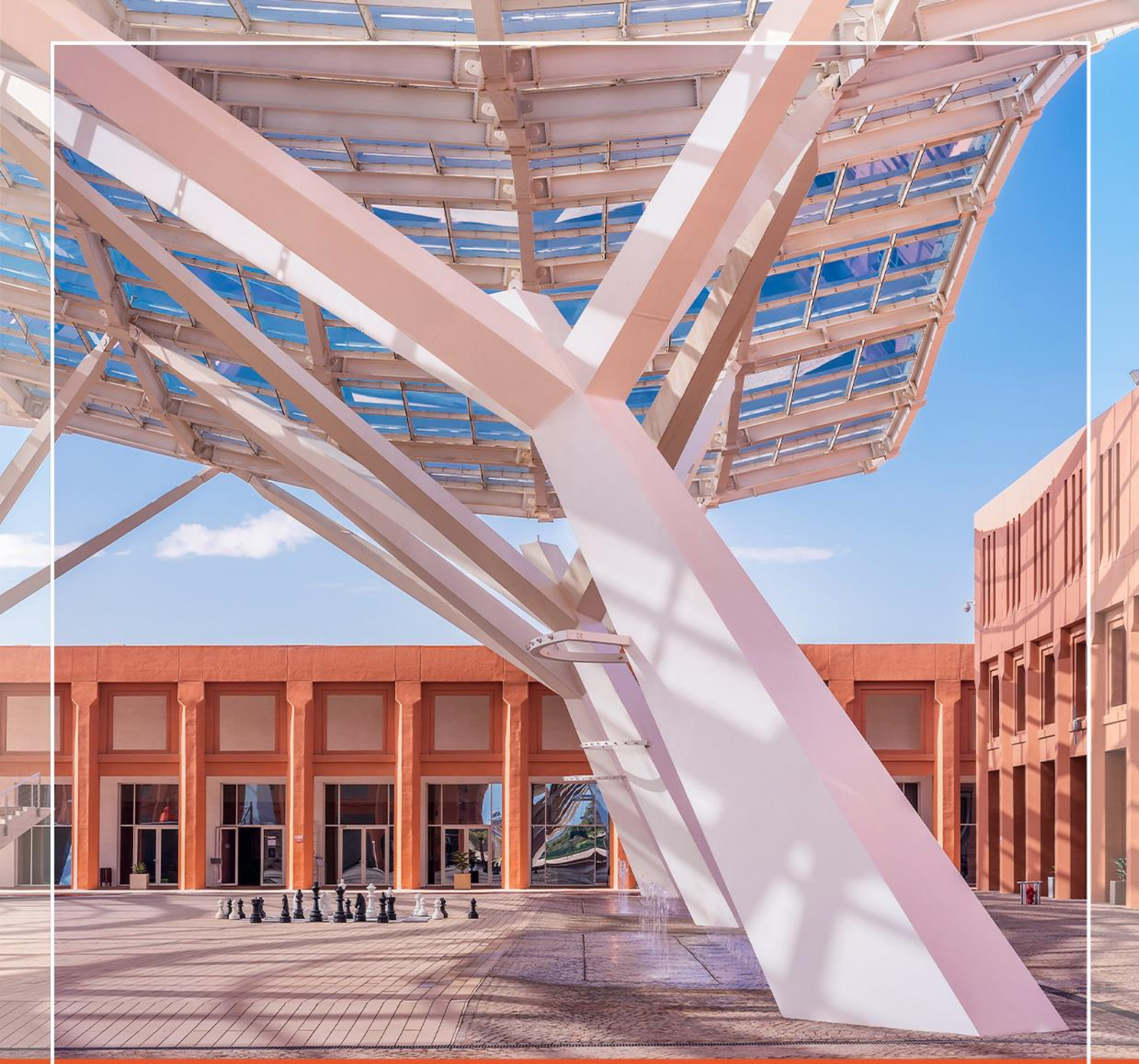

Africa Business School

Advanced Statistical Methods for Finance

Instructors: Dr. Ravi Ranjan, Africa Business School

Masters in quantitative and financial modelling (QFM) 2023

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A. FACULTY BIO

Dr. Ravi Ranjan is an assistant professor of business analytics at Africa Business School, UM6P. He holds a Ph.D. Degree in Decision Sciences from the Indian Institute of Management Bangalore (IIM-B). He has joined Africa Business School in the faculty of Business Analytics and Value Networks. Before joining ABS, he was working as a post-doctoral researcher in Operations, Planning, Accounting, and Control Group at Eindhoven University of Eindhoven (TU/e) in the Netherlands. His research topics and interests revolve around Internet Search Trends, Financial Time Series Analysis, Stochastic Modelling, Supply Chain Finance, and Working Capital Management. At TU/e, he was involved in a 'Cash Flow Harmonization' Project with NWO (Netherlands Scientific Organization) and DASCOVIMI project (understanding supply chain disruptions due to COVID 19). At ABS, he focuses on understanding – a) the financial risk management of SMEs and b) Consumer heterogeneity, behavior, and confidence in Africa. One of his recent papers on Investor Attention in Energy Market got published in Energy Economics. He has also been a member of the Surveillance Team as one of the leading stock exchanges and forecasting evaluation teams of Royal Air Maroc.

B. COURSE OVERVIEW

This course provides fundamentals of statistical inference to the students. With this course, the students would understand the process of observing and analyzing data and derive meaningful conclusions. The course covers strong theoretical foundations of hypothesis testing and parameter estimations with a focus on applications to finance. The statistical concepts are supplemented with practical and real-world examples illustrations in R. The course enables students to work on action learning project by taking up business challenges in financial and related sectors use statistical and data driven methodology to solve them in the project.

C. INTENDED LEARNING OUTCOMES

At the end of this course, you will be able to:

⇒ Understand the mathematical foundations underlying data distributions.

⇒ Possess a strong grasp of statistical inference.

⇒ Develop and test meaningful hypotheses.

⇒ Cultivate an ability to comprehend financial models.

⇒ Engage in critical thinking and foster a probabilistic mindset for risk management.

⇒ Interpret and effectively communicate meaningful statistical findings.

D. TEACHING AND LEARNING METHODS

The teaching sessions are expected to happen in classroom with face-to-face student faculty interactions. The learning platform CANVAS used for attendance, course materials, evaluations, and student presentations.

E. SESSION OVERVIEW

Sessions/Dates	Session Plan and Topics Covered
2nd October 2023 (Monday) Session 1: 9:00 AM to 12:15 AM Session 2: 2:00 PM to 5:15 PM	Probabilistic Thinking and Statistics for Business Theory of distributions – Binomial, multinomial, Poisson, normal and Exponential family of distributions, Moments
16th October 2023 (Monday) Session 3: 9:00 AM to 12:15 AM Session 4: 2:00 PM to 5:15 PM	Special and Sampling Distributions Central Limit Theorems and Hypothesis Testing
27th October 2023 (Friday) Session 5: 2:00 AM to 5:15 AM	Bootstrapping and Confidence Intervals
30th October 2023 (Monday) Session 6: 9:00 AM to 12:15 AM Session 7: 2:00 PM to 5:15 PM	Parameter Estimations – Maximum Likelihood Estimation Neyman Factorization Theorem, Unbiasedness, MVUE
24th November 2023 (Friday) Session 8: 2:00 PM to 5:15 PM	Cramer Rao Lower Bound, Uniformly Most Powerful Tests
27th November 2023 (Monday) Session 9: 9:00 AM to 12:15 AM Session 10: 2:00 PM to 5:15 PM	Bayesian Inference – Prior and Posterior Distributions Bayesian Regression and Parameter Estimation
8th December 2023 (Friday) Session 11: 2:00 PM to 5:15 PM	Simple and Multiple Linear Regression
11th December 2023 (Monday) Session 12: 9:00 AM to 12:15 AM Session 13: 2:00 PM to 5:15 PM	Guest Speaker Workshop from Finance Industry
Session 8: 5th January 2024 (Friday) Session 14: 2:00 PM to 5:15 PM	Latent Models in Finance
Session 8: 8th January 2024 (Monday) Session 15: 9:00 AM to 12:30 AM Session 16: 2:00 PM to 6:00 PM	**Student Action Learning Project Presentations**

F. COURSE PREPARATION AND READING MATERIALS

Submodule A: Textbook: Introduction to Mathematical Statistics, Hogg, Mckean and Craig, Pearson Publishers.

G. ASSESSMENT AND GRADING

Evaluation	Weights
Critical Thinking Examination	40 %
Action Learning Project Report and Presentation	40 %
Class Engagement, Attendance, Exercise Submissions	30 %

Important: Students are required to attend 100 % of the session. Any absence requires prior communication and justification to the program officers. Student must the to the ABS and UM6P guidelines and ethics and integration in all submissions.