Fiscal Unit/Academic Org	Statistics - D0694
Administering College/Academic Group	Arts And Sciences
Co-adminstering College/Academic Group	Public Health
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	Biostatistics
Proposed Program/Plan Name	Biostatistics
Program/Plan Code Abbreviation	BIOSTAT-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	84	56.0	60	4.0
	Maximum	90	60.0	62	2.0
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.

Program Specialization/Sub-Plan Name	Methodology (Existing)
Program Specialization/Sub-Plan Goals	
Program Specialization/Sub-Plan Name	Public Health (Existing)
Program Specialization/Sub-Plan Goals	

# **Pre-Major**

Does this Program have a Pre-Major? No

## Attachments

• PhD\_Biostat\_Attachments.pdf: Documents from the Program in Biostatistics

(Program Proposal. Owner: Craigmile,Peter F)

## Comments

# **Workflow Information**

Status	User(s)	Date/Time	Step
Submitted	Craigmile,Peter F	12/10/2010 03:18 PM	Submitted for Approval
Approved	Craigmile,Peter F	12/10/2010 03:23 PM	Unit Approval
Pending Approval	Andereck, Claude David	12/10/2010 03:23 PM	College Approval

### College of Public Health

Division of Biostatistics M-116 Starling-Loving Hall 320 W. 10<sup>th</sup> Ave. Columbus, OH 43210

> Phone (614) 293-7826 Fax (614) 293-3937 Web http://cph.osu.edu

9 December 2010

To: Office of Academic Affairs Re: Proposed Biostatistics PhD

Please find attached our proposal for the **Ph.D. in Biostatistics** under semesters. This degree is offered by the Program in Biostatistics consisting of Biostatistics faculty in the Department of Statistics in the College of Arts and Sciences, as well as faculty in the Division of Biostatistics in the College of Public Health. The ad-hoc Ph.D. in Biostatistics conversion committee put this proposal together, with continual feedback from the faculty involved in the Program. It was approved unanimously in a meeting of the two groups of faculty on 4<sup>th</sup> November 2010.

Sincerely,

H. N. Nagaro

H. N. Nagaraja, Chair, Division of Biostatistics





### **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 Biostatistics Ph.D.

Please find attached our proposal for the **Ph.D. in Biostatistics** under semesters. This degree is offered by the Graduate Program in Biostatistics consisting of Biostatistics faculty in the Department of Statistics in the College of Arts and Sciences, as well as faculty in the Division of Biostatistics in the College of Public Health. The ad-hoc Ph.D. in Biostatistics conversion committee put this proposal together, with continual feedback from the faculty involved in the Graduate Program. It was approved unanimously in a meeting of the two groups of faculty on November 4, 2010.

Sincerely,

Douglas A. Wilfe

Douglas A. Wolfe Professor and Chair

# **Proposed Ph.D. in Biostatistics**

## **Rationale for Changes**

## The changes to the Methodology Specialization are summarized as follows:

- 1. The quarter-based courses on Regression and Experimental Design are replaced with an integrated, year-long sequence (Stat 6910/6950, each 4 semester credits) on Applied Statistics. This sequence includes additional material currently scattered over a number of elective courses.
- 2. The course Stat 6860, *Foundations of Linear Model*, has been introduced. Stat 6860 presents background material for the study of Linear Models (Stat 7410, see below).
- 3. The time spent on mathematical prerequisites is reduced, with this coursework replaced, in part, by preparation for a theoretical treatment of the linear model, and a targeted applied course on clinical trials.
- 4. The Stat 722/723 quarter probability sequence (each 4 quarter credits) and the quarter course Stat 832 (3 quarter credits) have been replaced by two 3 semester credit courses, one on theoretical probability (Stat 7201-3 semester credits) and one on stochastic processes (Stat 7540-3 semester credits). Stat 7540 adds material on Gaussian processes.
- 5. The following required courses/sequences have substantially increased the amount of contact hours, allowing additional material to be added:
  - a. The quarter course Stat 742 (4 quarter credits) has been replaced by the semester course Stat 7410 (4 semester credits), adding material on generalized linear models.
  - b. The quarter course Stat 773 (3 quarter credits) has been replaced by the semester course Stat 7730 (3 semester credits), adding material on Monte Carlo methodology.
  - c. The quarter courses Stat 820/821 sequence (each 3 quarter credits) has been replaced by the two 3 semester credit courses Stat 7301 and Stat 7302, adding material on simultaneous hypothesis testing.
  - d. The quarter course Stat 833 (3 quarter credits) has been replaced by the semester course Stat 8625 (3 semester credits). The topics have been expanded to cover methods for analyzing data from recent advances in molecular technologies, including second generation sequencing data and detection of non-Mendelian effects, such as maternal and imprinting effects.
- 6. Due to increases in the required courses, the program has decreased the total hours of electives from 22 quarter credits to 11 semester credits. The sample list of electives has been updated to reflect some of the courses that will be available under semesters. The total number of semester credit hours required for the PhD is 80.

# The changes to the Public Health Specialization are summarized as follows:

- 1. The quarter-based courses on Regression and Experimental Design are replaced with an integrated, year-long sequence (Stat 6910/6950, each 4 semester credits) on Applied Statistics. This sequence includes additional material currently scattered over a number of elective courses.
- 2. The course Stat 6860, *Foundations of Linear Model*, has been introduced. Stat 6860 presents background material for the study of Linear Models (Stat 7410, see below).
- 3. The following required courses/sequences have substantially increased the amount of contact hours, allowing additional material to be added:
  - a. The quarter course Stat 773 (3 quarter credits) has been replaced by the semester course Stat 7730 (3 semester credits), adding material on Monte Carlo methodology.
  - b. The quarter course Stat 743 (3 quarter credits) has been replaced by one 3 semester credits course (Stat 7430) adding material on modeling non-Gaussian data, and greater depth on multivariate and longitudinal generalized models.
- 4. The following courses that were previously electives under quarters have been changed to required under semesters, reflecting a reprioritization and need for greater knowledge in certain topics in the expanding field of Biostatistics.
  - a. The quarter course Stat 632 (3 quarter credits) has been replaced by the semester course Stat 6540 (3 credit semester credits) on Applied Stochastic Processes, adding material on discrete state space continuous time Markov chains and coalescent theory models.
  - b. The quarter course Stat 742 (4 quarter credits) has been replaced by the semester course Stat 7410 (4 semester credits), adding material on general linear models.
- 5. The following courses that were required under quarters have been changed to electives under semesters, reflecting increased diversity in biostatistical topics and need for committee guidance in tailoring a student's plan of study:
  - a. Statistical Methods for Analyzing Genetic Data (Stat 833 / Stat 8625)
  - b. Survey Sampling (PUBHBIO 651/STAT 651; PUBHBIO 7225/STAT 6510)
  - c. Applied Statistical Analysis with Missing Data (PUBHBIO 652/STAT 652; PUBHBIO 7240/STAT 6520)
  - d. Applied Logistic Regression (PUBHBIO 606 / PUBHBIO 7220)
- 6. The following courses that were required under quarters have been removed from the curriculum under semesters. These courses are foundational graduate courses at a level lower than the rest of the PhD curriculum; many students placed out of these courses under quarters. The material in these courses is contained, at a higher level, in other required courses.
  - a. Design & Analysis of Studies in Health Sciences I (PUBHBIO 701 / PUBHBIO 6210)
  - b. Design & Analysis of Studies in Health Sciences II (PUBHBIO 702 / PUBHBIO 6211)
  - c. Problem-Oriented Approach to Biostatistics (PUBHBIO 703 / PUBHBIO 6212)
  - d. Applied Survival Analysis (PUBHBIO 605/BIOSTAT 605 ; PUBHBIO 7235 / STAT 6605)
- 7. The epidemiology requirement under quarters (PUBHEPI 710, 4 quarter credits) has been replaced with a new semester epidemiology course that includes a lecture (PUBHEPI 6430.01, 3 semester credits) plus a lab (PUBHEPI 6430.02, 1 semester credit). The increased credit hours

reflect the converted program's increased emphasis on applications, including this course as well as the new minor requirement (detailed below).

- 8. To reflect the interdisciplinary nature of biostatistics, a new minor requirement has been added. The program will require 6 semester credits outside statistics / biostatistics, in a health-related field, as approved by the student's PhD Examination Committee.
- 7. The program has increased the total hours of electives (13 quarter credits to 12 semester credits), reflecting increased diversity in biostatistical topics and the need for committee guidance in tailoring a student's plan of study. The sample list of electives has been updated to reflect some of the courses that will be available under semesters. The total number of semester credit hours required for the PhD is 80.

# **Proposed Ph.D. in Biostatistics - Public Health Specialization List of Semester courses**

# Math prerequisite (or equivalent)

Under Semesters	Under Qua	rters		
Code Credits Title	Code	Credits	Notes	
The Public Health track of the Biostatistics PhD program presupposes a mathematical background that includes linear algebra (including matrices) and advanced calculus.			no change to prereq	

# **Core Required Courses (44 credits)**

Cada	Under S	Semesters	Under Qua	rters	Natas
Code	Credits	litie	Code	Credits	Notes
PUBHBIO 7245 / STAT 7755	2	Biostatistical Collaboration	PUBHBIO 786 / BIOSTAT 709	3	straight conversion (name change, cross-list added)
PUBHBIO 8230 / STAT 7470	3	Advanced Longitudinal Data Analysis	PUBHBIO 726 / STAT 726	4	Material removed
PUBHBIO 8235	3	Advanced Regression Modeling of Time-to-Event Data	PUBHBIO 706	4	Material removed
PUBHEPI 6430.01	3	Epidemiology I	PUBHEPI 710	4	Enhanced "majors" version of quarter course
PUBHEPI 6430.02	1	Epidemiology I Lab			New course
STAT 6540	3	Applied Stochastic Processes	STAT 632	3	Straight conversion (with additional material for Biostatistics students)
STAT 6615	2	Design and Analysis of Clinical Trials	BIOSTAT 615	3	Straight conversion
STAT 6801	4	Statistical Theory I	STAT 620/621	4 + half of 4	Straight conversion of sequence
STAT 6802	4	Statistical Theory II	STAT 621/622	half of 4 + 4	Straight conversion of sequence
STAT 6860	2	Foundations of the Linear Model			New course
STAT 6910	4	Applied Statistics I	STAT 641	5	Modernized, with material added
STAT 6950	4	Applied Statistics II	STAT 645	5	Modernized, with material added
STAT 7410	3	Theory of the Linear Model	STAT 742	3	material added to course
STAT 7430	3	Generalized Linear Models	STAT 743	3	material added to course
STAT 7730	3	Advanced Statistical Computing	STAT 773	3	material added to course

	Under	Semesters	Under Qua	rters	
Code	Credits	Title	Code	Credits	Notes
PUBHBIO 7220	3	Applied Logistic Regression	PUBHBIO 606	4	Material removed
PUBHBIO 7225	2	Survey Sampling Methods	PUBHBIO	1	Material removed
/ STAT 6510	5	Survey Sampling Methous	651/STAT 651	+	
PUBHBIO 7240	2	Applied Statistical Analysis	PUBHBIO	1	Material removed
/ STAT 6520	5	with Missing Data	652/STAT 652	4	
STAT 6550	2	Statistical Analysis of Time	STAT 635	r	Straight conversion
51AT 0550	2	Series	51AI 055	5	
STAT 6620	2	Environmental Statistics	STAT 662	3	Straight conversion
STAT 6625	з	Statistical Analysis in Genetic			New course
51A1 0025	5	Epidemiology			
					Re-envisioned as a two
STAT 6650	2	Discrete Data Analysis	STAT 665	4	semester hour required
51A1 0050	2		51A1 005		course for MAS degree -
					material was removed
STAT 7450	З	Multiple Comparisons	STAT 745	З	Modernized, with material
51A1 7450	5	Procedures	51A1 745	,	added
STAT 8625	З	Stat Methods for Analyzing	STAT 833	З	Material added to course
5171 0025	5	Genetic Data	51A1 055	5	

### Sample Elective Courses (at least 12 credits as approved by student's PhD Examination Committee)

### Sample Minor Courses (at least 6 credits outside of STAT/PUBHBIO)

Under Semesters			Under Qua	rters	
Code	Credits	Title	Code	Credits	Notes
PUBHEHS 6310	3	Principles of Environmental Health Science	PUBHEHS 731	4	Material removed
PUBHEPI 6411	3	Biological Basis of Public Health	PUBHEPI 704	4	Material removed
PUBHEPI 8412	3	Design and Analysis of Group Randomized Trials	PUBHEPI 821	4	Material removed
PUBHEPI 7410	3	Epidemiology II	PUBHEPI 711	4	Material removed
PUBHHBP 6510	3	Preventing disease and promoting health through behavioral science	PUBHHBP 720	4	Material removed

The doctoral program requires a minimum of 80 semester credits including the 62 credits hours of courses described in the three groups of courses listed above.

# Proposed Ph.D. in Biostatistics - Methodology Specialization List of Semester courses

# Math Course (4 hours)

Under Semesters		Under Qua	rters		
Code	Credits	Title	Code	Credits	Notes
Math 1515	1	Tentative title: "Survey of			New course - still under
Matil 4545	4	topics in analysis"			discussion with Mathematics

### **Core Required Courses (49 hours)**

	Under	Semesters	Under Qua	rters	
Code	Credits	Title	Code	Credits	Notes
PUBHBIO 7245	n	Rightatistical Callaboration	PUBHBIO 786/	2	straight conversion (name
/ STAT 7755	Z	Biostatistical Collaboration	BIOSTAT 709	3	change, cross-list added)
PUBHBIO 8230	2	Advanced Longitudinal Data	PUBHBIO 726 /	4	Matavial variation
/ STAT 7470	3	Analysis	STAT 726	4	Material removed
PUBHBIO 8235	3	Advanced Regression Modeling of Time-to-Event Data	PUBHBIO 706	4	Material removed
STAT 6615	2	Design and Analysis of Clinical Trials	BIOSTAT 615	3	Straight conversion
STAT 6901	4	Statistical Theory I	STAT 620/621	4 + half	Straight conversion of
51AT 0601	4		51AT 020/021	of 4	sequence
STAT 6902	4	Statistical Theory II	STAT 621/622	half of 4	Straight conversion of
51AT 0602	4		51AT 021/022	+ 4	sequence
STAT 6860	2	Foundations of the Linear Model			New course
STAT 6010	4	Applied Statistics I	STAT 641	5	Modernized, with material
51AI 0910	4	Applied Statistics 1	51A1 041	5	added
STAT 6050	4	Applied Statistics II	STAT 645	5	Modernized, with material
31AI 0950	4	Applied Statistics II	STAT 045	5	added
					Some material has been
STAT 7201	3	Theory of Probability	STAT 722/723	4+4	removed; other material has
					been moved to Stat 7540
STAT 7301	3	Advanced Statistical Theory I	STAT 822	3	Modernized, with material
5001	5	Navaneca Statistical meory i	517(1 022	5	added
STAT 7302	3	Advanced Statistical Theory II	STAT 821	3	Modernized, with material
	0				added
STAT 7410	3	Theory of the Linear Model	STAT 742	3	Modernized, with material
				-	added
STAT 7540	3	Stochastic Processes	STAT 832	3	Modernized, with material
	-			_	added
STAT 7730	3	Advanced Computational	STAT 773	3	Modernized, with material
	-	Statistics		-	added
STAT 8625	3	Statistical Methods for	STAT 833	3	Material added to course
	-	Analyzing Genetic Data		-	

	Under	Semesters	Under Qua	rters	
Code	Credits	Title	Code	Credits	Notes
PUBHBIO 7220	3	Applied Logistic Regression	PUBHBIO 606	4	Material removed
PUBHBIO 7225	2	Survey Compling Methods	PUBHBIO 651 /	4	Material removed
/ STAT 6510	2	Survey Sampling Methods	STAT 651	4	Material removed
PUBHBIO 7240	2	Applied Statistical Analysis	PUBHBIO 652 /	4	Material removed
/ STAT 6520	2	with Missing Data	STAT 652	4	Material removed
STAT 6550	С	Statistical Analysis of Time	STAT 635	3	Straight conversion
51AT 0550	Z	Series	STAT 055	5	
STAT 6620	2	Environmental Statistics	STAT 662	3	Straight conversion
					Re-envisioned as a two
	r	Discrete Data Analysis	STAT 665	4	semester hour required
STAT 0050 2		Discrete Data Analysis	STAT 005	4	course for MAS degree -
					material was removed
STAT 7450	2	Multiple Comparisons	STAT 745	2	Modernized, with material
51A1 7450	3	Procedures	51AI 745	3	added

# Sample Elective Courses (at least 11 credits as approved by student's PhD Examination Committee)

The doctoral program requires a minimum of 80 semester credits including the 64 credits hours of courses described in the three groups of courses listed above.

# PLAN OF STUDY PHD IN Biostatistics with a Methodology Specialization

This form should be submitted to the Graduate Studies Committee within two semesters following the passing of Qualifier Exam II and before the Candidacy Exam. 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: (5	3 semester credits)			
/ STAT 7755 (2)	/ STAT 7470 (3)		PUBHBIO 8235 (3)	
STAT 6615 (2)	STAT 6801 (4)		STAT 6802 (4)	
STAT 6860 (2)	STAT 6910 (4)		STAT 6950 (4)	
STAT 7201 (3)	STAT 7301 (3)		STAT 7302 (3)	
STAT 7410 (3)	STAT 7540(3)		STAT 7730 (3)	
STAT 8625 (3)	MATH 4545 (4)			

**Electives**: (at least 11 semester credits): As approved by the student's PhD Examination Committee, generally chosen from courses at the 7000+ level in PUBHBIO or 6000+ level in STAT.

<b>Elective</b>	<u>Credit Hours</u>	<u>Grade or Semester Planned</u>
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:

Graduate Studies Committee Chairperson

# PLAN OF STUDY PHD IN Biostatistics with a Public Health Specialization

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

Name:		D	ate:		
<b>Core Course Requ</b> PUBHBIO 7245 / STAT 7755 (2)	uirements: (4	4 semester credits) PUBHBIO 8230 / STAT 7470 (3)		PUBHBIO 8235 (3)	
PUBHEPI 6430.01 (3)		PUBHEPI 6430.02 (1)		STAT 6540 (3)	
STAT 6615 (2)		STAT 6801 (4)		STAT 6802 (4)	
STAT 6860 (2)		STAT 6910 (4)		STAT 6950 (4)	
STAT 7410 (3)		STAT 7730 (3)		STAT 7430 (3)	

**Minor:** (6 semester credits): Coursework outside of statistics / biostatistics, in a health-related field, as approved by the student's PhD Examination Committee.

<u>Minor Area Course</u>	<u>Credit Hours</u>	Grade or Semester Planned
<b></b>		
lotal Hours:		

**Electives**: (at least 12 semester credits): As approved by the student's PhD Examination Committee, generally chosen from courses at the 7000+ level in PUBHBIO or 6000+ level in STAT.

<b>Elective</b>	Credit Hours	Grade or Semester 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:

Graduate Studies Committee Chairperson

# PH.D. IN BIOSTATISTICS PLAN OF STUDY THEORY/METHODOLOGIC TRACK

This form should be submitted to the Graduate Studies Committee within four quarters following the passing of Qualifier Exam II and before the Candidacy Exam. 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:	
<i>Statistics</i> 620(4) 621(4)	622(4) 641(5)
645(5) 722(4)	723(4) 742(3)
743 820(3)	821(3) 832(3)
Biostatistics 615(3)	PH-Bio 706(4)
PH-Bio 726(3)	Stat 833(3)
Consulting Biostat 709(2-3)	or Pub Hlth 786(3)

<u>Electives</u> (22 hours required): As approved by the student's Ph.D. Examination Committee, elective courses are generally at the 700 level and above in Statistics, Biostatistics, or Public Health with an additional course at the 500 level or above in a biomedical scientific area of application

Elective	<u>Credit Hours</u>	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: \_\_\_\_\_

Graduate Studies Committee Chairperson

1

# PH.D. IN BIOSTATISTICS PLAN OF STUDY APPLIED/METHODOLOGIC TRACK

This form should be submitted to the Graduate Studies Committee within four quarters following the passing of Qualifier Exam II and before the Candidacy Exam. 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 Req Statistics	uirements: 620(4) 645(5)	621(4) 743(3)	622(4) 773(3)	_ 641(5)
Biostatistics	Biostat 605(3) PH-Bio 606(4)	Biostat 615(3) PH-Bio 652/ STAT 652(4)	STAT	「 651 (4) Sio 701(4)
	PH-Bio 702(4) PH-Bio 726(3)	PH-Bio 703(4) Stat 833(4)	PH-B PH-E	io 706(4) pi 710(4)
Consulting	PH-Bio 786(3)			

<u>Electives</u> (13 hours required): As approved by the student's Ph.D. Examination Committee, elective courses are generally at the 700 level and above in Statistics, Biostatistics, or Public Health with an additional course at the 500 level or above in a biomedical scientific area of application

<b>Elective</b>	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: \_\_\_\_\_

Graduate Studies Committee Chairperson

# Proposed PhD in Biostatistics 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.

Requirements for the quarter-based Biostatistics PhD degree include a one-year sequence on Statistical Theory (Stat 620-621-622). The Statistical Theory sequence is a straight conversion of the quarterbased 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.

Students will be held to the requirements of the program in the year they matriculated; i.e., students entering under quarters will follow the quarter-based PhD curriculum, with the option to elect the semester-based curriculum. In particular, for the Methodology specialization, students entering under quarters will not be required to take STAT 7730 (Advanced Statistical Computing) or STAT 6860 (Foundations of the Linear Model), though taking these courses as electives will be encouraged. Methodology specialization students typically take the probability sequence Stat 722-723 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 the sequence. Students entering under quarters who do not start the sequence until semesters will take only Stat 7201 and make up the remaining credit hours in electives. For students in the Public Health specialization, those entering under quarters will not be required to take STAT 6540 (Applied Stochastic Processes), STAT 6860 (Foundations of the Linear Model), or PUBHEPI 6430.02 (Lab for Epidemiology I), though taking these courses as electives will be encouraged. For the Public Health specialization, the semester-based PhD has a requirement of 6

credits in a cognate area that will be waived for students who matriculate under quarters.

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.

Courses will be matched on the one-for-one basis below, with the exception of the statistical theory sequence (Stat 620-621-622) and the probability sequence (Stat 722-723), discussed above.

	Quarter		Semester
Quarter Course	Credits	Semester Course	Credits
BIOSTAT 615	3	STAT 6615	2
BIOSTAT 709	2	PUBHBIO 7245 / STAT 7755	2
PUBHBIO 606	4	PUBHBIO 7220	3
PUBHBIO 701	4	PUBHBIO 6210	3
PUBHBIO 702	4	PUBHBIO 6211	3
PUBHBIO 703	4	PUBHBIO 6212	3
PUBHBIO 706	4	PUBHBIO 8235	3
PUBHBIO 786	3	PUBHBIO 7245 / STAT 7755	2
PUBHBIO/BIOSTAT 605	4	PUBHBIO 7235 / STAT 6605	3
PUBHBIO/STAT 651	4	PUBHBIO 7225 / STAT 6510	3
PUBHBIO/STAT 652	4	PUBHBIO 7240 / STAT 6520	3
PUBHBIO/STAT 726	4	PUBHBIO 8230 / STAT 7470	3
PUBHEPI 710	4	PUBHEPI 6410 or 6430.01	3
STAT 620-621-622	3+3+3	STAT 6801-6802	4+4
STAT 641	5	STAT 6910	4
STAT 645	5	STAT 6950	4
STAT 722-723	4+4	STAT 7201	4
STAT 742	4	STAT 7410	3
STAT 743	3	STAT 7430	3
STAT 773	3	STAT 7730	3
STAT 822	3	STAT 7301	3
STAT 821	3	STAT 7302	3
STAT 832	3	STAT 7540	3
STAT 833	3	STAT 8625	3

# **Examples of transition:**

# **Methodology Specialization**

# Student entering in Autumn 2010:

	Au	Wi	Sp
Year 1 (Quarters)	Stat 620 (4)	Stat 621 (4)	Stat 622 (4)
2010 - 2011	Stat 645 (5)	Stat 641 (5)	Elective (5)
Year 2 (Quarters)	Stat 722 (4)	Stat 723 (4)	Stat 832 (3)
2011 – 2012	Stat 742 (4)	Stat 743 (3)	Elective (3)
	Stat 820 (3)	Stat 821 (3)	Elective (4)
		Biostat 709 (2)	
Year 3 (Semesters)	Stat 8625 (3)		Pubhbio 8235 (3)
2012 - 2013	Stat 6615 (2)		Pubhbio 8230
	Elective (3)		/ Stat 7470 (3)
			Elective (2)

# Student entering in Autumn 2011:

	Au	Wi	Sp
Year 1 (Quarters)	Stat 620 (4)	Stat 621 (4)	Stat 622 (4)
2011 - 2012	Stat 645 (5)	Stat 641 (5)	Elective (5)
Year 2 (Semesters)	Stat 7201 (3)		Stat 7540 (3)
2012 - 2013	Stat 7410 (3)		Stat 7302 (3)
	Stat 7301 (3)		Elective (3)
Year 3 (Semesters)	Stat 8625 (3)		Pubhbio 8235 (3)
2013 – 2014	Stat 6615 (2)		Pubhbio 8230
	Stat 7430 (3)		/ Stat 7470 (3)
	Elective (2)		Pubhbio 7245
			/ Stat 7755 (2)
			Elective (2)

# **Public Health Specialization**

# **Student entering in Autumn 2010:**

	Au	Wi	Sp
Year 1 (Quarters)	Stat 620 (4)	Stat 621 (4)	Stat 622 (4)
2010 - 2011	Stat 645 (5)	Stat 641 (5)	Pubhbio 703 (4)
	Pubhbio 701 (4)	Pubhbio 702 (4)	
Year 2 (Quarters)	Stat 773 (3)	Stat 743 (3)	Pubhbio 786 (3)
2011 – 2012	Pubhbio/Stat 652 (4)	Pubhbio 606 (4)	Elective (4)
	Pubhepi 710 (4)	Pubhbio/Biostat 605 (4)	Elective (3)
Year 3 (Semesters)	Stat 8625 (3)		Pubhbio 8235 (3)
2012 – 2013	Stat 6615 (2)		Pubhbio 8230
	Pubhbio 7225		/ Stat 7470 (3)
	/ Stat 6510 (3)		Elective (2)

# Student entering in Autumn 2011:

	Au	Wi	Sp
Year 1 (Quarters)	Stat 620 (4)	Stat 621 (4)	Stat 622 (4)
2011 - 2012	Stat 645 (5)	Stat 641 (5)	Pubhbio 703 (4)
	Pubhbio 701 (4)	Pubhbio 702 (4)	Elective (2)
Year 2 (Semesters)	Stat 7730 (3)		Pubhbio 7235
2012 - 2013	Pubhbio 7240		/ Stat 6605 (3)
	/ Stat 6520 (3)		Pubhbio 7220 (3)
	Pubhbio 7225		Elective (2)
	/ Stat 6510 (3)		
	Pubhepi 6410 (3)		
Year 3 (Semesters)	Stat 8625 (3)		Pubhbio 8235 (3)
2013 - 2014	Stat 6615 (2)		Pubhbio 8230
	Stat 7430 (3)		/ Stat 7470 (3)
			Pubhbio 7245
			/ Stat 7755 (2)

# Guide for the **Public Health Specialization of the Biostatistics PhD Degree Program**

The basic philosophy of the PhD program in biostatistics is to provide trained personnel not only to the academic profession, but also to industry and government. The goal is to develop a student's ability to create new methodologies as well as to address applied questions that arise in the biomedical sciences. Although programs are individually designed to suit the needs of particular students, there is a core curriculum that every student follows. This core curriculum includes courses in theoretical and applied statistics, as well as required coursework in a biological area such as genetics, medicine, or physiology.

Students in the Biostatistics PhD degree program who choose the Public Health Specialization will be assigned faculty advisers in the College Public Health after they declare their specialization preference during their second year. This document serves as a resource to be used by the student and the adviser in planning the program of study for the Public Health specialization. For additional information about PhD requirements, students are directed to the College of Public Health (CPH) Student Handbook (available online at

http://cph.osu.edu/academics/handbooks.cfm/) and to the Graduate School Handbook (available online at http://www.gradsch.ohio-state.edu/).

The Public Health specialization of the Biostatistics PhD program presupposes a mathematical background that includes linear algebra (including matrices) and advanced calculus.

### **PROGRAM OF STUDY**

**Required Courses** (44 semester credits) A grade of B- or better is required.

### **PUBHBIO/STAT Courses** (40 semester credits)

PUBHBIO 7245	Biostatistical Collaboration	2 cr
/ STAT 7755		
PUBHBIO 8230	Advanced Longitudinal Data Analysis	3 cr
/ STAT 7470		
PUBHBIO 8235	Advanced Regr Modeling of	
	Time-to-Event Data	3 cr
STAT 6301	Statistical Theory I	4 cr
STAT 6302	Statistical Theory II	4 cr
STAT 6540	Applied Stochastic Processes	3 cr
OR STAT 7540	Theory of Stochastic Processes	
STAT 6615	Design & Analysis of Clinical Trials	2 cr
STAT 6910	Applied Statistics I	4 cr
STAT 6950	Applied Statistics II	4 cr
STAT 7410	Theory of the Linear Model	3 cr
STAT 7430	Generalized Linear Models	3 cr
STAT 7730	Advanced Computational Statistics	3 cr
STAT 6860	Foundations of the Linear Model	2 cr
EPI Course (4 sen	nester credits)	
PUBHEPI 6430.01	Epidemiology I	3 cr
PUBHEPI 6430.02	Enidemiology I Lab	1 cr

1 ODIILI I 0450.02	Lpidemiology I Lao	

Cognate/Minor Courses (6 semester credits)

At least 6 semester credits outside of statistics/ biostatistics, in a health-related field, as approved by the student's PhD Examination Committee.

1 cr

#### Electives (at least 12 semester credits)

As approved by the student's PhD Examination Committee (generally chosen from courses at the 7000-level and above in PUBHBIO or 6000-level and above in STAT). A grade of B- or better is required.

#### Suggested Electives

#### **CPH Courses**

PUBHBIO 7220	Applied Logistic Regression	3 cr
PUBHBIO 7225/		
STAT 651	Survey Sampling Methods	3 cr
PUBHBIO 7240/		
STAT 652	Applied Stat Analysis w/Missing Data	3 cr
STAT Courses		
STAT 6550	Stat Analysis of Time Series	2 cr
STAT 6620	Environmental Statistics	2 cr
STAT 6625	Stat Methods for Analyzing	
	Genetic Data	3 cr
STAT 6650	Discrete Data Analysis	2 cr
STAT 7450	Multiple Comparisons Procedures	3 cr

### Summer Program

Maximum of 3 semester credits

Note: Students in the Biostatistics PhD program are given the same priority as students in the Statistics PhD program when registering for STAT classes.

### **REQUIRED HOURS**

The doctoral program requires a minimum of 80 semester credits or 50 semester credits beyond a master's degree. A maximum of 30 semester credits of master's degree work may be applied to PhD requirements if approved by the faculty adviser.

### TRANSFER CREDIT

Transfer credit must be approved by the student's Advisory Committee and the Graduate Studies Committee. For transfer credit to count towards the 50 post master's graduate hours required for the PhD, it must be in excess of the master's degree requirements in a field in which the PhD is awarded at the other institution and it must be course work normally taken by doctoral students at that institution

### **RESIDENCE REQUIREMENT**

In addition to the overall credit requirement, doctoral students must fulfill the following residence requirements after the master's degree has been earned or after the first 30 semester hours of graduate credit have been completed (for additional information, see the Graduate School Handbook):

A minimum of 24 graduate credit hours must be completed

at this university;

- one semester and a summer term with enrollment of at least eight graduate credit hours per semester must be completed while in residence at this university;
- A minimum of six graduate credit hours over a period of at least two semesters or one semester and a summer term must be completed after admission to candidacy.

### **QUALIFIER I EXAM**

Qualifier I is a six-hour closed-book examination given at the end of the May term following completion of the first year of study and, if not passed, may be retaken just prior to the Autumn Semester.

### **QUALIFIER II EXAM**

After passing Qualifier I, the student should elect to follow either the Methodology or the Public Health specialization. Those who declare the Public Health specialization are required to take a four-hour closed book in-class examination and complete a oneday (eight-hour) open book data analysis project in one of the CPH computer labs. The in-class exam covers material presented in the first and second year required courses, with an emphasis on Biostatistics applications. The student should pass this exam in his/her third year.

#### PhD EXAMINATION COMMITTEE

After passing the Qualifier II, the student chooses a dissertation adviser, who must be a Category P Biostatistics graduate faculty member. After a dissertation adviser is chosen, the student also forms a PhD Examination Committee, consisting of at least four graduate faculty members from the CPH Division of Biostatistics, the Department of Statistics, or other departments consistent with the student's interests. This committee is responsible for approving a Plan of Study to be filed with the Graduate Studies Committee within two semesters after passing Qualifier II.

### CANDIDACY EXAMINATION

After completion of all required courses (as specified by the student's PhD Examination Committee), the candidate's PhD Examination Committee will administer and grade a PhD Candidacy Examination. Specific details are available in Appendix G of the *CPH Student Handbook* online at http://cph.osu.edu/academics/handbooks.cfm/).

#### FINAL ORAL EXAMINATION/DISSERTATION PHASE

After passing the Candidacy Exam, the student forms a Dissertation Committee. The student should meet with the committee at least twice a year to report the progress. Once the student has made sufficient progress (as judged by the Dissertation Committee) on his/her dissertation to warrant holding the Final Oral Examination, the Doctoral Draft Approval/Notification of Final Oral Examination form must be filed with the Graduate School at least two weeks prior to the actual Final Oral Examination/Dissertation Defense. The Dissertation Committee then conducts a two-hour oral examination in which the candidate discusses/defends his/her dissertation.

• A minimum of two consecutive pre-candidacy semesters or Students must pass the Final Oral Examination and submit a final, approved copy of the dissertation to the Graduate School within five years of being admitted to candidacy. For more information about the dissertation and the Final Oral Examination, see Section 8.5 of the CPH *Graduate Student Handbook* and Section II.6 of the *Graduate School Handbook*. Detailed instructions for the dissertation are available on the Graduate Schools web site at <u>http://www.gradsch.ohio-state.edu</u>.

### DISSERTATION CREDITS

Following successful completion of the Candidacy Exam, the Graduate School requires doctoral candidates to maintain continuous enrollment in three (3) graduate credits per semester (except Summer) until they graduate. CPH students typically register for PUBHLTH 8999 credit each semester during which dissertation work is conducted.

#### ACADEMIC STANDARDS

To remain in good academic standing, graduate students must maintain a minimum 3.0 overall GPA. In addition, a B- or higher must be earned in the required courses. For more details, see Section 11.2 of the CPH *Student Handbook*.

#### GRADUATION

Students must be enrolled for a minimum of three graduate credits during the semester of graduation. An "Application to Graduate" form (available on the Graduate School's Web site) must be completed by the student, signed by the faculty adviser, and returned to the Office of Academic Programs (OAP) for processing. The deadline for submitting the signed form to OAP is the first Friday of the semester of graduation. Prior to end of the last semester of enrollment, students also are asked to complete an Exit Survey, as explained in Section 13.14 of the *CPH Student Handbook*.

#### OFFICE OF ACADEMIC PROGRAMS

Counselors are available in the Office of Academic Programs in Cunz Hall (614-293-3907) to provide assistance regarding College of Public Health or University processes and procedures. Questions regarding the student's course work or research should be directed to the faculty adviser.

# PH.D. IN BIOSTATISTICS (METHODOLOGY SPECIALIZATION)

(effective Summer 2012)

The basic philosophy of the Ph.D. program in biostatistics is to provide trained personnel not only to the academic profession, but also to industry and government. The goal is to develop a student's ability to create new methodologies as well as to address applied questions that arise in the biomedical sciences. Although programs are individually designed to suit the needs of particular students, there is a core curriculum that every student follows. This core curriculum includes courses in theoretical and applied statistics and biostatistics including Statistical Genetics and Survival Analysis.

Students in the Biostatistics PhD degree program who choose the Methodology Specialization will be assigned faculty advisers in the Department of Statistics after they declare their specialization preference following their successful passing of the QI examination. This document serves as a resource to be used by the student and the adviser in planning the program of study for the Methodology specialization.

Note: The Methodology Specialization of the Biostatistics Ph.D. program presupposes a mathematical background that includes linear algebra and advanced calculus.

## Course Requirements – Methodology Specialization

<u>Mathematics</u> (4 hours)	MATH 4545 (4)	Tentative title: "Survey of topics in analysis"
<u>Core Statistics</u> (37 hours)	6801 (4), 6802 (4) 6910 (4), 6950 (4) 7201 (3) 6860 (2) 7540 (3) 7730 (3) 7301 (3), 7302 (3) 7410 (3) 8625 (3)	Statistical Theory I & II Applied Statistics I & II Theory of Probability Foundations of the Linear Model Theory of Stochastic Processes Advanced Computational Statistics Advanced Statistical Theory I & II Theory of the Linear Model Statistical Methods for Analyzing Genetic Data
<u>Core Biostatistics</u> (8 hours)	PUBHBIO 7215 / STAT 6615 (2) PUBHBIO 8230	Design and Analysis of Clinical Trials Advanced Longitudinal Data Analysis
	/ STAT 7470 (3) PUBHBIO 8235 (3)	Advanced Regression Modeling of Time-to- Event Data
<u>Consulting</u> (2 hours)	PUBHBIO 7245 / STAT 7755 (2)	Biostatistical Collaboration

# Electives (11 Credits)

As approved by the student's PhD Examination Committee (generally chosen from courses at the 7000-level and above in PUBHBIO or 6000-level and above in STAT).

**TOTAL COURSE HOUR REQUIREMENTS:** The doctoral program requires a minimum of 80 semester credits including the 64 credits hours of courses described in the five groups of courses listed above. A grade of B- or better is required in all courses in the Ph.D. program.

# Typical Program (first three years)

<u>First Year</u>	<u>Autumn</u> STAT 6801 STAT 6910 MATH 4545	<u>Spring</u> STAT 6802 STAT 6910 STAT 6860 PUBHBIO 7215 / STAT 6615	<u>May</u>	<u>Summer</u>
Second Year	STAT 7410 STAT 7301 STAT 7201	STAT 7540 STAT 7302 PUBHBIO 8230 / STAT 7470		
<u>Third Year</u>	STAT 8625 PUBHBIO 8235 STAT 7730	Elective Elective Elective		

**Examinations:** Two qualifying examinations must be passed prior to the student forming his/her Examination Committee. Qualifier I covers the first year courses and Qualifier II covers the 2<sup>nd</sup> year courses. Qualifier I is a six-hour closed-book examination given at the end of the May term following completion of the first year of study and, if not passed, may be retaken just prior to the Autumn Semester. Qualifier II is a six hour closed book exam that covers the 1<sup>st</sup> and 2<sup>nd</sup> year courses.

Students must declare their choice of specialization, Public Health or Methodology, within one semester after passing the QI examination. Note that neither specialization should be considered as an alternative once the other track has resulted in failure.

The student is required to file a Plan of Study form with the approval of his/her Examination Committee within two semesters after passing Qualifier II. This examination structure is identical to that for the Ph.D. degree in Statistics (see section entitled "Ph.D. in Statistics").

# PH.D. IN BIOSTATISTICS (THEORY/METHODOLOGIC TRACK)

(as of June 2010)

Please note that the course requirements for the two-track program have not been finalized. The final course requirements will likely be very close to these, but be aware that some changes may be made. The final course requirements will posted on the department website (<u>www.stat.osu.edu</u>) as soon as they are available. If you have any questions or concerns about your course schedule, please see your advisor or the Graduate Studies Committee Chair.

The basic philosophy of the Ph.D. program in biostatistics is to provide trained personnel not only to the academic profession, but also to industry and government. The goal is to develop a student's ability to create new methodologies as well as to address applied questions that arise in the biomedical sciences. Although programs are individually designed to suit the needs of particular students, there is a core curriculum that every student follows. This core curriculum includes courses in theoretical and applied statistics, as well as required coursework in a biological area such as genetics, medicine, or physiology.

Note: The Ph.D. program in biostatistics (theory/methodologic track) presupposes a mathematical background that includes linear algebra and advanced calculus.

<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, and 832. Minimum requirements should be the equivalents of Math 547(4), 548(4), and 549(4)
Core Statistics (46 hours)	620, 621, 622 (4 each)	Statistical Theory I, II, & III
	641(5) 645(5)	Design and Analysis of Experiments Applied Regression Analysis
	722(4), 723(4)	Theory of Probability I & II
	742(4) 743 (3)	Analysis of Variance Generalized Linear Models
	820(3), 821(3)	Statistical Inference I & II
	832(3)	Applied Probability Models

## Course Requirements – Theory/Methodologic Track

<u>Core Biostatistics</u> (14 hours)	Biostat 615(3) PH-Bio 706(4) PH-Bio 726(4) Stat 833(3)	Design and Analysis of Clinical Trials Regression Modeling of Time-to-Event Data Longitudinal Data Analysis Statistical Methods for Analyzing Genetic Data
<u>Consulting</u> (2 hours)	709(2)	Biostat 709 [or PH-Bio 786(3)]
<u>Electives</u> (22 Hours)		An additional 22 hours as approved by a student's Ph.D. Examination Committee (generally chosen from courses at the 700-level and above in Statistics, Biostatistics, or Public Health and a course at the 500-level or above in a biomedical scientific area of application)

# TOTAL COURSE HOUR REQUIREMENTS: 84 hours plus any necessary mathematics

A grade of B- or better is required in all courses in the Ph.D. program.

# Typical Program (first three years)

Autumn	Winter	Spring
620	621	622
645	641	Elective
Math 547	Math 548	Math 549
	Autumn 620 645 Math 547	Autumn Winter   620 621   645 641   Math 547 Math 548

<u>Second Year</u> Currently under revision

<u>Third Year</u> Currently under revision

\*Offered every other year

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

**Examinations:** The examination structure is identical to that for the Ph.D. degree in statistics (see section entitled "Ph.D. in Statistics"). The student is required to file the Plan of Study form with the approval of his/her Examination Committee within four quarters after passing Qualifier II.

Students must declare their choice of track, Applied/Methodologic or Theory/Methodologic, within a quarter after passing the QI examination. Note that neither track should be considered as an alternative once the other track has resulted in failure.

# PH.D. IN BIOSTATISTICS (APPLIED/METHODOLOGIC TRACK)

(as of June 2010)

Please note that the course requirements for the two-track program have not been finalized. The final course requirements will likely be very close to these, but be aware that some changes may be made. The final course requirements will posted on department website (<u>www.stat.osu.edu</u>) as soon as they are available. If you have any questions or concerns about your course schedule, please see your advisor or the Graduate Studies Committee Chair.

# Course Requirements – Applied/Methodologic Track

Mathematics		The applied track presupposes a mathematical background that includes linear algebra (including matrices) and advanced calculus.
Core Statistics (28 hours)	620, 621, 622 (4 each)	Statistical Theory I, II, & III
	641(5) 645(5)	Design and Analysis of Experiments Applied Regression Analysis
	743(3) 773(3)	Generalized Linear Models Statistical Computing
Core Biostatistics and Public Health (46 hours)	Biostat 605(4) Biostat 615(3) Stat 651(4)	Applied Survival Analysis I Design and Analysis of Clinical Trials Survey Sampling Methods
	PH-Bio 606(4) PH-Bio 726(4) PH-Bio 652(4) PH-Bio 701(4) PH-Bio 702(4) PH-Bio 703(4) PH-Bio 706(4)	Applied Logistic Regression Longitudinal Data Analysis Applied Statistical Analysis with Missing Data Design and Analysis of Studies in the HIth Sci I Design and Analysis of Studies in the HIth Sci II A Problem-Oriented Approach to Biostatistics Regression Modeling of Time-to-Event Data
	Stat 833 (3)	Statistical Methods for Analyzing Genetic Data
	PH-Epi 710(4)	Principles of Epidemiology
Consulting (3 hours)	PH-Bio 786(3)	Biostatistics Consulting Laboratory

An additional 13 hours as approved by a student's Ph.D. Examination Committee (generally chosen from courses at the 700-level and above in Statistics, Biostatistics, or Public Health and a course at the 500-level or above in a biomedical scientific area of application)

# TOTAL COURSE HOUR REQUIREMENTS: 90 hours plus any necessary mathematics

A grade of B- or better is required in all courses in the Ph.D. program.

# First Year (Partial Class List for Typical Program)

<u>First Year</u>			
Summer	Autumn	Winter	Spring
602	620	621	622
603	645	641	

<u>Second Year</u> Currently under revision

<u>Third Year</u> Currently under revision

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

**Examinations:** Students in the Applied/Methodologic Track are required to pass the same QI examination as for the Ph.D. degree in statistics (see section entitled "Ph.D. in Statistics"). Their QII examination, however, will have a different structure. Students must declare their choice of track, Applied/Methodologic or Theory/Methodologic, within a quarter after passing the QI examination. Note that neither track should be considered as an alternative once the other track has resulted in failure.