



# Sungshin Women's University

## School of Mathematics, Statistics and Data Science

# 1. Introduction

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School of Mathematics, Statistics and Data Science is an interdisciplinary program that encompasses mathematics and statistics as its foundation, addressing essential fields such as data science and fintech in the era of the Fourth Industrial Revolution. With a robust foundation in mathematics and statistics, the department aims to cultivate talents with strong adaptability to real-world scenarios in the field of mathematical sciences through various practical courses.

## - Mathematics Major

The mathematics major offers different career tracks, including the pure mathematics track for research and education, the industrial and applied mathematics track that utilizes mathematics in industries and applications such as data and video analysis, and the startup track related to mathematics. These tracks aim to educate students to grow into professionals in various fields based on mathematics.

## - Fintech Major

The fintech major focuses on cultivating specialized professionals optimized for future-oriented financial services. It operates tracks such as ICT-based financial cryptography, AI-based intelligent financial services, and insurance and finance qualifications (such as insurance management and certified public accountants (CPA)). Providing tailored education, the department aims to nurture experts who integrate advanced ICT technology and finance as smart finance professionals based on mathematical sciences.

## - Statistics Major

The Statistics major aims to produce statistical analysis experts who can thrive in diverse fields such as national statistics, social surveys, financial data analysis, and bioinformatics. The educational program that incorporates several disciplines like fintech, data science, and AI convergence encourages our students to study statistical methodologies using various softwares such as R, Python, and SAS.

## - Big Data Science Major

The Big Data Science major is committed to producing data science professionals who can create additional value by applying scientific analyses. Our educational program is not one-dimensional, but offers integrative courses related the Statistics, Fintech and AI Convergence majors.

# 2. Educational Objectives

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The educational objectives of the Department of Mathematical Statistics and Data Science are to cultivate professionals specialized in fintech and data science, equipped with a foundation in mathematics and statistics along with expertise in ICT and financial knowledge.

# 3. Qualities of Graduates

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- Experts who can actively respond to the digital innovation in the financial market driven by fintech and datatech, based on a foundation in mathematics and statistics.
- Professionals capable of utilizing and analyzing large-scale data to extract valuable information, and actively responding to or predicting changes based on the generated knowledge.
- Experts trained in practical programming skills.
- Professionals who apply mathematics and statistics to industries, creating new value.

# Professors



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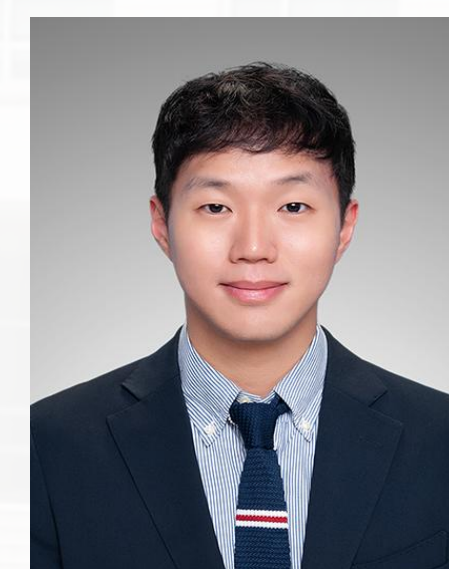
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# Professors



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# Professors



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# Major Curriculum of the school of Mathematics, Statistics and Data Science

| Major(Division)                                     | Subject Name                                            | Semester |
|-----------------------------------------------------|---------------------------------------------------------|----------|
| Core Major(1)                                       | Combinatorics and graph theory                          | 1        |
| Core Major(1)                                       | Calculus                                                | 2        |
| Core Major(1)                                       | Statistical Thinking                                    | 1        |
| Core Major(1)                                       | Laboratory in Introductory Statistics                   | 2        |
| Core Major(1)                                       | Introduction to Fintech                                 | 2        |
| Core Major(1)                                       | Introduction to Data Science                            | 1        |
| Core Major(1)                                       | Matrix Algebra                                          | 2        |
| Core Courses (Empirical and Mathematical Reasoning) | Introduction to Calculus and Vector Analysis (SA045900) | 1, 2     |
| Core Courses (Empirical and Mathematical Reasoning) | Advanced Mathematics for Natural Sciences(SA046000)     | 1, 2     |
| Core Courses (Empirical and Mathematical Reasoning) | Introductory Statistics(SA046100)                       | 1        |

\* View All Courses: <https://sugang.sungshin.ac.kr/> (Language : English)

| Major(Division)   | Subject Name                                                           | Semester |
|-------------------|------------------------------------------------------------------------|----------|
| Core Major(2)     | Introduction to Analysis 1                                             | 1        |
| Core Major(2)     | Linear Algebra 1                                                       | 1        |
| Core Major(2)     | Mathematical Modeling and Differential Equations                       | 1        |
| Core Major(2)     | Number Theory                                                          | 1        |
| Core Major(2)     | Multivariable Calculus                                                 | 1        |
| Core Major(2)     | Mathematics for Machine Learning                                       | 1        |
| Advanced Major(3) | Modern Algebra 1                                                       | 1        |
| Advanced Major(3) | Functions of Complex Variables                                         | 1        |
| Advanced Major(3) | Theory of Mathematical Problem Solving                                 | 1        |
| Advanced Major(3) | Theory and Research in Mathematics Education                           | 1        |
| Advanced Major(3) | Logic and Essay Writing in Mathematics                                 | 1        |
| Advanced Major(3) | Financial Society with Mathematics                                     | 1        |
| Advanced Major(3) | Topology 1                                                             | 1        |
| Advanced Major(3) | Advanced Mathematical Programming                                      | 1        |
| Advanced Major(4) | Numerical Data Processing                                              | 1        |
| Core Major(2)     | Introduction to Analysis 2                                             | 2        |
| Core Major(2)     | General Geometry                                                       | 2        |
| Core Major(2)     | Linear Algebra 2                                                       | 2        |
| Core Major(2)     | Mathematical Programming                                               | 2        |
| Core Major(2)     | Introduction to Probability and Statistics                             | 2        |
| Advanced Major(3) | Differential Geometry                                                  | 2        |
| Advanced Major(3) | Modern Algebra 2                                                       | 2        |
| Advanced Major(3) | Integrations of Complex Variables                                      | 2        |
| Advanced Major(3) | Teaching Materials and Instructional Methods for Mathematics Education | 2        |
| Advanced Major(3) | Topology 2                                                             | 2        |
| Advanced Major(3) | Numerical Analysis with Python                                         | 2        |
| Advanced Major(4) | Partial Differential Equation and its Applications                     | 2        |

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# Mathematics Major Curriculum





# Statistics Major Curriculum

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## Semester 1

| Major(Division)   | Subject Name                             |
|-------------------|------------------------------------------|
| Core Major(2)     | Statistical Package Programming          |
| Core Major(2)     | Actuarial Statistics                     |
| Core Major(2)     | Regression Analysis 1                    |
| Core Major(2)     | Mathematical Statistics 1                |
| Core Major(2)     | Exploratory Data Analysis                |
| Core Major(2)     | Statistics with R                        |
| Advanced Major(3) | The practice of Social Research          |
| Advanced Major(3) | Categorical Data Analysis                |
| Advanced Major(3) | Experimental Design                      |
| Advanced Major(3) | Statistical Computing and Simulation     |
| Advanced Major(4) | Multivariate Data Analysis I             |
| Advanced Major(4) | Data Analysis for Business and Economics |
| Advanced Major(4) | Statistical Analysis for Big data        |

## Semester 2

| Major(Division)   | Subject Name                                     |
|-------------------|--------------------------------------------------|
| Core Major(1)     | Statistics with Excel                            |
| Core Major(2)     | Laboratory in Statistical Programming            |
| Core Major(2)     | Mathematical Statistics 2                        |
| Core Major(2)     | Regression Analysis                              |
| Core Major(2)     | Statistics with Python                           |
| Advanced Major(3) | Biostatistics                                    |
| Advanced Major(3) | Time Series Data Analysis                        |
| Advanced Major(3) | Statistics and Marketing                         |
| Advanced Major(3) | Statistics with SQL                              |
| Advanced Major(3) | Statistical Analysis for Artificial Intelligence |
| Advanced Major(4) | Multivariate Data Analysis II                    |
| Advanced Major(4) | Data Mining                                      |
| Advanced Major(4) | Financial Data Analysis                          |
| Advanced Major(4) | Advanced Statistical Analysis                    |



# Fintech Major Curriculum

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## Semester 1

| Major(Division)   | Subject Name                            |
|-------------------|-----------------------------------------|
| Advanced Major(3) | Financial Database                      |
| Advanced Major(3) | AI Fintech Service                      |
| Advanced Major(3) | Fintech with Applied Cryptography 1     |
| Advanced Major(3) | Financial Cryptography Implementation 1 |
| Advanced Major(3) | Actuarial Science                       |
| Advanced Major(4) | Fintech Capstone Design 1               |

## Semester 2

| Major(Division)   | Subject Name                            |
|-------------------|-----------------------------------------|
| Core Major(2)     | Basic Actuarial Science                 |
| Core Major(2)     | Mathematical Cryptology                 |
| Advanced Major(3) | Fintech with Applied Cryptography 2     |
| Advanced Major(3) | Financial Cryptography Implementation 2 |
| Advanced Major(4) | Introduction to Cryptographic Protocols |
| Advanced Major(4) | Smart Financial Data Analysis           |
| Advanced Major(4) | Fintech Capstone Design 2               |



# Big Data Science Major Curriculum

\* View All Courses: <https://sugang.sungshin.ac.kr/> (Language : English)

| Major(Division)   | Subject Name                                     | Semester |
|-------------------|--------------------------------------------------|----------|
| Advanced Major(3) | Data-driven Artificial Intelligence 1            | 1        |
| Advanced Major(3) | Numerical Optimization and Statistical Computing | 1        |
| Advanced Major(4) | Advanced Machine Learning                        | 1        |
| Advanced Major(4) | Big Data Capstone Design                         | 1        |
| Core Major(1)     | Data Science Practice                            | 2        |
| Advanced Major(2) | Introduction to Database                         | 2        |
| Advanced Major(3) | Data-driven Artificial Intelligence 2            | 2        |
| Advanced Major(3) | Social Network Analysis                          | 2        |
| Advanced Major(4) | Business Analytics                               | 2        |
| Advanced Major(4) | Big Data Capstone Design                         | 2        |



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