

COLLEGE OF NATURAL AND APPLIED SCIENCES

MASTER OF SCIENCE IN DATA SCIENCE

PROSPECTUS

The University of Guam Master of Science in Data Science program is a comprehensive and cohort-based study requiring 30 credit hours. Delivered in a face-to-face format, the curriculum places a strong emphasis on the practical applications of statistical methodology, computational science, and diverse domains. It includes a range of topics, including statistical modeling, machine learning, optimization, data management, analysis of large datasets, and data acquisition.

Throughout the program, students will explore reproducible data analysis, collaborative problem-solving, and honing visualization and communication skills. Also, the curriculum addresses ethical and security issues intrinsic to data science. Students will have developed expertise in applying data science techniques to solve real-world problems across various domains.

OBJECTIVES

Master of Science in Data Science program objectives are:

1. To establish the first regional graduate program in Data Science that provides affordable education options to local students. The program will offer lower resident tuition rates and access to financial aid and support programs compared to similar off-island programs. Additionally, the program will leverage existing UOG grants such as U54, EPSCOR, and NASA to support students.
2. To equip students with the necessary skills to work as data analysts in both academic and industry settings. Graduates can contribute to existing research initiatives at UOG, further enhancing research capabilities at the university.

PROGRAM LEARNING OUTCOMES

Students completing the Master of Science in Data Science Program at UOG will be able to:

1. Design and execute statistical experiments and hypothesis tests to extract meaningful insights from data.
2. Analyze and interpret complex statistical data using advanced statistical methodologies and tools.
3. Visualize data for exploration, analysis, and communication.
4. Develop and implement predictive models and machine learning algorithms to make data-driven decisions.
5. Communicate statistical analyses, findings, and recommendations to both technical and non-technical audiences effectively.
6. Collaborate with interdisciplinary teams to design, implement, and evaluate statistical projects.

ADMISSION

Applicants must have the following minimum qualifications, to be eligible to apply to the program:

1. Earned baccalaureate degree in mathematics, computer science, biology, chemistry, statistics, psychology, or public health from an accredited college or university.
2. Graduate admission application and application fee
3. Official transcripts of all coursework completed.
4. At least two letters of recommendation
5. Current resume
6. Minimum cumulative undergraduate grade point average of 3.0.

In addition, undergraduate students must complete the following prerequisites or equivalent before entering the program:

1. Multivariate Calculus, MA-205
2. Linear Algebra, MA-341
3. Statistics course, MA-387+MA-387L, or BI-412+BI-412L

Or Bridge Course (no credit toward degree)

The bridge course will cover calculus, linear algebra and statistics topics necessary for data science courses. The Bridge Course will take place during the UOG summer Session C, preceding the program's start.

Calculus topics and learning outcomes:

- Vector calculus and multivariate integration
- Partial derivatives and gradient descent
- Analytically optimize different types of functions commonly used in machine learning using properties of derivatives and gradients

Linear algebra learning outcomes:

- Represent data as vectors and matrices and identify their properties using concepts of singularity, rank, and linear independence
- Apply common vector and matrix algebra operations like dot product, inverse, and determinants
- Express certain types of matrix operations as linear transformation and apply concepts of eigenvalues and eigenvectors to simple machine learning problems

Statistics topics:

- Calculate the descriptive statistics
- Understand the properties of commonly used probability distributions in machine learning and data science
- Conduct various statistical tests including a T test, an ANOVA, and regression analysis
- Interpret the results of your statistical analysis after conducting hypothesis testing.

DEGREE REQUIREMENTS

All Data Science classes take place on campus in a face-to-face format, with the exception of MA-500 and MA-505, which are eight-week online courses. All required math courses will be held at 4 p.m. Elective courses may take place in the morning or other times of day.

COURSE REQUIREMENTS (30 CREDIT HOURS)

Required Courses (17-20 credit hours)

Course	Course Title	Credits	Term Offered
MA541	REGRESSION MODELS AND APPLICATIONS	4	FALL ONLY/ EVEN YEARS
MA551	INTRODUCTION TO PROBABILITY THEORY	3	FALL ONLY/ EVEN YEARS
MA552	INTRODUCTION TO MATHEMATICAL STATISTICS	3	SPRING ONLY/ ODD YEARS
MA564	MULTIVARIATE ANALYSIS	3	SPRING ONLY/ ODD YEARS
MA571	STATISTICAL RESEARCH AND CONSULTING	1 - 3	FALL/SPRING/ ALL YEARS
MA581	MACHINE LEARNING FOR DATA SCIENCE	3	FALL ONLY/ ODD YEARS

Elective Courses (10-13 credit hours)

Complete at least 16 credit hours

Course	Course Title	Credits	Term Offered
AL505	NUTRITIONAL EPIDEMIOLOGY	3	SPRING ONLY/ ODD YEARS
EV558	ADVANCED GEOSPATIAL METHODS	4	SPRING ONLY/ ALL YEARS
BA622	STATISTICAL ANALYSIS AND ECONOMETRIC TECHNIQUES	3	SUMMER/ ALL YEARS
MA505	INTRODUCTION TO SAS	1	FALL ONLY/ ALL YEARS
MA500	INTRODUCTION TO R	1	FALL ONLY/ ALL YEARS
AL594	CANCER HEALTH DISPARITIES	3	FALL ONLY/ ALL YEARS

The master's program offers flexibility by not requiring a thesis. Instead, students can pursue alternative capstone projects or practical experiences aligned with their interests and goals.

SAMPLE SCHEDULE FOR COVERING REQUIREMENTS

Below is a sample schedule of the program across four semesters (two years), offering flexibility in personalizing your educational journey:

Fall 2024	Spring 2025	Fall 2025	Spring 2026
MA-551 (3 credits)	MA-552 (3 credits)	MA-581 (3 credits)	MA-571 (1 credit)
MA-541 (4 credits)	MA-564 (3 credits)	MA-571 (2 credits)	Elective (3 credits)
MA-500 (1 credit)	Elective (3 credits)	Elective (3 credits)	
MA-505 (1 credit)			

Fall 2024	Spring 2025	Fall 2025	Spring 2026
Total credits: 9	Total credits: 9	Total credits: 8	Total credits: 4

FACULTY

PROGRAM CHAIR

Grazyna Badowski

Associate Professor of Mathematics
College of Natural & Applied Sciences
(671) 735-2840
gbadowski@triton.uog.edu

FACULTY

Leslie J. Camacho Aquino

Associate Professor of Mathematics
College of Natural & Applied Sciences
(671) 735-2832
aquino18112@triton.uog.edu

Jaeyong Choi

Assistant Professor of Mathematics / I Meyeng UOG-
Certified Online Teacher
College of Natural & Applied Sciences
(671) 735-2130
choij@triton.uog.edu

Hyunju Oh

Professor of Mathematics
College of Natural & Applied Sciences
(671) 735-2142
ohh@triton.uog.edu

Frank A. Camacho

Interim Associate Director of Research / Professor of
Biology
Western Pacific Tropical Research Center
(671) 735-2005
fcamacho@triton.uog.edu

Yuming Wen

Director of Water and Environmental Research Institute
(WERI) of the Western Pacific
Water & Environmental Research Institute of the Western
Pacific
(671) 735-2687
ywen@triton.uog.edu

Bastian Bentlage

Associate Professor of Bioinformatics
Marine Lab
(671) 735-0320
bentlageb@triton.uog.edu

Yvette C. Paulino

Dean / Professor of Health Sciences / I Meyeng UOG-
Certified Online Teacher
Margaret Perez Hattori-Uchima School of Health
(671) 735-2661
paulinoy@triton.uog.edu

Tanisha F. Aflague

Extension Agent IV / Associate Professor of Nutrition
Cooperative Extension & Outreach
(671) 735-2026
taflague@triton.uog.edu

Kuan-Ju Chen

Associate Professor of Agricultural Economics / Senior
Liaison of the Asia-Pacific Universities Consortium
Cooperative Extension & Outreach
(671) 735-2089
chenkj@triton.uog.edu

James Ji

Assistant Professor of Management
School of Business & Public Administration
(671) 735-2501/20
jji@triton.uog.edu