| | |
|---|---|
| **Fiscal Unit/Academic Org** | Statistics - D0694 |
| **Administering College/Academic Group** | Arts And Sciences |
| **Co-adminstering College/Academic Group** | |
| **Semester Conversion Designation** | Re-envisioned with significant changes to program goals and/or curricular requirements (e.g., degree/major name changes, changes in program goals, changes in core requirements, structural changes to tracks/options/courses) |
| **Current Program/Plan Name** | Statistics |
| **Proposed Program/Plan Name** | Statistics |
| **Program/Plan Code Abbreviation** | STAT-PH |
| **Current Degree Title** | Doctor of Philosophy |

# Credit Hour Explanation

| Program credit hour requirements | | A) Number of credit hours in current program (Quarter credit hours) | B) Calculated result for 2/3rds of current (Semester credit hours) | C) Number of credit hours required for proposed program (Semester credit hours) | D) Change in credit hours |
|---|---|---|---|---|---|
| Total minimum credit hours required for completion of program | | 120 | 80.0 | 80 | 0.0 |
| Required credit hours offered by the unit | Minimum | 83 | 55.3 | 57 | 1.7 |
| | Maximum | 83 | 55.3 | 57 | 1.7 |
| Required credit hours offered outside of the unit | Minimum | 0 | 0.0 | 0 | 0.0 |
| | Maximum | 0 | 0.0 | 0 | 0.0 |
| Required prerequisite credit hours not included above | Minimum | 0 | 0.0 | 0 | 0.0 |
| | Maximum | 12 | 8.0 | 4 | 4.0 |

# Program Learning Goals

Note: these are required for all undergraduate degree programs and majors now, and will be required for all graduate and professional degree programs in 2012. Nonetheless, all programs are encouraged to complete these now.

 **Program Learning Goals**

# Assessment

Assessment plan includes student learning goals, how those goals are evaluated, and how the information collected is used to improve student learning. An assessment plan is required for undergraduate majors and degrees. Graduate and professional degree programs are encouraged to complete this now, but will not be required to do so until 2012.

**Is this a degree program (undergraduate, graduate, or professional) or major proposal?** No

# Program Specializations/Sub-Plans

If you do not specify a program specialization/sub-plan it will be assumed you are submitting this program for all program specializations/sub-plans.

# Pre-Major

**Does this Program have a Pre-Major?** No

**PROGRAM REQUEST**
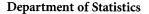
Statistics

## Attachments

- Stat PhD Attachments.pdf: Documents form the Department of Statistics

  *(Program Proposal. Owner: Craigmile,Peter F)*

## Comments

## Workflow Information

| Status | User(s) | Date/Time | Step |
|---|---|---|---|
| Submitted | Craigmile,Peter F | 12/10/2010 03:21 PM | Submitted for Approval |
| Approved | Craigmile,Peter F | 12/10/2010 03:21 PM | Unit Approval |
| Pending Approval | Andereck,Claude David | 12/10/2010 03:21 PM | College Approval |

**Department of Statistics**

404 Cockins Hall
1958 Neil Avenue
Columbus, OH 43210-1247

Phone (614) 292-2866
Fax (614) 292-2096

December 10, 2010

To: Office of Academic Affairs

Re: Proposed Ph.D. in Statistics

Please find attached our proposal for the **Ph.D. in Statistics** under semesters. The ad-hoc Master of Science/Ph.D. in Statistics conversion committee put this proposal together, with continual feedback from the entire faculty. The finalized program was voted on and approved in a faculty meeting on November 30, 2010 (17 for, 0 against, 2 abstain).

Sincerely,

Douglas A. Wolfe
Professor and Chair

## Proposed Ph.D. in Statistics

## Rationale for Changes

**The discipline of Statistics has changed through time, as has the pool of students entering our Ph.D. program. The Ph.D. program and the M.S. program are changed in an integrated fashion, to better reflect our goals. The new program has additional emphasis on applied statistics (especially interdisciplinary work) and the computational methods needed to fit sophisticated models. Individual courses are replaced with comprehensive sequences, the amount of time spent on various topics is redistributed, and the topics themselves are modernized. Careful attention ensures that the first year of the program is suitable as a starting point for the Ph.D. s in both Statistics and Biostatistics.**

Students obtaining a Ph.D. in Statistics typically enter the program with a bachelor's degree, and earn an M.S. degree en route to the Ph.D. As such, the first-year coursework for the M.S. degree and the Ph.D. degree coincide. The changes to the M.S. program can be summarized as follows:

1. The quarter-based courses on Regression and Experimental Design are replaced with an integrated, year-long sequence on Applied Statistics. This sequence includes additional material currently scattered over a number of elective courses.

2. The time spent on mathematical prerequisites is reduced, with this coursework replaced by preparation for a theoretical treatment of the linear model, and a targeted applied course (on Bayesian methods for the Statistics audience; on clinical trials for the Biostatistics audience).

3. The consulting component of the degree is formally updated to allow either the traditional Statistics consulting course, or the recently developed Biostatistical collaboration course.

4. The timing of the Masters exam is moved up, to allow students to select appropriate second-year courses.

The changes to the Ph.D. program, beyond those for the M.S. program, can be summarized as follows:

1. The three quarter sequence on Mathematical Statistics has been replaced by three semester courses on Mathematical Statistics. The material covered in these courses has been expanded to include material on computationally intensive methods and on infinite dimensional parameter spaces.

2. The two quarter sequence on Probability, followed by a third quarter on Stochastic Processes has been replaced by one semester of Probability and a second semester of Stochastic processes. Emphases within these courses has shifted slightly, and coverage of martingales has been moved from the Probability sequence to the Stochastic Processes course.

3. The one quarter course on the Linear Model has been replaced by a semester long course on the Linear Model. The expanded course includes additional treatment of the generalized linear model and the mixed model.

4. The second year of the program (the first year after the M.S. coursework) features a new requirement, designed to bring students into contact with more of our faculty members and to expose them to applications of Statistics in a broader fashion. Students will be required to join a research group, which will focus on one of a number of areas, typically associated with interdisciplinary problems. Students will rotate from one research2 group to another during the year.

5. We currently offer an elective course on Statistical Computing. Nearly all Ph.D. candidates take this course. Under semesters, this course will expand from one quarter to one semester, and it will be required for the Ph.D.

6. The new curriculum will introduce a Capstone Applications course. This course will be team-taught by several faculty, each providing in-depth treatment of an applied problem, from the scientific question, to model formulation, to model fitting and drawing conclusions. An individual course project will be required, and each student will give a series of formal presentations.

## Proposed Ph.D. in Statistics
## List of Semester courses

**Math prerequisite (or equivalent)**

| | | | Under Quarters | | |
|---|---|---|---|---|---|
| **Code** | **Credits** | **Title** | **Code** | **Credits** | **Notes** |
| Math 4545 | 4 | Tentative title: "Survey of topics in analysis" | | | New course -- still under discussion with Mathematics |

The "Under Semesters" header spans Code, Credits, Title.

**Core Required Courses**

| | Under Semesters | | Under Quarters | | |
|---|---|---|---|---|---|
| **Code** | **Credits** | **Title** | **Code** | **Credits** | **Notes** |
| 6570 | 2 | Applied Bayesian Analysis | 625 | 4 | Converted to a two semester hour required course for MAS/PhD. Material has been removed |
| 6801 | 4 | Statistical Theory I | 620 + half of 621 | 4 + half of 4 | Straight conversion of sequence |
| 6802 | 4 | Statistical Theory II | half of 621 + half of 622 | half of 4 + 4 | Straight conversion of sequence |
| 6860 | 2 | Foundations of the Linear Model | | | New course |
| 6910 | 4 | Applied Statistics I | 641 | 5 | Modernized, with material added |
| 6950 | 4 | Applied Statistics II | 645 | 5 | Modernized, with material added |
| 7201 | 3 | Theory of Probability | 722/723 | 4+4 | Some material has been removed; other material has been moved to Stat 7540 |
| 7301 | 3 | Advanced Statistical Theory I | 822 | 3 | Modernized, with material added |
| 7302 | 3 | Advanced Statistical Theory II | 821 | 3 | Modernized, with material added |
| 7303 | 3 | Bayesian Analysis and Decision Theory | 820 | 3 | Modernized, with material added |
| 7410 | 3 | Theory of the Linear Model | 742 | 4 | Modernized, with material added |
| 7540 | 3 | Theory of Stochastic Processes | 832 | 3 | Modernized, with material added |
| 7730 | 3 | Advanced Computational Statistics | 773 | 3 | Modernized, with material added |
| 8410 | 3 | Capstone Applications | | | New course |
| 8750.xx* | 1 | Research Group | | | New course |
| 8750.xx* | 1 | Research Group | | | New course |
| **Total** | **46** | | | | |

**\* The decimal values for 8750.xx must be different**

**Pick one of the following:**

| Code | Credits | Title | Code | Credits | Notes |
|---|---|---|---|---|---|
| 6750 | 2 | Statistical Consulting | 600/601 | 2 + 2 | Re-envisioned as a two semester hour course with a change in the content of the course. |
| 7755 | 2 | Biostatistical Collaboration | Biostat 709 | 2 or 3 | Straight conversion of the longer version of the Quarter course |
| **Total** | **2** | | | | |

**Elective Courses**
 **(at least 9 credits of letter-graded Stat 6000 level or higher, of which at least 6 credits must be Stat 7000 or higher)\*\***

\*\* Excludes Stat 6030, 6040, 6060, 6193, 6194, 6201, 6301, 6302, 6410, 6450, 6750,
   7193, 7194, 7755, 7998, 7999, 8010, 8193, 8194, 8750.xx, 8891, 8895, 8999).

# The Ohio State University, Department of Statistics
## Ph.D. PLAN OF STUDY

This form should be submitted to the Graduate Studies Committee within two semesters of passing the Qualifier Exam II.

**Name:** _____     **Date:** _____

**Date of 1st written exam**: _____     **Date of 2nd written exam**: _____

### Core Course Requirement:
Indicate your grade in the following required courses or when you plan to take them.  Use a W to indicate a waived course.  The first 8750.xx must be different from the second 8750.xx course.

**Statistics**

| | | |
|---|---|---|
| 6570 (2) _____ | 6801 (4) _____ | 6802 (4) _____ |
| 6860 (2) _____ | 6910 (4) _____ | 6950 (4) _____ |
| 7201 (3) _____ | 7301 (3) _____ | 7302 (3) _____ |
| 7303 (3) _____ | 7410 (3) _____ | 7540 (3) _____ |
| 7730 (3) _____ | 8410 (3) _____ | |
| 8750.xx(1) _____ | 8750.xx(1) _____ | |

**Either**     6750 (2) _____          OR          7755 (4) _____

**Elective courses**: At least 9 credits of letter-graded Stat 6000 level or higher, of which at least 6 credits must be Stat 7000 or higher. (Excludes Stat 6030, 6040, 6060, 6193, 6194, 6201, 6301, 6302, 6410, 6450, 6750, 7193, 7194, 7755, 7998, 7999, 8010, 8193, 8194, 8895, 8999).

| Elective Courses | Credit Hrs | Grade or Semester Planned |
|---|---|---|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |

**Total Elective Hours**     _____

**Projected Date of Ph.D. Candidacy Examination:**     _____

Having met on _____, the undersigned approve the listed program and agree to serve on the Ph.D. Candidacy Examination Committee.

_____
Student's Signature

_____
Examination Committee Chairperson

_____
Examination Committee Member

_____
Examination Committee Member

_____
Examination Committee Member

**Approved by:** _____     **Date:** _____
Graduate Studies Committee Chairperson

# PH.D. IN STATISTICS PLAN OF STUDY

This form should be submitted to the Graduate Studies Committee within four quarters following the passing of Qualifier Exam II.  Indicate your grade in the following required courses or when you plan to take them.  Use a W to indicate a waived course.

**Name:** _____     **Date:** _____

**Core Course Requirements:**

*Statistics*   620(4) _____   621(4) _____   622(4) _____   641(5) _____

645(5) _____   722(4) _____   723(4) _____   742(3) _____

820(3) _____   821(3) _____   822(3) _____   832(3) _____

*Consulting*      600(3) _____      or      Pub Hlth 786(3) _____

**Electives – 600 Level** (10 hours required): Letter graded Stat or Biostat courses at the 600 level or above (excluding Stat 600, 601, 602, 603, 610, 623, 628, 641, 645, and 693)

| **600 Level Elective** | **Credit Hours** | **Grade or Quarter Planned** |
|---|---|---|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| **Total Hours:** | _____ | |

**Electives – 700 Level and above** (25 hours required): Statistics courses at the 700 level or above (excluding Stat 801, 893, 895, and 999)

| **700+ Level Elective** | **Credit Hours** | **Grade or Quarter Planned** |
|---|---|---|
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| _____ | _____ | _____ |
| **Total Hours:** | _____ | |

**Projected Date of Ph.D. Candidacy Examination:** _____

Having met on _____, the undersigned approve the listed program and agree to serve on the Ph.D. Candidacy Examination Committee.

_____
Student's Signature

_____
Examination Committee Chairperson

_____
Examination Committee Member

_____
Examination Committee Member

_____
Examination Committee Member

**Approved by:** _____     **Date:** _____
Graduate Studies Committee Chairperson

**Proposed Ph.D. in Statistics**

**Transition Policy**

**Students who began their degree under quarters will not be penalized as the university moves to semesters, either in terms of progress towards their degree or their expected timing of graduation. The Graduate Studies Chair is the advisor for all PhD students upon entry to the program. Students are also assigned a faculty mentor with whom they meet every quarter. This level of support will continue under semesters: Each student will meet with a faculty mentor every semester. When a student selects an advisor for dissertation work (typically during year three of the program), this advisor will replace the assigned faculty mentor.**

The transition plan for the MS degree details how students who have completed portions of the first-year coursework will be able to fulfill the first-year coursework requirements. Much of the MS transition plan is relevant here:

Requirements for the quarter-based MS degree include a one-year sequence on Statistical Theory (Stat 620-621-622), and applied courses on Experimental Design (Stat 641) and Regression (Stat 645). The Statistical Theory sequence is a straight conversion of the quarter-based sequence. If a student already has credit for Stat 620, but not for Stat 621, then the student will have the option of taking a two-hour reading course (Stat 6193 or Stat 6194) to complete the equivalent of Stat 6801; if a student already has credit for Stat 620 and Stat 621, but not Stat 622, the student will take Stat 6802.

Additionally:

1. Stat 620-621-622 under quarters will be counted for Stat 6801-6802 under semesters.
2. Stat 641 under quarters will be counted for Stat 6910 under semesters.
3. Stat 645 under quarters will be counted for Stat 6950 under semesters.
4. Stat 742 under quarters will be counted for Stat 7410 under semesters.
5. Stat 600 under quarters will be counted for Stat 6750 under semesters, and

   Biostat 709 under quarters will be counted for Stat 7755 under semesters.

Requirements for the quarter-based PhD degree, beyond those for the MS degree, include a one-year sequence on Statistical Inference (Stat 820-821-822), a two-quarter sequence on Probability (Stat 722-723), a course on Applied Probability Models (Stat 832), and electives. Each course will serve as a replacement for its predecessor. Courses will be matched on the one-for-one basis below, with the exception of the probability sequence. Nearly all PhD students take this sequence during a single

academic year.  However, if a student already has credit for Stat 722, but not for Stat 723, then the student will have the option of taking a two-hour reading course (Stat 8193 or Stat 8194) to complete the equivalent of Stat 7201.

Additionally:

6.  Stat 820 under quarters will be counted for Stat 7303 under semesters.
7.  Stat 821 under quarters will be counted for Stat 7302 under semesters.
8.  Stat 822 under quarters will be counted for Stat 7301 under semesters.
9.  Stat 722-723 under quarters will be counted for Stat 7201 under semesters.
10. Stat 832 under quarters will be counted for Stat 7540 under semesters.

Several of the above-mentioned courses are currently three credit hours under quarters and will transition to three semester-credit-hour courses.  In addition taking specific courses, a student will be required to complete the missing hours as electives, under a conversion of one quarter-hour equals 2/3 semester-hour, with the overall fraction rounded to the nearest integer.  As an example of the calculation, a student who takes the quarter courses listed in points one through six above would have completed 20 quarter-hours.  The semester versions of the courses consist of 15 semester-hours.  The deficit is 15 - 20 x 2/3 = 1 2/3 semester-hours, and the student would be expected to complete an additional two hours of electives.

As with the MS degree, students who started the PhD program under quarters will be encouraged to take the Foundations of the Linear Model course (Stat 6860), and the Applied Bayesian course (Stat 6570 to complete their program, but this will not be required.  The requirement for the Foundations of the Linear Model will be waived, and the two semester-credit-hours for the Applied Bayesian course can be made up with other elective courses.  Students who started the PhD program under quarters will be encouraged to take the Research Group courses (Stat 8750.XX), the Advanced Computational Statistics Course (Stat 7730), and the Capstone Applications Course (Stat 8410), but these courses will not be required.  These eight semester hours can be made up with six semester-hours of other elective courses.

Additionally, a two quarter hour special topics course in Applied Statistics will be offered in Spring 2012 for Biostatistics and Statistics PhD students.  This course will cover the material that is not in the quarter-based Stat 641 and Stat 645, but will be in the semester versions of these courses.

Also, 600 level and above quarter-based elective courses can be counted with a 2/3 conversion to 6000

level and above elective credits under semesters.  The content of qualifying examinations from 2012 through 2014 will be adjusted to match the content of coursework taken by those who began the program under quarters.

**Examples of transition:**

|  | Au | Wi | Sp |
|---|---|---|---|
| Year 1 (Quarters) | Stat 620 (4)<br>Stat 645 (5)<br>Math 547 (4) | Stat 621 (4)<br>Stat 641 (5)<br>Math 548 (4) | Stat 622 (4)<br>Elective (5)<br>Math 549 (4) |
| Year 2 (Semesters) | Stat 7201 (3)<br>Stat 7301 (3)<br>Stat 7410 (3)<br>Stat 8750 (1) |  | Stat 7302 (3)<br>Stat 7303 (3)<br>Stat 7540 (3)<br>Stat 8750 (1) |
| Year 3 (Semesters) | Stat 7730 (3)<br>Stat 8410 (3)<br>Elective (3) |  | Elective (3)<br>Elective (3)<br>Elective (3) |

|  | Au | Wi | Sp |
|---|---|---|---|
| Year 1 (Quarters) | Stat 620 (4)<br>Stat 645 (5)<br>Math 547 (4) | Stat 621 (4)<br>Stat 641 (5)<br>Math 548 (4) | Stat 622 (4)<br>Elective (5)<br>Math 549 (4) |
| Year 2 (Quarters) | Stat 722 (4)<br>Stat 742 (4)<br>Stat 820 (3) | Stat 723 (4)<br>Stat 821 (3)<br>Elective (3) | Stat 600 (2)<br>Stat 822 (3)<br>Stat 832 (3)<br>Elective (2) |
| Year 3 (Semesters) | Stat 7730 (3)<br>Stat 8410 (3)<br>Elective (3) |  | Elective (3)<br>Elective (3)<br>Elective (3) |

# PH.D. IN STATISTICS (under semesters)

The Ph.D. program in statistics presupposes a mathematical background which includes linear algebra and advanced calculus.  The core of the Ph.D. program consists of coursework in mathematical statistics, applied statistics, and computational methods.

(1) The student must take and pass with a grade of B- or above in a letter-graded course and with a grade of S in an S/U course the coursework described below.

(2) The student must pass examinations as described below.

(3) The student must satisfy university rules on residency and total credit hours.  A minimum of 80 credit hours is required, which typically include a considerable number of hours of Stat 8999, PhD Research.

## Course Requirements

| Mathematics | | As required for individual students to reach the mathematical maturity necessary to be successful in the Statistics courses 7201, 7301, 7302, 7303, and 7540.  Minimum requirements should be the equivalent of a strong undergraduate course in Advanced Calculus or Real Analysis. |
|---|---|---|

| | | | |
|---|---|---|---|
| Core | | 6801(4) | Statistical Theory I |
| (48 hours) | | 6802(4) | Statistical Theory II |
| | | 6910(4) | Applied Statistics I |
| | | 6950(4) | Applied Statistics II |
| | | 6860(2) | Foundations of the Linear Model |
| | | 6570(2) | Applied Bayesian Analysis |
| | | 7410(3) | Theory of the Linear Model |
| | | 7301(3) | Advanced Statistical Theory I |
| | | 7302(3) | Advanced Statistical Theory II |
| | | 7303(3) | Bayesian Analysis and Decision Theory |
| | | 7201(3) | Theory of Probability |
| | | 7540(3) | Theory of Stochastic Processes |
| | | 7730(3) | Statistical Computing |
| | | 8410(3) | Capstone Applications |
| | | 8750.xx(1) | Research Group |
| | | 8750.xx(1) | Research Group |
| | | 6750(2) | Statistical Consulting |
| Either | | 6750(2) | Statistical Consulting |
| | or | 7755(2) | Biostatistical Collaboration |

Electives*          (at least 9 credits of letter-graded Stat 6000 level or higher, of
(9 hours)           which at least 6 credits must be Stat 7000 or higher)**

* Students may also take appropriate graduate courses outside the Statistics Department to meet the elective requirements.  Students may, with approval of the Graduate Studies Committee, substitute one course (up to 3 hours) from another department in place of an elective.  The course must have appropriate content for a statistics degree, and must not duplicate the material covered in any course available from the Department of Statistics.

** Excludes Stat 6030, 6040, 6060, 6193, 6194, 6201, 6301, 6302, 6410, 6450, 6750,
    7193, 7194, 7755, 7998, 7999, 8010, 8193, 8194, 8750.xx, 8891, 8895, 8999).

## Sample Schedule

First Year

| Autumn | Spring |
|---|---|
| 6801 | 6802 |
| 6910 | 6950 |
| Math 4545 | 6860 (1st half sem.) |
|  | 6570 (2nd half sem.) |

Second Year

| Autumn | Spring |
|---|---|
| 7201 | 7540 |
| 7301 | 7302 |
| 7410 | 7303 |
| 8750.xx | 8750.xx |

Third Year

| Autumn | Spring |
|---|---|
| 7730 | Elective |
| 8410 | Elective |
| Elective | Elective |
|  | 6750 |

## Examinations (None of these examinations may be taken more than twice.)

1. Qualifier I:  This written examination covers material from the first year of coursework.

2. Qualifier II:  This is a comprehensive written examination testing knowledge acquired in the first two years of study and the ability to integrate and apply such knowledge. It will cover material from the first two years of coursework.  It may not be attempted until Qualifier I has been passed.

   Note on all exams: students are expected to take exams on the usual schedule as they complete coursework in order for funding (if applicable) to continue.

   After passing Qualifier II, the student chooses a dissertation advisor, who must be a Category P graduate faculty member.  Category P faculty have been approved by

the university to formally supervise Ph.D. dissertations.  After a dissertation advisor is chosen, the student also forms a <u>Ph.D. Examination Committee</u>, consisting of at least four graduate faculty members from the Statistics Department or other departments consistent with the student's interests.  This committee is responsible for approving a <u>Plan of Study</u> to be filed with the Graduate Studies Committee within two semesters after passing Qualifier II.

3.  <u>Ph.D. Candidacy Examination</u>:  After completion of all required courses (as specified by the student's <u>Ph.D. Examination Committee</u>), the candidate's <u>Ph.D. Examination Committee</u> will administer and grade a Ph.D. Candidacy Examination.  The examination consists of two parts.  A written portion covers material on some area in the statistical literature as agreed upon by the student and the Examination Committee.  This portion will be administered within two years of the student's passing Qualifier II and will discuss open research topics in this area and possible research methodology for solving these problems.  This portion will ordinarily be a thesis proposal, but the student is not obliged to follow through with a thesis in this area, and the examination need not be repeated if the thesis topic is changed at a later date.  After the Examination Committee accepts the written portion, they will administer an oral examination over this material.  The student has two weeks to complete the written portion of the exam.  The oral exam should be scheduled at least two weeks after the due date for the written portion of the exam.  See the sample forms at the end of this booklet for the required Graduate School form (Doctoral Notification of Ph.D. Candidacy Examination).

4.  <u>Final Oral Examination/Thesis Defense</u>:  Once the student has made sufficient progress (as judged by the <u>Ph.D. Dissertation Committee</u>) on his/her Ph.D. dissertation to warrant holding the Final Oral Examination, the Doctoral Draft Approval/Notification of Final Oral Examination form (again see the sample forms at the end of this booklet) must be filed with the Graduate School at least two weeks prior to the actual Final Oral Examination/Thesis Defense.  The <u>Ph.D. Dissertation Committee</u> then conducts a two-hour oral examination in which the candidate discusses/defends his/her thesis.  The student must file the Application to Graduate Form (again see the sample forms at the end of this booklet) with the Graduate School no later than the second Friday of the intended quarter of graduation.


**Note:  Check deadline for filing the form with the graduate school—adjust last paragraph as needed.**

# PH.D. IN STATISTICS (under quarters)

The Ph.D. program in statistics presupposes a mathematical background which includes linear algebra and advanced calculus. The core of the Ph.D. program consists of coursework in mathematical statistics as well as a variety of applied and theoretical courses in various topical areas.

## Course Requirements

| | | |
|---|---|---|
| <u>Mathematics</u> | | As required for individual students to reach the mathematical maturity necessary to be successful in the Statistics courses 722, 723, 820, 821, 822, and 832. Minimum requirements should be the equivalents of Math 547(4), 548(4), and 549(4). |
| <u>Core Statistics</u> <u>(46 hours)</u> | 620(4) 621(4) 622(4) | Statistical Theory I Statistical Theory II Statistical Theory III |
| | 641(5) 645(5) | Design and Analysis of Experiments Applied Regression Analysis |
| | 722(4) 723(4) | Theory of Probability I Theory of Probability II |
| | 742(4) | Analysis of Variance |
| | 820(3) 821(3) 822(3) | Statistical Inference I Statistical Inference II Statistical Inference III |
| | 832(3) | Applied Probability Models |
| <u>Consulting</u> <u>(2 hours)</u> | 600(2) | Statistical Consulting I (graded S/U) or Public Health 786 |
| <u>600 Level</u> <u>Electives</u> <u>(10 Hours)</u> | | An additional 10 hours of 600 level statistics courses, excluding Statistics 600, 601, 602, 603, 610, 623, 628, and 693 |
| <u>700 and 800 Level</u> <u>Electives</u> <u>(25 Hours)</u> | | An additional 25 hours of 700 level or above statistics courses, excluding Statistics 801, 893, 895, and 999 |

**TOTAL COURSE HOUR REQUIREMENTS: 83 hours plus any necessary mathematics**

Non-statistics elective courses (at the 600 level or above) to replace statistics courses must be approved by the student's Ph.D. Examination Committee.  A grade of B- or better is required in all courses in the Ph.D. program.

## Typical program (first three years)

First Year

| Summer | Autumn | Winter | Spring |
|--------|--------|--------|--------|
| 602 | 620 | 621 | 622 |
| 603 | 645 | 641 | Elective |
| Elective | Math 547 | Math 548 | Math 549 |

Second Year

| | Autumn | Winter | Spring |
|--------|--------|--------|--------|
| | 722 | 723 | 822 |
| | 742 | 821 | Elective |
| | 820 | 832 | Elective |

Third Year

| | Autumn | Winter | Spring |
|--------|--------|--------|--------|
| | Elective | Elective | 600 |
| | Elective | Elective | Elective |
| | Elective | Elective | Elective |

Note: Enrollment in Summer Quarter of the first year is optional, but encouraged.

## Examinations (None of these examinations may be taken more than twice.)

1. Qualifier I:  This six-hour closed book examination covers material presented in Statistics 620, 621, 622, 641, and 645.  It is given Autumn Quarter and, if necessary, in Winter Quarter.

2. Qualifier II:  This is a comprehensive examination testing knowledge acquired in the first two years of study and the ability to integrate and apply such knowledge.  It is an eight-hour closed book examination and may not be attempted until Qualifier I has been passed.  Preparation for this examination should be obtained in Statistics 620, 621, 622, 641, 645, 722, 723, 742, 820, and 821.  The examination is given once a year, early in Autumn Quarter.  Upon petition of at least 2 students who failed the examination the previous Autumn Quarter, a Spring Quarter examination will also be offered.

   Note on all exams: students are expected to take exams on the usual schedule as they complete coursework in order for funding (if applicable) to continue.  Qualifier I should be taken Autumn Quarter of the second year.  Qualifier II should be taken Autumn Quarter of the third year.

After passing Qualifier II, the student chooses a dissertation advisor, who must be a Category P graduate faculty member. Category P faculty have been approved by the university to formally supervise Ph.D. dissertations. In the Department of Statistics, the Category P faculty are generally all tenured faculty. After a dissertation advisor is chosen, the student also forms a <u>Ph.D. Examination Committee</u>, consisting of at least four graduate faculty members from the Statistics Department or other departments consistent with the student's interests. This committee is responsible for approving a <u>Plan of Study</u> to be filed with the Graduate Studies Committee within four quarters after passing Qualifier II.

3. <u>Ph.D. Candidacy Examination</u>: After completion of all required courses (as specified by the student's <u>Ph.D. Examination Committee</u>), the candidate's <u>Ph.D. Examination Committee</u> will administer and grade a Ph.D. Candidacy Examination. The examination consists of two parts. A written portion covers material on some area in the statistical literature as agreed upon by the student and the Examination Committee. This portion will be administered within two years of the student's passing Qualifier II and will discuss open research topics in this area and possible research methodology for solving these problems. This portion will ordinarily be a thesis proposal, but the student is not obliged to follow through with a thesis in this area, and the examination need not be repeated if the thesis topic is changed at a later date. After the Examination Committee accepts the written portion, they will administer an oral examination over this material. The student has two weeks to complete the written portion of the exam. The oral exam should be scheduled at least two weeks after the due date for the written portion of the exam. See the sample forms at the end of this booklet for the required Graduate School form (Doctoral Notification of Ph.D. Candidacy Examination).

4. <u>Final Oral Examination/Thesis Defense</u>: Once the student has made sufficient progress (as judged by the <u>Ph.D. Dissertation Committee</u>) on his/her Ph.D. dissertation to warrant holding the Final Oral Examination, the Doctoral Draft Approval/Notification of Final Oral Examination form (again see the sample forms at the end of this booklet) must be filed with the Graduate School at least two weeks prior to the actual Final Oral Examination/Thesis Defense. The <u>Ph.D. Dissertation Committee</u> then conducts a two-hour oral examination in which the candidate discusses/defends his/her thesis. The student must file the Application to Graduate Form (again see the sample forms at the end of this booklet) with the Graduate School no later than the second Friday of the intended quarter of graduation.