

UNIVERSITY OF WISCONSIN-MADISON



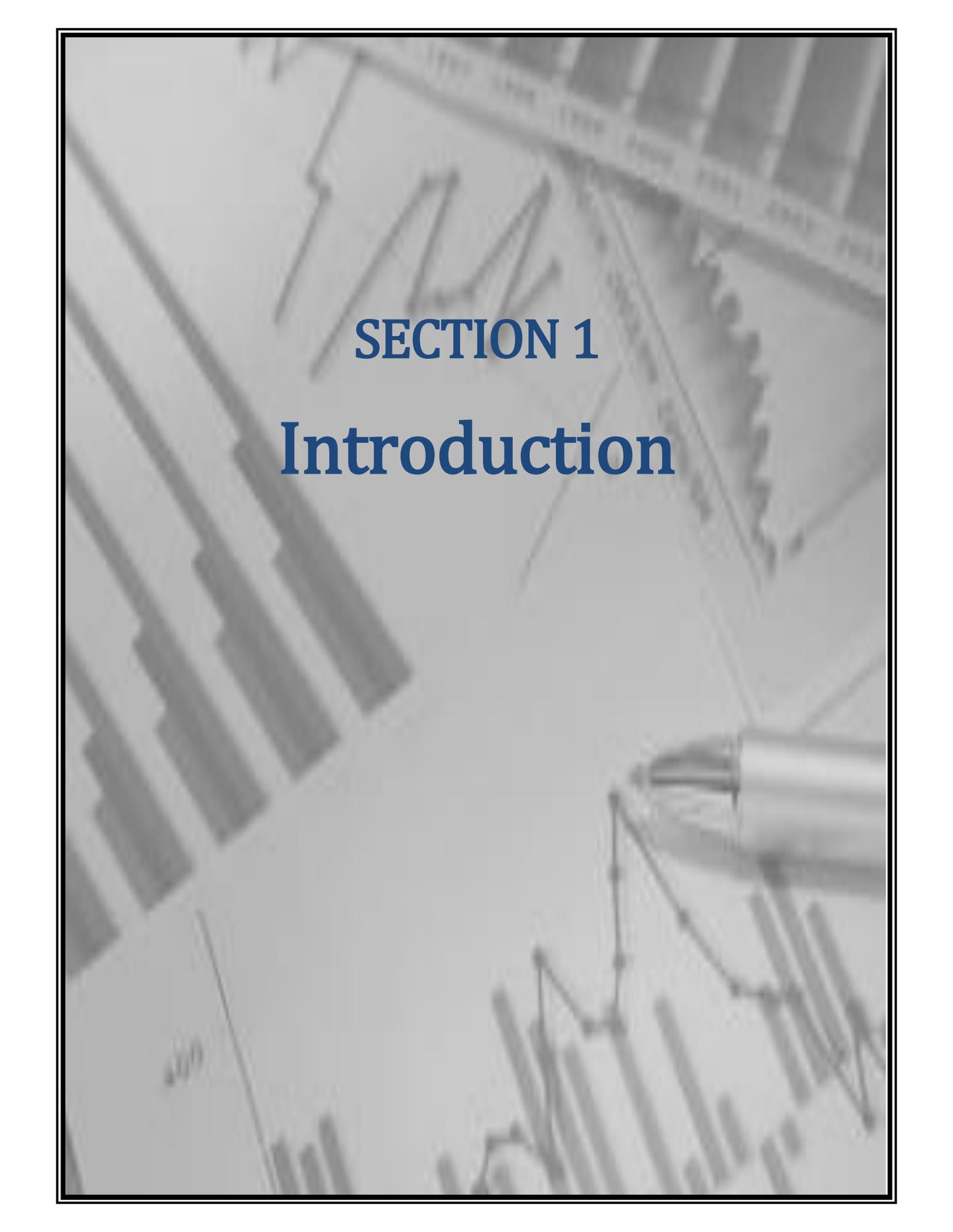
Department of Statistics

***GRADUATE  
STUDENT  
HANDBOOK***

***2019-2020***

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**SECTION 1**

**Introduction**

# Preface

The Department of Statistics at the University of Wisconsin-Madison strives to maintain both instructional and research programs of the highest quality. The M.S. and Ph.D. programs provide excellent training in the modern theory, methods and applications of statistics. The Department believes that its graduates should blend a strong theoretical statistics foundation with practical experience working with challenging statistical problems in diverse areas of application. For this reason the Department's graduate programs, stressing this relationship of theory and practice, are designed to prepare the graduate equally well for an academic, industrial, or governmental position.

The Department would like each graduate student's learning experience in the program to be as productive and rewarding as possible. To help build a successful experience, this handbook has been prepared to provide a variety of information that a graduate student might find useful during their time in the Statistics program. It describes the M.S. and Ph.D. degree programs and requirements, provides a range of academic information such as course descriptions and criteria for satisfactory progress in the programs, and information on aspects of financial support through teaching, research, and project assistantships. The information in this handbook, while extremely useful, should also be supplemented by individual consultation with faculty and staff, and appropriate departmental committees with regard to advising on academic programs and requirements, financial assistantships, and other matters.

Statistics Department

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1300 University Avenue

Madison WI 53706

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FAX: (608) 262-0032

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# **Student Handbook**

## **Department of Statistics**

### **University of Wisconsin-Madison**

#### **Introduction**

Many centuries ago, a great glacier carved out four lakes (Mendota, Monona, Wingra and Waubesa) and formed an isthmus on which Madison was built in the early 19<sup>th</sup> century. The University of Wisconsin-Madison campus lies on the isthmus on the shore of Lake Mendota, a mile from the state capitol. The UW-Madison was established by the state legislature in 1849. The University's first graduating class in 1854 consisted of two students. Since its founding, the University has become one of the nation's leading public, land-grant institutions, with about 30,000 undergraduates, 11,000 graduate students, and 22,000 faculty/staff members. Madison has the largest concentration of graduate, professional, and research programs in the state as well as a broad balanced undergraduate program. The University has ranked among the top ten in the nation in every survey of scholarly reputation conducted since 1910. The University includes all races and creeds, and seeks to minimize economic barriers to admission with jobs, scholarships and loans.

#### **About Madison**

Madison is a pleasant medium-sized city (252,000 pop.) located in the lake region of southern Wisconsin. It is the State Capital with a large base for educational, research and government activities as well as university-industry interaction. The University and community offer outstanding intellectual, cultural, and recreational activities. Madison's quality of life always ranks very high among cities of comparable size.

The change of weather is known to be extreme. During the summer (June-September), temperatures are often above 80 degrees Fahrenheit (26 Celsius) and occasionally above 90 degrees (32 Celsius), while during the winter (December-March), you must expect many days of 0 degrees F (-17 Celsius) temperatures and even lower. The average snowfall is 42 inches. Some winters, from mid-December to March, the ground is covered with an inch or more of snow 60% of the time.

#### **Statistics Today**

Statistics today is a young and exciting subject which, in its breadth and diversity, affects virtually every aspect of modern living. It has been developed to deal in a rationally objective manner with the uncertainty which accompanies variation, be it as simple a phenomenon as the random outcome of tosses of coins, or such a highly complex phenomenon as the interplay of many factors which affect our environment. Statistics today derives its vitality from coping with the demands imposed by practical problems arising in all fields of scientific activity. These include the social, managerial, biological, agricultural, medical, physical, and engineering sciences. For example, in certain areas of scientific experimentation, the application of the statistical methods has been essential for progress. In many other areas of scientific experimentation, the development of suitable statistical methods is necessary for deeper understanding and insight. The department feels that its graduates should have not only a strong mathematical statistics foundation, but also a sound practical experience and the ability to deal with challenging statistical problems.

#### **About the Department**

The University of Wisconsin Statistics Department was established in 1960 by Professor George Box and today reflects the breadth and diversity of the subject of statistics in both theory and practice. Currently, the department consists of about 35 faculty and affiliated faculty members, 175 graduate students, and 3 office staff members. Since 1963 over 460 PhD degrees and over 650 Master's degrees have been granted. The department is housed in the Medical Science complex at 1300 University Avenue.

## Faculty Research Interests

### Faculty:

- **Cecile Ané**, Professor: Statistical inference for evolutionary biology, computational biology
- **Richard Chappell**, Professor: Biostatistics, epidemiology, missing data, allometry
- **Peter Chien**, Professor: Big data analytics, uncertainty quantification, A/B testing, design of experiments
- **Hyunseung Kang**, Assistant Professor: Causal inference, instrumental variables, and econometrics, developing methods for causal inference using large observational data with applications to epidemiology, genetics, social policy evaluation, and online data
- **Sunduz Keles**, Professor: Biostatistics, statistical genomics & computational biology, censored data analysis
- **Bret Larget**, Professor: Statistical applications in the biological sciences, Bayesian statistics, computational biology, phylogenetics.
- **Po-Ling Loh**, Associate Professor: High-dimensional statistics, compressed sensing, nonconvex optimization, robust statistics, network inference
- **Wei-Yin Loh**, Professor: Statistical inference; bootstrap theory and methods; decision tree algorithms for data mining and prediction with applications to missing value imputation, sample surveys, causal inference, and subgroup identification for precision medicine
- **Michael Newton**, Professor: Stochastic modeling, computational biology, empirical Bayesian analysis, ranking, biomedical applications
- **Vivak Patel**, Assistant Professor: Incremental Estimation and Asymptotic Statistics; Numerical Optimization Theory and Algorithms; Statistical Filtering; Applications to Dynamical Systems.
- **Sebastian Raschka**, Assistant Professor: Deep learning with a focus on privacy protection and protection against adversarial attacks, automatic machine learning (AutoML), machine learning model evaluation, and machine learning applied to molecular modeling.
- **Garvesh Raskutti**, Associate Professor: Optimization theory, information theory and theoretical statistics to study computational and statistical aspects of large-scale inference problems
- **Karl Rohe**, Associate Professor: Regression and network clustering, machine learning, knowledge creation with statistics
- **Jun Shao**, Professor: Inference, asymptotic theory, resampling methods, linear and nonlinear models, model selection, sample survey
- **Nicolas Gracia Trillos**, Assistant Professor: Applied analysis, applied probability, computational probability and statistics, machine learning
- **Miaoyan Wang**, Assistant Professor: Statistical machine learning, higher-order tensors, numerical multi-linear algebra, statistical/population genetics.
- **Yazhen Wang**, Professor: Financial statistics & financial data science, quantum computing, quantum tomography, high-dimensional statistical inference, machine learning, wavelets, nonparametric smoothing, change points, long-memory process, and order restricted statistical inferences
- **Brian Yandell**, Professor: Nonparametrics, biometry, gene mapping, generalized linear models
- **Anru Zhang**, Assistant Professor: High-dimensional statistical inference, statistical learning theory, tensor data analysis, compressed sensing and matrix recovery, applications in genomics
- **Chunming Zhang**, Professor: Neuroinformatics and bioinformatics, machine learning and data mining, multiple testing, large-scale simultaneous inference and application, statistical methods in finance econometrics, non- and semi-parametric estimation and inference, functional and longitudinal data analysis
- **Zhengjun (Henry) Zhang**, Professor: Extreme value analytics for big data and financial time series analysis; risk analysis in finance, insurance, environmental studies, and seismic data; nonlinear/asymmetric causal inference; hi-dimensional inference; medical statistics; stochastic optimization and simulation technique; Bayesian inference for time series
- **Jun Zhu**, Professor: Spatial statistics, spatio-temporal statistics, environmental statistics, spatial demography, statistical ecology

## Affiliated Faculty

- **David Anderson**, Associate Professor: Developing and analyzing new computational methods for the stochastic models that arise in the biosciences; theoretical study of the mathematical models arising in the biosciences
- **Karl Broman**, Professor: Statistical genomics, computational biology, statistical computing, data visualization, general applied statistics
- **Moo Chung**, Associate Professor: Brain Image Analysis, Brain Network Analysis, Computational Topology, Functional Data Analysis, Partial Differential Equations
- **Christina Kendzierski Newton**, Professor: Statistical genetics and computational biology, Bayes and empirical Bayes methods
- **Ronald Gangnon**, Professor: Spatial statistics, Bayes and empirical Bayes methods, ranking, age-period-cohort models, measurement error, epidemiology
- **Kyung Mann Kim**, Professor: Sequential methods, clustered data analysis, categorical data analysis, biostatistics, clinical trials methods, epidemiology methods
- **Qiongshi Lu**, Assistant Professor: Statistical genetics, genetic risk prediction, genome-wide association study, genome annotation, genomic data integration
- **Lu Mao**, Assistant Professor: Survival analysis, semiparametric inference, design and analysis of clinical trials, nonparametric estimation under shape constraint
- **Robert Nowak**, Professor: Machine learning and high-dimensional statistics
- **Mari Palta**, Professor: Biostatistical methods and epidemiology
- **Paul Rathouz**, Professor: Missing data in models for highly stratified or longitudinal data, generalized linear models, methods for behavior genetic designs, and outcome-dependent sampling for longitudinal data. Most of his current applied statistical work is in the areas of developmental psychopathology and health services research.
- **Timo Seppalainen**, Professor: Probability theory, random environments and random potentials, interacting particle systems, and large deviation theory
- **Yajuan Si**, Assistant Professor: Bayesian statistics, missing data analysis, complex survey inference and causal inference
- **Menggang Yu**, Professor: Clinical Biostatistics and Personalized Medicine, Causal Inference, Risk Prediction, Survival Analysis

## Emeritus

- **Douglas Bates**, Professor Emeritus: Nonlinear regression, statistical computing
- **Murray Clayton**, Professor Emeritus: Applications of statistics to the agricultural, biological, and environmental sciences; spatial statistics, foundations
- **Norman Draper**, Professor Emeritus: Experimental design, linear models, nonlinear estimation
- **Erik Nordheim**, Professor Emeritus: Biological statistics, design and analysis, applied linear models
- **Richard Johnson**, Professor Emeritus: Life testing & reliability, statistical inference, large sample theory, applied multivariate analysis
- **Robert Wardrop**, Professor Emeritus: Online statistical education, statistics in sports
- **Kjell Doksum**, Senior Research Scientist: Nonparametric regression, biostatistics, high dimensional analysis
- **Kam-Wah Tsui**, Professor: Decision theory, survey sampling, statistical inference
- **Grace Wahba**, Professor with affiliate appointments in CS and BMI: Statistical machine learning, including complex models with heterogenous interacting inputs and outputs. Applications in Biostatistics and Physical Sciences.

## Office Staff

|  |          |          |                         |
|--|----------|----------|-------------------------|
| <b>Dan Barnish</b> (Dept. Administrator)     | Rm 1220B | 262-2937 | dbarnish@wisc.edu       |
| <b>Nancy Brinkerhoff</b> (Curricular Coord.) | Rm 1220C | 262-1009 | nancyb@stat.wisc.edu    |
| <b>John Schuppel</b> (Graduate Coord.)       | Rm 1220D | 262-2598 | jschuppel@stat.wisc.edu |
| <b>IT Office</b>                             | Rm 1280  |          | lab@stat.wisc.edu       |

Contact **Dan** if you have questions regarding:

- Payroll
- Appointment information
- Insurance
- Visa/Tax/I-9 Information
- Copy Machine code and quota
- Faculty and TA teaching evaluations
- Tuition remission
- Employment verification letter
- TA evaluations

Contact **Nancy** if you have questions regarding:

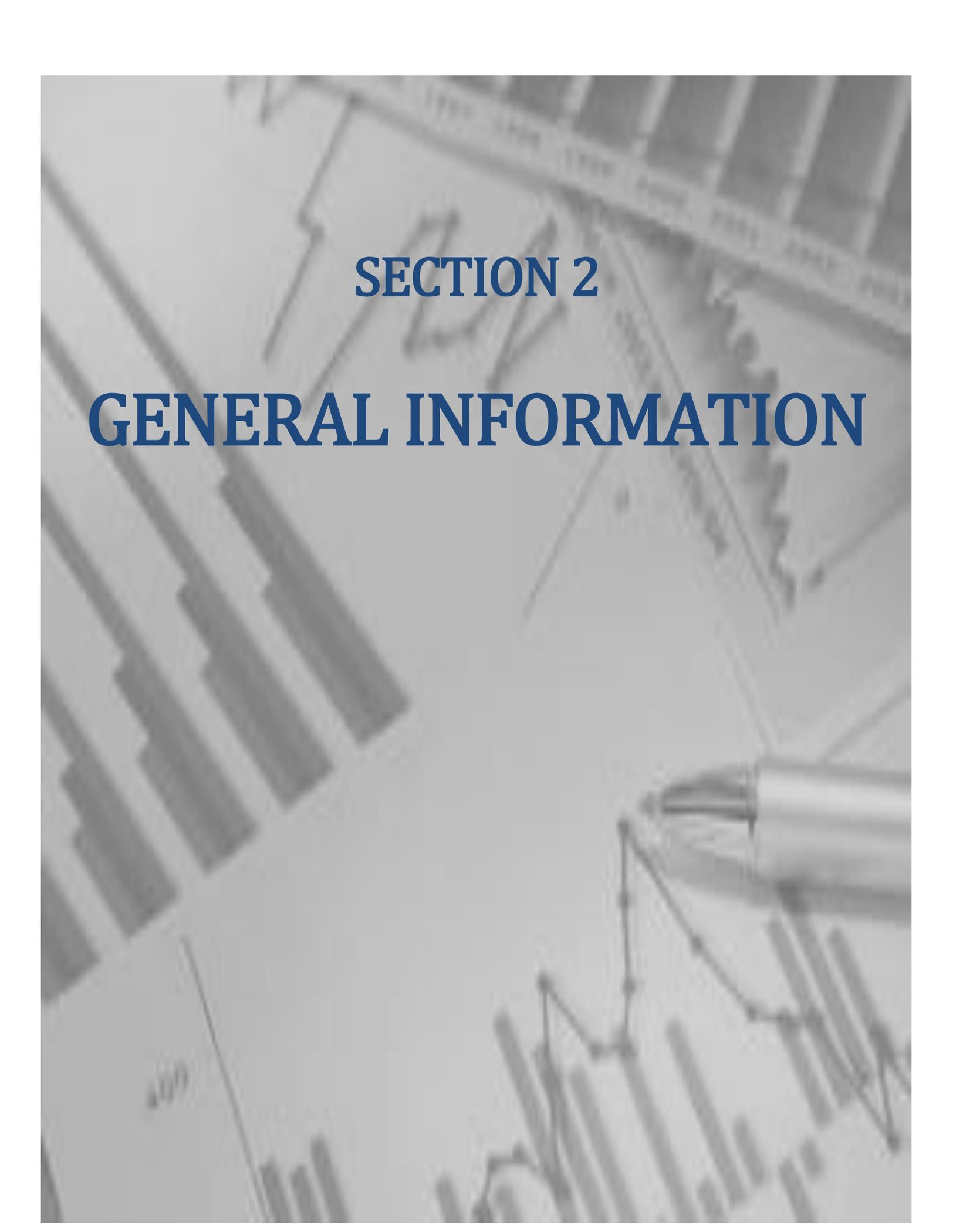
- Course enrollment information
- Registration authorization
- Classroom/exam room reservations
- Grades
- Desk assignments and keys
- Office supplies
- Department directory
- Posting announcements
- Room and projector reservations

Contact **John** if you have questions regarding:

- Advisor grade forms
- Advisor change form
- Grad School warrants or other documents (add/change major, etc.)
- Master's exam, Qualifying exam, Prelim, PhD defense
- PhD minor
- Mailbox or package delivery
- Entering/exiting the department
- Department seminars
- General information not listed above

Contact **the IT office** if you have questions regarding

- Computer accounts
- Printer problems/repair
- Department email account

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## **SECTION 2**

# **GENERAL INFORMATION**



# Statistics Computing Lab (SCL) Info

Staff: Mike Cammilleri \* Paul Beebe \* Colleen Brabender

## *Account Activation:*

YOU WILL NEED YOUR CAMPUS NETID in order to activate your Statistics department account. If you do not have a NetID (campus login) or ID number please obtain this information and an ID card at Photo ID in Union South.

To activate your Statistics account visit <http://www.stat.wisc.edu/services/account-activation>. Most information about computing in Statistics will be found under the 'Services' tab on our department website.

!!!! Your campus NetID and Statistics account are not the same. !!!!

## *Resources:*

SCL Email: [lab@stat.wisc.edu](mailto:lab@stat.wisc.edu)

SCL Room: 1280 Medical Sciences Center

Campus Level Questions (NetID, WiscMail (<[netid](mailto:netid@wisc.edu)>@wisc.edu))

264-HELP (264-4357)

## *Logging In:*

Computers in the department are kiosks which means you can log into any computer and get the same desktop environment. To log in you must enter your Statistics user name and password. Note that this is not the same as your campus NetID username and password.

## *Email:*

Office 365 campus email is default. There you will receive your @wisc.edu as well as your departmental @stat.wisc.edu email. You can access email from <http://wiscmail.wisc.edu/>

## *Printing:*

Printer names are based on room number: pr1270, pr1224, etc. You have a paper quota of 2000 pages per semester. Do not print entire books, instead use campus printing services or shops such as Bob's Copy Shop for large print jobs. Printing from laptops is possible. For more information read the Statistics Computing Lab Manual available on the department website.

<https://stat.wisc.edu/wp-content/uploads/sites/870/2019/04/sclmanual.pdf>

### *Network:*

You have a network storage limit of 100GB.

Useful commands to use in the xterm window (command line):

Check disk quota: `fs lq ~`

Check paper quota: `lpquota`

Change your password: `passwd`

List directory contents: `ls`

Change to home directory: `cd`

Run R program: `R`

Run SAS program: `sas`

Change password: `passwd`

Google is your friend for learning Linux commands.

### *Statistical Computing:*

A High Performance Computing cluster is available for instruction and research. The HPC is a 13 node system with 624 CPU cores and 1.7 terabytes of memory. A total of 8 NVIDIA RTX 2080 Ti GPUs are also available for deep learning initiatives. SLURM is the scheduler software used for job submissions.

<https://slurm.schedmd.com/>

This system is designed to run any type of computational task for the department and is accessible on a per-student request. It is highly recommended that you read the user's guide first found on the department website. Tutorials and examples are given as well as more detailed information about the system, available software and SLURM commands.

<https://stat.wisc.edu/hpc-cluster/users-guide/>

### *Computer Lab:*

A modest computer lab is available with six Linux terminals in room 1270.

# Visitor and Information Programs

## Welcome

Your gateway to campus, Campus & Visitor Relations serves as the central access point for visitors, students, faculty and staff for answering questions, locating information and navigating UW–Madison and the surrounding community.

## About Campus & Visitor Relations

**In-Person:** Visitors and members of the campus community may find in-person assistance at three wonderful facilities:

### Campus and Community Information Welcome Desk

[Union South](#), 1308 W. Dayton St.

All prospective student visits and campus walking tours begin at Union South.

Hours: 7:30 a.m.–10 p.m. daily.

(Hours may vary during holiday and university break periods.)



### Campus and Community Information Welcome Desk

[Memorial Union](#), 800 Langdon St.

Phase I of the Memorial Union Reinvestment Project is just finished, and we have opened our newest Welcome Desk!

Hours: 7:30 a.m.–10 p.m. daily.

(Hours may vary during holiday and university break periods.)





**Town Center Welcome Desk**

[Wisconsin Institutes for Discovery](#), 330 N. Orchard St.

Hours: Monday–Friday: 7 a.m.–6 p.m.; Saturday: 9 a.m.–3 p.m.

(Hours may vary during holiday and university break periods.)

**E-Mail:** [askbucky@uwmad.wisc.edu](mailto:askbucky@uwmad.wisc.edu)

**Phone:** 608-263-2400

**FAX:** 608-265-3277 (fax only, please)

**TTY:** 1-800-WI-RELAY (800-947-3529)

**Mail:** Visitor & Information Relations Administrative Offices  
University of Wisconsin-Madison  
Union South  
1308 W. Dayton St.  
Madison, WI 53715-1149

**\*\*Students with RA, TA, PA, or Fellowship appointments receive State Group Health Insurance through their appointment, and generally do not choose to enroll in SHIP**

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## SHIP for Domestic Students

### Who needs health insurance?

Everyone needs comprehensive health insurance, because unexpected accidents and illnesses do occur, and treatment can be very expensive.

### What about University Health Services?

All enrolled students are eligible for the medical and counseling care available at University Health Services, but UHS is not a substitute for health insurance. UHS is not open evenings and weekends and does not provide emergency care, hospitalization, or specialty care for complex problems.

### What is the difference between UHS and SHIP?

University Health Services (UHS) provides students with many basic health care services at no extra cost, including medical care and mental health counseling and psychiatry. UHS also has clinics for women's health, STI testing and treatment, and allergy/immunization.

SHIP is a comprehensive insurance plan for UW-Madison students, which covers additional health care costs incurred both at UHS and elsewhere. This includes travel, meningococcal vaccines, and the HPV vaccine at UHS, as well as after hours, emergency room, hospitalization, and other specialized medical services, locally and nationwide.

### I already have health insurance. How can I tell if it is good enough?

Even if you already have health insurance, you need to be aware of the following:

- Employer plans often limit coverage to emergency room care while you are out of the plan area, and you may have to take time off school to return to your hometown for treatment.
- Even in their home area, some plans have increasingly narrow provider networks. As a result it can be difficult for enrollees to access key services such as mental health.
- Many plans require enrollees to pay a large portion of their medical costs. High deductibles, copayments, and coinsurance can make enrollees reluctant, or unable to seek medical attention when they need it.

Please note that International Students, Scholars and visa dependents are required to enroll in SHIP unless the qualifying criteria on the [Waiver Application \[PDF\]](#) are satisfied.

## Five reasons to choose SHIP

1. SHIP is designed specifically for UW–Madison students. Meeting the needs of our students is our motivation—not profit.
2. UHS provides primary and preventive care on campus, keeping costs as low as possible.
3. SHIP travels with you. SHIP members are protected by a nationwide network of hospitals, clinics, and specialized medical services.
4. SHIP for Domestic Students has low member cost-sharing, with an in-network deductible of \$600.
5. Value. For many students, SHIP offers “Gold +” level coverage at a “Bronze” price.

## How is SHIP affected by the Affordable Care Act (ACA)?

SHIP coverage already equals or exceeds the level of coverage for student health plans under the ACA and satisfies the individual mandate.

[Domestic Students: click here for more information](#)

## Can SHIP premiums be included in the UW-Madison Financial Aid package?

Undergraduate students can request that the cost of SHIP insurance be included in their financial aid package calculations. If the student qualifies, the financial aid package may be adjusted to accommodate the expense paid for SHIP coverage. If the student has already received an aid package and then purchases SHIP, the student will have to submit a receipt or other proof of payment of SHIP premiums. Graduate student financial aid packages already include an allowance for health care costs, so in general, no adjustments can be made for these students.

For more information, please contact UW-Madison Student Financial Services by calling 608-262-3060 or by emailing [finaid@finaid.wisc.edu](mailto:finaid@finaid.wisc.edu).

**SHIP is now accepting Fall and Annual enrollments.** SHIP coverage is effective from August 15, 2019.

**The SHIP office must receive enrollment and full payment by the stated deadline.**

**Fall Enrollment Deadline:** September 14, 2019

SHIP Office | University Health Services  
333 East Campus Mall | 7th Floor | Madison, WI 53715-1381  
Phone: 608-265-5232 | Fax: 608-265-5668  
[shipmail@uhs.wisc.edu](mailto:shipmail@uhs.wisc.edu)

[https://www.uhs.wisc.edu/wp-content/uploads/SHIP\\_2019\\_Domestic-From-Communications-6-11-19.pdf](https://www.uhs.wisc.edu/wp-content/uploads/SHIP_2019_Domestic-From-Communications-6-11-19.pdf)

# SHIP for International Students

## Health insurance compliance

All international students and visa dependents are required to have UW–Madison approved health insurance coverage. You must enroll yourself and any visa dependents in SHIP or file a qualifying waiver by the compliance deadline unless you qualify for an automatic waiver.

## Safeguarding your health

Medical treatment in the United States can be very expensive, and quality insurance coverage is essential. SHIP is a comprehensive health insurance plan that is specifically designed to safeguard the health of UW–Madison students. By administering the plan locally at University Health Services (UHS), we keep costs as low as possible—ensuring that the plan is tailored to the needs of our members.

Most services at UHS, including primary, urgent and preventive care, are fully covered for SHIP members with no out-of-pocket expense. (Please note that UHS is not open evenings and weekends and does not provide hospitalization, emergency room care, pediatric care, or specialty care for complex problems). In addition to the medical and mental health services provided by UHS, SHIP members are protected by a nationwide network of hospitals, clinics, and specialized medical services.

It is also important to note that SHIP is not motivated by profit, which enables us to pass on any plan savings to our members.

The health care system in the United States can be overwhelming, and the SHIP Customer Service team is here to assist you with any benefits or claims issues that you may encounter.

## Compliance Deadlines for International Students

The SHIP office must receive a completed enrollment application and full payment or a [waiver](#) application, on or before the posted deadlines.

### Annual and Fall Compliance Deadline: September 14

- Open enrollment is July 15–September 14
- Annual SHIP coverage is effective August 15 and terminates August 14
- Fall SHIP coverage is effective August 15 and terminates January 14

### Spring/Summer Compliance Deadline: February 14

- Open enrollment is December 15–February 14
- Spring/Summer SHIP coverage is effective January 15 and terminates August 14

### Summer Compliance Deadline (Newly Eligible Students Only): Within 31 days of the first day of class

- Summer SHIP coverage is effective from the first day of class and terminates on August 14.

**SHIP is now accepting Fall and Annual enrollments.** SHIP coverage is effective from August 15, 2018. The SHIP premium must be paid at the time of enrollment.

- Enroll at the SHIP Office – 9am to 5pm, Monday – Friday (MasterCard/VISA/Discover/Check)
- Enroll by telephone (608) 265-5232 – 9am to 5pm, Monday – Friday (MasterCard/VISA/Discover)

## Waivers

Waivers will only be approved for international students and visa dependents who meet one of the qualifying criteria listed on the Waiver Application. **Please read the Waiver Application carefully to ensure that you understand the requirements and do not purchase insurance which does not meet the SHIP waiver requirements. If you do not qualify for a waiver, you are required to enroll in SHIP.**

## Automatic Waivers

You do not need to file a Waiver Application if you are employed at UW–Madison and are receiving health insurance benefits that are effective on or before September 1, 2017, for fall or February 1, 2018, for spring. If you meet these criteria, the SHIP office will file an automatic waiver on your behalf.

If you are employed at UW–Madison and are receiving health insurance benefits, but are registered for summer classes only, you must file your own waiver application with the SHIP office.

Dependents of UW–Madison employees who are also international students must file their own waiver application with the SHIP office.

## Failure to Comply

International students who fail to purchase SHIP or file a qualifying waiver by the compliance deadline will be automatically enrolled in SHIP.

International students who make payment after the compliance deadline will be charged a \$100 late fee and required to pay SHIP premiums from the beginning of the initial compliance period.

International students who file a qualifying waiver after the compliance deadline will be charged a \$100 late fee in addition to any required premiums.

International students who fail to meet the compliance deadline will be considered non-compliant with the health insurance requirements of UW-Madison and an academic hold will be placed on the student's academic record. An academic hold prevents students from adding classes, dropping classes or obtaining a copy of their transcripts or diploma.

An academic hold will not be removed until the international student is compliant. Outstanding balances must be made by VISA/MasterCard/Discover or exact cash. If the outstanding balance remains unpaid, the account will be referred to a collections agency.

- Pay an outstanding balance at the SHIP office -- 9 am to 5 pm, Monday - Friday
- Pay an outstanding balance by telephone (608) 265-5232 -- 9 am to 5 pm, Monday - Friday (MasterCard/VISA/Discover)
- SHIP Office | University Health Services  
333 East Campus Mall | 7th Floor | Madison, WI 53715-1381  
Phone: 608-265-5232 | Fax: 608-265-5668  
[shipmail@uhs.wisc.edu](mailto:shipmail@uhs.wisc.edu)

[https://www.uhs.wisc.edu/wp-content/uploads/SHIP\\_2019\\_International-From-Communications-6-11-19.pdf](https://www.uhs.wisc.edu/wp-content/uploads/SHIP_2019_International-From-Communications-6-11-19.pdf)

## Housing

Graduate students may live in University housing or in private apartments. For information about University housing, see <http://www.housing.wisc.edu/residencehalls.htm>.

For off-campus housing after you arrive on campus, contact Campus and Visitor Relations, 1308 W. Dayton St. (Union South). Phone is 608-263-2452. You can also search for rentals at <https://campusareahousing.wisc.edu/>. Rentals are usually subject to contracts and payment of both one month's rent and a security deposit equal to one month's rent.

International students may also contact the International Student Services at the Red Gym, 716 Langdon Street, Madison, WI 53706. Phone (608) 262-2044.

Temporary housing (1-3 days) for new international students is offered, when available, by Madison volunteers. Contact MFIS, Inc., preferably at least six weeks in advance at the Red Gym, 716 Langdon Street, Madison WI 53706. Phone (608) 263-4010. Be sure to include your name, address, arrival date and gender.

## OPPORTUNITIES FOR STUDENT INVOLVEMENT

As a graduate student at UW-Madison, you have a multitude of opportunities to become involved on campus and in your academic discipline. This involvement enhances your academic, professional, and social development.

### Student Representation in Governance

**Associated Students of Madison (ASM)** - The Associated Students of Madison (ASM) is the campus-wide student governance organization at UW-Madison. Graduate and undergraduate representatives are elected to the 33-member ASM Student Council based on their respective college or school. The student council has regular biweekly meetings open to all students. Learn more here: <http://www.asm.wisc.edu/>

**Teaching Assistants' Association (TAA)** - The Teaching Assistants' Association (AFT Local 3220) is the labor union for TAs and PAs at UW-Madison. As a result of decades of organizing and by working together as a union, graduate students at UW-Madison have achieved good health benefits, tuition remission, and many other gains. The TAA is a democratic union run by the members. All key policy decisions are made at monthly membership meetings. Learn more here: <http://taa-madison.org/>

### Registered Student Organizations

There are more than 750 student organizations on campus. The best way to seek out current organizations is to visit the **Center for Leadership and Involvement (CFLI)** website, [www.cfli.wisc.edu](http://www.cfli.wisc.edu), and visit the Registered Student Organization directory. This list will not include unregistered student organizations, and you may find that there are groups in your department that you would like to get involved with as well. If you are interested in officially registering an organization you are involved, you must register at [www.cfli.wisc.edu](http://www.cfli.wisc.edu). Once registered through CFLI, your organization is eligible for funding from ASM, and your group can reserve rooms in the Union and access other resources.

### Outreach and Community Connections

The Wisconsin Idea is the principle that education should influence and improve people's lives beyond the university classroom. For more than 100 years, this idea has guided the university's work. Learn how you can get involved at <http://www.wisc.edu/public-service/>.

The Morgridge Center for Public Service connects campus with community through service, active civic engagement, community-based learning and research, and more. Explore opportunities at <http://www.morgridge.wisc.edu/>.

If you would like additional guidance on this section of the handbook, please contact Alissa Ewer at the Graduate School – [aewer@grad.wisc.edu](mailto:aewer@grad.wisc.edu).

## Academic, Non-Academic, and Research Misconduct

This graduate program, the Graduate School, and the Division of Student Life all uphold the UW-System policies and procedures in place for academic and non-academic misconduct. In addition, graduate students are held to the same standards of responsible conduct of research as faculty and staff. The department expects professional, ethical, and respectful conduct in all interactions. Students may be disciplined or dismissed from the graduate program for misconduct or disregard for professional conduct expectations regardless of their academic standing in the program. Separate and apart from a violation of Professional Conduct, a student may face University disciplinary action with regard to the same action. Students are responsible for reading the information here as well as the information published on all the relevant web sites.

### Academic Misconduct

Academic misconduct is an act in which a student (UWS 14.03(1)):

1. seeks to claim credit for the work or efforts of another without authorization or citation;
2. uses unauthorized materials or fabricated data in any academic exercise;
3. forges or falsifies academic documents or records;
4. intentionally impedes or damages the academic work of others;
5. engages in conduct aimed at making false representation of a student's academic performance; or
6. assists other students in any of these acts.

Examples of academic misconduct include but are not limited to:

1. cutting and pasting text from the Web without quotation marks or proper citation;
2. paraphrasing from the Web without crediting the source;
3. using notes or a programmable calculator in an exam when such use is not allowed;
4. using another person's ideas, words, or research and presenting it as one's own by not properly crediting the originator;
5. stealing examinations or course materials;
6. changing or creating data in a lab experiment;
7. altering a transcript;
8. signing another person's name to an attendance sheet;
9. hiding a book knowing that another student needs it to prepare for an assignment;
10. collaboration that is contrary to the stated rules of the course; or
11. tampering with a lab experiment or computer program of another student.

### Additional information regarding Academic Misconduct:

Graduate School Policy & Procedure: Misconduct, Academic: <https://grad.wisc.edu/documents/misconduct-academic/>

Dean of Students Office: Resources for Academic Integrity:

<https://students.wisc.edu/student-conduct/academic-integrity/student-resources/>

Dean of Students Office: Academic Misconduct Flowchart:

<https://students.wisc.edu/student-conduct/documents/academic-misconduct-flow-chart/>

University of Wisconsin System: Chapter UWS 14: Student Academic Disciplinary Procedures:

<http://www.uwc.edu/sites/uwc.edu/files/imce-uploads/students/handbook-policies/files/uws14.pdf>

### Non-Academic Misconduct

The university may discipline a student in non-academic matters in the following situations:

- for conduct which constitutes a serious danger to the personal safety of a member of the university community or guest;
- for stalking or harassment;
- for conduct that seriously damages or destroys university property or attempts to damage or destroy university property, or the property of a member of the university community or guest;
- for conduct that obstructs or seriously impairs university-run or university-authorized activities, or that interferes with or impedes the ability of a member of the university community, or guest, to participate in university-run or university-authorized activities;
- for unauthorized possession of university property or property of another member of the university community or guest;
- for acts which violate the provisions of UWS 18, Conduct on University Lands;
- for knowingly making a false statement to any university employee or agent on a university-related matter, or for refusing to identify oneself to such employee or agent;
- for violating a standard of conduct, or other requirement or restriction imposed in connection with disciplinary action.

Examples of non-academic misconduct include but are not limited to:

- engaging in conduct that is a crime involving danger to property or persons, as defined in UWS 18.06(22)(d);
- attacking or otherwise physically abusing, threatening to physically injure, or physically intimidating a member of the university community or a guest;
- attacking or throwing rocks or other dangerous objects at law enforcement personnel, or inciting others to do so;
- selling or delivering a controlled substance, as defined in 161 Wis. Stats., or possessing a controlled substance with intent to sell or deliver;
- removing, tampering with, or otherwise rendering useless university equipment or property intended for use in preserving or protecting the safety of members of the university community, such as fire alarms, fire extinguisher, fire exit signs, first aid equipment, or emergency telephones; or obstructing fire escape routes;
- preventing or blocking physical entry to or exit from a university building, corridor, or room;
- engaging in shouted interruptions, whistling, or similar means of interfering with a classroom presentation or a university-sponsored speech or program;
- obstructing a university officer or employee engaged in the lawful performance of duties;
- obstructing or interfering with a student engaged in attending classes or participating in university-run or university-authorized activities;
- knowingly disrupting access to university computing resources or misusing university computing resources.

The full text of the state statute governing non-academic misconduct, UWS 17, Student Non-Academic Misconduct Disciplinary Procedures, as well as the UW campus procedures for implementing the provisions of UWS 17 and general information about non-academic misconduct, are available from the Division of Student Life.

**Additional information regarding Non-Academic Misconduct**

Graduate School Academic Policies & Procedures: Misconduct, Non-Academic:

<https://grad.wisc.edu/documents/misconduct-nonacademic/>

Dean of Students Office: Non-Academic Misconduct Standards Statement:

<http://students.wisc.edu/doso/nonacadmiscconduct-statement.html>

University of Wisconsin System: Chapter UWS 17: Student Non-Academic Disciplinary Procedures:

[https://docs.legis.wisconsin.gov/code/admin\\_code/uws/17.pdf](https://docs.legis.wisconsin.gov/code/admin_code/uws/17.pdf)

University of Wisconsin System: Chapter UWS 18: Conduct on University Lands:

[http://docs.legis.wisconsin.gov/code/admin\\_code/uws/18.pdf](http://docs.legis.wisconsin.gov/code/admin_code/uws/18.pdf)

### **Research Misconduct**

Much of graduate education is carried out not in classrooms, but in laboratories and other research venues, often supported by federal or other external funding sources. Indeed, it is often difficult to distinguish between academic misconduct and cases of research misconduct. Graduate students are held to the same standards of responsible conduct of research as faculty and staff. The Graduate School is responsible for investigating allegations of research misconduct. This is often done in consultation with the Division of Student Life as well as with federal and state agencies to monitor, investigate, determine sanctions, and train about the responsible conduct of research. For more information, contact the Associate Vice Chancellor for Research Policy, 333 Bascom Hall, (608) 262-1044.

Please see section on “Grievance Procedures and Misconduct Reporting” for further information on reporting research misconduct of others. Here are links for additional information regarding Research Misconduct and Responsible Conduct:

Graduate School Policies & Procedures: Responsible Conduct of Research

<https://grad.wisc.edu/documents/responsible-conduct-of-research/>

Office of the Vice Chancellor for Research and Graduate Education’s - Office of Research Policy: Introduction & Guide to Resources on Research Ethics:

<https://research.wisc.edu/respolcomp/resethics/>

Graduate School Office of Research Policy: Policies, Responsibilities, and Procedures: Reporting Misconduct

<http://kb.wisc.edu/gsadminkb/page.php?id=34486>

Research and Graduate Education: Responsible Conduct of Research:

<https://kb.wisc.edu/gsadminkb/search.php?cat=2907>

## **Grievance Procedures and Misconduct**

If a student feels unfairly treated or aggrieved by faculty, staff, or another student, the University offers several avenues to resolve the grievance. Students’ concerns about unfair treatment are best handled directly with the person responsible for the objectionable action. If the student is uncomfortable making direct contact with the individual(s) involved, they should contact the advisor or the person in charge of the unit where the action occurred (program or department chair, section chair, lab manager, etc.). Many departments and schools/colleges have established specific procedures for handling such situations; check their web pages and published handbooks for information. If such procedures exist at the local level, these should be investigated first. For more information see the Graduate School Academic Policies & Procedures: Grievances & Appeals:

<https://grad.wisc.edu/documents/grievances-and-appeals/>.

### ***Procedures for proper accounting of student grievances:***

1. The student is encouraged to speak first with the person toward whom the grievance is directed to see if a situation can be resolved at this level.
2. Should a satisfactory resolution not be achieved, the student should contact the program’s advisors to discuss the grievance (Sara Rodock, [rodock@wisc.edu](mailto:rodock@wisc.edu); Dan Barnish, [dbarnish@wisc.edu](mailto:dbarnish@wisc.edu); Jun Shao, [shao@stat.wisc.edu](mailto:shao@stat.wisc.edu); or Brian Yandell, [brian.yandell@wisc.edu](mailto:brian.yandell@wisc.edu)). They will facilitate problem resolution through informal channels and facilitate any complaints or issues of students. The first attempt is to help

students informally address the grievance prior to any formal complaint. Students are also encouraged to talk with their faculty advisors regarding concerns or difficulties if necessary. University resources for sexual harassment, discrimination, disability accommodations, and other related concerns can be found on the UW Office of Equity and Diversity website: <https://oed.wisc.edu/>

3. Other campus resources include
  - The Graduate School - <https://grad.wisc.edu/>
  - McBurney Disability Resource Center - <https://mcburney.wisc.edu/>
  - Employee Assistance Office - <https://eao.wisc.edu/>
4. Ombuds Office - <https://ombuds.wisc.edu/>
5. University Health Services – <https://www.uhs.wisc.edu/>
6. If the issue is not resolved to the student's satisfaction the student can submit the grievance to one of the advisors in writing, within 60 calendar days of the alleged unfair treatment.
7. On receipt of a written complaint, a faculty committee will be convened by the advisor to manage the grievance. The program faculty committee will obtain a written response from the person toward whom the complaint is directed. This response will be shared with the person filing the grievance.
8. The faculty committee will determine a decision regarding the grievance. The advisor will report on the action taken by the committee in writing to both the student and the party toward whom the complaint was directed within 15 working days from the date the complaint was received.
9. At this point, if either party (the student or the person toward whom the grievance is directed) is unsatisfied with the decision of the faculty committee, the party may file a written appeal. Either party has 10 working days to file a written appeal to the School/College.
10. Documentation of the grievance will be stored for at least 7 years. Significant grievances that set a precedent will be stored indefinitely.

The Graduate School has procedures for students wishing to appeal a grievance decision made at the school/college level. These policies are described in the Graduate School's Academic Policies and Procedures: <https://grad.wisc.edu/documents/grievances-and-appeals/>

## Reporting Misconduct and Crime

The campus has established policies governing student conduct, academic dishonesty, discrimination, and harassment/abuse as well as specific reporting requirements in certain cases. If you have a grievance regarding unfair treatment towards yourself, please reference the procedures and resources identified above. If you learn about, observe, or witness misconduct or other wrongdoing you may be required to report that misconduct or abuse. Depending on the situation, it may be appropriate to consult with your advisor, Graduate Program Coordinator, or other campus resources.

### *Research Misconduct Reporting*

The University of Wisconsin-Madison strives to foster the highest scholarly and ethical standards among its students, faculty, and staff. Graduate students and research associates are among the most vulnerable groups when reporting misconduct because their source of financial support and the progress in their careers may be at risk by raising questions of wrongdoing. They are also often the closest witnesses to wrongdoing when it occurs and therefore must be appropriately protected from the consequences of reporting wrongdoing and be informed of their rights. Please find full details at <https://research.wisc.edu/compliance-policy/research-ethics/>

### *Academic Misconduct Reporting*

If you know a classmate is cheating on an exam or other academic exercise, notify your professor, teaching assistant or proctor of the exam. As a part of the university community, you are expected to uphold the standards of the university. Also, consider how your classmate's dishonesty may affect the overall grading curve and integrity of the program.

### *Sexual Assault Reporting*

UW-Madison prohibits sexual harassment, sexual assault, dating violence, domestic violence, and stalking. These offenses violate UW-Madison policies and are subject to disciplinary action. Sanctions can range from reprimand to expulsion from UW-Madison. In many cases, these offenses also violate Wisconsin criminal law and could lead to arrest and criminal prosecution.

Students who experience sexual harassment, sexual assault, domestic violence, dating violence, and/or stalking have many options and services available to them on and off campus, including mental health counseling, victim advocacy and access to the criminal and campus disciplinary systems. For a list a confidential support and reporting options, please visit <https://www.uhs.wisc.edu/prevention/violence-prevention/resources/>.

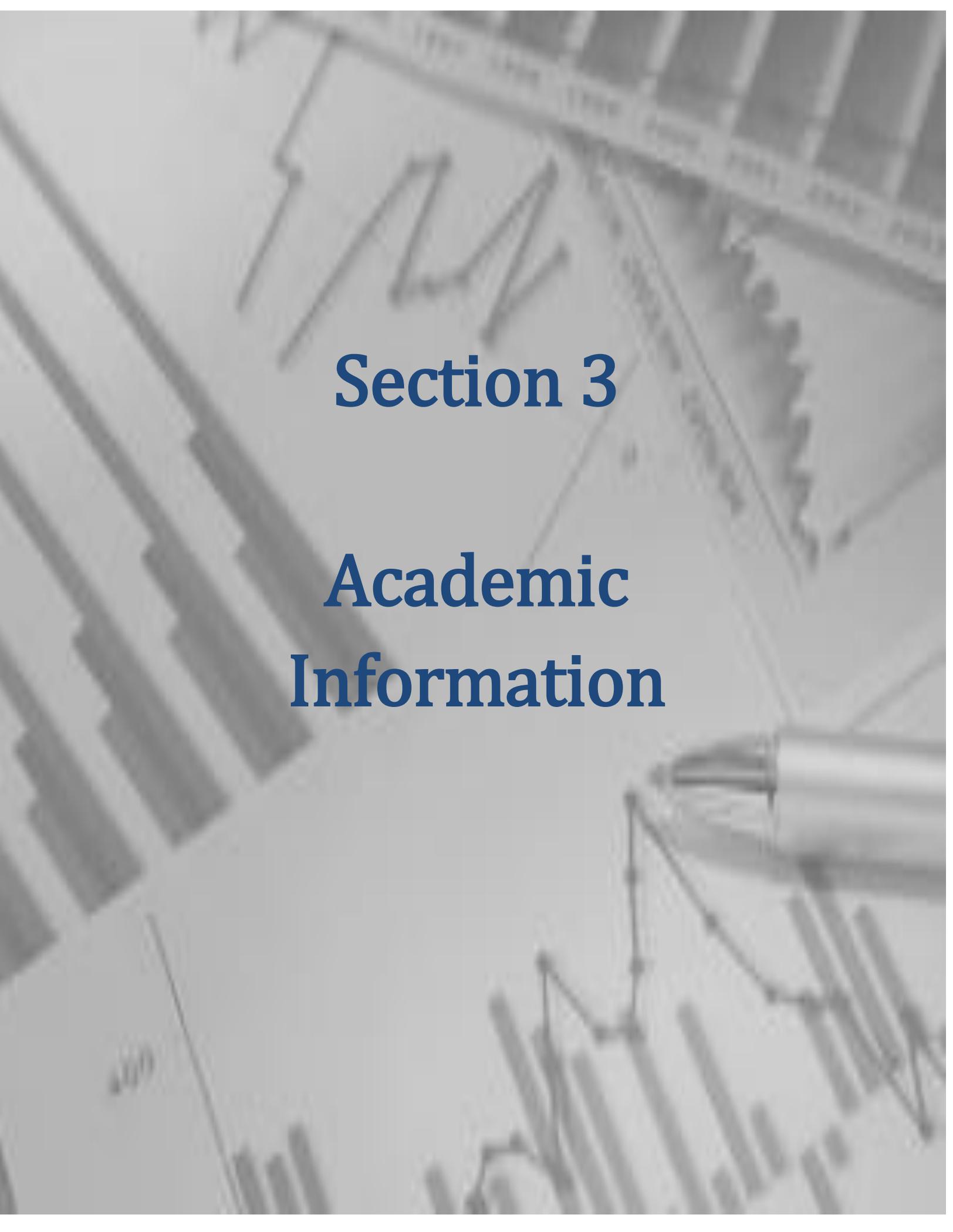
Faculty, staff, teaching assistants, and others who work directly with students at UW-Madison are required by law to report first-hand knowledge or disclosures of sexual assault to university officials for statistical purposes. In addition, disclosures made to certain university employees, such as academic advisors or university administrators, may be forwarded to the campus Title IX coordinator for a response. For more information, please visit <https://doso.students.wisc.edu/sexual-assault-dating-and-domestic-violence/>.

### ***Child Abuse Reporting***

As a UW-Madison employee (under Wisconsin Executive Order #54), you are required to immediately report child abuse or neglect to Child Protective Services (CPS) or law enforcement if, in the course of employment, the employee observes an incident or threat of child abuse or neglect, or learns of an incident or threat of child abuse or neglect, and the employee has reasonable cause to believe that child abuse or neglect has occurred or will occur. Volunteers working for UW-Madison sponsored programs or activities are also expected to report suspected abuse or neglect. Please find full details at <https://oed.wisc.edu/> (midway down, right hand side)

### ***Reporting and Response to Incidents of Bias/Hate***

The University of Wisconsin-Madison values a diverse community where all members are able to participate fully in the Wisconsin Experience. Incidents of bias/hate affecting a person or group create a hostile climate and negatively impact the quality of the Wisconsin Experience for community members. UW-Madison takes such incidents seriously and will investigate and respond to reported or observed incidents of bias/hate. Please find full details at <https://doso.students.wisc.edu/services/bias-reporting-process/>.

The background of the page is a grayscale, slightly blurred image of a spiral-bound notebook. A silver pen is positioned diagonally across the lower right portion of the notebook. A ruler is visible at the top of the page, with some numbers and text partially legible. The overall aesthetic is clean and academic.

## **Section 3**

# **Academic Information**

# Criteria for Satisfactory Progress for Graduate Students in the Department of Statistics

Revised May 2012.

The progress of every graduate student in the Department of Statistics will be reviewed semiannually. The reviews will take place before the start of the Spring Semester and during the Summer. The review will be conducted by a committee or person to be designated by the Department Chair.

In addition to the Departmental Criteria, the student must satisfy of the Graduate School regulations. It is the student's responsibility to understand the Graduate School rules. Students should take particular cognizance of the residence requirements as described in the Graduate School Bulletin.

As a result of each review the student will be deemed either to be making Satisfactory Progress or not. The student will be notified of the results of the review only if the Criteria are not satisfied. The consequences of failing to satisfy the Criteria are given below; the immediate consequence is to make the student ineligible for Departmental support as a TA, RA or PA.

In order to be deemed to be making Satisfactory Progress, graduate students must satisfy minimum requirements in each of the following areas:

- Grade Point Average
- Approved Credits
- Time Limits for core courses
- Time limit for first mentoring committee meeting [PhD]
- Ethics
- Handling of Incompletes

There are exceptions to the Criteria for part-time students; see below. Throughout this document, semester means Fall or Spring; Summer session is excluded (although Summer grades are used to compute grade point averages). To 'Pass' a course means to receive a grade of C or better.

## 1. Grade Point Average

At the end of each semester the Department will compute the cumulative grade point average (GPA) of each student in the program, with two exceptions. The GPA will not be computed at the end of the first semester of study, nor will it be computed in semesters during or after the passing of the preliminary exam. 'Cumulative' means the GPA in all courses numbered 301 or above in any department since entering the program. The cumulative GPA must equal or exceed 3.00 in order to satisfy this Criteria. If the cumulative GPA is below 3.00, then the student has failed to satisfy the Criteria.

## 2. Approved Credits

Prior to the semester in which the Preliminary Exam is passed, each semester the student must pass at least six credits approved by the academic advisor and in every two consecutive semesters pass at least fifteen credits approved by the academic advisor. Statistics courses listed under "Introductory Courses" and "Mathematical Foundations" on the Statistics Department course listing webpage ([www.stat.wisc.edu/course-listing](http://www.stat.wisc.edu/course-listing)) cannot be used to fulfill the required minimum number of credits. The Department requires no minimum number of credits during the semester in which the Preliminary Exam is passed and subsequent semesters; however, the student should be aware of any Graduate School rules.

The credit limit may be relaxed, at the discretion of the Department, if it is believed a lower requirement is more appropriate for a student's academic goals.

### **3. Time Limits for core courses**

The following criteria reflect the belief that the M.S. program should be a two-year program for most students. Note exceptions below for students who earn a M.S. from the Department and then decide to pursue the Ph.D. degree.

Time limits for students who begin graduate study in the Department in the Fall Semester:

1. Pass Statistics 709-710 within four semesters.
2. Pass the Ph.D. Qualifying Exam within six semesters.

Time limits for students who begin graduate study in the Department in the Spring Semester:

1. Pass Statistics 709 within four semesters and pass Statistics 710 within five semesters.
2. Pass the Ph.D. Qualifying Exam within six semesters of the first Fall Semester of enrollment; that is, the first Spring Semester is not included in the count for students who start their program in the Spring.

(Note: Students in the M.S. program usually do not enroll in 709 or 710. Thus, a typical consequence of the above time limits is that M.S. students who have not graduated after four semesters will subsequently fail to satisfy the Criteria.)

Students in the M.S. program who successfully complete the Department's M.S. exam within four semesters and who have sufficient mathematical background to enroll in Statistics 709 shall be granted a two-semester extension to the time limits for passing 709, 710, and the Ph.D. Qualifying exam.

Students who interrupt their graduate studies with an approved leave of absence will have the above time limits modified in a reasonable manner to be determined by the Department.

### **4. Time limit for first mentoring committee meeting**

Ph.D. students are required to select a mentoring committee of 3 or more faculty members and meet with this committee within a year after passing the qualifying examination. A Ph.D. dissertation advisor need not be selected by the time of this first meeting. The student will be expected to prepare a short oral report of his/her research activities during the past year(s) and of anticipated directions for future research. Committee members will be expected to provide feedback and direction. Students may then meet regularly with their mentoring committee, which can change membership over time. The preliminary examination may serve as the first mentoring committee meeting if taken within a year after passing the qualifying examination.

### **5. Ethics**

The department of Statistics expects graduate students to demonstrate intellectual honesty, a responsible attitude towards colleagues and clients, and a strong sense of personal integrity. Ethical statistical practice is essential to our profession and failure to act ethically undermines our profession. Training in research ethics is required for students on some federally funded grants. Unethical behaviors include, but are not limited to, academic misconduct in a class or assignment, academic misconduct in an examination, and violation of data confidentiality. Unethical behavior constitutes failure to meet Criteria and will result in sanctions at the university level and at the departmental level.

### **6. Incompletes**

Any student who received an Incomplete in a course must provide the Department with a brief written explanation of the circumstances that led to the Incomplete, including a description of the work that must be completed. For an Incomplete received during Summer or Fall, the explanation must be received before Monday of the week before the next Spring semester classes start. For an Incomplete during Spring, the explanation must be received before June 15 of the same year.

If the explanation either arrives late or is deemed unacceptable by the Department, then the student will be deemed not to be making Satisfactory Progress.

If the explanation is accepted, the student will have one semester to remove the Incomplete; otherwise in the next review the student will fail to satisfy the Criteria. For example, if a student receives an Incomplete in Fall, he/she has until the end of the Spring Semester to complete the work, receive a grade, and report the grade to the Statistics Department. Thus, the student should complete the work in time for the instructor in the course to finish grading by the end of the appropriate semester.

In some cases, several students in a class will be given an Incomplete because the instructor is not able to complete course grading on time. In such cases, the instructor may provide the Department with one letter to cover all students affected. In these cases, the student need not write a letter to the Department.

## **7. Consequences of Failure to Meet Criteria**

A student who fails to satisfy the Criteria is ineligible for departmental support as a TA, PA, or RA beginning with the following semester (Fall for the summer review, Spring for the pre-Spring review). Three consecutive reviews in which a student fails to meet the Criteria for Satisfactory Progress will result in the Department immediately notifying the student and the Graduate School that the student is no longer eligible to be student in the Department. The student may petition to remain in the Department after three consecutive failures to meet the Criteria. For example, a student who is simultaneously pursuing two Master's degrees may reasonably be allowed four years to complete the degrees.

A student who has failed to satisfy the Criteria for fewer than three consecutive reviews is eligible to take courses, finish degree requirements and receive a degree. Failure to satisfy the Criteria will not appear on the student's transcript.

## **8. Part-time Students**

A student who enters the Department as a part-time student will meet with an advisor to create individualized Criteria to be approved by the Department. It is anticipated that the individualized Criteria will follow the above guidelines on Grade Point Average and Incompletes, but the requirements on the number of approved credits and time limits will be relaxed.

A student with full-time status who wants to switch to part-time status must petition the Department for permission; permission will not be granted if it appears that a primary reason for the request is to avoid the consequences of failing to satisfy the Criteria.

## **9. Appeals and the Student's Responsibilities**

The student may appeal in writing to the Department Chair any decision on Satisfactory Progress. The results of the review will stand, pending the outcome of the appeal. Thus, it is recommended that a student anticipate potential problems and makes an appeal early.

It is the student's responsibility to make sure he/she receives the results of the Department's review. In particular, the student must check his/her departmental mailbox in a timely manner or leave a forwarding address with the staff member in charge of mail. Ignorance of the result of the review is not grounds for an appeal. (We expect students will know they have failed to meet the Criteria before the Department does.) Also, note the student's responsibility regarding Incompletes as explained earlier.

## **Appendix: Examples of Academic misconduct**

The list below is not exhaustive and focuses on examples most relevant to students taking courses. Individual instructors may have different expectations. Students are responsible for seeking out information when unsure of what is expected.

Copying or attempting to copy someone else's work, communicating answers during an exam, or using concealed information. For a take-home exam, communicating about the exam with anyone else other than the instructor, without the instructor's consent. Using any resource not allowed by the instructor (internet, books other than those allowed, other students or friends) is cheating. Example of collaboration on homework: 3 students meet to work on their 609 assignment. The right way: They talk about the homework, write down some ideas on the board. Then they separate and individually write up their solutions. The wrong way: There are 3 problems on the assignment. Student A is in charge of problem 1; Student B is in charge of problem 2; and Student C is in charge of problem 3. Student A presents her solution to problem 1 and students B, C copy down this solution. Repeat with Student B on problem 2, etc. This is cheating. Students are encouraged to cite who they worked with on what problems, just like authors acknowledge colleagues in research publications. If someone else's code was used to do your homework, or the proof to a key step from a book or a paper, these references should be cited. Altering university documents is academic misconduct, such as altering a previously graded exam for the purpose of obtaining a grade change, or altering a student's progress form after it was signed by the student's advisor.

### **Guidelines for the first mentoring committee meeting**

**Before the meeting:** Start the process as soon as you pass the qualifying exam. Build in time to identify a research area of interest and potential committee members, including a dissertation advisor ideally. Ask potential committee members to serve on your committee. Tell them about your research interests at this time, then schedule the meeting. Two months in advance is not too early to schedule the meeting, especially in the summer.

**At the meeting:** get prepared to give an oral report and discuss the following topics: Past research activities, such as background readings on the anticipated research area and early preliminary results. Description of anticipated directions for future research. Elective courses already taken and planned coursework, in relation to the anticipated dissertation area.

**After the meeting:** Follow the directions provided by the mentoring committee. Do not hesitate to seek more guidance from committee members, either individually or through regular committee meetings.

## Enrollment Requirements

(taken from the Grad School academic policies page (<https://grad.wisc.edu/academic-policies/>))

*- note that department requirements may be stricter than the Grad School requirements – for example, full-time students in our department need to make sure to enroll in a minimum of 15 credits over the fall and spring semesters (one semester in 6 credits, the other semester in 9 credits)*

**ALL of the following credit requirements (except F-1 and J-1 visa requirements) must be satisfied by graded courses taken at 300 or above; courses numbered below 300, audit, and pass/fail do not satisfy enrollment requirements.**

**Full-time enrollment:** The Graduate School considers full-time enrollment to be 8-15 graded credits taken at 300 or above, excluding pass/fail and audit, during the fall and spring semesters, and 4-12 credits\* during the summer term. If students elect not to enroll as full-time students as defined by the Graduate School, they are responsible for knowing about possible obligations that may require full-time status. Such obligations may include visa eligibility, fellowships, assistantships, financial aid, external funding agencies, and program satisfactory progress requirements.

**Maximum enrollment:** The Graduate School considers full-time enrollment to be 8-15 graded credits taken at 300 or above, excluding pass/fail and audit, during the fall and spring semesters, and 4-12 credits\* during the summer term. Any exceptions to the maximum credit load permitted must be obtained via the [Overload Request form](#).

**Minimum enrollment:** Non-dissertator minimum credit load is 2 credits\* during the fall and spring semesters. Graduate students must be enrolled at least at the minimum requirement in the semester in which they receive a degree; master's degree students expecting a summer degree must enroll in a minimum of 2 graduate credits in any summer session\*. Graduate students who do not need to maintain full-time status (including TAs and PAs) have a 2 credit enrollment minimum during fall and spring semesters. Minimum requirements must be fulfilled by courses taken for a grade (not pass/fail or audit) and must be taken at 300 or above.

**Underload:** During the fall and spring semesters, non-dissertators must enroll for a minimum of 2 credits\*. Audit and pass/fail courses do not satisfy this enrollment requirement. Dissertators are required to enroll for 3 graded credits taken at 300 or above and directly related to their dissertation research.

The specific situations listed below have special enrollment requirements.

**Dissertators:** Dissertators must enroll in exactly 3 credits\* directly related to their dissertation (generally research and thesis or required seminars) during fall and spring semesters. Dissertators are considered full-time at 3 credits\*. Dissertators who are summer RAs or trainees, or who expect to graduate in summer, must enroll in the general 8-week summer session (DHH) for 3 credits\*. Additional courses for credit, audit, or pass/fail will result in removal of dissertator status and tuition assessment at the regular graduate rate.

Once dissertator status has been achieved, courses other than 990 must be directly related to the dissertation research and approved by the advisor. Dissertators must enroll during the semester or general 8-week summer session (DHH) in which they expect to earn a degree. Students must be enrolled during the semester when they defend the dissertation and when they deposit the dissertation. If defending and depositing in two different semesters, the student is required to be enrolled in both semesters. Students do not have to be dissertators during the semester or summer in which they expect to earn a doctoral degree, but they must be eligible for dissertator status before they complete the doctoral degree, and they must enroll in the semester in which they will graduate.

If a student enrolls before the dissertator status is approved, the enrollment system may indicate they are not eligible for that course. The enrollment system does not care if students are dissertators. If students had problems getting into a course, it is probably because permission has not been entered into the enrollment system. Most individualized study courses, such as research and thesis, require instructor's permission and online authorization

before enrollment is possible. If students have trouble with enrollment, they should contact the Office of the Registrar's help line, 608-262-0920.

If dissertator status is not processed by the segregated fee deadline, students pay regular non-dissertator graduate fees. The fee difference will be refunded for that semester when dissertator status is indicated in the system.

**Assistantship appointees:** It is against university policy to hold an assistantship without being appropriately enrolled. Assistantships include those at UW-Madison as well as any UW System institution, including UW-Extension.

**RA (Research Assistant):** RAs are required to carry a full load each semester (8 to 15 credits\* including research or thesis credits for non-dissertators, 3 credits\* for dissertators) and at least 2 credits\* during the general 8-week summer session (DHH) (3 credits\* for dissertators). Dissertators who hold assistantships are considered full-time with 3 credits\* directly related to their dissertation.

**TA (Teaching Assistant) and PA (Project Assistant):**

Minimum enrollment for PAs and TAs is 2 credits\* (3 credits\* for dissertators) during the fall and spring semesters.

- To be considered full-time by the Registrar for loan deferment and for certification of student immigration status, non-dissertator PAs and TAs who hold an appointment of at least 33.33% must be enrolled for 6 credits\*, or those who hold an appointment of at least 50% must be enrolled for 4 credits\*.
- Dissertator PAs and TAs are considered full-time with 3 credits\* directly related to their dissertation (generally research and thesis or required seminars).
- Maximum enrollment for PAs and TAs is 15 credits\* during the fall and spring.
- The Graduate School has no enrollment requirement for the summer session for PAs and TAs, unless the student is receiving a summer degree, but individual programs may.

**Fellows:** Non-dissertator graduate students holding fellowships that are payrolled through the university must be enrolled full-time: 8 credits\* during the fall and spring semester. Fellows who are non-dissertators with 12-month appointments must also enroll in 2 credits\* during the general 8-week summer session (DHH). Those who are not payrolled as fellows over the summer are not required to be enrolled. Those who are payrolled as fellows during any part of the summer term must enroll in the general 8-week summer session (DHH). Fellows who are dissertators must enroll in 3 credits\* during the fall and spring semesters. Fellows with 12-month appointments who are dissertators must also enroll in 3 credits\* during the general 8-week summer session (DHH).

**Trainees:** Trainees must carry a full load each fall and spring semester of 8 to 15 credits\* including research or thesis credits for non-dissertators (3 credits\* for dissertators), and at least 2 credits\* during the general 8-week summer session (DHH) (3 credits\* for dissertators).

**International students:** Both F-1 and J-1 student visa regulations require students to be enrolled full-time each fall and spring semester (8 credits, not taken as audit). Summer enrollment is not required by the U.S. federal government regulations for F-1/J-1 visa holders. However, summer enrollment may be required due to other circumstances; see summer enrollment requirements for assistantships, fellowships, traineeships, and graduating students. Failure to maintain full-time status can result in loss of F-1/J-1 student benefits, including on-campus employment and practical/academic training options. Any exceptions to full-time enrollment must be authorized by International Student Services (ISS). Visit the [ISS](#) webpage to learn more about visa requirements. Permission from ISS to drop below full-time enrollment does NOT exempt an international student from meeting the enrollment requirement determined by a Teaching Assistantship (TA), Project Assistantship (PA), Research Assistantship (RA), fellowship, traineeship, or dissertator status.

**International students-online learning credit limit:** F-1 and J-1 student visa holders have restrictions regarding the number of online credits that can be taken during the semester as it relates to fulfilling the full-time enrollment requirement. There are also restrictions regarding online enrollment during the final term of study-especially when the final term for completion is in summer. For more information, visit the ISS [Online Course Enrollment](#) webpage.

**Summer enrollment requirements:** Students must be enrolled at UW-Madison if they are using university facilities, including faculty and staff time.

- Dissertators defending and/or depositing dissertation (completing their degree) in summer must enroll for 3 credits\* in the general 8-week summer session (DHH).
- Dissertator RAs must enroll for 3 credits\* in the general 8-week summer session (DHH).
- Dissertator fellows with 12-month appointments are required to enroll for at least 3 credits\* in the general 8-week summer session (DHH).
- Dissertator trainees are required to enroll for at least 3 credits\* in the general 8-week summer session (DHH).
- Master’s candidates, who expect to graduate in summer must enroll for at least 2 credits\* in any session, short session or general 8-week summer session (DHH).
- Non-dissertators completing a summer doctoral degree must enroll for at least 2 credits\* in the general 8-week summer session (DHH).
- Non-dissertator RAs must enroll for 2 credits\* in the general 8-week summer session (DHH).
- Non-dissertator TAs and PAs not receiving a summer degree have no enrollment requirement. However, those who held such an appointment during the previous semester may qualify for summer tuition remission and are advised to consult with their employing department if they wish to enroll.
- Non-dissertator fellows with 12-month appointments are required to enroll for at least 2 credits\* in the general 8-week summer session (DHH).
- Non-dissertator trainees are required to enroll for at least 2 credits\* in the general 8-week summer session (DHH).
- International students who are completing a summer degree are required to enroll for at least 2 credits\* in the general 8-week summer session (DHH).
- International students who are RAs in the summer are required to enroll for at least 2 credits\* in the general 8-week summer session (DHH).
- International students who are not completing a summer degree and who are not RAs have no summer enrollment requirement mandated by the U.S. federal government regulations for F-1/J-1 visa holders.

**Financial aid, loan deferral:** In most cases, students are eligible for federal loans and federal loan payment deferral when enrolled at least half-time, which is 4 credits\* for the fall and spring semesters. However, individual cases may vary, and students are advised to seek individual advice at the UW-Madison [Office of Student Financial Aid](#).

**Full-Time Enrollment Status at a Glance**

|                   |  |   |
|-------------------|--|---|
| <b>Categories</b> | <b>Minimum enrollment for full-time status:<br/>Fall or Spring</b> | <b>Minimum enrollment for full-time status:<br/>Summer (general 8-week DHH session)</b> |
|-------------------|--|---|

| <b>Categories</b>  | <b>Minimum enrollment for full-time status:<br/>Fall or Spring</b> | <b>Minimum enrollment for full-time status:<br/>Summer (general 8-week DHH session)</b>   |
|--|--|---|
| Dissertator  | Exactly 3 credits directly related to research                     | Not required unless receiving summer degree or if graduate assistant, trainee, or fellow, 3 cr. required.                                       |
| RA, non-dissertator  | 8 cr.  | 2 cr.   |
| TA/Lecturer (SA) 33%, non-dissertator  | 6 cr.  | Not required unless receiving summer degree, 2 cr. minimum.   |
| TA/Lecturer (SA) 50%, non-dissertator  | 4 cr.  | Not required unless receiving summer degree, 2 cr. minimum.   |
| PA 33%, non-dissertator  | 6 cr.  | Not required unless receiving summer degree, 2 cr. minimum.   |
| PA 50%, non-dissertator  | 4 cr.  | Not required unless receiving summer degree, 2 cr. minimum.   |
| Fellow, non-dissertator  | 8 cr.  | 2 cr. for 12-month appointments. Not required for 9-month appointments.   |
| Trainee, non-dissertator   | 8 cr.  | 2 cr.   |
| International student (F-1/J-1 visa), non-dissertator, if no other category in this list | 8 cr.  | 4 cr. when summer is admit semester (2 cr. when summer is admit semester and student holds RA appointment or at least 33% TA or PA appointment) |
| <b>If none of the above, full time enrollment is:</b>                                    | 8 cr.  | 4 cr.   |

\* Credit requirements (except F-1 and J-1 visa requirements) must be satisfied by graded courses taken at 300 or above; courses numbered below 300, audit, and pass/fail do not satisfy enrollment requirements.

\*\*Lecturer (SA) is included in the same enrollment category as TA



**ADVISOR SELECTION**

During your first year of graduate studies, academic advising is provided by designated advisors during Welcome Week. After your initial appointment during Welcome Week, please feel free to seek advice from any of the faculty members throughout the year.

After your first year of study, you may continue to meet with your advisor listed above or with any faculty member who agrees to be your academic advisor. Students typically work with a research advisor for at least several months and potentially much longer prior to taking the PhD preliminary examination. Students are strongly encouraged to seek a research advisor shortly after passing the PhD qualifying examination, typically during the second year of the program.

When considering a prospective advisor, the following might be helpful to think about. Many of these questions are not simple and may not elicit a quick answer. However, any advisor should be willing to discuss these important issues with you. You may also want to discuss these issues with any students that are currently in the prospective advisor's group/lab. This list is by no means complete; you should spend some time thinking about what is most important to you in your graduate training.

- What thesis projects would be available to me if I were to join your group?
- Would these projects expose me to a variety of different approaches?
- In general, how available will you be to answer questions I might have?
- What is your philosophy regarding the amount of guidance the advisor should provide to a student during preparation of the thesis proposal, thesis, etc.?
- What are your expectations for the amount of time I should spend each day/week in your group/lab?
- Do you include your graduate students in professional activities that will familiarize them with their field of interest/research, such as reviewing manuscripts and meeting with visiting speakers?
- How long do you think it should take me to get my degree?
- What are your former graduate students (if any) doing now?
- What is your general philosophy of graduate training and what goals do you have for your graduate students?

**SAMPLE**

If you wish to change your assigned advisor, please see the Graduate Program Coordinator (Rm 1220D MSC) for the form.

Change of Advisor Form

I, \_\_\_\_\_, would like to select \_\_\_\_\_  
(my name) (faculty name)

as my faculty advisor.

Student signature \_\_\_\_\_ Date \_\_\_\_\_

(new) Advisor signature \_\_\_\_\_ Date \_\_\_\_\_

## STATISTICS (STAT)

### STAT 240 — INTRODUCTION TO DATA MODELING I 4 credits.

Introduces students to reproducible data management, modeling, and analysis through a practical, hands-on case studies approach. Topics include the use of an integrated statistical computing environment, data wrangling, the R programming language, data graphics and visualization, random variables and concepts of probability, data modeling, and report generation using R Markdown with applications to a wide variety of data to address open-ended questions. Enroll Info: None Requisites: Satisfied Quantitative Reasoning (QR) A requirement Course Designation: Gen Ed - Quantitative Reasoning Part B Breadth - Natural Science Level - Elementary L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No

### STAT 301 — INTRODUCTION TO STATISTICAL METHODS 3 credits.

Distributions, measures of central tendency, dispersion and shape, the normal distribution; experiments to compare means, standard errors, confidence intervals; effects of departure from assumption; method of least squares, regression, correlation, assumptions and limitations; basic ideas of experimental design. Enroll Info: None Requisites: Satisfied Quantitative Reasoning (QR) A requirement. Not open to students who have completed STAT 201, 224, 324, or 371 Course Designation: Gen Ed - Quantitative Reasoning Part B Breadth - Natural Science Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Summer 2019

### STAT 302 — ACCELERATED INTRODUCTION TO STATISTICAL METHODS 3 credits.

Graphical and numerical exploration of data; standard errors; distributions for statistical models including binomial, Poisson, normal; estimation; hypothesis testing; randomization tests; basic principles of experimental design; regression; ANOVA; categorical data analysis; goodness of fit; application. (Intended for students wishing to take additional statistics courses). Enroll Info: Satisfied Quantitative Reasoning (QR) A requirement and MATH 221 or equivalent Requisites: MATH 217, MATH 221, or MATH 275 Course Designation: Gen Ed - Quantitative Reasoning Part B Breadth - Natural Science Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Spring 2019

### STAT 303 — R FOR STATISTICS I 1 credit.

An understanding of the commonly used statistical language R. Topics will include using R to manipulate data and perform exploratory data analysis. Enroll Info: None Requisites: STAT 224, 301, 302, 312, 324, 371, MATH/STAT 310, ECON 310, GEN BUS 303, 304, PSYCH 210, or SOC/C&E SOC 360 Course Designation: Breadth - Natural Science Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No

### STAT 304 — R FOR STATISTICS II 1 credit.

Provides an understanding of the commonly used statistical language R. Topics will include writing conditional expressions, loops, and functions; manipulating data matrices and arrays; extracting data from text; and making high level visualizations of data. Enroll Info: None Requisites: STAT 303 (or STAT 327-Intro Data Analysis with R prior to Fall 2019) Course Designation: Breadth - Natural Science Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No

### STAT 305 — R FOR STATISTICS III 1 credit.

Provides an understanding of the commonly used statistical language R. Students will learn to combine R with high performance computing tools to do scientific computing. Enroll Info: None Requisites: STAT 304 (or STAT 327-Intermed. Data Analysis with R prior to Fall 2019) Course Designation: Breadth - Natural Science Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No

### STAT/MATH 309 — INTRODUCTION TO PROBABILITY AND MATHEMATICAL STATISTICS I 3 credits.

Probability and combinatorial methods, discrete and continuous, univariate and multivariate distributions, expected values, moments, normal distribution and derived distributions, estimation. Enroll Info: None Requisites: MATH 234 or concurrent enrollment; not open to students with credit for STAT/MATH 431 or STAT 311 Course Designation: Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Spring 2019

## 2 Statistics (STAT)

STAT/MATH 310 — INTRODUCTION TO PROBABILITY AND MATHEMATICAL STATISTICS II 3 credits.

Mathematical statistical inference aims at providing an understanding of likelihood's central role to statistical inference, using the language of mathematical statistics to analyze statistical procedures, and using the computer as a tool for understanding statistics. Specific topics include: samples and populations, estimation, hypothesis testing, and theoretical properties of statistical inference. Enroll Info: None Requisites: (STAT/MATH 309, STAT 311, or STAT/MATH 431) and (STAT 224, STAT 301, STAT 302, STAT 324, STAT 371, or ECON 310); or graduate/professional standing Course Designation: Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Spring 2019

STAT 311 — INTRODUCTION TO THEORY AND METHODS OF MATHEMATICAL STATISTICS I 3 credits.

Elements of probability, important discrete distributions, acceptance sampling by attributes, sample characteristics, probability distributions and population characteristics, the normal distribution, acceptance sampling plans based on sample means and variances, sampling from the normal, the central limit theorem, point and interval estimation. Enroll Info: None Requisites: MATH 234 or concurrent enrollment; not open to students who have taken STAT/MATH 309 or STAT/MATH 431 Course Designation: Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Summer 2019

STAT 312 — INTRODUCTION TO THEORY AND METHODS OF MATHEMATICAL STATISTICS II 3 credits.

Unbiased estimation, maximum likelihood estimation, confidence intervals, tests of hypotheses, Neyman-Pearson lemma, likelihood ratio test, regression, analysis of variance with applications. Enroll Info: None Requisites: STAT/MATH 309, STAT 311, STAT/MATH 431, or graduate standing Course Designation: Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Spring 2019

STAT 324 — INTRODUCTORY APPLIED STATISTICS FOR ENGINEERS 3 credits.

Descriptive statistics, probability concepts and distributions, random variables. Hypothesis tests and confidence intervals for one- and two sample problems. Linear regression, model checking, and inference. Analysis of variance and basic ideas in experimental design. Enroll Info: Not open to students who have completed STAT 224 or 371. Requisites: MATH 211, 217, 221, or 275. Not open to students who have completed STAT 224 or 371 Course Designation: Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Summer 2019

STAT 327 — LEARNING A STATISTICAL LANGUAGE 1 credit.

This modular course is aimed at providing students with an understanding of commonly used statistical languages. (Two such languages commonly used in our Department -- and others -- are R and SAS.) Modules will be offered at the introductory, intermediate and advanced levels. (Also, students may not receive credit twice for the same language at the same level.) Enroll Info: Any introductory stat course (224, 301, 302, 324, 371) for all modules; additional prerequisites will vary by topic Requisites: None Course Designation: Breadth - Natural Science Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: Yes, unlimited number of completions Last Taught: Summer 2019

STAT 333 — APPLIED REGRESSION ANALYSIS 3 credits.

An introduction to regression with emphasis on the practical aspects. Topics include: straight-line model, role of assumptions, residual analysis, transformations, multiple regression (with some use of matrix notation), multicollinearity, subset selection, and a brief introduction to mixed models. Enroll Info: An introductory statistics course (Stat 224 or STAT 301 or STAT 302 or STAT 324 or STAT 371) and STAT 327 (STAT 327 may be taken concurrently) Requisites: (STAT 224, 301, 302, 312, 324, or 371) and (STAT 303 or concurrent enrollment, or STAT 327 prior to Fall 2019) Course Designation: Gen Ed - Quantitative Reasoning Part B Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Spring 2019

Statistics (STAT) 3

STAT 349 — INTRODUCTION TO TIME SERIES 3 credits.

Autocorrelation; stationarity and non-stationarity; heteroscedasticity; dynamic models; auto-regressive and moving average models; identification and fitting; forecasting; seasonal adjustment; applications for financial time series, social sciences and environmental studies. Enroll Info: None Requisites: STAT 333 Course Designation: Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Spring 2019

STAT 351 — INTRODUCTORY NONPARAMETRIC STATISTICS 3 credits.

Distribution free statistical procedures or methods valid under nonrestrictive assumptions: basic tools; counting methods; order statistics, ranks, empirical distribution functions; distribution free tests and associated interval and point estimators; sign test; signed rank tests; rank tests; Mann Whitney Wilcoxon procedures; Kolmogorov Smirnov tests; permutation methods; kernel density estimation; kernel and spline regression estimation; computer techniques and programs; discussion and comparison with parametric methods. Enroll Info: None Requisites: STAT 333 Course Designation: Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Spring 2019

STAT 360 — TOPICS IN STATISTICS STUDY ABROAD 1-3 credits.

Credit is awarded for students having completed an advanced statistics course in a study abroad program for which there is no direct equivalence to the statistics department course offerings. The study abroad course must be pre-approved by the statistics department. Enroll Info: None Requisites: None Course Designation: Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: Yes, unlimited number of completions

STAT 371 — INTRODUCTORY APPLIED STATISTICS FOR THE LIFE SCIENCES 3 credits.

The course will provide students in the life sciences with an introduction to modern statistical practice. Topics include: exploratory data analysis, probability and random variables; one-sample testing and confidence intervals, role of assumptions, sample size determination, two-sample inference; basic ideas in experimental design, analysis of variance, linear regression, goodness-of fit; biological applications. Enroll Info: None Requisites: MATH 112 and 113, 114, or 171. Not open to students who have completed STAT 224 or 324 Course Designation: Gen Ed - Quantitative Reasoning Part B Breadth - Natural Science Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Summer 2019

STAT 411 — AN INTRODUCTION TO SAMPLE SURVEY THEORY AND METHODS 3 credits.

An introduction to the methods used to design sample surveys and analyze the results. Topics covered include: basic tools, simple random sampling, ratio and regression estimation, stratification, systematic sampling, cluster (area) sampling, two-stage sampling, unequal probability sampling, non-sampling errors, and missing data. For illustration and clarification, examples are drawn from diverse areas of application. Enroll Info: None Requisites: STAT 333 Course Designation: Breadth - Natural Science Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Fall 2018

STAT 421 — APPLIED CATEGORICAL DATA ANALYSIS 3 credits.

Analysis of multidimensional contingency tables, Poisson regression, and logistic regression, with emphasis on practical applications. Use of computer programs for such analyses. Model selection, testing goodness of fit, estimation of parameters, measures of association and methods for detecting sources of significance. Enroll Info: None Requisites: STAT 333 or graduate standing Course Designation: Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Fall 2018

STAT/M E 424 — STATISTICAL EXPERIMENTAL DESIGN 3 credits.

This course provides a systematic introduction to statistical design and analysis of experiments. Topics include: principles of randomization, blocking and replication, randomized blocking designs, Latin square designs, full factorial and fractional factorial designs and response surface methodology. Substantial focus will be devoted to engineering applications. Enroll Info: None Requisites: STAT 224, STAT 301, STAT 302, STAT 324, or STAT 371 Course Designation: Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Spring 2019

4 Statistics (STAT)

STAT/MATH 431 — INTRODUCTION TO THE THEORY OF PROBABILITY 3 credits.

Topics covered include axioms of probability, random variables, the most important discrete and continuous probability distributions, expectation and variance, moment generating functions, conditional probability and conditional expectations, multivariate distributions, Markov's and Chebyshev's inequalities, laws of large numbers, and the central limit theorem. Enroll Info: None Requisites: MATH 234 or 376 or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program Course Designation: Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Summer 2019

STAT 441 — INTRODUCTION TO BIOSTATISTICS FOR PHARMACY 3 credits.

Introduction to statistical methods used in pharmaceutical and related biomedical applications. Topics include exploratory data analysis of random samples, theory of probability and population reference distributions, statistical inference and hypothesis testing, regression methods, and survival analysis techniques. Enroll Info: Admission to School of Pharmacy, Pharm.D. prgm Requisites: Declared in Pharmacy program Course Designation: Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Spring 2011

STAT 456 — APPLIED MULTIVARIATE ANALYSIS 3 credits.

Theory and applications of multivariate statistical methods. Basic concepts and statistical reasoning which underlie the techniques of multivariate analysis. Ideas rather than derivations stressed although basic models discussed to give the student some feeling for their adequacy in particular situations. Acquaintance with and use of existing computer programs in the multivariate analysis area. Enroll Info: STAT 333 and a course in linear algebra (MATH 340 or MATH 341 or MATH 375) Requisites: STAT 333 and (MATH 340, MATH 341, or MATH 375) or graduate standing Course Designation: Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Fall 2018

STAT 461 — FINANCIAL STATISTICS 3 credits.

Stochastic models and statistical methodologies are widely employed in modern finance. The models and their inferences are very important for academic research and financial practices. This course will cover the financial stochastic models and their statistical inferences with applications to volatility analysis and risk management. It will introduce discrete models such as binomial trees and GARCH and stochastic volatility models as well as simple continuous models like the Black Scholes model. The main focus of the course will be on statistical inference, data analysis and risk management regarding these models. Enroll Info: STAT 333 or ECON 410 and one of

STAT/MATH 309 or STAT 311 or MATH/STAT 431 Requisites: None Course Designation: Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Fall 2017

STAT/COMP SCI 471 — INTRODUCTION TO COMPUTATIONAL STATISTICS 3 credits.

Classical statistical procedures arise where closed-form mathematical expressions are available for various inference summaries (e.g. linear regression; analysis of variance). A major emphasis of modern statistics is the development of inference principles in cases where both more complex data structures are involved and where more elaborate computations are required. Topics from numerical linear algebra, optimization, Monte Carlo (including Markov chain Monte Carlo), and graph theory are developed, especially as they relate to statistical inference (e.g., bootstrapping, permutation, Bayesian inference, EM algorithm, multivariate analysis). Enroll Info: None Requisites: (STAT/MATH 310 and STAT 333) or graduate/professional standing Course Designation: Breadth - Natural Science Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Spring 2019

STAT/COMP SCI/MATH 475 — INTRODUCTION TO COMBINATORICS 3 credits.

Problems of enumeration, distribution, and arrangement. Inclusion/exclusion principle. Generating functions and linear recurrence relations. Combinatorial identities. Graph coloring problems. Finite designs. Systems of distinct representatives and matching problems in graphs. Potential applications in the social, biological, and physical sciences. Puzzles. Problem solving. Enroll Info: None Requisites: (MATH 320, 340, 341, or 375) or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program Course Designation: Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: No Last Taught: Spring 2019

Statistics (STAT) 5

STAT 479 — SPECIAL TOPICS IN STATISTICS 1-3 credits.

This course will be used for curricular offerings for topics of interest to undergraduates. It will be offered as the need arises. Enroll Info: None Requisites: None Course Designation: Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Repeatable for Credit: Yes, unlimited number of completions Last Taught: Summer 2019

STAT/B M I 511 — INTRODUCTION TO BIOSTATISTICAL METHODS FOR PUBLIC HEALTH 3 credits.

Provides breadth in biostatistical methods for public health practitioners. Topics will include research design, data collection methods and database management, statistical computing and programming, descriptive statistics in tables and graphics, introductory statistical methods, and survey sampling. Enroll Info: None Requisites: Declared in the Master of Public Health (MPH) program. Not open to students who have taken STAT/B M I 541 or POP HLTH/ B M I 551 Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2018

STAT/COMP SCI/I SY E/MATH 525 — LINEAR OPTIMIZATION 3 credits.

Introduces optimization problems whose constraints are expressed by linear inequalities. Develops geometric and algebraic insights into the structure of the problem, with an emphasis on formal proofs. Presents the theory behind the simplex method, the main algorithm used to solve linear optimization problems. Explores duality theory and theorems of the alternatives. Enroll Info: None Requisites: MATH 320, 340, 341, 375, or 443 or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program Course Designation: Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2019

STAT/B M I 541 — INTRODUCTION TO BIOSTATISTICS 3 credits.

Course designed for the biomedical researcher. Topics include: descriptive statistics, hypothesis testing, estimation, confidence intervals, t-tests, chi-squared tests, analysis of variance, linear regression, correlation, nonparametric tests, survival analysis and odds ratio. Biomedical applications used for each topic. Enroll Info: Graduate standing. Students may not enroll if they have completed BMI 511 or BMI 551. Requisites: None Course Designation: Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2018

STAT/B M I 542 — INTRODUCTION TO CLINICAL TRIALS I 3 credits.

Intended for biomedical researchers interested in the design and analysis of clinical trials. Topics include definition of hypotheses, measures of effectiveness, sample size, randomization, data collection and monitoring, and issues in statistical analysis. Statistics graduate students should take STAT/B M I 641. Enroll Info: STAT/B M I 541 or equiv or cons inst Requisites: None Course Designation: Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2019

STAT/B M I 546 — PRACTICUM IN CLINICAL TRIAL DATA ANALYSIS AND INTERPRETATION 3 credits.

Provides practice in analysis and interpretation of existing datasets from national and international clinical trials in a variety of diseases. Students will develop a research question, review clinical protocols, and analyze available data to prepare a report. Enroll Info: STAT/B M I 541 or 572 STAT/B M I 542 or 641 Requisites: None Course Designation: Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Summer 2015

STAT/F&W ECOL/HORT 571 — STATISTICAL METHODS FOR BIOSCIENCE I 4 credits.

Descriptive statistics, distributions, one- and two-sample normal inference, power, one-way ANOVA, simple linear regression, categorical data, non-parametric methods; underlying assumptions and diagnostic work. Enroll Info: None Requisites: Graduate/professional standing Course Designation: Gen Ed - Quantitative Reasoning Part B Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2018

STAT/F&W ECOL/HORT 572 — STATISTICAL METHODS FOR BIOSCIENCE II 4 credits.

Polynomial regression, multiple regression, two-way ANOVA with and without interaction, split-plot design, subsampling, analysis of covariance, elementary sampling, introduction to bioassay. Enroll Info: Continuation of FSTAT 571 Requisites: STAT/F&W ECOL/HORT 571 or graduate/professional standing Course Designation: Level - Intermediate L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2019

6 Statistics (STAT)

STAT 575 — STATISTICAL METHODS FOR SPATIAL DATA 3 credits.

Detecting and quantifying spatial patterns and modeling in the presence of such patterns. Spatial Point Patterns: testing nonrandomness, simulating and characterizing patterns. Lattice Data: spatial autocorrelation and regression. Geostatistics: variograms, ordinary and universal kriging, inference, assessing assumptions, and extensions. Enroll Info: STAT 333 424; or Stat/Forest/HORT/F&W ECOL/STAT 572; or cons inst Requisites: None Course Designation: Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2015

STAT 601 — STATISTICAL METHODS I 4 credits.

Together with STAT 602, this course is to provide graduate students in statistics and related quantitative fields with a thorough grounding in modern statistical methods. The specific learning outcomes for the course are to understand data collection in context (how/why data were collected, key questions under study); explore data by effective graphical and numerical summaries; understand probability concepts and models as tools for studying

random phenomena and for statistical inference; analyze data using appropriate, modern statistical models, methods, and software; understand the statistical concepts underlying methods; develop the ability to interpret results and critically evaluate the methods used; communicate data analysis and key findings in context. This course will assume students have had at least one semester of calculus and one semester of linear algebra. Enroll Info: None Requisites: Graduate standing Course Designation: Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2018

#### STAT 602 — STATISTICAL METHODS II 4 credits.

Together with STAT 601, this course is to provide graduate students in statistics and related quantitative fields with a thorough grounding in modern statistical methods. The specific learning outcomes for the course are to understand data collection in context (how/why data were collected, key questions under study); explore data by effective graphical and numerical summaries; understand probability concepts and models as tools for studying random phenomena and for statistical inference; analyze data using appropriate, modern statistical models, methods, and software; understand the statistical concepts underlying methods; develop the ability to interpret results and critically evaluate the methods used; communicate data analysis and key findings in context. Enroll Info: STAT 601 Requisites: None Repeatable for Credit: No Last Taught: Spring 2019

#### STAT 605 — DATA SCIENCE COMPUTING PROJECT 3 credits.

The development of tools necessary for collecting, managing, and analyzing large data sets. Examples of techniques and programs utilized include Linux, R, distributed computing, powerful editor(s), git/github, and other related tools. Work in the class will be done in teams to research, develop, write, and make presentations related to a variety of data analysis projects. Enroll Info: Knowledge of R equivalent to STAT 303, 304, and 305. Requisites: Enrolled in Statistics MS or Statistics Visiting International Program Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No

#### STAT 609 — MATHEMATICAL STATISTICS I 3 credits.

Review of probability, random variables and vectors and their distributions, moments and inequalities, generating functions, transformations of random variables, sampling and distribution theory, convergence concepts for sequences of random variables, laws of large numbers, central limit and other limit theorems. Enroll Info: STAT/MATH 309 or 431, MATH 340, MATH 521, or equiv or cons inst Requisites: None Course Designation: Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: Yes, unlimited number of completions Last Taught: Fall 2018

#### STAT 610 — INTRODUCTION TO STATISTICAL INFERENCE 4 credits.

Conditioning, distribution theory, approximation to distributions, modes of convergence, limit theorems, statistical models, parameter estimation, comparison of estimators, confidence sets, theory of hypothesis tests, introduction to Bayesian inference and nonparametric estimation. Enroll Info: STAT/MATH 309 or STAT/MATH 431, MATH 521, MATH 340 or equiv or cons inst Requisites: None Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2019

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#### STAT 615 — STATISTICAL LEARNING 3 credits.

The development of a variety of mathematical theories and statistical concepts (1) to understand the properties of those models and methods used for the purpose of prediction from data or decision making from data, and (2) to criticize such models, methods and their consequences. Specifically, the theories and tools that will be developed will include complexity theory, Hilbert spaces, Gaussian processes, Variational Analysis, and concentration inequalities. Enroll Info: None Requisites: Declared in Statistics or Biometry graduate programs, or Statistics

Visiting International Program Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No

STAT 627 — PROFESSIONAL SKILLS IN DATA SCIENCE 1-3 credits.

This topics course is aimed at providing statistics graduate students with an understanding of and experience with important aspects of professional development in statistics, including skills with internet tools, sophisticated use of statistical languages (such as R) and other emerging topics. Enroll Info: Graduate student in Statistics Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: Yes, unlimited number of completions Last Taught: Spring 2019

STAT 628 — DATA SCIENCE PRACTICUM 1-3 credits.

This course is aimed at providing graduate students with an understanding of and experience with turning statistics concepts into practice through data science practicums inspired by realistic projects. Students will combine theory and methods expertise with communications skills to translate from a vaguely stated project description and complex data set into a concisely summarized analysis, including both written and graphical interpretation that can be used by decision makers in an organization. Enroll Info: Graduate student in Statistics Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: Yes, unlimited number of completions Last Taught: Spring 2019

STAT/I SY E/MATH/OTM 632 — INTRODUCTION TO STOCHASTIC PROCESSES 3 credits.

Topics include discrete-time Markov chains, Poisson point processes, continuous-time Markov chains, and renewal processes. Applications to queueing, branching, and other models in science, engineering and business. Enroll Info: None Requisites: (STAT/MATH 431, 309, STAT 311 or MATH 531) and (MATH 320, 340, 341, 375, 421 or 531) or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program Course Designation: Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Summer 2019

STAT/B M I 641 — STATISTICAL METHODS FOR CLINICAL TRIALS 3 credits.

Statistical issues in the design of clinical trials, basic survival analysis, data collection and sequential monitoring. Intended for statistics graduate students; those with medical backgrounds should take STAT/B M I 542. Enroll Info: Math/STAT/MATH 310 or equiv or cons inst Requisites: None Course Designation: Breadth - Natural Science Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2019

STAT/B M I 642 — STATISTICAL METHODS FOR EPIDEMIOLOGY 3 credits.

Methods for analysis of case-control, cross sectional, and cohort studies. Covers epidemiologic study design, measures of association, rates, classical contingency table methods, and logistic and Poisson regression. Enroll Info: Statistics 310 or equivalent or consent of instructor Requisites: None Course Designation: Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2018

STAT 679 — SPECIAL TOPICS IN STATISTICS 1-3 credits.

Special topics in statistics at the master's level. Subject matter varies. Enroll Info: None Requisites: None Course Designation: Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: Yes, unlimited number of completions Last Taught: Summer 2019

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STAT 681 — SENIOR HONORS THESIS 3 credits.

Enroll Info: None Requisites: Consent of instructor Course Designation: Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Honors - Honors Only Courses (H) Repeatable for Credit: No Last Taught: Fall 2018

STAT 682 — SENIOR HONORS THESIS 3 credits.

Enroll Info: None Requisites: Consent of instructor Course Designation: Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Honors - Honors Only Courses (H) Repeatable for Credit: No Last Taught: Spring 2019

STAT 698 — DIRECTED STUDY 1-6 credits.

Enroll Info: Graded on a Cr/N basis; requires cons inst Requisites: Consent of instructor Course Designation: Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: Yes, unlimited number of completions Last Taught: Summer 2019

STAT 699 — DIRECTED STUDY 1-6 credits.

Enroll Info: Graded on a lettered basis; requires cons inst Requisites: Consent of instructor Course Designation: Level - Advanced L&S Credit - Counts as Liberal Arts and Science credit in L&S Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: Yes, unlimited number of completions Last Taught: Summer 2019

STAT 701 — APPLIED TIME SERIES ANALYSIS, FORECASTING AND CONTROL I 3 credits.

Theory and application of discrete time series models illustrated with forecasting problems. Principles of iterative model building. Representation of dynamic relations by difference equations. Autoregressive integrated Moving Average models. Identification, fitting, diagnostic checking of models. Seasonal model application to forecasting in business, economics, ecology, and engineering used at each stage, which the student analyzes using computer programs which have been specially written and extensively tested. Enroll Info: STAT/ MATH 310 or equiv Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2018

STAT/MATH 709 — MATHEMATICAL STATISTICS 4 credits.

Introduction to measure theoretic probability; derivation and transformation of probability distributions; generating functions and characteristic functions; conditional expectation, sufficiency, and unbiased estimation; methods of large sample theory including laws of large numbers and central limit theorems; order statistics. Enroll Info: None Requisites: Consent of instructor Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2018

STAT/MATH 710 — MATHEMATICAL STATISTICS 4 credits.

Estimation, efficiency, Neyman-Pearson theory of hypothesis testing, confidence regions, decision theory, analysis of variance, and distribution of quadratic forms. Enroll Info: None Requisites: STAT/MATH 709 Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2019

STAT/COMP SCI/ISYE/MATH 726 — NONLINEAR OPTIMIZATION I 3 credits.

Theory and algorithms for nonlinear optimization, focusing on unconstrained optimization. Line-search and trust-region methods; quasiNewton methods; conjugate-gradient and limited-memory methods for large-scale problems; derivative-free optimization; algorithms for least-squares problems and nonlinear equations; gradient projection algorithms for bound-constrained problems; and simple penalty methods for nonlinearly constrained optimization. Enroll Info: Students are strongly encouraged to have knowledge of linear algebra and familiarity with basic mathematical analysis. Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2018

STAT 732 — LARGE SAMPLE THEORY OF STATISTICAL INFERENCE 3 credits.

Stochastic modes of convergence. Asymptotic theory of normed sums of random variables with applications to asymptotic normality of estimators. Methods for deriving limit distributions of nonlinear statistics. Asymptotic relative efficiencies. Asymptotic confidence regions and tests of hypotheses. Models of non-identically distributed or dependent random variables. Enroll Info: Either STAT/MATH 709, 731, or 831 or cons inst Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2018

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STAT/MATH 733 — THEORY OF PROBABILITY I 3 credits.

An introduction to measure theoretic probability and stochastic processes. Topics include foundations, independence, zero-one laws, laws of large numbers, convergence in distribution, characteristic functions, central limit theorems, random walks, conditional expectations. Enroll Info: Familiarity with basic measure theory (e.g. MATH 629 or 721) or concurrent registration in MATH 721 is strongly recommended. Requisites: Graduate/professional standing or member of the PreMasters Mathematics (Visiting International) Program Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: Yes, unlimited number of completions Last Taught: Fall 2018

STAT/MATH 734 — THEORY OF PROBABILITY II 3 credits.

Continuation of MATH/STAT 733. Possible topics include martingales, weak convergence of measures, introduction to Brownian motion. Enroll Info: None Requisites: Graduate/professional standing or member of the PreMasters Mathematics (Visiting International) Program Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: Yes, unlimited number of completions Last Taught: Spring 2019

STAT/B M I 741 — SURVIVAL ANALYSIS THEORY AND METHODS 3 credits.

Theory and practice of analytic methods for censored survival data, including nonparametric and parametric methods, the proportional hazards regression model, and a review of current topics in survival analysis. Enroll Info: STAT 610 or 710 or equivalent or consent of instructor Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2018

STAT 760 — MULTIVARIATE ANALYSIS I 3 credits.

Multivariate normal distribution, estimation of mean and covariance matrix; Wishart distribution; distribution of partial and multiple correlation coefficients; Hotelling's T-squared, principal components. Enroll Info: Cons inst or STAT/MATH 710 Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2017

STAT 761 — DECISION TREES FOR MULTIVARIATE ANALYSIS 3 credits.

Tree construction, including finding splits, tree-pruning and error estimation. Categorical predictor variables, missing or censored data, prior class-probabilities, and unequal misclassification costs. Selection bias. Comparison with other statistics and machine-learning methods. Extensions to piecewise linear and non-least squares regression models. Enroll Info: None Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2018

STAT/B M I 768 — STATISTICAL METHODS FOR MEDICAL IMAGE ANALYSIS 3 credits.

Introduce key statistical methods and concepts for analyzing various medical images. Analyze publicly available and student/instructor supplied imaging data using the most up-to-date methods and tools. Aimed at graduate student and researchers with strong quantitative background. Enroll Info: Two semesters of statistics courses

(STAT/ MATH 309-310), or the consent of instructor. The course is self-contained. The knowledge of calculus and linear algebra is needed Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2019

STAT 771 — STATISTICAL COMPUTING 3 credits.

The design of statistical software including special techniques for probability distributions, methods of simulation of random processes, numerical methods for linear models and multivariate analysis, and methods for nonlinear models. Enroll Info: STAT 333 or equiv or cons inst Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2018

STAT/ECON/GEN BUS 775 — INTRODUCTION TO BAYESIAN DECISION AND CONTROL I 3 credits.

Common sampling models in business and economic problems, information from data, likelihood function of parameters, choices of models, Bayes' Theorem, subjective basis for probability, sequential nature of Bayesian inference, prior and posterior distributions of parameters in binomial, poisson, exponential and normal populations, comparison of two normal distributions, predictive distributions, decision theory, utility, risk aversion, extensive form of analysis, two-action problems, point estimation, best population problems, economics of sampling. Enroll Info: None Requisites: STAT 609 or STAT/MATH 709 Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2018

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STAT 801 — ADVANCED FINANCIAL STATISTICS 3 credits.

Statistical theory and methodology for modern financial data. Topics include financial stochastic models based on time series and stochastic calculus, modern statistical inference, and statistical learning for financial data as well as their applications to financial problems. Enroll Info: None Requisites: STAT 701 Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No

STAT/MATH 803 — EXPERIMENTAL DESIGN I 3 credits.

Summary of matrix algebra required, theory of estimable functions, incomplete blocks, balanced incomplete block designs, partially balanced incomplete block designs. Enroll Info: None Requisites: Graduate/professional standing or member of the PreMasters Mathematics (Visiting International) Program Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2017

STAT 809 — NON PARAMETRIC STATISTICS 3 credits.

Statistical procedures valid under unrestrictive assumptions; sign test; confidence intervals; efficiency comparisons; signed rank procedures; Walsh sums; point estimators; two sample rank tests; zeros, ties, and other problems of discrete data; order statistics; Winsorized and truncated point estimators and connection with gross error models; permutation procedures; combinatorial problems, and computer applications. Enroll Info: STAT/MATH 710 or cons inst Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2019

STAT 811 — SAMPLE SURVEY THEORY AND METHOD 3 credits.

Simple random sampling; systematic sampling; probability sampling; stratified sampling; subsampling with units of equal and unequal size; double sampling; multi-stage and multi-phase sampling; ratio and regression estimates; model-based and model-assisted approaches; variance estimation; non-response. Enroll Info: Stats 610 or 710 or equiv Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2017

STAT/MATH 833 — TOPICS IN THE THEORY OF PROBABILITY 3 credits.

Advanced topics in probability and stochastic processes. Enroll Info: None Requisites: Graduate/professional standing or member of the PreMasters Mathematics (Visiting International) Program Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: Yes, unlimited number of completions Last Taught: Spring 2019

STAT 834 — EMPIRICAL PROCESSES AND SEMIPARAMETRIC INFERENCE 1-3 credits.

Empirical process methods in statistics; semiparametric models; stochastic convergence in metric spaces; Glivenko-Cantelli and Donsker theorems; entropy calculations; bootstrapped empirical processes; functional delta method; Z-estimators; M-estimators; rates of convergence; semiparametric efficiency; semiparametric estimating equations; nonparametric maximum likelihood. Enroll Info: Math/STAT/ MATH 710 or Math/Stat 832 or cons inst Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2019

STAT 840 — STATISTICAL MODEL BUILDING AND LEARNING 3 credits.

Theory of reproducing kernel Hilbert spaces in statistical model building; bounded linear functionals and representer theory; smoothing splines; ANOVA spines; degrees of freedom for signal and the bias-variance tradeoff; Bayesian confidence intervals; model selection. Enroll Info: STAT/MATH 710 or cons inst Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2015

STAT 841 — NONPARAMETRIC STATISTICS AND MACHINE LEARNING METHODS 3 credits.

Statistical function estimation and classification; reproducing kernel machines, support vector machines; high dimensional model selection and estimation; Bayesian, empirical Bayesian interpretation of nonparametric learning methods; log density ANOVA and graphical models; tree ensemble methods including bagging, boosting, and random forest. Enroll Info: STAT 840 Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2015

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STAT 849 — THEORY AND APPLICATION OF REGRESSION AND ANALYSIS OF VARIANCE I 3 credits.

Theory and applications of the general linear model; graphical methods; simultaneous inference; regression diagnostics; analysis of variance of fixed, random and mixed effects models; ANCOVA: violations of assumptions. Enroll Info: STAT/MATH 310, 312 or 314 Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2018

STAT 850 — THEORY AND APPLICATION OF REGRESSION AND ANALYSIS OF VARIANCE II 3 credits.

Theory and applications of the general linear model; graphical methods; simultaneous inference; regression diagnostics; analysis of variance of fixed, random and mixed effects models; ANCOVA: violations of assumptions. Enroll Info: STAT 849 Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2019

STAT 860 — ESTIMATION OF FUNCTIONS FROM DATA 3 credits.

Statistical and approximation theoretic methods of estimating functions and values of functionals from experimental data; experimental design and data analysis problems that arise as problems in approximation theory; convergence theorems; ill-posed inverse problems; Banach and Hilbert space penalty functionals. Enroll Info: STAT/MATH 710 or cons inst Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Fall 2016

STAT/COMP SCI/E C E 861 — THEORETICAL FOUNDATIONS OF MACHINE LEARNING 3 credits.

Advanced mathematical theory and methods of machine learning. Statistical learning theory, Vapnik-Chevronenkis Theory, model selection, high-dimensional models, nonparametric methods, probabilistic analysis, optimization,

learning paradigms. Enroll Info: None Requisites: E C E/COMP SCI 761 or E C E 830 Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2019

STAT/B M I 877 — STATISTICAL METHODS FOR MOLECULAR BIOLOGY 3 credits.

Develop statistical problems in gene mapping, high through putomic data analysis, phylogenetics and sequence analysis. Introduce ideas of key methods using published data. Statisticians learn statistical basis for research methodology. Collaboration among students and with biologists is encouraged through projects. Enroll Info: STAT/MATH 309-310 or 609-610 or 709-710 or equiv, or cons inst. GENETICS 466 or equiv strongly recommended Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2019

STAT 990 — RESEARCH 1-12 credits.

Content varies. Enroll Info: None Requisites: Consent of instructor Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: Yes, unlimited number of completions Last Taught: Summer 2019

STAT 992 — SEMINAR 1-3 credits.

Content varies. Enroll Info: None Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: Yes, unlimited number of completions Last Taught: Spring 2019

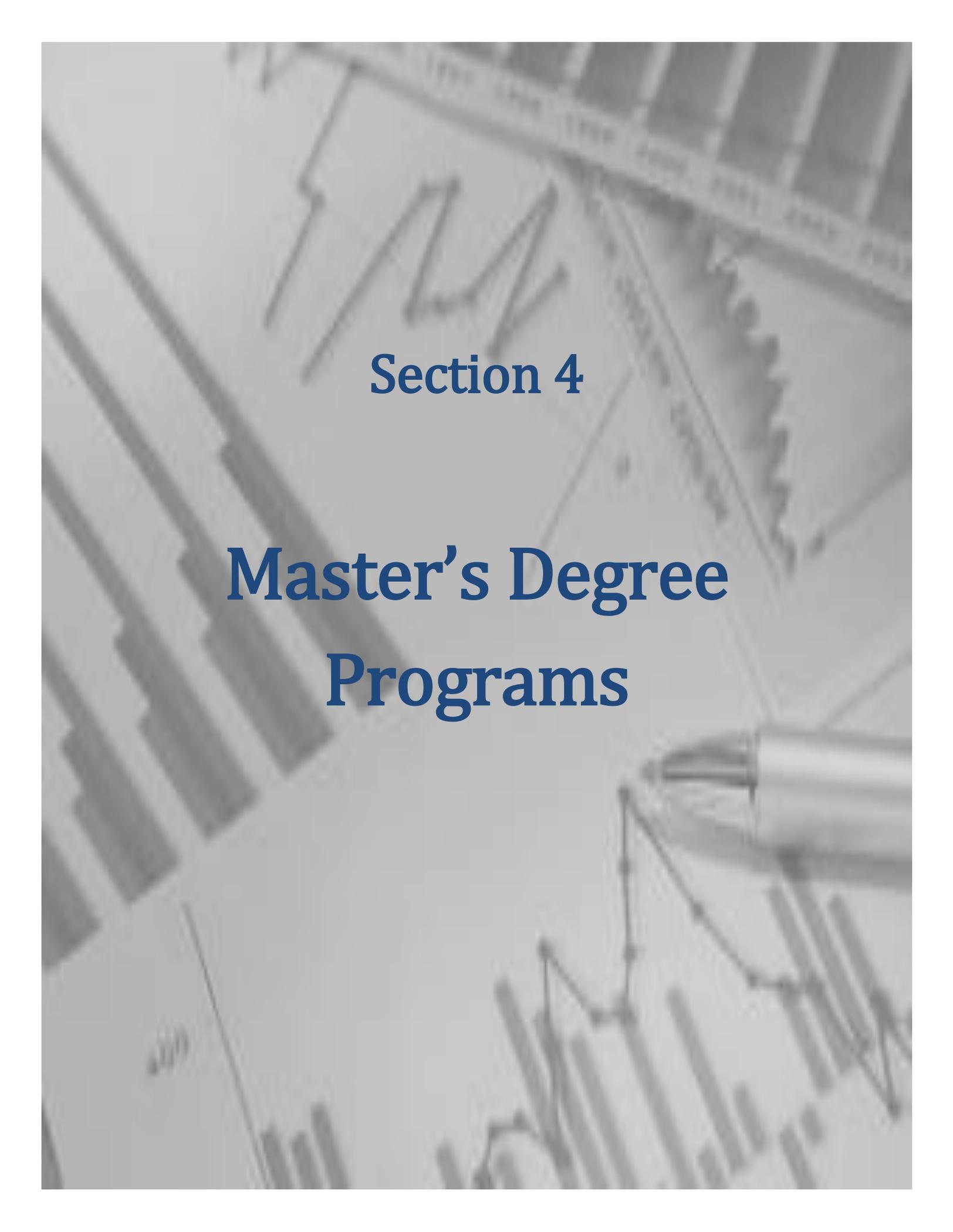
STAT 998 — STATISTICAL CONSULTING 3 credits.

Consulting apprenticeship. Enroll Info: 9 cr in statistics and cons inst Requisites: Graduate/professional standing Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement Repeatable for Credit: No Last Taught: Spring 2019

## How to: add & enroll in classes

“Add a class” and “enroll in a class” follow the same steps. “Add” is often used to describe picking up another class after you have already enrolled in the majority of your classes for a term.

Please visit the Office of the Registrar’s website: <https://registrar.wisc.edu/howto-add-enroll/>

The background of the page is a grayscale image of architectural blueprints. The blueprints show various geometric shapes, lines, and text, including the word 'WALL' and 'DOOR'. A pen nib is visible in the lower right corner, pointing towards the center of the page.

## Section 4

# Master's Degree Programs

# BIOMETRY MS DEGREE REGULATIONS

University of Wisconsin-Madison – Department of Statistics

Revised 05/01/14 - Effective for students entering the program in Fall 14 or later

## A) General

Graduate School entrance, residence and general requirements must be fulfilled. Specific requirements are listed below. The background courses in biology are a bare minimum; it is anticipated that almost all successful applicants will have a strong background in some area of biological science. Under extenuating circumstances, students may appeal to the Executive Committee for exemptions to prerequisites or requirements.

## B) Prerequisites

1. Undergraduate calculus (Math 221, 222, and 234 or equivalent).
2. Course in statistics (For/Hort/Stat 571 and 572 or equivalent one year sequence).
3. Background courses in biology (e.g. Bot 130, Zool 101 & 102, Biology 151 & 152).

## C) Required coursework

Each student must complete 30 credits of required courses as enumerated in the four categories below. At least 16 of these credits must be earned while the student is enrolled at UW-Madison. Courses used to satisfy requirements must be taken for a letter grade and passed with a grade of B or higher. A minimum of 9 of the 30 credits must be completed while enrolled in the Program. A grade of B or better must be received in any course used to fulfill the required and elective course requirements.

1. Six credits of Intro Math Stat (Stat 309-310 or 311-312, or equivalent one-year sequence).
2. Six credits in Statistics courses numbered above 600 (excluding 641, 698, 699, 756, and 990).
3. Three additional credits in Stats courses numbered at the 500 level or above (excluding 571, 572, 698, and 990) which are specifically designed for graduate students. Credits from suitable quantitative courses taught in other (non-biological) departments (e.g. mathematics) may be substituted.
4. Nine credits in biological courses numbered 300 or above (excluding introductory statistics courses and research) so that: at least six credits are taken in a single discipline or in closely related disciplines, at least six credits are taken at the 700 level and above, or in courses specifically designated by the relevant department as “graduate” courses, and a maximum of three credits are obtained in statistically oriented courses (e.g. MAS 610, Agron 770 or Agron 811).

## D) Consulting experience

Students must complete three credits of Statistics 699 (Directed Study -- S/U grade) by consulting in the CALS Statistical Consulting Service. (These credits cannot be used for meeting requirements in section C.) This consists of supervised consulting and will provide exposure to statistical issues surrounding a broad range of problems in biology, provide awareness of practical issues such as experiment management, data collection, data recording, etc., and provide experience assisting others in designing experiments and analyzing data. One credit is roughly equivalent to a single project that can be completed in one semester, and involves about 20-30 hours of effort, including meetings with consulting clients, background research, data analyses, etc.

## **E) Biometry project**

Each student must complete a project that represents an original contribution to biometry. Examples of such contributions may include a novel analysis of some interesting biological data, the creation and evaluation of a useful experimental design, or the development and/or comparison of statistical methods. The project results are to be presented in a manuscript with emphasis on the integration of statistics and science. The manuscript should be of a quality that can lead to a publication. This requirement will be formalized by enrolling in at least three credits of "Research" (e.g. Hort 990) in the department of one of the co-advisors. (These credits cannot be used for meeting requirements in section C.) For a student seeking a double M.S., a joint thesis would satisfy this requirement.

## **F) Final oral examination**

Upon completion of course work and project, a three-member committee composed of the student's co-advisors plus an additional faculty member from Statistics will examine the student orally. This examination will cover the student's project and course work. For a student seeking a double M.S., a combined examination is acceptable. If failed, the oral examination may be repeated once.

At least three weeks prior to the final oral exam, you must fill out an MS Warrant Form with the Graduate Coordinator in Statistics. Please pick up the warrant from the Graduate Coordinator on the day of your oral exam.

## **G) Requirements for students seeking more than one degree**

1. Students seeking two M.S. degrees (both research degrees) must recognize Graduate School requirements that at most 25% of the credits used for one degree can be applied towards the other. Students pursuing a professional degree may seek a Biometry M.S. but may not use courses required for a professional degree to count towards the Biometry M.S. degree.

2. There are no Graduate School limitations on applying credits towards both a M.S. and a Ph.D. degree. Credits used to satisfy the Biometry M.S. can also be used towards satisfaction of requirements for a Statistics minor, subject to approval by the appropriate minor certification committees. It should be noted that the Graduate School will not grant dissertator status on the Ph.D. program until completion of all requirements for the Biometry M.S. degree except for the final project. Upon reaching dissertator status, the student will register for research or thesis credits (they will have completed all coursework). The student should make application for both the Master's and PhD degrees during the semester in which they defend.

# MASTER'S DEGREE REGULATIONS

University of Wisconsin-Madison – Department of Statistics

Revised May 1, 2014 - Effective for students entering the program in Summer/Fall 2014 or later

The objective of the Master's degree (MS) requirement is to satisfy the Department that the candidate has the potential to be a practicing statistician, it being understood that a practicing statistician must also have a proper grasp of statistical theory.

The Master's degree and PhD programs are distinct. The student can obtain a PhD without first obtaining a Master's degree. A Master's degree is regarded as evidence of having the skills of a practicing statistician. It confers a specific status on the recipient and it is hoped that most students will obtain a Master's degree, regardless of whether or not they proceed to a PhD.

The requirements for a Master's degree in Statistics are:

- (a) Satisfaction of University requirements.
- (b) Adequate course performance. A grade of B or better must be received in any course used to fulfill the required and elective course requirements.
- (c) Passing a competency test of the candidate's potential as a practicing statistician (again, bearing in mind that this may include testing of theoretical competence).

## 1. Course Requirements (30 credits)

- Stats 609 (3 cr) or 709 (4 cr)
- Stats 610 or 710 (4 cr)
- Stats 849 (3 cr)
- Stats 850 (3 cr)
- Stats 998 (3 cr)
- Six or more elective credits from statistics courses numbered 600 or higher (with the exception of 609, 610, 699, 709, 710, 849, 850, or 998)
- The following will also be allowed to count towards the 30-credit minimum for the Master's degree (with permission of the Curriculum and Degree Requirement Committee)
  - Up to six credits from statistics courses numbered 327, 349, 351, 411, 421, 456, or 471 (students may not count both 456 and 760, 349 and 701, or 471 and 771)
  - Up to six credits of research (699)
  - Up to six credits of graduate courses in other departments complementary to the student's interest areas
  - Up to six credits of statistics coursework at the 600-level or above, taken while an undergraduate or special student at UW-Madison, provided that the work was completed no more than five years prior to admission to the Master's degree (with permission of the chair of the Master's Examination Committee). If the work was completed as a special student, the student must also pay the difference between special student and graduate tuition.
- If completing the Biostatistics option, six credits must include three credits of Stat 641 and three credits of either Stat 642, 741, or 877.

## 2. Competency Test

The Master's degree competency test (examination) will be the responsibility of an Examination Committee of faculty members (usually four) appointed by the faculty. Typically, the appointment will be for two years and half the committee will be reappointed each year to provide overlap and continuity.

After the candidate successfully completes 998 or the semester in which 998 is taken, the candidate must demonstrate to the Examination Committee the potential to be a practicing statistician. The committee is given latitude to decide the details on each occasion as to how this will be done. However, the general form of the competency test (examination) will be as follows:

- (a) The candidate will be presented with one or more written problems or projects and asked to provide a brief written report involving a suitable statistical analysis seven days later.
- (b) The candidate will meet briefly with the clients related to the projects early in the examination period.
- (c) After a further period of time, not to exceed ten days, the candidate will go before the Examination Committee for an oral examination based on questions arising from the above problems or projects. It is understood that the area of questioning may be extended to cover additional aspects of the candidate's theoretical or practical background on which satisfaction of competence is considered desirable by the committee.

A candidate may attempt the competency test at most twice. If a candidate initially attempts the MS degree exam in the fall and does not pass, a second attempt must be made in the following spring or fall. If a candidate initially attempts the MS degree exam in the spring and does not pass, a second attempt must be made in the following fall or spring. A candidate desiring to take this exam must register with the Examination Committee prior to the exam date. Picking up the exam constitutes an attempt *regardless of whether or not the examination is submitted for grading*.

### 3. Graduate School Higher Learning Commission Requirements

- A Master's degree requires 30 credits (not including audits or pass/fail). *[Minimum Graduate Degree Credit Requirement]*
- At least 16 of these credits must be taken in-residence at UW-Madison. *[Minimum Graduate Residence Credit Requirement]*
- Half of the degree course work (15 credits out of 30 total credits) must be completed in Statistics courses numbered 600 or higher (which our department considers to be graduate courses). *[Minimum Graduate Course Work (50%) Requirement]*
- With program approval, students are allowed to count no more than 9 credits of graduate course work from other institutions toward the graduate degree credit and graduate course work (50%) requirements. Course work earned five or more years prior to admission to a Master's degree is not allowed to satisfy requirements. *[Prior Course Work Requirement]*
- With program approval, up to 6 statistics credits from a UW-Madison undergraduate degree at the 600 level or above are allowed to count toward minimum graduate degree credits. Course work earned five or more years prior to admission to a Master's degree is not allowed to satisfy requirements. *[Prior Course Work Requirement]*
- With program approval, and payment of the difference between special and graduate tuition, up to 15 statistics credits completed at UW-Madison while a University Special Student at the 300 level or above are allowed to count toward minimum graduate degree and graduate residence credit requirements. Of these credits, those at the 700-level or above may also count toward the minimum graduate course work (50%) requirement. Course work earned five or more years prior to admission to a Master's degree is not allowed to satisfy requirements. *[Prior Course Work Requirement]*

## MS Exam, Spring 2019

**Schedule:** Handed out: 12:30 pm, Tuesday, April 9, 2019  
Due: 11:00 am, Tuesday, April 16, 2019  
Oral exams: Friday, April 19, 2019

### Notice of intent:

If you intend to take the exam this semester, please so indicate on or **before February 15<sup>th</sup>** by stopping in the Administrative office in Room 1220 MSC to sign up for the exam in person. **Generally, no more than twelve students may take the MS exam each semester.** **If you sign up for this exam the last day to cancel will be Friday, April 5<sup>th</sup>.**

**Committee:** R. Chappell (Chair), H. Kang, M. Newton, M. Wang

**Format:** The exam consists of problems similar to those that may later be encountered on the job. The exam has two parts: (1) preparing one or more written reports and (2) answering oral questions of the Master's Exam Committee. Copies of earlier exam problems are available for reading in Administrative office (Room 1220.)

### Written reports:

There should be a separate report for each problem on the exam. Each report should be directed to the "client" whose problem you are attempting to solve and should be limited to at most 12 pages, including computer output, tables, and figures. It is extremely important that each report be *concise, well-written, and thorough*. However, you need to ensure that your report contains the appropriate amount of "hard" statistical information. Finding the balance between too much and too little 'hard' statistical information is a key part of report preparation.

### Oral exams:

The oral questioning provides an opportunity to explore various points in greater depth and to clear up questions such as those relating to choice of models, priorities and analyses not reported. Questioning is not necessarily limited to just those topics covered in the written portion of the exam. Please sign up for a time for the oral exam when you pick up the exam.

### Taking the exam:

Picking up a copy of the exam constitutes "taking the exam." If a student fails the exam on the first attempt, the following options are available:

- If you fail the exam in the fall, the second and final attempt must be made the following spring or the following fall.
- If you fail the exam in the spring, the second and final attempt must be made the following fall or the following spring.
- Failure to turn in the reports by the indicated time will constitute failure on the exam.
- Errata sheets will be accepted by the committee at the time of the oral exam. Obviously, such errata should be kept to a minimum.

### Computer facilities:

The departmental computers are intended as the primary computers for this exam. The data file(s) will be accessible on all departmental computers. Many of the data sets from earlier M.S. exams are available on the departmental computers in subdirectories of /p/stat/Data/MS.exam/. Use of non-departmental computer systems is allowed for the exam but you will have to make your own arrangements for copying data and accessing the necessary software.

### Intent to graduate:

If you hope to graduate with the M.S. this semester, you need to inform John of this when you sign up for the exam, so that he can file the appropriate form with the Graduate School.

**University of Wisconsin-Madison**  
**Department of Statistics**  
Rm 1220 MSC  
1300 University Avenue  
Madison WI 53706-1685  
(608) 262-2598

April 9, 2019

TO: Master's Exam Candidates  
FROM: Master's Exam Committee (R. Chappell, chair, H. Kang, M. Newton, M. Wang)  
SUBJECT: Master's Examination, Spring 2019

Schedule: Handed out: 12:30 p.m., Tuesday, April 9, 2019  
Due: 11:00 a.m., Tuesday, April 16, 2019  
Oral exams: Friday, April 19, 2019

**The examination should be treated as confidential and candidates should ensure that no one else reads it until after the oral examinations are completed on April 19<sup>th</sup>. In addition, the examination should not be discussed with anyone else until that time, unless permission is obtained from the committee to do otherwise.** The only exceptions to this rule involve members of the exam committee. Please sign the attached honor code form on the day you pick up the exam (April 9) and then again at your oral exam on April 19<sup>th</sup> (there are two lines on the form to be signed on the different dates).

Questions regarding the exam should be addressed to Rick Chappell. He can be reached through email as "chappell." Outside of client interviews, any question should be addressed to the committee chair, for fairness purposes and to avoid extra burden on the clients. Questions to clarify the problem description or data entry will be communicated to the client by the committee chair and answers will be forwarded to all students if necessary.

There are two problems: (1) Identifying Factors Affecting Recruitment of Walleyes in Northern Wisconsin Lakes (2) Polygenic Scores and their Associations with Facial Attractiveness. Submit one report for each problem. The reports are to be aimed at the client. Each report should not exceed 12 pages (double-spaced) including the title and summary. There should not be a full page set aside as a title page; one to two lines of title should be followed immediately by the rest of your report. The reports must be clear and readily legible, with the body of the text double-spaced and in a font that produces no more than 32 lines of text per page (for example, **Word**, with 1.5 line spacing, standard width, and various 11pt fonts; or various **LaTeX** formats using 11pt or 12pt). Figure and table captions may be single-spaced. A very brief Appendix may be included with each problem, and is not counted toward the 12-page limit. Be sure to number all the pages in your report.

In general, caution should be exercised in deciding what to include in the appendices. Information critical to your major analyses should be presented in the main body of the report. A few extra graphs and tables can properly be included in the appendices, but keep in mind that lengthy appendices will not generally receive as much attention as part of the report.

You will be given a code name by the graduate coordinator, John Schuppel, when you pick up your examination. Put this code on your reports. Your name should NOT appear on the reports.

Holly Embke, the client on the Walleye problem, will be available for appointments on Wednesday, April 10, between 9:00 and 10:00 AM in 1219 MSC.

Qiongshi Lu, the client on the Facial Attractiveness problem, will be available for appointments on Thursday, April 11, from 1:00 to 2:00 PM in Room 1219 MSC.

Prepare a written list of questions on each problem and give this list to the client at the beginning of the session. It is understood that an answer to any question may cause you to follow up with questions in an order that differs from the one prepared ahead of time. Indeed, you may think of questions that had not occurred to you before. Make a photocopy of your lists of questions and hand them in as an Appendix to your report. Be sure your name does not appear on these lists.

**Turn in the original of each report along with three photocopies (four total). Note that your reports are due by 11:00 am on Tuesday, April 16<sup>th</sup>.** Keep a copy for yourself. Make sure that all photocopies are clearly readable. Check especially the graphs and tables. It is your responsibility to ensure that you have sufficient time for photocopying. Recall that the departmental photocopiers should not be used for large jobs. You are encouraged to arrange for your own copying. Give yourself plenty of time!

**Exams are due on time.** Late exams will not be accepted, unless accompanied by a written explanation regarding the reason(s) for being late. Exams handed in late will be graded, and an oral exam will be offered, so that students can obtain feedback. However, if the exam is handed in late, the student will fail the MS exam. Under very extenuating circumstances, the student may appeal the ruling that the MS exam is automatically failed due to lateness of handing in the exam. Such an appeal, if it is desired, should be included with the written explanation regarding the reason(s) for being late. The Committee will rule on the appeal prior to conducting the oral exams.

The data for the exam are available by going to the Statistics Department website at [www.stat.wisc.edu](http://www.stat.wisc.edu). Login with NetID login button on the right side and then MS Exam Spring 2019 button to access the files.

During the oral exam you will answer questions from committee members. Bring a copy of your reports and get prepared for questions.

**REMEMBER TO BRING FOUR COPIES TO JOHN BY 11:00 AM ON  
04/16/19!**

## **COMPLETING YOUR MASTER'S DEGREE**

Please visit: <https://grad.wisc.edu/current-students/masters-guide/#what-you-need-to-do>

## **Application to PhD Program in Statistics for Students Currently Enrolled in the Department's MS Program**

**General Principles:** Students who successfully complete our MS program (or are very close to completion of the Program) and demonstrate sufficient aptitude to complete our PhD Program are encouraged to continue toward the PhD in our Department. Any necessary and appropriate exemptions to the timing deadlines in our Criteria for Satisfactory Progress will normally be granted. Students who already had a guarantee of support in place as an MS student will be considered for an extension to the guarantee, but new guarantees are not normally granted.

**Timing:** Applications for PhD student status beginning in the fall semester should be received by no later than January 1, and a decision will be made before the end of the spring semester. No applications to begin in the summer or spring term will be accepted.

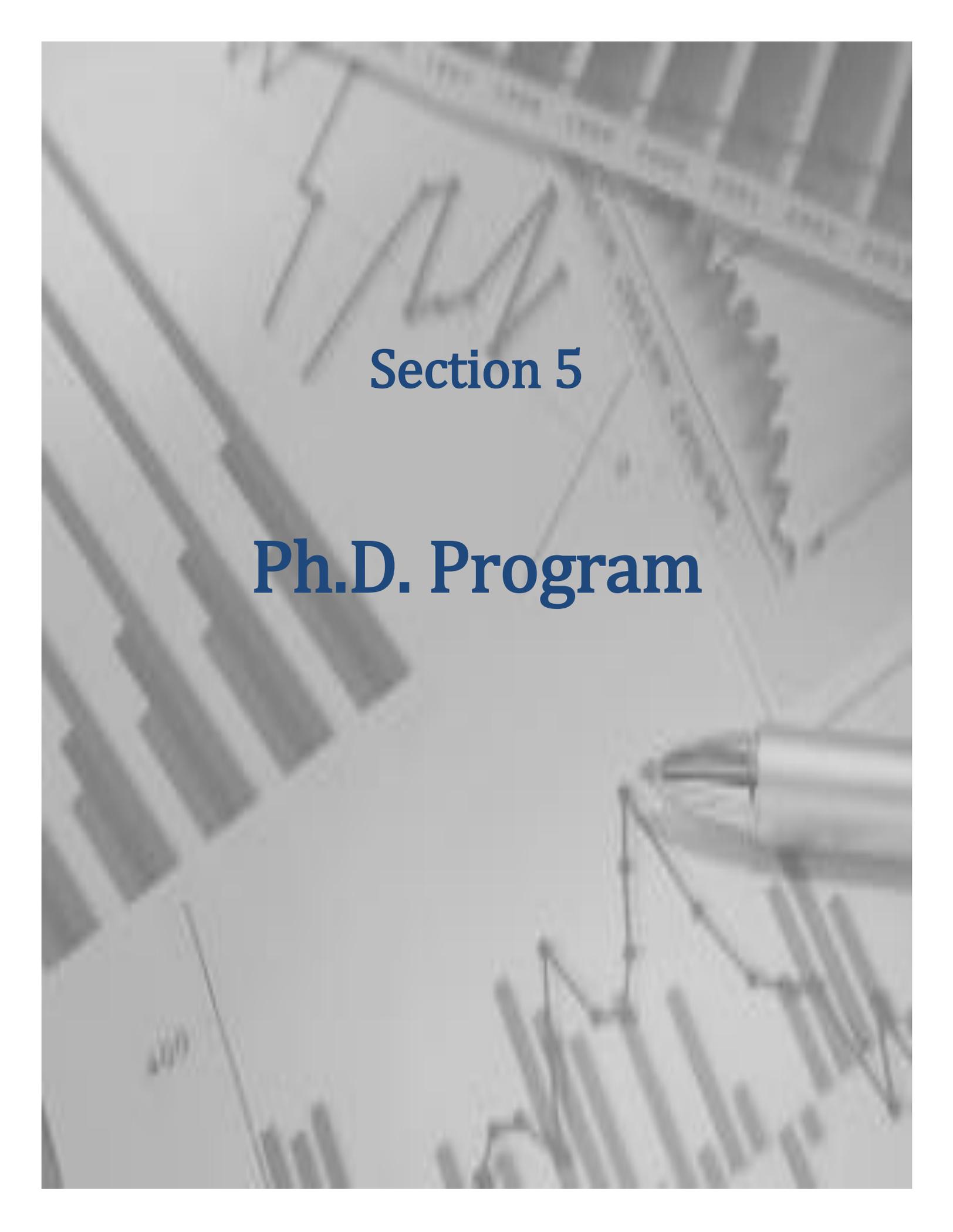
Please note that students must already hold PhD student status in order to take the Qualifying Exam, based on the term for which they have applied and been admitted. This means that students who are accepted into the PhD program beginning with the fall semester are not eligible to take the Qualifying Exam until the following summer.

**Application Procedure:** A student currently completing the MS degree in our Department wishing to pursue the PhD here needs to complete the following. All letters should be submitted to the Graduate Student Coordinator.

- 1) Write a letter addressed to the chairperson of the Graduate Admissions Committee that addresses the following issues:
  - a. The student's exact status in the MS degree program. (Is s/he finished or what is left to be completed?)
  - b. The student's goals in seeking the PhD. (Any special interests or possible research objectives should be mentioned.)
  - c. (Optional) Any other information that might be helpful for the committee (not likely to be found in the student's departmental folder).
- 2) (Optional but recommended) Up to two letters of recommendation from UW faculty attesting to the student's promise for the PhD.

**Decision Process:** The Graduate Admissions Committee will consider the application. It should be noted that successful completion of the MS degree is not an entitlement to continue for the PhD. Each student's potential for success in the PhD program will be carefully evaluated. Requests will be made for additional material if this might be helpful. If the student had a guarantee of support already in place as an MS student, the decision will include a determination of whether or not the guarantee will be continued for a period of time (normally an additional three years) as a PhD student.

All questions relative to this process should be addressed to the Chairperson of the Graduate Admissions Committee and/or the Graduate Student Coordinator.

The background of the slide is a grayscale image of architectural blueprints. The blueprints show various geometric shapes, lines, and text, including the word 'SECTION' and the number '400'. A pen nib is visible in the lower right corner, pointing towards the center of the page.

## **Section 5**

# **Ph.D. Program**

# PhD DEGREE REGULATIONS

University of Wisconsin-Madison – Department of Statistics

Adopted April 2017 - Effective immediately

## 1. Course Requirements (51 credits)

- Statistics 709 and 710 (Mathematical Statistics)
- Math/Statistics 733 (Measure Theoretic Probability) **OR** Stat 771 (Statistical Computing)
- Statistics 849 and 850 (Statistical Methods and Applications)
- Statistics 998 (Statistical Consulting)
- **Eighteen or more elective credits from statistics courses** numbered 641, 642, or 700 or higher (with the exception of 609, 610, 699, 709, 710, 849, 850, 990, or 998). If 992 is used to fulfill the elective requirement, a maximum of 9 credits can be counted, with a maximum of three credits on any one topic. If a student takes either 733 or 771 as a required course, then the other of those two may be taken as an elective.
- **Breadth requirement** (option A, B, or C). Specific requirements can be found in section 5 of this document.
- The following may also be allowed to count towards the 51-credit minimum for the PhD degree:
  - Up to six credits of graduate courses in other departments complementary to the student's interest areas (with permission of the student's advisor).
  - Up to six credits of statistics coursework at the 600-level or above, taken while an undergraduate or special student at UW-Madison, provided that the work was completed no more than ten years prior to admission to the PhD degree (with permission of the student's advisor). If the work was completed as a special student, students must also pay the difference between special student and graduate tuition.
- Sufficient credits of Statistics 990 to reach the 51-credit minimum.
- If completing the Biostatistics option, 12 credits of the required 18 elective credits must include three credits of Stat 641, six credits from this list: (Stat 642, 741, and 877), and three credits selected from this list: (Genetics 466, Zoology 570, Biocore 303, Population Health 795, or Medical Sciences 622-721).

A grade of B or better must be received in any course used to fulfill the required and elective course requirements.

With the approval of the Curriculum and Degree Requirements Committee, up to nine credits of graduate course work taken elsewhere or equivalent material learned elsewhere may be used to fulfill the above requirements. Approval must be requested within the first two semesters of registration as a graduate student in the department.

## 2. Qualifying Examination

The student must pass the PhD Qualifying Examination within six semesters from the first fall semester of registration as a graduate student in the Department. The examination may be attempted a maximum of two times.

Master's degree students who successfully complete the Department's MS Degree Requirements within four semesters and are then admitted to the PhD program must pass the PhD Qualifying Examination within four semesters after entering the PhD program.

The examination is a written exam and is based on a syllabus made available by the PhD Qualifying Examination Committee. Students choose whether they will do Option A (based on the material of 709 and 710), or Option B (based on the material of 609, 610, 849, and 850).

The Qualifying Examination is generally given during the last week of August. Occasionally it may be offered right before the start of the Spring semester also, although in recent years there has not been enough interest from students to hold an exam at that time.

Passing or failing this examination will not affect the student's candidacy for the Master's degree.

### 3. Preliminary Examination

The student must pass an oral preliminary examination on a topic selected with the approval of the student's advisor. The examination is given by a committee of at least four faculty members appointed by the advisor. Prior to the actual examination, the student must prepare a 15 to 20 page paper outlining the area to be covered. The paper must be written in a clear style with consistent notation. The paper should indicate the scope and depth of the student's dissertation research, and should be submitted to the committee at least one week prior to the examination.

The examination typically consists of a 20 to 30 minute talk by the student and questions by the committee. The committee may ask questions during and after the talk. The student may consult notes, but is expected to display a mastery of the subject matter as defined by the list of references. The scope of the questions will normally be directed to the subject matter of the paper but may, by natural extension, include any relevant topic. The student's advisor may not serve as chair of the committee, but does appoint the chair.

At least three weeks before the scheduled Preliminary Examination, students should contact the graduate coordinator, who will request a preliminary warrant from the Graduate School. Upon review, the Graduate School will return the warrant to the Graduate Coordinator for committee members to sign after the examination.

### 4. Dissertation

The primary requirement for the PhD degree is the completion of a significant body of original research and the presentation of this research in a dissertation. The research is carried out under the guidance of a member or members of the Department. The candidate must defend the dissertation in a final oral examination.

At least three weeks prior to the final oral examination, the student should contact the graduate coordinator, who will submit a request for a "PhD Final Oral Committee Approval Form" to the Graduate School. Upon review, the Graduate School will return the warrant to the Graduate Coordinator, which will then need to be signed by the Committee and Department Chair following a successful defense.

Students are responsible for ensuring that they meet Graduate School requirements and deadlines:

<http://grad.wisc.edu/currentstudents/degree/>.

### 5. Breadth Requirements

There are three options that fulfill the breadth requirement. For all options, students must complete PhD Breadth Requirement form and have it signed.

**Option A** (External): Fulfill the minor requirement as specified by another department or program other than Statistics. Students should contact the individual department or program for details.

**Option B** (Distributed minor):

- At least 9 credits in one or more departments other than Statistics.
- At least 3 credits must be from courses numbered 600 or higher.
- Some courses numbered lower than 600 may not be included\*.
- Any course covering the same material as existing courses in Statistics cannot be included\* *except that at most one course cross-listed with Statistics may be included if it is not staffed by the Statistics department*. (\*Students should check with the Graduate Coordinator if they have questions on whether specific courses can be applied to the Option B minor.)
- Courses must be completed with grades BC or higher with an average of B or higher.

**Option C** (Breadth): Fulfill at least two of the following three:

- Participatory seminar experience: Take two one-credit seminar courses outside of the Statistics and Biostatistics and Medical Informatics (BMI) departments. These must involve some level of active participation, such as an oral presentation or written report.
- Collaborative research experience: This provides students with direct experience in interdisciplinary collaborative research activity under the guidance of a faculty trainer. The student must report the results of this activity in an advertised seminar. Students may fulfill this requirement by rotating through directed study/research credits with Statistics or Biostatistics degree option faculty trainers, or with faculty from other departments.
- Breadth course: Take a 2-3 credit graduate course outside of the Departments of Statistics or BMI. This must be at or above the 600 level, or be from the approved list of outside courses for the [Biostatistics Degree Option](#).

For option B, the student must complete a PhD Minor Agreement Form signed by the student's advisor and the Department Minor Advisor before starting the second minor course.

For option C, the student must present a tentative proposal signed by the student's advisor and the Department Breadth Advisor before starting the second part of this option. The student must write a letter to the Chair of the Curriculum and Degree Requirements Committee (CDRC) detailing how the requirements are fulfilled and submit with PhD Breadth Requirement form.

Students who do not yet have a major professor and who want some preliminary advice on the kinds of programs likely to be approved may speak with a Graduate Advisor for New Students.

#### 6. Graduate School Higher Learning Commission Requirements

- A PhD degree requires 51 credits (not including audits or pass/fail). *[Minimum Graduate Degree Credit Requirement]*
- At least 32 of these credits must be taken in-residence at UW-Madison. *[Minimum Graduate Residence Credit Requirement]*
- Half of the degree course work (26 credits out of 51 total credits) must be completed with a combination of Statistics courses numbered 600 or higher (which our department considers to be graduate courses), and, if doing the Biostatistics option, courses considered graduate courses from other departments used to satisfy the Biostatistics requirements (including, but not limited to, Genetics 466, Zoology 570, Biocore 303, Population Health 795, and Medical Sciences 622-721). *[Minimum Graduate Course Work (50%) Requirement]*
- With program approval, students are allowed to count no more than 9 credits of graduate course work from other institutions toward the graduate degree credit and graduate course work (50%) requirements. Course work earned ten years or more prior to admission to a doctoral degree is not allowed to satisfy requirements. *[Prior Course Work Requirement]*
- With program approval, up to 6 statistics credits from a UW-Madison undergraduate degree at the 600 level or above are allowed to count toward minimum graduate degree credits. Course work earned ten years or more prior to admission to a doctoral degree is not allowed to satisfy requirements. *[Prior Course Work Requirement]*
- With program approval, and payment of the difference between special and graduate tuition, up to 15 statistics credits completed at UW-Madison while a University Special Student at the 300 level or above are allowed to count toward minimum graduate degree and graduate residence credit requirements. Of these credits, those at the 700-level or above may also count toward the minimum graduate course work (50%) requirement. Course work earned ten years or more prior to admission to a doctoral degree is not allowed to satisfy requirements. *[Prior Course Work Requirement]*



Department of Statistics

1220 Medical Science Center

1300 University Avenue

Madison, WI 53706-1510

SAMPLE  
(608) 262-2598  
MEMORANDUM

May 06, 2019

TO: Statistics Graduate Students

FROM: PhD Qualifying Exam Committee (Sunduz Keles, Chair; John Schuppel, Coordinator)

SUBJECT: PhD Qualifying Exam in Statistics, Fall 2019

\*\*Please note that this memo does not apply to students who are entering the department in Summer or Fall 2019; the earliest they should attempt to take the Qualifying Exam would be in Fall 2020.

The Statistics PhD Qualifying Exam is scheduled for **Tuesday, August 27, 2019**. Students who sign up must indicate whether they will be taking Option A (709/710) or Option B (609/610/849/850). Both options will be held in 133 SMI from 12:30-4:30 pm on August 27<sup>th</sup>. Link to a detailed syllabus with information about the material to be tested for both options is provided below to help you decide which option you will be taking.

Here are the general guidelines for the exam:

1. The exam will be closed book but you are permitted to bring one page of notes. The page of notes may be double-sided (not two one-sided pages back-to-back), and it must be handwritten, non-photocopied originals of standard size (8½" x 11").
2. No stapled sheets are permitted, and all notes will be subject to inspection by the proctors.
3. Statistical tables will be provided as needed.
4. You will need a hand calculator. The main office has hand calculators that you may check out up to one week from the exam. Checking out early is in general a good idea to familiarize yourself with the calculator. No other calculators, cell phone applications, or computers will be allowed.
5. Please check [https://www.stat.wisc.edu/phd-masters/PhD Exam Syllabus](https://www.stat.wisc.edu/phd-masters/PhD_Exam_Syllabus) for the syllabus and notes on the Departmental PhD Regulations. Note, in particular, that a student must pass the Exam within six semesters from the first fall semester of registration as a graduate student in the department. Each student may sit for the Exam a maximum of two times.

6. A no-show to the exam without a medical report will be counted as a failed attempt towards the allowed maximum number of two attempts. Under the circumstances where it is not possible to obtain/provide a medical report, the committee will make a decision on a case-by-case basis.

7. You can request withdrawal from the exam up to one week prior to the exam date by notifying the chair of the Qualifying Exam Committee with a written request. The committee will discuss the request and notify you within two business days.

If you wish to take the PhD Qualifying Exam this Fall semester, please complete the attached registration form and return it to John Schuppel (jschuppel@stat.wisc.edu) by **12:00 pm, Tuesday, May 28, 2019** (a signed and scanned form sent as a PDF is acceptable).

If you have any questions, please contact Prof. Sunduz Keles (the Qualifying Exam Committee Chair).

Attached: Registration form

Fall 2019 PhD Qualifying Exam Registration

Complete and return to John Schuppel

(jschuppel@stat.wisc.edu)

by 12:00 pm, Tuesday, May 28, 2019

1. I wish to take the Statistics PhD Qualifying Exam on August 27, 2019.

Name: \_\_\_\_\_ Signed \_\_\_\_\_

2. I wish to take the following option (choose only one): A \_\_\_\_\_ B \_\_\_\_\_

3. First or second attempt? Circle one: First Second

4. First enrollment as a graduate student in this Department (Sem/Yr): \_\_\_\_\_

5. Information on courses 609/610/849/850/709/710:

| Course        | 609 | 610 | 849 | 850 | 709 | 710 |
|---------------|-----|-----|-----|-----|-----|-----|
| Sem/Yr Course |     |     |     |     |     |     |
| Taken         |     |     |     |     |     |     |
| Grade         |     |     |     |     |     |     |

6. Other graduate statistics courses at UW-Madison:

| Course # | Grade | Course # | Grade |
|----------|-------|----------|-------|
|          |       |          |       |
|          |       |          |       |

7. Graduate statistics courses taken elsewhere:

| Institution | Course Title | Grade |
|-------------|--------------|-------|
|             |              |       |

|  |  |  |
|--|--|--|
|  |  |  |
|--|--|--|

8. Names of three faculty members in the Department who are most familiar with you:

## PhD Qualifying Exam Syllabus

### Option A (709/710)

#### Probability and Distribution Theory.

Set operations,  $\sigma$ -fields, measures, probability measures, distribution functions, measurable functions, random variables and vectors, induced measures, abstract integration theory, \*monotone and dominated convergence theorems, product measures and \*Fubini's theorem, differentiation under integral sign, expectations, moments, inequalities, absolute continuity of measures, independence of classes of events, independence of random vectors, \*Radon-Nikodym theorem, probability density functions, change of variables, generating functions, characteristic functions, \*uniqueness theorem, quadratic forms and their distributions, \*Cochran's theorem, conditional expectations, conditional distributions, properties of conditional expectations, Markov chains. \*proofs not required

#### Asymptotic Theory.

Modes of convergence (almost sure, in probability, in  $r$ th mean, in distribution, weak convergence) and their relationships, stochastic orders ( $Op(1)$  and  $op(1)$ ), \*Borel-Cantelli lemma, \*Helly-Bray theorem, \*Levy-Cramér theorem, \*Skorohod theorem, Slutsky theorem, Scheffé's theorem, convergence of moments, convergence in distribution of a sequence of multivariate random vectors in terms of their linear combinations, continuous mapping theorem, delta method, weak laws of large numbers, strong law of large numbers, central limit theorems (Lindeberg, Liapunov, Lindeberg-Feller). \*proofs not required

#### Models and Inference Criteria.

Statistical models, sufficient statistics, factorization theorem, minimal sufficiency, exponential family, natural parameter space properties under sampling from exponential family, moments of exponential family, completeness, completeness of exponential family, Basu's theorem, inference problems, elements of decision theory, loss and risk functions, admissibility, Bayes and minimax criteria, prior and posterior distributions, large sample criteria, weak and strong consistency, asymptotic biases and variances, asymptotic inference.

#### Point Estimation.

Unbiased estimators, UMVUE, Rao-Blackwell and Lehmann-Scheffé theorems, Fisher information, Cramér-Rao lower bounds, least squares in general linear models, geometric interpretation of least squares, estimable functions, Gauss-Markov theorem, U and V -statistics, methods of moments, Bayes and generalized Bayes estimators, minimax estimators, shrinkage estimators, likelihood functions, maximum likelihood estimation (MLE), MLE in exponential family, consistency and asymptotic normality of MLE and asymptotic normality of solution to the score equation, asymptotic efficient estimators, asymptotic relative efficiency, empirical distributions, empirical likelihoods, density estimation, semi-parametric methods, consistency and asymptotic normality of sample quantiles, L- and M-estimators.

#### Hypothesis Testing and Confidence Sets.

Tests, randomized tests, power function and size of a test, Neyman-Pearson lemma, uniformly most powerful tests, monotone likelihood ratios, unbiased tests, uniformly most powerful unbiased for exponential family, similar test and

Neyman structure, likelihood ratio test, and other large-sample equivalents to LR test (Walds test, Raos score test, Pearsons goodness of fit chi-square test for multinomial parameters), limiting distribution of tests, general linear hypothesis and likelihood ratio tests in linear models, ANOVA table and distribution theory, confidence sets, pivotal quantities, optimal confidence sets (uniformly most accurate confidence sets, confidence intervals of minimum length or expected length), large sample confidence sets

using MLE and likelihood ratio statistics, relation between confidence sets and tests of hypothesis, confidence sets and simultaneous confidence intervals with applications in one-way and balanced two-way layout and simple regression analysis.

#### Suggested References

Chung, K.L. (1974). A Course in Probability Theory, 2nd edition. Academic Press, New York.

Lehmann, E.L. (1986). Testing Statistical Hypotheses, 2nd edition. Springer-Verlag, New York.

Searle, S.R. (1971). Linear Models. Wiley, New York.

Shao, J. (2003). Mathematical Statistics, 2nd edition. Springer, New York.

#### Option B (609/610/849/850)

##### Probability Theory.

Probability and conditional probability, correlation and independence, random variables, distributions, transformations, expectations, moment generating functions, useful distributions (binomial, Poisson, negative binomial, normal, gamma, chi-square, t- and F-distributions), exponential and location-scale families, multivariate normal and linear and quadratic forms, convergence (almost surely, in probability, in distribution), law of large numbers, central limit theorem, convergence of transformations, Slutsky theorem and deltamethod.

##### Statistical Inference.

Sample, population, statistics, sampling distribution, sufficiency, minimal sufficiency, completeness, maximum likelihood, moment method, estimation equation, least squares, weighted least squares, Bayes estimators, unbiasedness, UMVUE, information inequality, likelihood ratio tests, evaluation of tests and NeymanPearson Lemma, uniformly most power tests, unbiased tests, the duality between tests and confidence sets, pivotal quantities, consistency, asymptotic normality and efficiency, robustness, asymptotic tests based on likelihoods and chi-square tests.

##### Linear and Generalized Linear Models.

Linear regression, least squares fit, Gauss-Markov theorem, distributions of quadratic forms, standard model assumptions, computational issues, testing simple and compound hypotheses, prediction, diagnostic tools and model selection (residuals, leverage and influence, Cp, R-square and adjusted R-square, stepwise methods, all possible regressions, leaps and bounds, AIC and BIC), transformations, Box-Cox transformations, multicollinearity, ridge regression, generalized linear models (estimation and testing theory, prediction and model selection, residuals and diagnostics).

##### Experimental Design and Applications.

Model formulation, ANOVA table, hypothesis testing, diagnostic tools, transformations, multiple comparisons, contrasts, completely randomized designs, block designs, designs with multiple blocking factors, factorial designs, designs with multiple random effects, subsampling, split plot and strip plot designs, general linear models for designed experiments,

parameterization of factors, estimability, cell means model, unbalanced designs and missing data, random and mixed effects models, model representations in matrix form, model fitting, testing, and diagnostics, ML and REML.

#### Suggested References

Grimmett, Geoffrey R. and Stirzaker, David R. (2001), *Probability and Random Processes* (Third edition), Oxford University Press.

Bickel, P.J. and Doksum, K.A. (2001), *Mathematical Statistics* (Vol. I), 2nd edition, Prentice Hall.

Casella, G. and Berger, R.L. (2002), *Statistical Inference*, 2nd edition, Brooks/Cole Cengage Learning.

McCullagh, P. and Nelder, J.A. (1989). *Generalized Linear Models*, 2nd ed.

Milliken, G. A. and Johnson, D. E. (2009). *Analysis of Messy Data. Volume I: Designed Experiments*, 2nd ed.

Seber, G. A. F. and Lee, A. J. (2003). *Linear Regression Analysis*, 2nd ed.

## BREADTH REQUIREMENTS & PROCEDURES FOR PHD STATISTICS STUDENTS

There are three options that fulfill the breadth requirement. For all options, students must complete a PhD Breadth Requirement form and have it signed.

**Option A (External):** Fulfill the minor requirement as specified by another department or program other than Statistics. Students should contact the individual department or program for details.

**Option B (Distributed minor):**

- At least 9 credits in one or more departments other than Statistics.
- At least 3 credits must be from courses numbered 600 or higher.
- Some courses numbered lower than 600 may not be included\*.
- Any course covering the same material as existing courses in Statistics cannot be included\*, except that at most one course cross-listed with Statistics may be included if it is not staffed by the Statistics department.
- Courses must be completed with grades BC or higher with an average of B or higher.

(\* Students should check with the Graduate Coordinator if they questions on whether specific courses can be applied to Option B.)

**Option C (Breadth):** Fulfill at least two of the following three:

- *Participatory seminar experience:* Take two one-credit seminar courses outside of the Statistics and Biostatistics and Medical Informatics (BMI) departments. These must involve some level of active participation, such as an oral presentation or written report.
- *Collaborative research experience:* This provides students with direct experience in interdisciplinary collaborative research activity under the guidance of a faculty trainer. The student must report the results of this activity in an advertised seminar. Students may fulfill this requirement by rotating through directed study/research credits with Statistics or Biostatistics degree option faculty trainers, or with faculty from other departments.
- *Breadth course:* Take a 2-3 credit graduate course outside of the Departments of Statistics or BMI. This must be at or above the 600 level, or be from the approved list of outside courses for the Biostatistics Degree Option.

For option B, the student must complete a PhD Minor Agreement Form signed by the student's advisor.

For option C, the student must present a tentative proposal signed by student's advisor before starting the second part of this option. The student must write a letter to the Chair of the Curriculum and Degree Requirements Committee (CDRC) detailing how the requirements are fulfilled and submit it with PhD Breadth Requirement form.

Students who do not yet have a major professor and who want some preliminary advice on the kinds of programs likely to be approved may speak with a Graduate Advisor for New Students.

**PhD BREADTH REQUIREMENT FORM**  
**Graduate Program in Statistics Department**

Name: \_\_\_\_\_ ID#: \_\_\_\_\_  
 E-Mail: \_\_\_\_\_ Tel #: \_\_\_\_\_  
 Major: STATISTICS Area: \_\_\_\_\_  
 Today's Date: \_\_\_\_\_ Date Breadth Requirement Completed: \_\_\_\_\_

- Option A** (single department outside Statistics) Dept: \_\_\_\_\_  
 External (requires approval of minor department)  
 **Option B** (minimum 9 credits in two or more departments) Dept: \_\_\_\_\_  
 Distributed (requires approval of major department)  
 **Option C**  
 Breadth

List courses outside of Statistics as they appear on your Madison campus transcript:

| Dept Name | Course # | Course Title | Cr | Grade | Sem/Yr |
|-----------|----------|--------------|----|-------|--------|
|           |          | SAMPLE       |    |       |        |
|           |          |              |    |       |        |
|           |          |              |    |       |        |
|           |          |              |    |       |        |
|           |          |              |    |       |        |

Option A \_\_\_\_\_ Signature & Date of Minor Advisor

Option B \_\_\_\_\_ Signature & Date of Statistics Advisor

Option B and C \_\_\_\_\_ Signature & Date of Statistics Req. Advisor      \_\_\_\_\_ Signature & Date of Statistics Dept. Chair

Note: This form is to be retained by the Graduate Coordinator in the Department of Statistics. Return signed form to Rm 1220D MSC.

## Dissertator Status

(from <https://grad.wisc.edu/acadpolicy/?policy=dissertationstatus>)

Dissertator is a unique fee status for students who have completed all requirements for a doctoral degree except for the dissertation. To be eligible for dissertator fee status, a student must:

- Pass the preliminary examination(s);
- Satisfy the doctoral minimum credit requirement;
- Complete all minor requirements, if the major program requires a minor;
- Complete all program requirements except the dissertation;
- Clear all Incomplete grades or Progress grades in non-research courses (progress grades in 990 research may remain);
- Earn at least a 3.0 cumulative GPA;
- Return the signed preliminary exam warrant to the Graduate School.

Dissertator status is effective at the start of the semester following completion of all dissertator requirements for the doctoral degree except for the dissertation. In order to initiate the change to dissertator status, the prelim warrant must be sent to the Graduate School. Students can check on dissertator status by contacting the program's graduate student coordinator.

All dissertator requirements must be met before the first day of classes to be a dissertator for any given semester. If all dissertator requirements are completed before the first day of classes but the signed prelim warrant does not reach the Graduate School by that deadline, the student can still become a dissertator that semester. Submit the warrant to the Graduate School as soon as possible and enroll for 3 credits (usually 990 research) for that semester.

Removal of Dissertator Status: A dissertator who enrolls for more than 3 credits will be removed from dissertator status for the fall or spring term in which the enrollment exceeds the 3-credit maximum. During the summer, however, an enrolled dissertator may ask their advisor to request an overload of 1-2 additional credits in a short session and still retain dissertator fee status, if the course is related to dissertation research or professional training that is not offered in regular semesters.

The removal of dissertator status may have the following consequences:

- Graduate assistant (TA/PA/RA) salary rates may have to be adjusted to the non-dissertator rate, or percent limitations. See Maximum Levels of Appointments.
- Fees are assessed at the non-dissertator rate.
- Full-time status may change to part-time, possibly affecting loan deferral, visa status, etc.

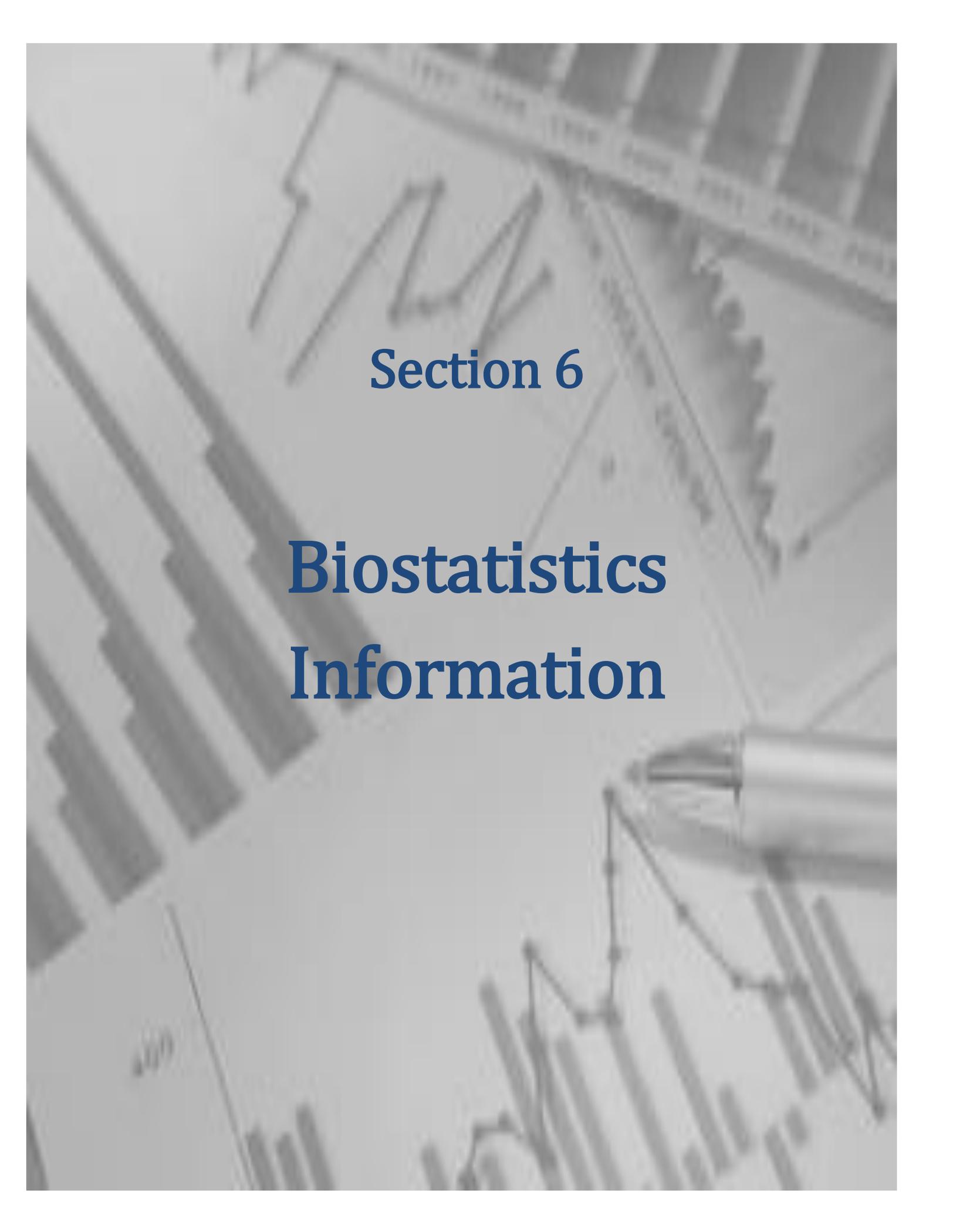
If a dissertator wants to pursue a graduate degree or certificate in another area, the dissertator fee status will be discontinued and regular graduate fees will be assessed, with possible consequences listed above.

## **DEADLINES**

Please visit: <https://grad.wisc.edu/deadlines/>

## **GUIDE TO PREPARING YOUR DOCTORAL DISSERTATION**

Please visit: <https://grad.wisc.edu/current-students/doctoral-guide/>

The background of the slide is a grayscale image of a pen writing on a document. The document contains various data visualizations, including a bar chart on the left, a line graph with a jagged peak in the center, and another line graph with a smoother curve on the right. The pen is positioned in the lower right quadrant, with its tip touching the paper. The overall scene is slightly blurred, giving it a professional and analytical feel.

## Section 6

# Biostatistics Information

# BIostatistics Degree Option (BDO): MS/PhD Programs

## Overview

The Biostatistics Degree Option (BDO) is a collaborative program with both the Department of Statistics and Biostatistics and Medical Informatics. Students pursue course work in theory, methodology, and application of statistics.

Both the Master's and PhD students are required to satisfy the general requirements for their degree in Statistics with additional coursework noted below.

## PhD Requirements

### Courses:

Seven Required Statistic Courses (23 credits) – cover core topics in probability, mathematical statistics, and statistical methodology, including distribution theory, asymptotic analysis, theory of estimation and testing, general regression techniques, and also specialized statistical methods for clinical studies.

- Statistics 709 (fall) and 710 (spring) – Mathematical Statistics
- Statistics 733 - Theory of Probability I (fall)
- Statistics 849 (fall) and 850 (spring) – Theory and Application of Regression and Analysis of Variance I & II
- Statistics 998 (fall, spring) – Statistical Consulting
- Statistics/BMI 641 (fall) – Statistical Methods for Clinical Trials

Four elective courses (12 credits) must be taken from statistics courses numbered 641, 642, 700, or higher (with the exception of 609, 610, 699, 709, 710, 849, 850, 990, or 998).

The chosen elective must contain at least two of three specialized biostatistics courses:

- BMI 642 (spring) – Statistical Methods for Epidemiology
- BMI 741 (spring) – Survival Analysis Theory and Methods
- BMI 877 (spring biannually) – Statistical Methods for Molecular Biology

One course (3 credits) is required, from an approved list of biological sciences courses:

- Genetics 466 – General Genetics
- Zoology 570 – Cell Biology
- Biocore 303 – Cellular/Molecular Biology
- Population Health Sciences 795 – Principles of Population Health Sciences
- Medical Sciences 622-721 – Neoplastic Diseases
- Approval of other biological sciences courses is at the discretion of the BDO Committee.

Students may be required to take a course in the responsible conduct of research:

- Any student supported by an NIH grant is required to take this course.

**Collaborative Research Experience:** This unique aspect of the BDO program provides the student with experience in interdisciplinary collaborative research under the supervision of a faculty trainer. Students can accomplish this requirement by rotating through directed study/research credits with various faculty trainers.

- Lab rotations should be completed during the first three years of the program
- Lab rotations need to be established at the beginning of the semester, plan accordingly!
- Students must give a presentation of their research at the end of the same semester

**Qualifying Exam:** Students take their qualifying exam in August after completing their 1<sup>st</sup> year in the Statistics program<sup>1</sup>.

**Mentoring Committee Meeting:** Within one year of passing the qualifying exam, students must hold a meeting with a minimum of three BDO faculty advisors. The student will present a short oral report of his/her research and review the anticipated future research.

**Preliminary Exam:** After the selection of a thesis advisor, the student will prepare a short paper and present their thesis plans to a faculty committee.

**Seminars:** Students are expected to attend seminars from the Statistics Department (Wednesday, 4:00pm), the BMI Department (Friday, 12:00pm)

**Final Exam:** A final oral thesis presentation on novel developments in biostatistics will be presented to the thesis committee.

**Breadth:** For the BDO student, the breadth requirement is satisfied by: (1) the biological sciences course and (2) the collaborative research experience.

**Other:** Rules governing courses and timing, operation, and requirements of the qualifying, preliminary, and final exams are as in the parent program<sup>2</sup>, as are the criteria for satisfactory progress<sup>3</sup>. Issues specific to the BDO are governed by the BDO trainers within the two sponsoring departments.

### **MS Requirements:**

For BDO students, the requirements are as in the parent program<sup>4</sup>, except that the two courses (6 credits) must include BMI/STAT 641(fall) - Statistical Methods for Clinical Trials

And one of the following:

BMI/STAT 642 (spring) – Statistical Methods for Epidemiology

BMI/STAT 741 (spring) – Survival Analysis Theory and Methods

BMI/STAT 877 (spring, biannual) – Statistical Methods for Molecular Biology

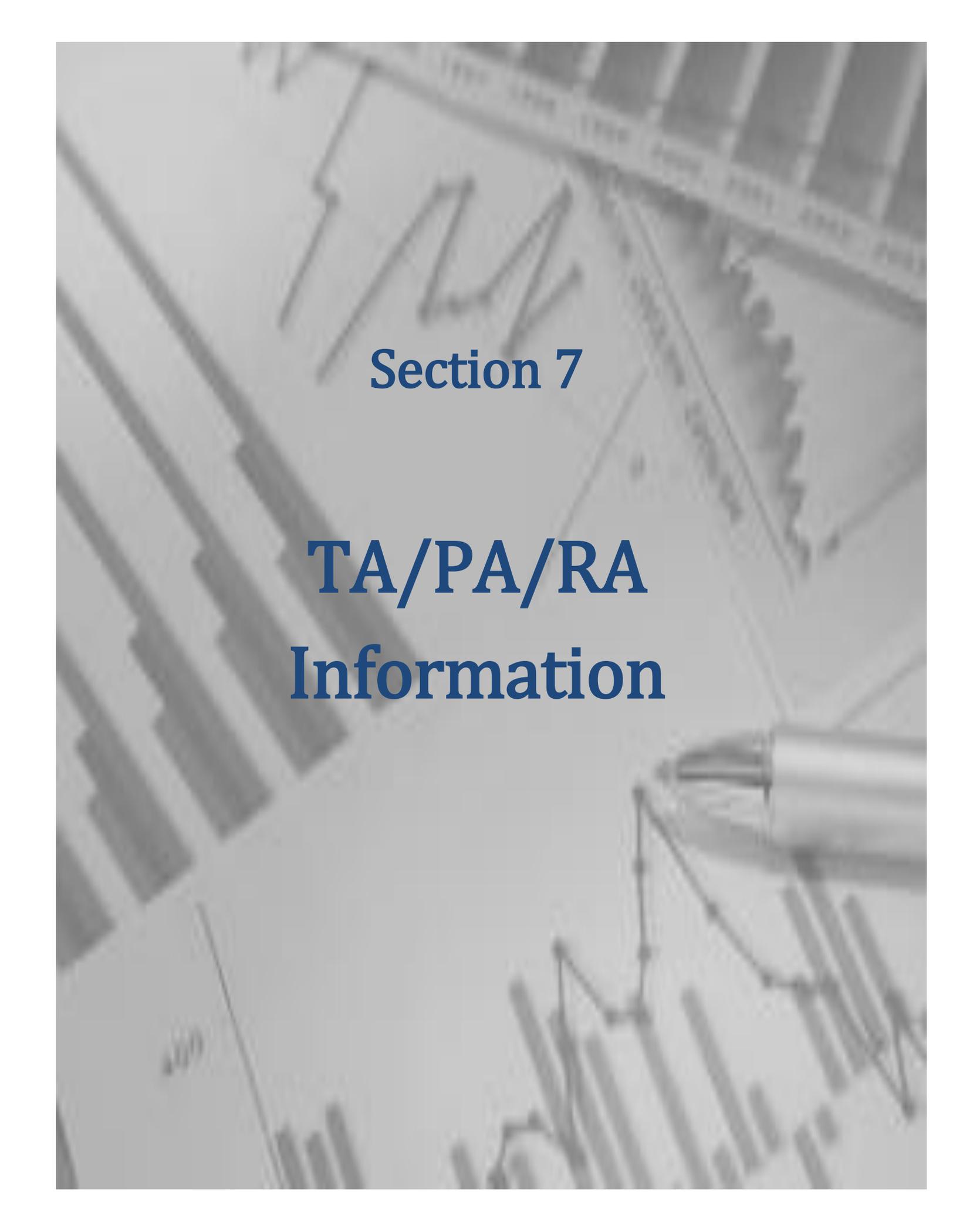
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<sup>1</sup> [https://www.stat.wisc.edu/phd-masters/PhD\\_Exam\\_Syllabus](https://www.stat.wisc.edu/phd-masters/PhD_Exam_Syllabus)

<sup>2</sup> [https://www.stat.wisc.edu/phd-masters/PhD\\_Degree\\_Regulations#1](https://www.stat.wisc.edu/phd-masters/PhD_Degree_Regulations#1)

<sup>3</sup> [https://www.stat.wisc.edu/phd-masters/Criteria\\_Satisfactory\\_Progress](https://www.stat.wisc.edu/phd-masters/Criteria_Satisfactory_Progress)

<sup>4</sup> [https://www.stat.wisc.edu/phd-masters/MS\\_Degree\\_Regulations](https://www.stat.wisc.edu/phd-masters/MS_Degree_Regulations)

The background of the slide is a grayscale image of architectural blueprints. The blueprints show various lines, rectangles, and a grid pattern, representing a technical drawing. A silver pen is visible in the lower right corner, with its tip pointing towards the center of the page. The overall tone is professional and technical.

## Section 7

# TA/PA/RA Information

## Financial Support

Departmental support for qualified graduate students is usually granted in the form of Teaching Assistantships (TA), Research Assistantships (RA), Project Assistantships (PA), Student Lecturers (LSA), and Fellowships and Traineeships (Biostatistics). Details of each of these types of support are given in the following sections.

Sources of financial support in the Statistics Department are often not able to cover all students. The department may not be able to support students who come to Madison without a guarantee of funding, and those with guarantees may be funded at a minimal level. While there are some sources of funding at the University outside the Statistics Department, the department does not actively seek to identify these. Thus, students without a guarantee of support, or students who want support in excess of their guarantee should be aware that they must look for such funding on their own.

### Eligibility Requirements for Departmental Support

In making appointments for Teaching Assistant (TA) openings, the Department of Statistics seeks to make the best possible match between the background, abilities and academic program of the graduate student and the particular position being filled. Such a match may require that certain factors are weighed more heavily for one opening or type of opening for another. In general, consideration will be given to the following factors (not listed in order of importance):

- Graduate and Undergraduate GPAs
- GRE scores and other relevant test scores
- Academic progress in the department
- Field of interest or specialty
- Letters of recommendation
- Relevant experience
- Faculty and staff comments and evaluations
- Student evaluations
- Long-term support guarantees
- Academic needs and mission of the department
- University policies
- Other factors, such as particular research expertise, relevant to position being filled

### Fringe Benefits for Graduate Assistants (TAs, PAs, & RAs)

Graduate assistants with appointments of at least 33.4% qualify for remission of tuition, except for segregated fees, which are charged to all students. The current salary rates for 2019-20 at the 100% appointment level, on an academic year (9-month) basis unless otherwise indicated, are as follows:

|   |            |
|---|------------|
| Teaching Assistant - Standard             | = \$44,000 |
| Teaching Assistant - Senior (dissertator) | = \$40,000 |
| Project Assistant (9 month)               | = \$36,700 |
| Project Assistant (12 month)              | = \$44,854 |
| Research Assistant (9 month)              | = \$40,608 |
| Research Assistant (12 month)             | = \$49,632 |
| Lecturer (Student Assistant)              | = \$48,400 |

Fellowship (12 month) = \$27,000 +

Eligibility for health care coverage (with dental) is an extremely valuable benefit associated with financial assistantship. It provides single or family coverage that is more comprehensive than individuals can usually purchase insurance on their own. With this appointment, you would pay only a small portion (\$45.50-\$113.50 monthly), depending on your selection of plan. Academic-year appointees (TAs & PAs) are eligible to continue their coverage through the summer, provided they are planning to return in the fall.

### **Teaching Assistant (TA) Appointments**

Most of the TA appointments are made at 33.4% or 50% of the full time standard rate, depending on teaching experience and guaranteed support or no support. All teaching assistants are paid at the standard rate and at the senior rate once you have become a dissertator. Appointments are usually made at the 50% level with a guarantee of two (for Masters) or five years (for PhD). TA positions are guaranteed during the regular academic year but not during the summer, when fewer classes are offered. A committee makes the actual TA assignments each semester.

Teaching assistants for the academic year are paid on the first of each month from October 1 to June 1 (nine pay periods) with deductions taken out for taxes and health coverage premiums.

The duties of a teaching assistant include preparing for and meeting with up to four discussion sections each week, grading homework and exams, holding one or more office hours per week, attending meetings called by the instructor, and usually attending lecture. Also, TAs teaching 301, 324 or 371 will be required to spend some time in Statistics Learning Center each week. Full-time employment is based on a 40-hour work week; a one-third time TA is expected to put in thirteen (13) hours of work per week while a half-time TA works twenty (20) hours per week.

The weekly discussion section is not meant to be a supplementary lecture. Rather, it should be used to answer questions of students and to go over examples of problems. Sometimes it is a good idea to have the students work on a problem during class and then go over it. This way they can ask questions that come up when they actually try a problem. Because the lectures for many introductory courses are large, often the student's only opportunity to ask questions is during discussion and the only personal contact is the TA.

Manual for Teaching Assistants: This booklet is put out by the College of Letters and Science and contains some useful information including teaching tips and information about campus resources.

### **Research Assistant (RA) Appointments**

Most RA appointments are at the 50% level and are usually granted for twelve months rather than nine-month academic year. RA appointments are granted primarily to students who have passed the PhD qualifier and are rarely granted to incoming students. RA positions allow students to assist in research in the Statistics Department in a project that will meet the requirements for the master's or doctoral thesis. The work performed is primarily to further the education and training of the student. RAs are required to carry a full load each semester (eight to twelve graduate-level credits including research or thesis credits for nondissertators, three credits for dissertators) and at least two graduate-level credits during the eight-week summer session (three graduate-level credits for dissertators).

## **Project Assistant (PA) Appointments**

Most PA appointments are at the 50% level. There are two kinds of PA appointments: academic year and calendar year. However, most of the PA appointments in Biostatistics are made for the calendar year. In addition to PA appointments made through the Department of Biostatistics, several PA appointments are available through the College of Agricultural and Life Sciences (CALs). Unlike RA appointments, PA appointments are often available to incoming students without advanced degrees. PAs must be registered for at least two graduate-level credits during the fall and spring semester. There is no registration requirement for the summer session.

## **Lecturer (student assistants) LSA**

Student Lecturers cover core courses for the department. Appointments are assigned at either a 33% or 40% level depending on course size. A training/mentoring program is provided to each new LSA. Candidates are selected by the Instructional team.

## **Outside Support**

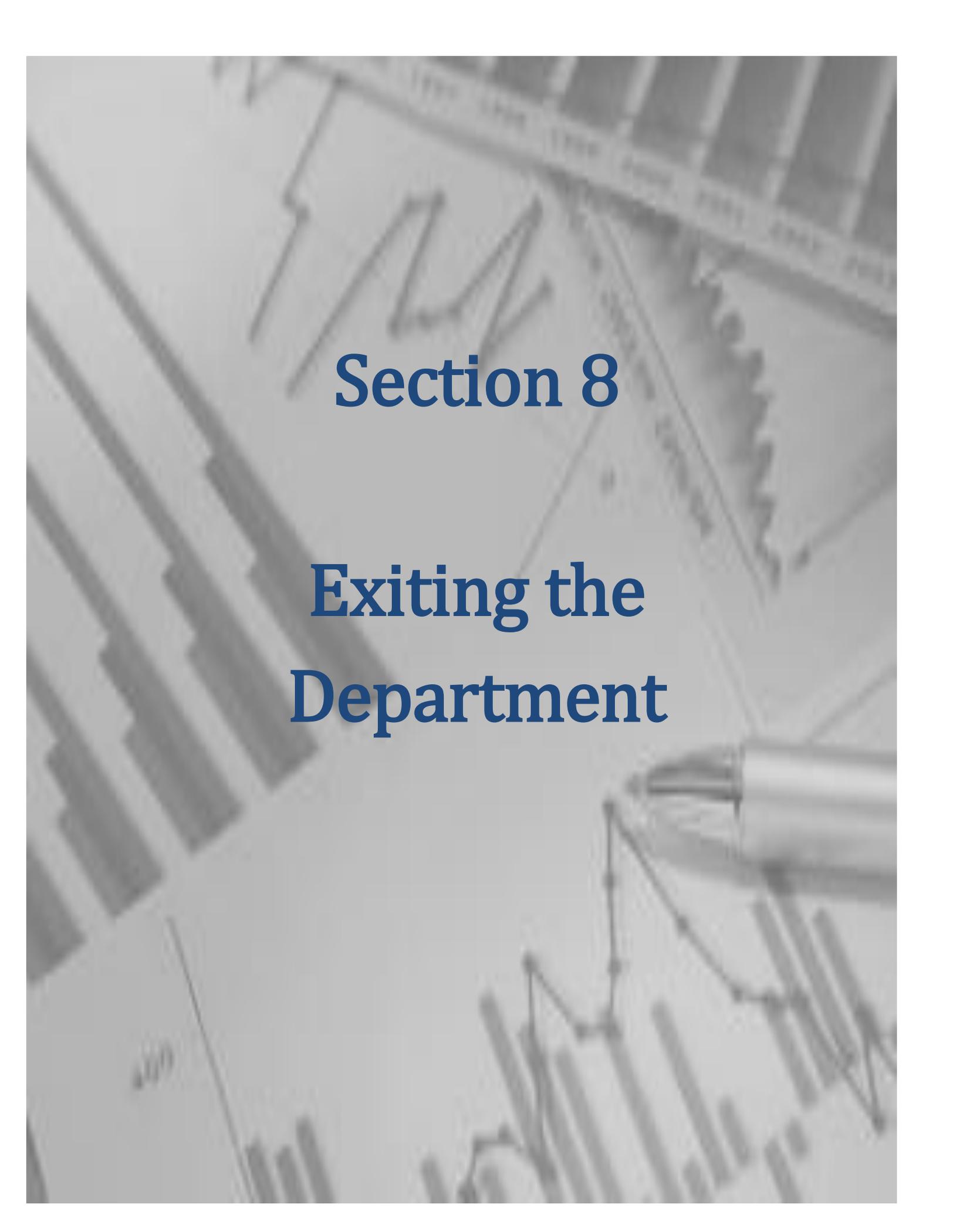
Several students are supported by outside sources such as fellowships from private industry and various governmental agencies (foreign and domestic). Such students are not eligible for the subsidized health coverage or tuition waiver.

## **Fellowships**

Students receiving fellowships are also eligible for the benefits available to all graduate assistants. While Fellowship awards are for the first year of study only, students receiving them are usually able to secure funding for subsequent years.

## **Traineeships**

The Biostatistics group currently administers a number of traineeships funded by the National Institute of Health (NIH). Only US citizens are eligible, and recipients must agree to take a job related to biostatistics when they receive their PhD. The stipend is equivalent to a 50% research assistantship, less tuition. Tuition and fees are paid by NIH.

The background of the slide is a grayscale image of architectural blueprints. The blueprints show various lines, rectangles, and a grid pattern, typical of a floor plan. A silver pen is visible in the lower right corner, resting on the blueprints. The overall image is slightly blurred and has a soft, faded appearance.

## **Section 8**

# **Exiting the Department**

## Procedures for Exiting the Department

### Withdrawal from UW-Madison prior to completion of your degree:

Withdrawal indicates that a student intends to stop attending classes for the current semester. Submission of a withdrawal request in MyUW Student Center is required between the first and last day of the semester, when a student wishes to drop all classes in which he or she is enrolled for the current semester. Students must submit withdrawal requests via MyUW Student Center, and the requests are then routed electronically to the Graduate School for review. Approval from the Graduate School, as well as from the Office of International Student Services for students on J-1 and F-1 visas, is required before a graduate student is formally withdrawn from the semester. For more information see Canceling Your Enrollment-Withdrawals on the Office of the Registrar's website at [https://registrar.wisc.edu/canceling\\_your\\_enrollment\\_withdrawal\\_info.htm](https://registrar.wisc.edu/canceling_your_enrollment_withdrawal_info.htm).

**If students drop all courses before the first day of classes, they officially cancel their enrollment, owe no tuition or fees for that term, and have no semester entry on their transcript. In this case, it is not necessary for the student to submit a withdrawal request to the Graduate School. Students planning to withdraw from their academic program should contact their program directly.**

If students withdraw after the transcript deadline, a notation to that effect and the date of withdrawal will appear on the transcript. Enrollment deadlines are posted by the Office of the Registrar at <http://registrar.wisc.edu>. Failure to withdraw properly and promptly can be expensive. Students receive email confirmations when they submit a withdrawal and when it is approved.

### Department Procedures:

Once a decision has been reached to leave the Department of Statistics (either prior to or after finishing your degree), please complete the following steps:

1. Ask the Graduate Coordinator to email you the Statistics Department Exit form, and complete and return it as soon as possible.
2. If you have completed either your Master's or PhD degree, the Graduate Coordinator will also email you a Graduate Survey to fill out (both MS and PhD graduates) and Doctorates Granted Survey Form (PhD graduates only).
3. Turn in all department keys to Nancy.
4. Turn in your building access card to Dan.

Samples of the exit forms and surveys are on the following pages.

STATISTICS DEPARTMENT EXIT FORM

We hope you enjoyed the time you spent with us. Before you leave, please complete this form.

NAME: \_\_\_\_\_

ADDRESS TO FORWARD MAIL:

Company/University employed:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Phone: \_\_\_\_\_

Job Title: \_\_\_\_\_

Email: \_\_\_\_\_



**MAIL:** Remember to notify journals, etc. of your new address.

**KEYS:** All keys must be turned in to the Statistics Department before you leave.

**COMPUTER ACCT:** Your computer accounts and files will remain on the system for **30 (thirty) days**, after which they will be deleted. Be sure to arrange any transfers before you leave. We suggest making either a DVD or CD-R of your files. You must provide the media, which is available for purchase at the DO-IT Help Desk. Contact Colleen Brabender at *brabend@stat.wisc.edu* for details.

For PhD graduates, if you are to retain a log-in directly with your advisor to continue exchange of research ideas, it is your responsibility to: 1) discuss this with your advisor; 2) have your advisor directly contact Colleen Brabender to retain your computer log-in.

(for office use only)

Keys have been turned in for: \_\_\_\_\_ office \_\_\_\_\_ computer rooms \_\_\_\_\_ outside door  
\_\_\_\_\_ cubicle/drawer key

Date: \_\_\_\_\_

# SAMPLE

## Survey of Graduate Degree Recipients in Statistics

Please answer the following questions and return this form to Andrea Palm. If you need more space, please submit additional pages. Thanks, in advance, for your participation in this important activity.

1. Graduation date (circle one):

May

August

December

2. Degree (circle one):

PhD

MS

3. Briefly describe your plans for your first three years after graduation.

4. What are your career goals for seven years from now?

5. Discuss the graduate program. What are its strengths and weaknesses? How can we improve the program? Have we served your educational needs?

