as the timely submission of accurate forms and adherence to deadlines, are rigid and generally not subject to appeal. The Graduate College changes its requirements occasionally so be advised that the requirements presented here to be used as guidelines. Therefore, if the student has any doubts or questions concerning the material in this section, the wisest course is to contact the Graduate College directly.

Students should refer to the Graduate College website for up-to-date information on college-wide policies. The page for New and Current Students http://grad.arizona.edu/new-and-current-students contains information on Academic Services, Policies and Procedures; Funding; FAQs; and work-life resources. **When in doubt, you can likely find what you are looking for starting on this page.**

Navigate to "Academic Services, Policies and Procedures" for information on:

- Academic and Enrollment policies and procedures
- GradPath
- Finding your Graduate College Degree Counselor
- Steps to Your Degree and Degree Requirements
- From this page you can navigate to pages outlining specific policies for MS and PhD students, including transfer credits, continuous enrollment, time limitations, and steps to your degree.
- Important Dates and Deadlines
- Dissertation and Thesis Information
- Commencement Information
- Graduate College Forms

Statistics & Data Science GIDP Academic Policies
These policies are a supplement to school-wide policies as outlined in http://grad.arizona.edu/new-and-current-students

Advising

Prior to matriculation, students will be assigned an initial academic advisor and are expected to meet to discuss course selection. Academic advisors are members of the Statistics GIDP faculty who will advise the student on course selection, the annual progress report, and any other academic related issues. Qualifying Exam preparation, and beginning research (if applicable). MS students completing the Qualifying Exams can keep their academic advisor throughout their program tenure. Students completing research must choose a research advisor from among the Regular faculty of the GIDP in Statistics & Data Science (see Appendix 1). It is recommended that students choose an advisor by the end of their second semester in residence.

Students should expect to meet with their advisor regularly, and a minimum of once per semester. These meetings are to be coordinated between the advisor and the advisee.

In order to maintain a positive and productive working relationship**, potential advisors and students are encouraged to discuss expectations prior to finalizing their roles**. Possible expectations include, but

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are not limited to, turn-around time for assignments, appropriate communications, and meeting frequency. Establishing these expectations early on will forestall future conflict.

Communication Skills Requirement

The ability to communicate effectively, both verbally and in writing and to audiences of varying levels of sophistication, is essential to a successful career in industry, research, or teaching. The communication skills requirement gives Ph.D. and M.S. students an opportunity to develop their capabilities in a variety of directions. To complete the requirement students must:

● Prepare a basic web page containing information on their own research, teaching, and other professional activities and make this page available through the Program's website.

● Prepare a professional CV and submit it to the Program Coordinator for posting on the program website.

● Write articles or proposals and give lectures or presentations for audiences of various levels of sophistication so that at least one activity occurs in each row of the following table of examples. At least one of these activities must be verbal, and at least one must be written.

	Verbal	**Written**
General audience	K-12 classroom visit Presentation to a professional student club. Presentation to a STATCOM client	Newsletter article Essay describing your research to undergraduates. Report as a consultant on a project.
General Statistical Audience	Colloquium or seminar talk Brown bag presentation Master's thesis defense	Survey article Essay in statistics
Specialist Audience	Conference talk Poster Session	Research paper Grant proposal Master's thesis

The entries in the table are meant to be illustrative and do not exhaust the possibilities. Each component must be sponsored by a faculty member who will review the text or presentation and provide constructive feedback. When the sponsoring faculty member is satisfied with a student's performance on a component of the requirement, this fact should be communicated to the graduate office by including the details in the annual progress report.

On-Line vs In Person Courses

Students in the Statistics & Data Science Graduate program are expected to take the in-person sections of the core courses. Exceptions can be made with approval. For questions or approval of an exception contact the Program Coordinator.

Prerequisites for Individual Courses

Students must meet all prerequisites for any elective courses they wish to undertake, or must secure instructor permission prior to registering for the course. Instructor decisions are final.

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Petitioning for Credit Courses

Where needed to suit a particular or specialized need in an individual student's program of study, petition may be made to the GIDP Executive Committee for approval of a course not listed for use as an elective. Petitions may be submitted to the Program Coordinator to distribute to the Executive Committee. The student must be in good standing and be enrolled in the Statistics GIDP. The burden of proof for admitting such a course rests with the student, and the decision of the committee will be final. Note that introductory, elementary-methods courses that do not expand the statistical frontier are not generally approved for credit towards the graduate degrees in Statistics.

Policy for Incompletes

Information on Incomplete Grades can be found in the University's general catalog (catalog.arizona.edu). Students are responsible for working with the course instructor to complete all necessary coursework and have the Incomplete grade changed within one year.

The Statistics Program does not have a limit on the number of Incompletes a student may have to remain in good academic standing, but all students will be held to the standards of Satisfactory Academic Progress as outlined in Appendix 1.

Student Faculty Mentoring

During the course of graduate education, students will engage with Statistics & Data Science Program faculty in several mentoring capacities – independent studies, internships, graduate committees, and advising theses and dissertations. Mentoring relationships should be entered voluntarily under the expectation that both the mentor and mentee will engage in a rich and rewarding professional development experience. To this end, the Statistics Program stresses the importance of a mentor/mentee discussion to reach a clear understanding on the conditions of this relationship. Sometimes, a written memorandum of understanding (MOU) is used to formalize the expectations and responsibilities of both parties. Example MOUs can be found on the Statistics webpage (stat.arizona.edu). Even if you do not use a written MOU, the examples will facilitate your discussion.

1.A. The PhD in Statistics and Data Science

Statistics & Data Science PhD students typically complete their degree in five years, though some students take longer to complete their dissertations. Students graduating with a PhD in Statistics & Data Science are prepared to move onto careers in both university and business environments.

The following guidelines identify the basic structure of the PhD in Statistics & Data Science at the University of Arizona. At the core of the program is a fundamental grounding in both statistical theory and methodology; however, extensive flexibility via course electives allows students to tailor their final programs of study to their own interdisciplinary interests. The student's advisor, along with the Program director, are available to discuss individual selection of these electives. *It is GIDP policy that the student holds final responsibility for being aware of and responding to all GIDP and Graduate College policies, requirements, formats, and deadlines as they pertain to progression towards and completion of the PhD* Please refer to the Graduate College website, http://grad.arizona.edu/new-and-current-students, for information on academic services, policies, and procedures.

Refer to http://grad.arizona.edu/gsas/degree-requirements/doctor-philosophy for general PhD requirements. The following policies and procedures are specific to the Statistics & Data Science GIDP, and *are intended as a supplement to Graduate College policies and procedures.*

Expectations

See guidelines for Satisfactory Academic Progress, Appendix 1.

Course Requirements

The GIDP in Statistics offers two tracks for the PhD - the Regular Track and the Track in Interdisciplinary Statistical Informatics. The list of course requirements for both tracks may be found on the program website (stat.arizona.edu).

The PhD Minor

In addition to the coursework outlined below, PhD students are required to apply a minimum of 9 units to a PhD minor. Minor requirements are fixed by the minor department or program; some Minor programs require upwards of 12 or even 15 units for completion. (A PhD Minor in Statistics & Data Science cannot be counted towards a PhD in Statistics.) The selection of the PhD Minor field is to be made by the student in consultation with her/his advisor and the Program director. The Minor should reflect the student's trans-disciplinary interests, and wherever possible should be coordinated with the student's additional SDS electives. A non-exhaustive list of potential PhD Minors is provided in Appendix 3.

Dissertation Credits

As per Graduate College requirements, a minimum of 18 units in the PhD program of study must include dissertation credits. These are used to undertake the PhD research. **Registration for any units of STAT 920 is restricted to students who have assembled an active, complete PhD Comprehensive Examination Committee** (see below). Students who wish to undertake research coursework prior to assembling a Comprehensive Committee may consider STAT 599 and/or STAT 900 as possible alternatives; however, a maximum of only 6 units from STAT 599 and/or STAT 900 may be applied to the PhD program of study. A form is required for STAT 599. The form can

The Path to Your PhD

You will submit the necessary forms for your degree using GradPath (http://grad.arizona.edu/gsas/gradpath). New users should begin with the "FAQ for Students" found on that web page.

The Graduate College Degree Requirements webpage (http://grad.arizona.edu/gsas/degree-requirements) contains information on the requisite forms and activities that must be completed to receive your PhD. Relevant deadlines are available at http://grad.arizona.edu/gsas/degree-requirements/important-degree-dates-and-deadlines. *It is your responsibility to be aware of and respond to all GIDP and Graduate College policies, requirements, formats, and deadlines as they pertain to progression towards and completion of the PhD*

Refer to http://grad.arizona.edu/gsas/degree-requirements/doctor-philosophy for the general PhD process. The following information is specific to the SDS GIDP, and *is intended as a supplement to Graduate College policies and procedures.*

PhD Timetable

More information on the requirements outlined in this table is available below.

Below is a typical timetable for a SDS PhD student in order to make satisfactory progress and finish the PhD in 5 years.

Year 1	Complete core courses: STAT 564, STAT 566, STAT 571A, 571B Prepare for Qualifying Exam and take exam at the end of first year.

Year 2	Submit *Plan of Study* in GradPath by end of third semester Pass Qualifying Exam by the end of the second year. Choose an advisor from Statistics faculty by beginning of second semester Investigate research opportunities in one or more areas
Year 3-4	Form Comprehensive Exam Committee Submit Comprehensive Exam Committee Appointment Form in GradPath Submit Announcement of Doctoral Comprehensive Examination in GradPath Plan for Comprehensive Exam
Year 5	File Prospectus/Proposal with Graduate Coordinator Submit Doctoral Dissertation Committee Appointment Form in GradPath Submit Announcement of Final Defense Defend your thesis, earn your PhD!

The average time to the PhD in Statistics is 5 years. Some students are able to complete the Ph.D. requirements in 4 years, others take 6 or 7 years.

The Doctoral Plan of Study (DPOS)

The Doctoral Plan of Study represents a tailored guideline for the courses that will satisfy the student's PhD degree requirements; it may be amended if circumstances so require. The DPOS must be formulated and submitted to GradPath by the end of the student's third semester in residence in the SDS GIDP. To facilitate this, by the beginning of the second semester in residence the student must choose an *advisor* from among the Regular faculty of the GIDP in Statistics (see Appendix 1After consultation with the chosen advisor and the GIDP Chair, the student determines an expected list of courses to be taken toward the PhD degree, and submits these on the DPOS on GradPath (https://grad.arizona.edu/gsas/gradpath). The DPOS *must* be on file before the student can sit for the PhD Oral Comprehensive Examination (see below.)

Components on the DPOS will include:

- the 32 units of core PhD courses
- the minimum 12 + 9 = 21 units of additional electives and PhD minor coursework that comprise the student's own interdisciplinary specialization.
- 18 required units of STAT 920 (dissertation).

The PhD Minor must be officially recognized and correctly listed on the DPOS form. No more than half of the total units listed on the DPOS (including transfer units; see below) can be in courses graded with an S or P grade.

The Qualifying Examination

To proceed towards PhD candidacy in the GIDP, a student must pass a written PhD Qualifying Examination by the beginning of her/his fourth semester of study. The examination may be retaken only once. Offered during summer and winter each year (twice per year), the Qualifying Examination is used to assess the student's potential to successfully complete a PhD dissertation in modern interdisciplinary statistics & data science.

More information on the exam format, registration, and study materials is available in Appendix 2.

There are three possible outcomes to the exam:

- **PhD Pass**: Students may continue towards candidacy in the Program.

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•   **MS Pass**: Students interested in pursuing a PhD will be required to retake the exam the next time it is offered and improve to a grade of PhD Pass. Students who wish to complete only the MS degree in Statistics (see below) may use this result to stand for their MS exit examination.

•   **Fail**: Students must retake the exam at the next opportunity in order to remain in the Program and be eligible to pursue a PhD degree in Statistics. Failure, or a score of MS Pass, on a second attempt on the exam results in the student's dismissal from the PhD program.

After receiving written notice of the Qualifying Exam results, students may request a meeting with the Program director to discuss his/her performance and options for the coming year. Students may request a consultation with a designated member of the Examination Committee to review their exam results.

Note that a Qualifying Examination result of MS Pass on a first attempt indicates that the student has made good progress but also identifies areas of weakness that must be resolved in order to pursue more advanced studies. Although students are often initially disappointed at not having achieved a PhD Pass on their first attempt, they should recognize that an MS Pass demonstrates development in their studies. It is not uncommon for students who retake and pass the exam, after the benefit of further study, to later produce excellent PhD dissertations.

The PhD Comprehensive Examination

Before advancement to PhD candidacy, a student must pass a written and an oral PhD Comprehensive Examination in both the major area of Statistics and the chosen minor(s). This examination is intended to test the student's comprehensive knowledge of Statistics and Data Science and of the minor field(s) of study, both in breadth across the general field of Statistics and Data Science and in depth within the area of interdisciplinary specialization. The Comprehensive Examination is considered a single examination, although it consists of separate written and oral components.

A student must pass the written portion of the exam before sitting for the oral portion. The written portion is determined and graded by a Comprehensive Examination Committee, which by Graduate College regulations must consist of a minimum of four members. For information on who may serve on Graduate Committees, see "Graduate Committee Service" under the Graduate College's Academic Policies (https://grad.arizona.edu/). It is expected, but not required, that the examining committee will overlap with the student's graduate dissertation committee (see below), in order to foster continuity in the student's research program.

The Comprehensive Examination Committee bears the responsibility for setting the written portion of the qualifying exam. The format and the timing for the exam is flexible and left to the discretion of this Committee with the goal to structure the exam in the best interests of advancing the preparation of the candidate. The typical format for the written portion of the examination is a series of technical and conceptual questions put forth by the committee concerning the student's expected dissertation research. A variety of formats are acceptable and not limited to the following suggestions.

- A series of written questions prepared by the Committee under a specified schedule.

- A review paper based on a specific set of background documents set by the Committee and related to the candidate's research topic.

- A literature review of the dissertation topic with an analysis of the shortcomings of previous research as they apply to the candidate's research topic.

- A dissertation proposal with preliminary analysis.

The written portion of the exam will be graded by the examining committee, and results transmitted to the student within 14 calendar days of receipt of the student's answers. A student who fails her/his written portion may sit for a second attempt; an entirely new set of questions may be drawn up and graded by the committee. This second sitting must be scheduled within 90 days of the original sitting. Failure on a second written portion will lead to a student's dismissal from the Program.

Upon successful completion of the written portion of the Comprehensive Examination, a student must sit for the oral portion of the exam. The oral portion is again conducted by the student's examining committee, and must occur no earlier than 1 calendar week and no later than 4 months after successful completion of the written portion. After the student has completed their Comprehensive Examination Committee Appointment form on GradPath, they will gain access to the Announcement of Doctoral Comprehensive Examination form. Students will use this form to set the date of the oral portion of their Comprehensive Exam. After the Announcement form has been approved, the Results of the Comprehensive Examination form is automatically created in GradPath. The Chair of the student's examination committee will have access to the Results form, allowing them to submit the student's results to the Graduate College electronically. **Students must be careful to fill out the requisite forms on GradPath** (Comprehensive Examination Committee Appointment, Announcement of Doctoral Comprehensive Examination).

The faculty committee conducting the oral portion of the examination has both the opportunity and obligation to require the student to exhibit knowledge of

    (i) the specific questions/material posed during the written portion,

    (ii) general comprehension of the minor field(s) of study as it pertains to the student's research interests, and

    (iii) sufficient depth of understanding in the area(s) of the student's statistical specialization.

Discussion of proposed dissertation research may be included. The examining committee must attest that the student has demonstrated the professional level of knowledge necessary to successfully undertake a PhD-level career in interdisciplinary statistics.

As with the written portion of the examination, a student who fails her/his oral portion may sit for a second attempt. This second sitting must be scheduled within six months of the original oral sitting. Failure on a second oral portion will lead to a student's dismissal from the Program.

The written and oral portions of the comprehensive examination must be successfully completed no later than 90 days prior to the Final Oral Defense Examination (see below).

Advancement to Candidacy, the Dissertation Committee, the PhD Dissertation, and the Final Oral Defense
Information on these steps can be found at http://grad.arizona.edu/gsas/degree-requirements/doctor-philosophy.

Additional notes on the Dissertation Committee: **The Statistics program requires that two of the Dissertation Committee members be members of the Statistics GIDP, and that one committee member must represent the student's minor field(s) of study.** It is encouraged, but not required, that

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the dissertation committee include as many members as possible from the candidate's Comprehensive Examination Committee, in order to foster continuity in the student's research.

Additional notes on the Dissertation: For the dissertation, candidates must develop a (formal or informal) research proposal of sufficient academic merit and on a topic of sufficient scholarly impact to satisfy their committee. Work proceeds on the research via the dissertation course STAT 920, under the direction of the candidate's advisor and using the skills and knowledge of the larger committee where appropriate. Students can expect feedback on dissertation drafts within six weeks of submission.

The final, completed dissertation must represent an original, substantive advance in the theory, methodology, and/or practice of statistics, with focus on the candidate's interdisciplinary interests. It is expected that the work will result in one or more published research articles in high-quality, peer-reviewed statistics and subject-matter journals.

1.B. The MS in Statistics & Data Science

The following guidelines identify the basic structure of the MS in Statistics & Data Science at the University of Arizona. At the core of the program is a fundamental grounding in both statistical theory and methodology; however, extensive flexibility via course electives allows students to tailor their final programs of study to their own interdisciplinary interests. The student's advisor, along with the Program director, are available to discuss individual selection of these electives. *It is GIDP policy that the student holds final responsibility for being aware of and responding to all GIDP and Graduate College policies, requirements, formats, and deadlines as they pertain to progression towards and completion of the MS degree.*

Refer to http://grad.arizona.edu/gsas/degree-requirements/masters-degrees for general MS requirements. The following policies and procedures are specific to the Statistics GIDP, and *are intended as a supplement to Graduate College policies and procedures.*

Expectations
See guidelines for Satisfactory Academic Progress, Appendix 1.

Coursework
The GIDP in Statistics offers a thesis and non-thesis option for the MS in Statistics. A minimum of 30 units of coursework (graded C or better) past the Bachelor's Degree is required. The list of course requirements for both options may be found on the program website (https://stat.arizona.edu/) under "Current Student Hub" and "Degree/Program Requirements".

The Path to Your MS
You will submit the necessary forms for your degree using GradPath (http://grad.arizona.edu/gsas/gradpath). New users should begin with the "FAQ for Students" found on that web page.

The Graduate College Degree Requirements webpage (http://grad.arizona.edu/gsas/degree-requirements) contains information on the requisite forms and activities that must be completed to receive your MS. Relevant deadlines are available at http://grad.arizona.edu/gsas/degree-requirements/important-degree-dates-and-deadlines. *It is your responsibility to be aware of and respond to all GIDP and Graduate College policies, requirements, formats, and deadlines as they pertain to progression towards and completion of the MS.*

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Refer to http://grad.arizona.edu/gsas/degree-requirements/masters-degrees for the general MS process. The information is specific to the Statistics GIDP, and *is intended as a supplement to Graduate College policies and procedures.*

MS Timetable

More information on the requirements outlined in this table is available below. Below is a typical timetable for full-time MS students:

Year 1	Complete core courses: STAT 564, STAT 566, STAT 571A, 571B Choose an advisor from Statistics faculty by beginning of second semester Submit *Plan of Study* in GradPath by beginning of second semester Prepare for Final Exit Examination (Qualifying Exam)
Year 2	Complete course work and Communications Skills Requirement **For thesis option** Form thesis committee, submit *Committee Appointment* form on GradPath Present thesis, earn your MS! **For non-thesis option** Submit *Committee Appointment* form on GradPath, choose "No Committee" option Pass Final Exit Examination, earn your MS!

The average time for students to complete the MS in Statistics is 2 years, though some students extend their studies to complete their theses.

The Master's Plan of Study (MPOS)

The MPOS must be formulated and submitted by the beginning of the student's second semester in residence in the GIDP.

Components on the MPOS will include the 18 units of core MS courses, the minimum 9 units of additional electives that comprise the student's own interdisciplinary specialization, and the 3 thesis units of STAT 910. If the student elects to apply advanced statistical coursework in lieu of the MS Thesis, then these (minimum) 3 units should be listed instead of STAT 910 on the MPOS.

No more than half of the total units listed on the MPOS (including transfer units) can be in courses graded with an S or P grade rather than a regular letter grade. This includes the 3 units of thesis research via STAT 910 which, if so elected, should appear on the MPOS.

The Master's Thesis

For students undertaking an MS thesis in Statistics, a *thesis committee* must be formed prior to registration for STAT 910. Policies for the thesis committee are available at http://grad.arizona.edu/gsas/degree-requirements/masters-degrees.

For the thesis, students must develop a (formal or informal) proposal of sufficient academic merit and on a topic of sufficient scholarly impact to satisfy their committee. Work proceeds on the research via the thesis course STAT 910, under the direction of the candidate's advisor and using the skills and knowledge of the larger committee where appropriate. The final, completed thesis must meet all Graduate College formatting and submission requirements.

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The Master's Final Exit Examination

All MS students must pass an exit examination in Statistics prior to awarding of the MS degree. If the student has chosen to undertake a thesis, their final exam will be an oral defense of their thesis. Non-thesis MS students must pass a written examination regularly offered and assessed by a standing committee of the GIDP faculty.

Final Examination - Thesis Option

The oral defense of the MS thesis will be held at the completion of STAT 910. The examination focuses on the thesis itself but can include general questions relating to the interdisciplinary study of statistics contained within the scope of the thesis research. The exact time and place of this examination must be scheduled with the GIDP Graduate Coordinator at least seven working days in advance of the event. The candidate must be in good academic standing in order to schedule the defense.

The student's advisor presides over the examination. The examination is closed to the public, although an initial, open portion may be held during which the candidate presents the thesis results and entertains questions. (Questions may not be proffered by the thesis committee during the open period.) During the subsequent closed portion, the thesis committee brings forward their questions to the candidate. There is no minimum time limit for the Final Exit Examination, but the entire proceedings may not exceed three hours. If held, all members of the thesis committee must be present for the entire examination. In private session following the examination, the committee votes to pass or fail the candidate based on her/his performance during the oral defense: the candidate requires two votes to pass.

A candidate who fails a final oral defense may, upon the recommendation of the GIDP to the Graduate College, be granted a second oral defense. This second defense must be held within 4 months of the first defense. The results of the second oral defense are considered final.

Final Examination - Non-Thesis Option

Students who elect the non-thesis option must pass a written examination regularly offered and assessed by a standing committee of the GIDP faculty. The examination may be retaken only once. Offered twice each year, the examination coincides with the PhD Qualifying Examination.

More information on the exam format, registration, and study materials is available in Appendix 2.

There are three possible outcomes to the exam:

• **PhD Pass:** A student who achieves this score may consider taking further coursework towards candidacy in the Program. This score also counts as an MS Pass; see next item.

• **MS Pass:** A student who wishes to complete the MS degree in Statistics may use this score to stand for their MS exit examination. If the student also undertakes and completes an MS Thesis via STAT 910, an MS Pass may be enlisted to serve as proxy for acceptable performance on the Oral Thesis defense, if desired.

• **Fail:** A student who receives this score must retake the exam at the next opportunity in order to remain in the Program and be eligible to pursue a graduate degree in Statistics. Failure on a second attempt invalidates use of the written exam results to stand for an MS exit examination, and prevents the student from continuing on to a PhD in the program.

After receiving written notice of the exam results, students may request a consultation with a designated member of the Examination Committee to review their exam results.

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For final steps to MS completion, please refer to
http://grad.arizona.edu/gsas/degree-requirements/masters-degrees.

2. The Graduate Certificate in Statistics & Data Science

The following guidelines identify the basic structure of the Graduate Certificate in Statistics & Data Science at the University of Arizona. The Certificate expands existing opportunities for potential or current University of Arizona graduate students wishing to obtain a deeper understanding of statistical methodology, inference, and practice, and offers greater depth of focus to their data-analytic training. The Certificate's program of study provides a prescribed format for such learning, while also allowing for a flexible curriculum that addresses this need over a wide variety of disciplines.

Students may design or select a course curriculum pertinent to their own research or professional interests from a list of advanced, statistically-rigorous courses taken from across the campus. Depending on the student's selection of Elective Courses, expertise may be gained in statistical practice, theory, and/or applications in a specialized area such as biometry, bioinformatics, econometrics, environmetrics, psychometrics, etc. Of course, these outcomes will differ depending on the combination of elective courses selected.

On-Campus vs. Online Options
The Statistics GIDP offers a Graduate-level Certificate for both on-campus and off-campus (online) students. Admissions procedures and course options vary between these two options. Please refer to the appropriate program option below.

On-campus students are required by Statistics & Data Science program policy to enroll in on-campus sections, unless there are extraordinary circumstances that prevent in-class attendance. If you are an on-campus student who would like to enroll in an online section, contact the Program Coordinator, currently Melanie Bowman at bowmanm@math.arizona.edu.

The Main Campus Certificate
Coursework
A minimum of 12 units of coursework (graded B or better) are required for the Certificate. Course options are listed on the program website (https://stat.arizona.edu/). Please note, students who do not receive a B or better grade for their Certificate coursework may instead have an overall 3.0 GPA for Certificate coursework and pass the Theory portion of the Qualifying Exam at the MS level.
Financial Assistance
Graduate Certificate students are not eligible for financial assistance, unless concurrently enrolled in a separate MS or PhD program at the University of Arizona.

The Online Certificate
For **more information on the Online Graduate Certificate**, including course options, academic policies and procedures, and navigation of online courses, please refer to the Statistics GIDP Graduate Certificate Handbook, available on the Graduate Program page of http://stat.arizona.edu/.

3. The PhD Minor in Statistics & Data Science

The following guidelines identify the basic structure of the PhD Minor in Statistics at the University of Arizona. At the core of the program is a foundation in the theory of statistical inference (via STAT 566/MATH 566); however, extensive flexibility via course electives allows students to tailor their Minor programs of study to their own interdisciplinary interests. Students may design or select a concomitant

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curriculum pertinent to their own research or professional interests from a list of advanced, statistically-rigorous courses taken from across the campus. Depending on the student's selection of Elective Courses, expertise may be gained in statistical practice, theory, and/or applications in a specialized area such as biometry, bioinformatics, econometrics, environmetrics, psychometrics, etc. Of course, these outcomes will differ depending on the combination of elective courses selected.

Candidates seeking a doctoral minor in Statistics & Data Science must have one member of the SDS Program serve on the Comprehensive Examination Committee. Under normal circumstances, this Exam should take place no earlier than the semester that the Candidate completes coursework for the Statistics Minor. Under exceptional circumstances, Candidates may petition the Program's Executive Committee for earlier scheduling of the Comprehensive Exam. The decision will be based in part on consultation with the Candidate's minor representative.

The student's minor advisor (who must be a member of the SDS faculty – see Appendix 1) should be consulted to plan the individual selection of Elective Courses. *It is GIDP policy that the student holds final responsibility for being aware of and responding to all GIDP and Graduate College policies, requirements, formats, and deadlines as they pertain to progression towards and completion of her/his graduate degree.*

Coursework

A minimum of 12 units of coursework is required for the minor. The courses must include STAT/MATH 566 as the (only) required course, and at least three more from the complete list of courses on the program website (https://stat.arizona.edu/). To complete the minor, students must receive an A or B in STAT 566 and have an overall 3.0 GPA for the entire minor coursework. Please note, students who do not receive an A or B in 566 may pass the qualifying exam, theory version, at the MS level, an alternative.

Where needed to suit a particular or specialized need in an individual student's curriculum plan, a petition may be made to the SDS Executive Committee through the SDS Chair for approval of a course not listed on the website for use as an Elective Course. The decision of the committee will be final. In no case, however, will a prerequisite course for any Elective Course be considered for such special approval if it is not already listed as an approved course, nor may a course be used to satisfy both a major degree requirement *and* a requirement for the PhD Minor in Statistics & Data Science.

Prerequisite Courses

Prerequisite courses necessary to undertake a course chosen for the Minor are the responsibility of the student and may only count towards the Minor if they are already listed as a Core Course or as Elective Courses. Students may, however, consult each individual course instructor to determine if special permission can be secured to register for a Core or Elective Course when a prerequisite course requirement has not been met. Decisions of the course instructors are considered final.

Transfer of Credit

No transfer of credit from outside of the University is allowed; however, coursework taken previously at another institution may be used to satisfy prerequisites for any of the courses in the PhD Minor, at the discretion of the course instructor or offering department.

4. Financial Support Options

Eligibility

Many graduate students in the Program receive financial assistance in the form of Fellowships, Teaching Assistantships, and/or Research Assistantships. Students should recognize that financial support from the

GIDP is a privilege and is not guaranteed. In order to receive financial aid, the SDS Program requires that each student must maintain a cumulative GPA of 3.0 or higher while enrolled in the Statistics graduate program. *Different sources of funding have different enrollment requirements*, so students should pay close attention to hiring and award documents.

All MS and PhD students are encouraged to seek out funding from a variety of sources; the Graduate College has online resources which can facilitate this effort. Students are also strongly encouraged to apply for Research Assistantship support through faculty and fellowship awards from local and national agencies.

Note: Graduate Certificate students are not eligible for financial assistance, unless concurrently enrolled in a separate MS or PhD program at the University of Arizona.

Financial Support for International Applicants/International Students

Additional requirements for financial aid eligibility apply to international applicants. Please see the following page for more information: https://gradcenter.arizona.edu/gcof/gradfunding-opportunities-newsletter

Graduate Assistantships (GAs)

Teaching Assistantships (TAs)

Teaching Assistantships carry teaching assignments in various departments and programs across the campus. When you are awarded a teaching (or research; see below) assistantship, you essentially become a student employee of the University and must sign an employment contract, called the *Notice of Appointment* (NOA). A copy of the NOA is given to the student to sign, and it should be read carefully. Please be aware of training, enrollment, and academic standing requirements, work hour limits, and employment guarantees. For more information, see https://grad.arizona.edu/funding/gaships .

In addition to the key points established by the Graduate College, above, the GIDP in Statistics & Data Science has an additional set of guidelines which must be followed by students on Teaching Assistantships. These are:

•   Students working as Teaching Assistants are classified by the University as exempt student employees; therefore there is no provision for sick or medical leave time. If a TA becomes ill and cannot teach or meet her/his class responsibilities, s/he must inform the course supervisor and the TA coordinator *immediately*, and s/he must make the necessary arrangements for coverage of the class/responsibilities. In the extreme circumstance of being incapacitated to the extent that a TA cannot teach for an indefinite or extended period of time, the University will require the student to resign from the Teaching Assistantship.

•   There is *no* vacation time for Teaching Assistants. Time off during the semester is only allowed for the most exceptional family situations (e.g. death, serious illness) and must be kept to the minimum number of days possible. Obviously, the TA must inform the course supervisor and the TA coordinator if such a situation arises.

•   TAs will *not* be paid for time taken off during the semester and for payroll purposes must report any time away to the business office of the sponsoring department or program.

•   Graduate Assistants classified as exempt student employees of the GIDP must complete an Electronic Time Record (ETR) every pay period. The ETR is then approved by the Supervising Instructor or Professor. Failure to submit the ETR or receive Supervisor approval will prevent the Graduate Assistant from receiving her/his paycheck.

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In the extreme circumstance of your being incapacitated to the extent that you cannot teach for an indefinite or extended period of time, the University will require you to resign from your teaching position.

GIDP students may at times be confused about their status when they are Teaching Assistants in another University department or program. The GIDP recommends that students view the teaching and services they provide as a form of "contract" between the student and the department or program. (A similar sort of arrangement often occurs with employees of consulting companies in the commercial sector). While you have a TA contract with another University department or program, you must follow their (and the University's) rules and procedures with regard to your teaching performance. We call, however, for GIDP students to always conduct themselves as citizens of, and ambassadors for, the GIDP in Statistics & Data Science, since they are governed by all the GIDP's academic policies and requirements, irrespective of the source of their financial support.

Research Assistantships (RAs)

Research assistantships can come from grants and contracts to faculty members and generally require research related to the grant or contract. Faculty in the Program receive grant and contract support from numerous Federal agencies, including the National Science Foundation (NSF), the National Institutes of Health (NIH), the Environmental Protection Agency (EPA), the Department of Agriculture (USDA), and several other private foundations and companies. This grant and contract support provides many opportunities for students to secure research assistantships as well as funds for special Program activities.

Individual faculty or campus training programs administering the research position(s) may have specific requirements that students must meet in order to be eligible for funding. *The nature of financial support for graduate students can vary year to year.* Continuation of research assistantships from non-GIDP sources is always at the discretion of the Principal Investigator of the grant, regardless of the number of years of prior funding. All other aspects and responsibilities for Research Assistants are similar to those discussed above for Teaching Assistants, including the stipulations of an NOA.

Policy for Graduate Assistant Compensation

The majority of the Statistics Program's GAs are based in the Mathematics Department. The Mathematics

For information on the Mathematics Department's compensation policies contact the Math Business Office or consult with the SDS Program Coordinator. This information is also available on the Mathematics website.

Graduate Assistantships based in other departments will be compensated based on the funding department's policies. The Statistics Program will endeavor to provide, if necessary, additional support to bring the students up to parity with the stipends in Mathematics.

Fellowships and Research Grants

University Fellowships, for which competition is heavy, are available mainly to first year students; these carry no explicit teaching or research obligations. All support is contingent upon meeting Graduate College requirements, which include maintaining at least a 3.0 grade point average.

There are opportunities for students to obtain external fellowships of various kinds from funding agencies such as the U.S. National Science Foundation (NSF), other various Federal Depts. and Agencies, and private foundations. See https://grad.arizona.edu/ofce/. These fellowships are prestigious, financially advantageous, and can speed up time to graduation. Students are strongly encouraged to apply for these awards.

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Multiple Means of Support

The University has strict regulations governing academic year employment limits. Details are available in the GA Manual, http://grad.arizona.edu/funding/ga.

Professional Conduct

The guidelines reviewed above all center on how a GIDP student should conduct herself or himself, i.e., one's *professional conduct*. Professional conduct not only involves a commitment to follow the letter of an assistantship contract's requirements, but also implies that proper respect be given to the spirit behind these requirements. Award of a TA or RA is a privilege, not a right. Irresponsible actions exhibited while serving the GIDP and the University not only damage the student's own reputation (who will want to hire you as TA in the future if you are known to disrespect rules?), but ultimately damage the reputation of the GIDP. **Failure to exhibit professional conduct can result in the termination of program funding.** TA and RA positions are exciting opportunities for graduate students to develop professional skills that will carry through the rest of their careers. Enjoy them and benefit from them, but on no account abuse them!

Appendix 1: Satisfactory Academic Progress

Satisfactory Academic Progress is based on a combination of maintaining a 3.0 GPA in program courses, timely completion of steps to degree as outlined in this handbook, and performance against the Expected Student Learning Outcomes described below.

Graduate Student Learning Outcomes Assessment

Upon consultation with the Office of Instruction and Assessment, the Executive Committee of the Statistics Program developed the Assessment Rubric consistent with the goals of the program. The Learning Outcomes were ratified in April 2015. MS and PhD students are assessed throughout their tenure in the program – details are below. Certificate students are not assessed against Learning Outcomes.

The Statistics Program Assessment Form is available in Appendix 6, and on the program website.

Expected Student Learning Outcomes

1. Student demonstrates understanding of the key concepts in the theory of probability and statistics and can communicate that understanding through a well-constructed theoretical argument.

2. Student demonstrates understanding of the key concepts in the statistical methodology and can communicate that understanding through effective experimental design and sophisticated use of statistical and computational tools.

3. Student develops creative and innovative research ideas and approaches that can further the body of statistical knowledge and contribute to significant advances in the intended field of application.

4. Student clearly communicates statistical ideas, both written and oral, and adapts the presentation to be suitable for the intended audience.

5. Student can describe statistics research and the impact of this research in the context of a broad discussion of the application of statistics in the given field of application.

Assessments are scored 1 (low) to 5 (high) by each individual faculty member present at the activity.

Assessment Activities

MS students are assessed through:

- Annual progress reports

- Final Examination (non-thesis students)

- Final Oral (thesis students)

PhD students are assessed through

- Annual progress report

- Written qualifying exams

- Committee meetings

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- Written comprehensive exam

- Oral comprehensive exam

- Scholarly presentations

Students who teach are also assessed through classroom presentations.

The following table indicates the learning outcomes that are assessed in each assessment activity.

Assessment Outcomes	1	2	3	4	5
Written qualifying exams	*	*		*	
Classroom presentation				*	
Committee Meeting			*	*	*
Annual review			*	*	
Written comprehensive exams	*	*	*	*	*
Oral comprehensive exam	*	*	*	*	*
Scholarly presentation			*	*	*
Final Oral			*	*	*

Annual Reviews

Annual progress reports are required from all current students. Progress reports are generally due at the end of May, after the second semester has concluded – students will receive a notification in the Spring semester on the deadline for progress reports. The Advisory committee then meets to discuss all of the student reports. Each student and their advisor receives a letter with the summary of the Committee's thoughts and concerns. When there's concern about the progress of a student, the report and letter from the Committee will be forwarded to the Statistics Chair for further discussion with the student and advisor. Copies of all letters from the Advisory Committee will be filed with the Executive Committee and in the students' files. If students fail to make progress in successive years, the Advisory Committee may recommend probation or termination.

The format for annual progress reports is available in Appendix 4.

Failure to Achieve Satisfactory Progress

When a student fails to meet program guidelines for satisfactory progress, the student will receive written notification with a clear statement of what the student must do and a date by which such actions must be completed. The Graduate College will receive a copy of letters of unsatisfactory progress. Students will be given an opportunity to appeal or rebut, as described in Appendix 5: Student Appeals. Students who fail to remediate by the deadlines specified may be dismissed from the program.

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Appendix 2. PhD Qualifying Examination/MS Final Examination

PhD and MS candidates need to take the Qualifying Exam at the end of their first year of study. For PhD candidates this exam is called the Qualifying Exam. For MS candidates, it is the Final Exit Examination.

The PhD Qualifying Examination must be passed by a PhD candidate by his/her fourth semester of study in order to proceed towards candidacy. Generally students will take the exam at the end of their first year of study.

The MS Final Examination must be passed by non-thesis option MS candidates in order to earn their degree.

The examination is offered in summer and winter (twice) of each year, and *may be retaken only once*. It tests the student's ability to integrate material from the following core courses, and to use this knowledge in solving pertinent, challenging statistical problems commensurate with degree status at the level of these courses:

STAT 564/MATH 564 – Theory of Probability (3 units)

Description: Probability spaces, random variables, weak law of large numbers, central limit theorem, various discrete and continuous probability distributions. Graduate-level requirements include more extensive problem sets or advanced projects.

STAT 566/MATH 566 – Theory of Statistics (3 units)

Description: Sampling theory. Point estimation. Limiting distributions. Testing Hypotheses. Confidence intervals. Large sample methods. Graduate-level requirements include more extensive problem sets or advanced projects.

STAT 571A/MATH 571A – Advanced Statistical Regression Analysis (3 units)

Description: Regression analysis including simple linear regression and multiple linear regression. Matrix formulation and analysis of variance for regression models. Residual analysis, transformations, regression diagnostics, multi-collinearity, variable selection techniques, and response surfaces. Students will be expected to utilize standard statistical software packages for computational purposes.

STAT 571B/MATH 571B – Design of Experiments (3 units)

Description: Principles of designing experiments. Randomization, block designs, factorial experiments, analysis of contrasts, multiple comparisons, analysis of variance and covariance, repeated measures, variance components analysis. Students will be expected to utilize standard statistical software packages for computational purposes.

Each specific examination is constructed and graded by a committee of Statistics & Data Science faculty appointed annually by the SDS Chair. Where possible, this will include the instructors of the pertinent core courses. A minimum of two examiners grade every question independently.

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The exam is administered in two parts over two consecutive days; the first day centers on the more theoretical material from STAT 564-566/MATH 564-566, and the second day centers on the more methodological material in STAT 571A and STAT 571B. With prior agreement of the SDS Examination Committee, this order may be reversed on an exam-by-exam basis, but must be the same for all students who sit for that exam. Note, however, that concepts from all four course areas will be addressed freely in either or both parts of any examination, at the discretion of the Examination Committee.

Students have 4 hours on each day to complete the exam questions given on that day. If a student is present for only one of the two days, s/he will be viewed as having attempted the entire exam and graded accordingly.

Past exams are available on D2L. Students will gain access to the D2L site when they have notified the Program Coordinator that they intend to take the exam on a particular date.

Students must register in advance for each examination; deadlines will be set by the SDS Examination Committee prior to each offering. (Students who register for an examination but do not sit for it at the designated time and place will be viewed as having received a failing grade on that examination, unless prior authorization and approval are acquired from the Program director.) Information on exam registration will be distributed by the Program Coordinator through the student list serv.

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Appendix 3. Potential PhD Minors

The selection of the PhD Minor field is to be made by the student in consultation with her/his advisor and the Program director. The Minor should reflect the student's trans-disciplinary interests, and wherever possible should be coordinated with the student's additional Statistics electives.

Possible PhD Minors for students in the Statistics GIDP include the following. **This list is *not* considered exhaustive**, and students should study the Graduate College Catalog for other possible Minor areas that can meet their individual interdisciplinary interests.

To view requirements for a specific minor, please visit the relevant program webpage.

- Agricultural Resource Economics
- Anthropology
- Applied Mathematics
- Atmospheric Sciences
- Biomedical Engineering
- Biostatistics
- Economics
- Educational Psychology
- Epidemiology
- Finance
- Genetics
- Geography
- Global Change
- Management Information Systems
- Mathematics
- Optical Sciences
- Planetary Sciences
- Systems and Industrial Engineering

Appendix 4: Progress Report Format

All files must be saved as .docx with the following name format: "PR(Academic Year)_(Last Name).

For example, John Smith's Progress Report for the 2015-2016 school year should be saved as PR2016_Smith.docx

Part A will be no longer than 2 pages, (could be just over 1 page)

1.

a. Your name

b. Your program (MS or PhD)

c. When you matriculated

d. When you expect to complete your degree

e. Awards/Funding sources from the past academic year

f. Your major advisor

g. The names of the members of your graduate committee (if you have one)

h. The last time your graduate committee met (if they have met)

i. If in a PhD program: Have you passed your comprehensive examinations?

j. Your current grade point average

k. Have you met your communications requirement?

2. A paragraph summary of the thesis/dissertation research project (even if preliminary). Please write this for educated non-specialists (i.e. not just for your advisor).

3. Goals of the past calendar year (from last year's report), and a discussion of how those goals were met, or not met, and if the latter, why not. If you are a first year student, or haven't submitted one of these before, you may have to think back on what your goals were, exactly.

4. Goals for the next twelve months. These should be two to five concrete statements, and should include research objectives as well as other aspects of progress in your program. (Some hypothetical goals for different students could be: Form a committee and have a committee meeting, Collect a second season of field data on the effect of stress on whitefly population dynamics, Finish coursework requirements, or Submit draft of master's thesis to committee). Try to make them realistic, because these goals will be measured against your progress at the end of next year.

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5. (optional) Other things that you think pertinent.

Part B A current 2 page CV that should include contact information, education, experience (academic work/research/teaching), awards and honors, service/activities, presentations, and publications. There is no proscribed format - you can use the format you prefer. However, please highlight (with the Microsoft Word highlight function, with an asterisk or in bold) the awards, presentations, TAs, or publications of the past year.

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Appendix 5: Student Appeals

All students of the Statistics GIDP have the right to appeal decisions which impact their academic standing.

Student Appeals

Graduation Requirements
Appeals for changes in the graduation requirements can be made to the Program Chair and will be considered at the next Executive Committee meeting.

Course Grades
University policy for grade appeals can be found under Grade Appeal in the University's General Catalog (catalog.arizona.edu).

Examination Results
Step 1: Within two weeks of receiving the results of the Qualifying Exam, the student shall carefully formulate an appeal in writing (including contested questions), and submit it to the Chair of the Examinations Committee with a copy to the Program Chair.

Step 2: Within two weeks from the date of receipt of the student's written statement, the Chair of the Examinations Committee shall respond to the student in writing. The Chair of the Examinations Committee should explain the grading procedures and how the grade in question was determined as well as other issues raised in the student's statement.

Step 3: If the Chair of the Examinations Committee is not available or does not resolve the matter within the two-week period, the student shall, within one week thereafter, readdress and submit the written appeal to the Program Chair.

Step 4: The Program Chair has two weeks to consider the student's written statement, the Chair of the Examinations Committee's written statement, and confer with each. The Program Chair may not change the grade, but shall inform the Chair of the Examinations Committee and the student in writing of his/her recommendation. If a grade change is recommended, the Chair of the Examinations Committee may refuse to accept the recommendation. The Chair of the Examinations Committee shall notify the Program Chair and the student in writing of his/her decision.

Step 5: If the Program Chair does not act on or resolve this matter to the student's satisfaction within a two-week period, the student shall, within one week thereafter, readdress and submit the written appeal to the dean.

The process for the dean's processing of grade appeals can be found in the University General Catalog (catalog.arizona.edu).

Unsatisfactory Academic Progress
Students who receive notification of unsatisfactory progress from the Advisory committee will be given an opportunity to appeal the actions and/or deadlines required to prevent program termination as dictated by the committee. Appeals can be made to the Program Chair and will be considered at the next Executive Committee meeting.

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In any case, should a student feel that there is a conflict of interest that may interfere with the objective review of their appeal, this issue should be raised with either the Program Chair or the Program Coordinator.

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Appendix 6: Assessment Form

Statistics Graduate Program Assessment

This form is an essential tool in our University-mandated effort to assess graduate training in the Statistics program. These data will not be used in any way to evaluate individual students, but will be aggregated to assess our programs' success in fostering the five learning objectives listed below. Identifying data will be considered confidential and may be seen only by the Program Coordinator and Program Chair.

VERY IMPORTANT: The same benchmarks should be used for beginning and advanced students. Low scores for beginning students will simply be interpreted as a reflection of their understanding at the beginning of their program. Similarly, high marks for advanced students would indicate success in achieving our learning objectives and outcomes.

Send completed forms in Campus Mail to: **Melanie Bowman, Statistics & Data Science Graduate Interdisciplinary Program, Math 520, PO Box 210089, CAMPUS.** If preferred, assessments may be sent electronically to bowmanm@math.arizona.edu

Student ID _____ Meeting Date: _____

Degree: M.S. ☐ Ph.D. ☐

Year of study: First ☐ Second ☐   Third ☐   Fourth ☐   Five and above ☐

Type of assessment: Written qualifying exam ☐   Classroom presentation ☐

Committee meeting ☐   Annual review ☐   Written comprehensive exam ☐

Oral comprehensive exam ☐   Scholarly presentation ☐   Final oral ☐

Is this assessment exceptional in any way? If so, please explain:

_____

Assessor: Student (self-assessment) ☐   Faculty ☐

The learning outcomes are to be assessed on a five point scale, in which 1 is "well below average," 2 is "below average," 3 is "average," 4 is "good" and 5 is "excellent" based on the expectations for students graduating from the program. *Note that not all learning objectives will be measured at each assessment event.* Again, both faculty and students should remember that these criteria do not take into account where students are in a program. Thus, a very promising first year student could be "below average" in skills that they would expect to learn as their graduate studies progress. Not assessed (n/a) should be used when the assessor's knowledge of the student does not allow for assessment of that particular outcome.

Please use the following to table to determine which learning outcomes must be graded for each assessment activity.

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Assessment Outcomes	1	2	3	4	5
Written qualifying exams	*	*		*	
Classroom presentation				*	
Committee Meeting			*	*	*
Annual review			*	*	
Written comprehensive exams	*	*	*	*	*
Oral comprehensive exam	*	*	*	*	*
Scholarly presentation			*	*	*
Final Oral			*	*	*

1. Student demonstrates understanding of the key concepts in the theory of probability and statistics and can communicate that understanding through a well-constructed theoretical argument.

n/a   1   2   3   4   5

2. Student demonstrates understanding of the key concepts in the statistical methodology and can communicate that understanding through effective experimental design and sophisticated use of statistical and computational tools.

n/a   1   2   3   4   5

3. Student develops creative and innovative research ideas and approaches that can further the body of statistical knowledge and contribute to significant advances in the intended field of application.

n/a   1   2   3   4   5

4. Student clearly communicates statistical ideas, both written and oral, and adapts the presentation to be suitable for the intended audience.

n/a   1   2   3   4   5

5. Student can describe statistics research and the impact of this research in the context of a broad discussion of the application of statistics in the given field of application.

n/a   1   2   3   4   5

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