The Statistics Track

(AMS website: http://www.ams.sunysb.edu/)

1. **Our faculty** (in alphabetical order):
   (*Email is a good way to reach us in this unprecedented time*)

<u>Core faculty</u>

Professor Hongshik Ahn (Hongshik.Ahn@stonybrook.edu), math tower P-137

Professor Stephen Finch (Stephen.Finch@stonybrook.edu), math tower 1-113

Professor Pei-fen Kuan (Peifen.Kuan@stonybrook.edu), math tower 1-106

Professor Haipeng Xing (Haipeng.Xing@stonybrook.edu), math tower 1-102

Professor Song Wu (Song.Wu@stonybrook.edu), math tower 1-114

Professor Wei Zhu (Wei.Zhu@stonybrook.edu), math tower P-138

<u>Affiliated faculty from the Department of Preventive Medicine</u>

Professor Wei Hou (Wei.Hou.1@stonybrook.edu)

Professor Barbara Nemesure (Barbara.Nemesure@stonybrook.edu)

Professor Jie Yang (Jie.Yang@stonybrook.edu)

Other adjunct faculty:

http://www.stonybrook.edu/commcms/ams/people/affiliatedfaculty.php

2. **Masters course requirement (10 courses <30-credit>, no thesis):**

Required Courses for M.S. Degree in Statistics Track

AMS **507** Introduction to Probability (Fall)

AMS **510** Analytical Methods for Applied Mathematics and Statistics (Fall)

AMS **570** Mathematical Statistics I (Spring)

AMS **571** Mathematical Statistics II (required for PhD only) (Fall)

AMS **572** Data Analysis (Fall)

AMS **573** Design and Analysis of Categorical Data (Spring)

AMS **578** Regression (Spring)

AMS **582** Design of Experiments (Fall)

AMS **597** Statistical Computing (Spring)

<u>Plus two electives chosen from other graduate courses in the department or (with approval) graduate statistics courses in other departments.</u> Some popular choices:

AMS **595** Fundamentals of Computing (Fall)

AMS **511** Foundation of Quantitative Finance (Fall)

AMS **516** Statistical Methods in Finance (Fall)

AMS **530** Principles in Parallel Computing (Fall)

AMS **562** Introduction to Scientific Programming in C++ (Fall)

AMS **598** Big Data Analysis (Fall)

AMS **588** Failure and Survival Data Analysis (Fall)

AMS **560** Big Data Systems (Fall)
AMS **580** Statistical Learning (Spring)
AMS **586** Time Series Analysis (Spring)
AMS **550** Stochastic Models (Spring)

*You will notice we have more electives in Fall than Spring because most of you will graduate in 3 semesters (Fall, Spring, Fall). Once you have taken all core courses and fulfilled the 30-credit required for the MS degree, you must graduate.

The first year graduate students (G1/G3) should take 4 courses (12-credits) per semester. The second year graduate student (G2/G4) should take 3~4 courses (9~12 -credits) per semester.

3. Recommended course schedule

For our master's students in statistics, we recommend the following schedule (*our doctoral students can follow the same schedule for the first 3 semesters):

(1) Year 1, Fall semester: **AMS 507, AMS 510, AMS 572, AMS 595** (*Those who have already learned Python which is taught in AMS 595, can register for AMS 562 instead to learn C++.) (*Some of our doctoral students who serve as TA must register for an English course [OAE] – you can take AMS 595 the next Fall semester, or alternatively, take AMS 561, nearly identical to 595, in Spring.)

AMS 507 Introduction to Probability AMS 507 Webpage
91310 LEC 01 TUTH 3:00-4:20PM Loc: ONLINE Mode: SYNCHRONOUS Inst: Eugene Feinberg
91309 REC R01 M 7:50-8:45PM Loc: ONLINE Mode: SYNCHRONOUS Inst: Can Huang

AMS 510 Analytical Methods for Applied Mathematics and Statistics AMS 510 Webpage
Prerequisites: A course in linear algebra and in multivariate calculus
91311 LEC 01 TUTH 9:45-11:05AM Loc: ONLINE Mode: SYNCHRONOUS Inst: Xiaolin Li
91312 REC R01 W 7:50-8:45PM Loc: ONLINE Mode: SYNCHRONOUS Inst: TBA

AMS 572 Data Analysis I AMS 572 Webpage
91198 LEC 02 TUTH 11:30AM-12:50PM Loc: ONLINE Mode: SYNCHRONOUS Inst: Pei-Fen Kuan

AMS 562 Introduction to Scientific Programming in C++ AMS 562 Webpage
91336 LEC 02 MF 1:00-2:20PM Loc: ONLINE Mode: SYNCHRONOUS Inst: Qiao Chen

AMS 595 Fundamentals of Computing AMS 595 Webpage
91302 LEC 01 TUTH 8:15-9:35PM Loc: ONLINE Mode: SYNCHRONOUS Inst: Barbara Chapman

** Those who consider themselves already have a solid background in statistics (for example, some of our doctoral students) can consider taking **AMS 571 Mathematical Statistics** (Prof. Ahn) and/or **AMS 582 Design of Experiments** (Prof Finch). Please be sure to consult with the instructors for the courses you wish

to take first, sending them your CV/transcripts, so that they can decide whether you are ready.

AMS 571 Mathematical Statistics AMS 571 Webpage

Prerequisite: AMS 570 preferred but not required

90445 LEC 01 MW 10:30-11:50AM Loc: Physics P122 Mode: IN PERSON Inst: Hongshik Ahn

AMS 582 Design of Experiments AMS 582 Webpage

Prerequisite: AMS 572

89347 LEC 01 TUTH 1:15-2:35PM Loc: Harriman 112 Mode: IN PERSON Inst: Stephen Finch

** Those of our master's and doctoral students who are interested in our sister-track of Quantitative Finance (QF), can also consider taking **AMS 511** Foundation of Quantitative Finance.

AMS 511 Foundation of Quantitative Finance AMS 511 Webpage

Prerequisite: AMS 505 or 510

90474 LEC 01 W 2:40-5:30PM Loc: ONLINE Mode: SYNCHRONOUS Inst: Robert Frey

TOEFL iBT Speak	IELTS Speak	Course Requirement	Result
23-30	7 or Higher	none	Eligible to TA
21-22	6.5	OAE 594	Eligible to TA
18-20	6	OAE 592	Eligible to run recitation & lab sessions/grade
15-17	5-5.5	OAE 590	Not eligible to TA

* All graduate students are expected to maintain a B or better grade average. Otherwise one cannot graduate. *

(1) Year 1, Spring semester: **AMS 570, AMS 573, AMS 578, AMS 597** (*Note: If you are an international master's student who wishes to study for 4 semesters instead of 3 semesters – you will need to hold a core course till the last Spring semester – so instead of that core course, you must choose a different 3-credit course, for example, AMS 562, to reach a 4-course full-time schedule).

(2) Year 2, Fall semester: **AMS 582**, AMS 588 (*doctoral students should take AMS 571), AMS 598, AMS 595 (*for those who did not take it in the first fall), AMS 516, AMS 560 **(***Note you can graduate with your MS degree at the end of this semester for you have already taken at least 10 courses including all the core courses)**

(3) ** Year 2, Spring semester: **the AMS core course** (for example **AMS 597** that you have not taken yet), AMS 580, AMS 586, AMS 550 (or other elective courses of interest).

* Take 4 courses/semester for the first 2 semesters, & 3~4 courses/semester later.

4. Data Science & Advanced Graduate Certificate in Data Science:

Data science has been gaining increasing job market in the recent years – especially with the advent of advanced computers and the internet. "Data Scientist" has been voted the most satisfying job, four years (2016, 2017, 2018, 2019) in a row, by glassdoor.com.   Computer programming and data analysis are the two main pillars of data science. Aside from our rigorous data analysis training, we have also strengthened your programming training with many programming and algorithm classes. The following courses are the subset that we hope you can all master:

AMS 595 Fundamentals of Computing (matlab, Python, C++) – everyone should take this if one is not a master of the materials yet

AMS 580 Statistical Learning – introduction to common statistical learning and machine learning procedures, and how to run them in R (mainly R, some Python)

AMS 597 Statistical Computing (R, and a bit Perl) – this is also a core course in statistics

AMS 598 Big Data Analysis -- application of the supercomputing for statistical data analyses, particularly on big data (R & Python)

AMS 530 Principles in Parallel Computing – this course is also closely related to big data analysis, AMS 598. (C/C++/Python; JAVA also allowed; teach C++ for 2-3 weeks)

AMS 560 Big Data System -- Recent progress on big data systems, algorithms and networks including the web graph, search engines, online algorithms, etc. (JAVA)

Advanced Graduate Certificate in Data & Computational Science:
Through ICAS (https://iacs.stonybrook.edu/opportunities/certificates/cdcs), we have a 17-credit Graduate Certificate in Data and Computational Science available to both AMS MS and PhD students. Here are some key points for AMS graduate students:

(1). For the core course AMS 561 -- we can replace it with AMS 595

(2). For the two Journalism (JRN) courses (1 credit each), they can be taken within one semester, please see the following site for details:
https://www.aldacenter.org/training/courses-at-sbu

(3). We can use 6 credits you have already earned before being registered to this certificate.

(4). It is important to **register** for the certificate program **early** (*definitely before the second Fall semester) because up to 12 credits can be counted towards both your

AMS degree program and this certificate.

(5). The key is that you need to take one 3-credit CS course (*that is not cross-listed with AMS), plus another 3-credit course that is from ANY non-AMS department (CS, ECE, College of Business etc., not cross-listed with AMS)

For CS courses https://www.cs.stonybrook.edu/students/Graduate-Studies/courses, we think the following might be viable:

CSE505 Computing with Logic
CSE512 Machine Learning
CSE519 Data Science Fundamentals
CSE525 Introduction to Robotics
CSE532 Theory of Database Systems
CSE544 Prob/Stat for Data Scientists
CSE545 Big Data Analytics
CSE549 Computational Biology
CSE564 Visualization

For our international master students in statistics who wish to get the advanced graduate certificate in Data Science, we recommend the following schedule (*our domestic master students and doctoral students can follow the same schedule except you can take AMS 597 <core course> first, and AMS 562 <elective> last):

(1) Year 1, Fall semester: **AMS 507, AMS 510, AMS 572, AMS 595**

(2) Year 1, Spring semester: **AMS 570, AMS 573, AMS 578,** AMS 580 (or AMS 530)

(3) Year 2, Fall semester: **AMS 582**, **CS graduate course**, AMS 588 (*AMS 571 for doctoral students), AMS 598

(4) Year 2, Spring semester: **JRN 501 (1 credit), JRN 503 (1 credit)**, **AMS 597**, **CS graduate course (or another non-AMS graduate course)**, AMS 586 (or AMS 550)

For our master's students who are determined to graduate in 3 semesters, you can follow the schedule (35 credits in total) below:

(1) Year 1, Fall semester: **AMS 507, AMS 510, AMS 572, AMS 595** (12 credits)

(2) Year 1, Spring semester: **AMS 570, AMS 573, AMS 578, AMS 597** (12 credits)

(3) Year 2, Fall semester: **AMS 582**, **JRN 501 (1 credit), JRN 503 (1 credit), CS graduate course, CS graduate course (or another non-AMS graduate course)** (11 credits)

5. Advanced Graduate Certificate in Quantitative Finance (QF):

** Given that the track of Statistics is highly correlated with the track of Quantitative Finance, interested students can choose to take selected courses in QF and obtain the 15-credit <u>Advanced Graduate Certificate in Quantitative Finance</u> introduced below.

Any strong student (3.5+ GPA in first-semester core courses) in another track (such as statistics) may enroll in AMS 511, Foundations in Quantitative Finance.   With the permission of the Quantitative Finance Program Director (Prof. Stan Uryasev <stanislav.uryasev@stonybrook.edu>), one may take additional quantitative finance courses to earn an Advanced Graduate Certificate in Quantitative Finance. You must formally apply for the secondary certificate program prior to taking the required courses. Only a maximum of six credits taken prior to enrolling in the certificate program may be used towards the requirements. The QF certificate requires **AMS 511, 512, 513**, one additional QF elective, and one additional AMS course.

AMS 511 Foundations of Quantitative Finance
AMS 512 Portfolio Theory
AMS 513 Financial Derivatives and Stochastic Calculus

Permission to enroll in the certificate program will require the permission of Prof. Stan Uryasev and Prof. Wei Zhu.
The form to apply for the secondary certificate program:
http://grad.stonybrook.edu/_data/documents/forms/newforms/Permission%20to%20Enroll%20in%20a%20Secondary%20Certificate%20Program.pdf

For our international master's students in statistics who wish to get the advanced graduate certificate in QF, we recommend the following schedule (*our domestic master's students and doctoral students can follow the same schedule except you can take AMS 597 <core course> first, and AMS 586 <elective> last):

(1) <u>Year 1, Fall semester: **AMS 507, AMS 510, AMS 572,** AMS 595</u>

(2) <u>Year 1, Spring semester: **AMS 570, AMS 573, AMS 578,** AMS 586 (or AMS 580, AMS 550, or AMS 562, etc.)</u>

(3) <u>Year 2, Fall semester: **AMS 582**, **AMS 511**, AMS 588 (*AMS 571 for doctoral students), AMS 598 (*One must take 582 & 511 – however, to maintain full time status requiring 9 credits, you only need one more elective, so choose one from 588 and 598 and other graduate courses)</u>

(4) <u>Year 2, Spring semester: **AMS 512, AMS 513**, **AMS 597**, (AMS 580 etc. – optional)</u>

6. Advanced Graduate Certificate in Operations Research (OR):

The department also has an 18-credit advanced graduate certificate in Operations Research (http://www.stonybrook.edu/commcms/spd/graduate/operations.html).
This certificate has 5 REQUIRED COURSES (15 credits):

AMS 507 Introduction to Probability
AMS 540 Linear Programming
AMS 550 Stochastic Models
AMS 553 Simulation and Modeling
AMS 572 Data Analysis I

Plus one ELECTIVE (3 credits) which can be any graduate course in AMS, management and policy, or computer science, which has been approved by the student's advisor. For students in statistics, one only needs to be sure to take AMS 540, 550, and 553.   **Permission to enroll in the certificate program will go through the School of Professional Development as shown in the above link.**

For our international master's students in statistics who wish to get the advanced graduate certificate in OR, we recommend the following schedule (*our domestic master's students and doctoral students can follow the same schedule except you may wish to take AMS 597 <core course> first, and AMS 586 <elective> last):

(1) Year 1, Fall semester: **AMS 507, AMS 510, AMS 572,** AMS 595

(2) Year 1, Spring semester: **AMS 570, AMS 573, AMS 578,** AMS 586

(3) Year 2, Fall semester: **AMS 582**, **AMS 540**, AMS 588, AMS 598 (*One must take 582 & 540 – however, to maintain full time status requiring 9 credits, you only need one more elective, so choose one from 588 and 598 and other graduate courses)

(4) Year 2, Spring semester: **AMS 550, AMS 553**, **AMS 597**, (AMS 580, AMS 562 etc. – optional)

7. Doctoral qualifying exam requirements:

Our doctoral students are expected to take and pass the following doctoral qualifying exams in 1-2 years. Each exam is offered twice per year in January and June. **(*During this special time, online exams are offered if deemed necessary*)**

(1) **Foundation Exam**:   4-hour close-book exam covering AMS **507** and AMS **510**.
(2) **STAT Area Exam**:   ***This is a 4-hour in-class exam with two parts:***
(i)   *Math STAT Exam*:   2-hour close-book exam covering AMS **570** and AMS **571**.
(ii)   *Applied STAT Exam*:   2-hour open-book exam covering AMS **572,** AMS **573,** AMS **578,** and AMS **582**. One problem from each course will be given. One must choose to do exactly 3 out of these 4 problems given. Four books, 4 notes, & a calculator are allowed but no computers.

*** Students are expected to take and pass the Foundation Exam first before taking the STAT Area Exam. However, they are allowed to take both exams together. Also, our master's students in good standing (grades of B+ or better in all related courses) can take these doctoral qualifying exams.

We urge those of you who wish to take the qualifying exams to study for the exams early. Please check out the outlines of these exams in the following website – and please note that at the end of the page, you have a link to past qualifying exam questions. Prepare early for success.
http://www.stonybrook.edu/commcms/ams/graduate/resources/quals-website.php
http://www.stonybrook.edu/commcms/ams/graduate/resources/past-qualifying-exams.php

8. Be safe on campus and off campus:

We are a beautiful campus located in a very safe town. However one must always be cautious and does not put oneself in any potentially dangerous position. For example, do not get into any stranger's car; and always wait for the pedestrian walking sign before you cross the street – and look around before stepping into the cross section. When taking the train or subway, stay away from the edge of the platform. It is also very important that you do not drive without a proper driver's license. For emergencies, contact University Police at 333 from campus phones or (631) 632-3333 from non-campus phones. The general emergency phone number is **911** for the entire USA. Our safety advice goes on and on, following the same lines as those from your parents.

In this special time of Pandemics, please follow all University regulations of social distance, wearing facemasks, wash-hands, etc. in the following website:

https://www.stonybrook.edu/comingback/

Be safe & diligent, we wish you all the successes!