

# MATHEMATICS AND STATISTICS

Chair	Secretary	Location	Department Phone
Dr. Richard Marchand	Mary Caylor	200 Vincent Science Center	724-738-2061

Department Web Site URL (<https://www.sru.edu/academics/colleges-and-departments/ches/departments/mathematics-and-statistics/>)

## Graduate Coordinator

Dr. Dilruksha Singhabahu

## Faculty

### **Jana Asher**

Assistant Professor  
Mathematics & Statistics  
Ph.D., Carnegie Mellon University  
M.S., Carnegie Mellon University  
B.A., Wellesley College

### **Joshua Ballew**

Assistant Professor  
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Ph.D., University of Maryland College Park  
B.A., St. Mary's College of Maryland

### **Boris Brimkov**

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Ph.D., Rice University  
M.A., Rice University  
B.S., State University of New York at Buffalo

### **Danielle Dumbeck**

Instructor  
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M.E., Slippery Rock University  
B.S., Slippery Rock University

### **Amanda Goodrick**

Instructor  
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M.S.M., Youngstown State University  
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### **Elise Grabner**

Professor  
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Ph.D., Ohio University  
M.S., Ohio University  
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### **Nicholas Hurl**

Assistant Professor  
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Ph.D., University of Pittsburgh  
B.S., Kent State University

### **Woosuk Kim**

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Ph.D., University of Cincinnati  
M.S., University of Cincinnati  
M.S., Texas A & M University  
B.S., Pusan National University Institution Korea

### **Richard Marchand**

Professor  
Mathematics & Statistics  
Ph.D., University of Virginia  
B.S., Clarion University

### **Kirk McDermott**

Assistant Professor  
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Ph.D., Oregon State University  
M.S., Oregon State University  
B.A., Earlman College

### **J Lyn Miller**

Assistant Professor  
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B.S., Slippery Rock University

### **Jeffrey Musyt**

Assistant Professor  
Mathematics & Statistics  
Ph.D., University of Oregon  
M.S., University of Oregon  
B.S., University of Scranton

### **Dilrukshika Singhabahu**

Associate Professor  
Mathematics & Statistics  
Ph.D., University of Pittsburgh  
B.S., Slippery Rock University

### **Shukhrat Usmanov**

Instructor  
Mathematics & Statistics

## Programs

### Majors

- Data Analytics, Master of Science (MS) (<https://catalog.sru.edu/graduate/health-engineering-sciences/mathematics-statistics/data-analytics-ms/>)

### Certificates

- Data Analytics, Certificate (<https://catalog.sru.edu/graduate/health-engineering-sciences/mathematics-statistics/data-analytics-certificate/>)

## Courses

### MATH Courses

#### MATH 590 - Experimental

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Enrollment limited to students with a semester level of Graduate.

#### MATH 595 - Workshop

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Term(s) Typically Offered: Offered as Needed

Enrollment is limited to Graduate level students.

#### MATH 598 - Selected Topics

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Enrollment is limited to Graduate level students.

#### MATH 611 - Optimization Models

An introduction to creating, analyzing, solving and interpreting real-world optimization models. Topics include linear, discrete and nonlinear optimization techniques, linear and integer programming, the simplex method, sensitivity, duality, graphical analysis and branch-and-bound techniques. Applications include transportation problems, finance scheduling, networks and supply chains. Appropriate software tools for analyzing optimization models including MATLAB and spreadsheet software.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms

Enrollment is limited to Graduate level students.

#### MATH 668 - Model Analysis

An introduction to decision theory applied to complex and dynamic business, industry and health care problems. Topics include multi-criteria decision theory, Bayesian decision theory, decision analysis under uncertainty and risk, simulation, utility theory, decision trees, analytic hierarchy process, marginal analysis, choice functions, forecasting models and ethics and social responsibility in decision making. Applications to business, engineering, health care, supply chain management, quality control, inventory control, etc. Appropriate software tools for decision theory.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Enrollment is limited to Graduate level students.

#### MATH 678 - Data Analytics Capstone I

This is the first of two capstone courses. In this course, the student will begin a large, real-life problem working with a company problem of their choice (e.g., retail, logistics, healthcare, risk-management, etc). This project must be approved by at least one faculty mentor and/or the course instructor. Through a series of lectures, the student will be exposed to the ethics and global laws pertaining to data collection, manipulation and dissemination.

Prerequisite: STAT 672 (may be taken concurrently)<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Winter Terms

Enrollment is limited to Graduate level students.

#### MATH 688 - Data Analytics Capstone II

This is a capstone course that requires students to complete a multi-dimensional data analytics project in their area of interest: health care analytics, business, engineering, etc. The project must be approved by MSDA faculty by no later than the end of the first week of the start of the course. Students will be invited to propose their own projects or create one in collaboration with MSDA faculty.

Credits: 3

Term(s) Typically Offered: Offered Summer Terms

Enrollment is limited to Graduate level students.

#### MATH 690 - Experimental

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Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Enrollment limited to students with a semester level of Graduate.

#### MATH 695 - Workshop

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Term(s) Typically Offered: Offered as Needed

Enrollment is limited to Graduate level students.

#### MATH 698 - Selected Topics

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Enrollment is limited to Graduate level students.

#### MATH 700 - Data Analytics Independent Study

The independent study course provides an opportunity to conduct research or advanced studies in data analytics that is not covered in the current MSDA curriculum. Students work individually with a faculty member or in small groups. Specific content is determined by the instructor.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Enrollment is limited to Graduate level students.

**MATH 750 - Data Analytics Internship**

An individually designed data analytics experiential learning opportunity within a cooperating enterprise. The experience provides an opportunity to integrate, apply and expand upon the skills acquired in data analytics coursework. Learning objectives, specific activities and an anticipated timeline must be approved by the professional supervisor and faculty supervisor prior to registering for the course.

Credits: 3-9

Term(s) Typically Offered: Offered as Needed

Enrollment is limited to Graduate level students.

**MATH 790 - Experimental**

A unique and specifically focused course within the general purview of a department which intends to offer it on a "one time only" basis and not as a permanent part of the department's curriculum.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Enrollment limited to students with a semester level of Graduate.

**MATH 795 - Workshop**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Term(s) Typically Offered: Offered as Needed

Enrollment is limited to Graduate level students.

**MATH 798 - Selected Topics**

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Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Enrollment is limited to Graduate level students.

**STAT Courses****STAT 590 - Experimental**

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Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Enrollment limited to students with a semester level of Graduate.

**STAT 595 - Workshop**

A workshop is a program which is usually of short duration, narrow in scope, often non-traditional in content and format, and on a timely topic.

Credits: 1-6

Term(s) Typically Offered: Offered as Needed

Enrollment is limited to Graduate level students.

**STAT 598 - Selected Topics**

A Selected Topics course is a normal, departmental offering which is directly related to the discipline, but because of its specialized nature, may not be able to be offered on a yearly basis by the department.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed

Enrollment is limited to Graduate level students.

**STAT 603 - Statistical Methods**

Statistical methods such as descriptive statistics, probability, Central Limit Theorem, probability distributions, statistical inference, hypothesis testing, Analysis of Variance (ANOVA), nonparametric methods and Linear regression will be covered. These topics may be taught using health/public health/epidemiology examples as well as applications to business, engineering and finance.

Credits: 3

Term(s) Typically Offered: Offered Fall Terms

Enrollment is limited to Graduate level students.

**STAT 630 - Regression Methods**

Regression methods including simple linear regression, multiple linear regression, logistic regression, survival analysis, repeated measures, principal component analysis and inferential statistics applied to regression models.

Corequisite(s): STAT 603

Credits: 3

Term(s) Typically Offered: Offered Fall Terms

Enrollment is limited to Graduate level students.

**STAT 656 - Statistical Computing**

Computational data analysis is an essential part of modern statistics. Topics concerning computing and advanced statistics will be covered. Statistical analysis packages (such as SAS R, and SPSS) will be discussed and compared. Background information and computational issues in various areas of statistics will be included.

Prerequisite: STAT 630<sup>C</sup>

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Winter Terms

Enrollment is limited to Graduate level students.

**STAT 660 - Advanced Statistical Methods**

Statistics is used in computer algorithms (machine learning) to enhance computer decision-making and prediction capabilities. This course will cover a wide variety of topics in statistical learning methods. Major statistical methods used in machine learning such as linear regression, survival analysis and others will be discussed. Additional topics include unsupervised learning and supervised techniques such as principal component analysis, nearest neighbor, random forest, support vector machines and neural networks. Simulation methods, such as the EM algorithm, Metropolis-Hasting algorithm and the Markov Chain Monte Carlo method will also be discussed.

Prerequisites: STAT 630<sup>C</sup> and STAT 656<sup>\*C</sup> (may be taken concurrently).

<sup>C</sup> Requires minimum grade of C.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms

Enrollment is limited to Graduate level students.

**STAT 668 - Decision Theory**

An introduction to decision theory applied to complex and dynamic business, industry and health care problems. Topics include multi-criteria decision theory, Bayesian decision theory, decision analysis under uncertainty and risk, simulation, utility theory, decision trees, analytic hierarchy process, marginal analysis, choice functions, forecasting models and ethics and social responsibility in decision making. Applications to business, engineering, health care, supply chain management, quality control, inventory control, etc. Appropriate software tools for decision theory.

Credits: 3

Term(s) Typically Offered: Offered as Needed  
Enrollment is limited to Graduate level students.

**STAT 672 - Forecasting and Time Series**

An introduction to creating, solving, analyzing and interpreting real-world time-series and forecasting models. Topics include linear, autoregressive, moving average and other forecasting and time-series techniques, transfer functions, multivariate model building, stationary and nonstationary techniques. Applications may include all areas where forecasting is required including transportation, finance, scheduling, networks and supply chains. Appropriate software tools for analyzing forecasting models including software such as SAS and spreadsheet software will be taught.

Credits: 3

Term(s) Typically Offered: Offered Spring Terms  
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**STAT 690 - Experimental**

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**STAT 695 - Workshop**

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Credits: 1-6

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**STAT 698 - Selected Topics**

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Credits: 1-3

Term(s) Typically Offered: Offered as Needed  
Enrollment is limited to Graduate level students.

**STAT 700 - Independent Study**

Independent Study courses give students the opportunity to pursue research and/or studies that are not part of the university's traditional course offerings. Students work one on one or in small groups with faculty guidance and are typically required to submit a final paper or project as determined by the supervising professor.

Credits: 1-3

Term(s) Typically Offered: Offered as Needed  
Enrollment is limited to Graduate level students.

**STAT 790 - Experimental**

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Credits: 1-3

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**STAT 798 - Selected Topics**

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Credits: 1-3

Term(s) Typically Offered: Offered as Needed  
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