Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2023-2024

Course Handout Part II

Date: 09-01-2024

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : *ECON F215*
Course Title : Computational Methods for Economics
Instructor-in-Charge : Bheemeshwar Reddy A

Scope and Objective of the Course:

With increased digitization, it has become common for industries to generate massive data. Firms increasingly use big data by employing data science techniques to solve business problems. Hence, knowledge of modern statistical learning tools and an understanding of economic reasoning are essential for students aspiring to be data scientists.

This course gives students a hands-on introduction to the data science and econometric tools and practices required to address business and economic problems in the real world. Students will be introduced to modern statistical learning tools through learning by-doing mode. The course will provide many practical data examples of applying causation in data science and prediction techniques to solve actual business problems. Students will get hands-on training in data cleaning and computational implementation using R.

Textbooks(TB): Matt Taddy **(**2019) "Business Data Science: Combining Machine Learning and Economics to Optimize, Automate, and Accelerate Business Decisions" McGraw Hill; 1st edition

Reference books

R1: Matt Taddy**,** Leslie Hendrix, Matthew Harding (2022) "Modern Business Analytics" McGraw Hill; 1st edition

R2: James, G., D. Witten, T. Hastie, and R. Tibshirani. (2021). "An Introduction to Statistical Learning: with Applications in R", Springer. (2nd ed.)

Course Plan:

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1-4	After completing the module, students will learn the fundamental structure and concepts used in regression analysis.	Regression	Chapter 2 (TB) and additional material
5-9	Upon completing this	Uncertainty Quantification	Chapter 1

	module, students can understand uncertainty in terms of probability and statistics and quantify the same.		(TB) and additional material
10-14	After completion of the module, students will be able to master the essential tools for high-dimensional modelling	Regularization and Selection	Chapter 3 (TB) and additional material
15-20	At the end of the module, students will learn how to deal with classification questions in the context of prediction problems	Classification	Chapter 4 (TB) and additional material
20-25	Students can distinguish between correlation and causation in analyzing business and economic systems after completing the module and will be able to carry out casual analysis by creating counterfactuals using experimental designs.	Causal Inference with Experiments	Chapter 5 (TB) and additional material
26-30	At the end of the module, students will be able to carry out causal analysis using counterfactual in the context of observational data	Causal Inference with Controls	Chapter 6 (TB) and additional material
31-34	Upon completing this module, students will learn to model economics and business phenomena with CART and random forest algorithms.	Trees and Forests	Chapter 7 (R1) and additional material
34-38	At the end of this chapter, students will be able to apply different methods of unsupervised factorization and supervised factor modelling to solve business problems.	Factor Models	Chapter 8 (R1) and additional material

39-42	After completion of this chapter, Students can apply text-specific techniques to aid decision making a business context.	Text as Data	Chapter 8 (TB) and additional material

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Assignments(2)	Take home	30%	TBA	OB
Quiz (2)	TBA	10%	TBA	OB
Mid-sem	90 min	25%	11/03 - 9.30 - 11.00AM	Closed book
Compre	180 min	35%	06/05 FN	Closed book

Chamber Consultation Hour: 4-5pm Monday

Notices: All notices regarding the course will be displayed on the CMS or ECOFIN Dept. notice board.

Make-up Policy: Make-up will be given only on Doctor's/Warden's recommendation and with prior permission of the Instructor-in-Charge/Instructor. Make-up application via sms/messages is not acceptable.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

INSTRUCTOR-IN-CHARGE