هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission
اعتماد
NCAAA
2024
TP-153

Course Specification
(Bachelor)

Course Title :	**Introduction to Regression**
Course Code:	**STA 1224**
Program:	**Bachelor of Science in Applied Statistics**
Department:	**Mathematics and Statistics**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**2024 – V1**
Last Revision Date:	**2 October 2024**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours:					
4 (3 Lectures, 1 Lab, 1 Tutorial)					
2. Course type:					
A.	☐University	☐College	☒ Program	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered:					
Level 4 / Year 2					
4. Course General Description:					
The Introduction to Regression course is designed to provide students with a foundational understanding of regression analysis, a key statistical technique used to model and analyze relationships between variables. This course covers various types of regression models, emphasizing their applications in real-world data analysis. The course aims to teach how to formulate such models and fit them to data, how to make predictions with associated measures of uncertainty, and how to select appropriate explanatory variables. Both theory and practical aspects are covered, including the use of computer software for regression.					
5. Pre-requirements for this course (if any):					
STA 1203					
6. Co-requisites for this course (if any):					
None					
7. Course Main Objective(s):					

- To provide students with a foundational understanding of regression analysis concepts, including the roles of dependent and independent variables in modeling relationships.
- To equip students with the skills to perform simple linear regression analysis, enabling them to estimate and interpret the relationship between two variables.
- To develop students' abilities to implement multiple linear regression techniques, allowing them to analyze the effects of multiple predictors on a response variable.
- To train students to assess and diagnose the assumptions of regression models, ensuring the validity and reliability of their analyses.
- To prepare students to evaluate and validate regression models using appropriate metrics, such as R-squared, adjusted R-squared, and cross-validation techniques.
- To provide hands-on experience with statistical software (e.g., R, Python, or SPSS) for conducting regression analyses, enhancing computational skills and practical application.
- To enable students to interpret the results of regression analyses accurately and communicate findings effectively, considering the practical implications of their results.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	*E-learning*	0	0%
3	Hybrid	0	0%

No	Mode of Instruction	Contact Hours	Percentage
	• Traditional classroom • E-learning		
4	**Distance learning**	**0**	**0%**

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**45**
2.	**Laboratory/Studio**	**15**
3.	**Field**	**0**
4.	**Tutorial**	**15**
5.	**Others (specify)**	**0**
Total		**75**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**To outline the concept of linear regression model and properties of model parameters for prediction purposes.**	**K1, K3**	3 lecture hours per week 1 tutorial hours per week 1 lab hours per week Self-study	**Direct:** Regular Exams
1.2	**To define regression analysis and its limitations.**	**K1, K2**	3 lecture hours per week 1 tutorial hours per week 1 lab hours per week Self-study	**Direct:** Short Quizzes
2.0	**Skills**			
2.1	**To summarize and explain the general procedures of statistical inference for linear regression models.**	**S1, S2**	Self-study Real-life problems	**Direct:** Participations Short Quizzes
2.2	**To differentiate the situation where linear regression is appropriate**	**S2**	Real-life problems	**Direct:** **Short Quizzes**
2.3	**To interpret estimates and diagnostic statistics.**	**S3, S4**	Self-study	**Direct:** **Participations**
2.4	**To construct and fit linear regression models with the appropriate software.**	**S5**	Self-study Real-life problems	**Direct:** Regular Exams Participation Short Quizzes
2.5	**To design and implement advanced methods in regression analysis for applications.**	**S2, S3**	2 tutorial hours\week Self-study	**Direct:** Regular Exams Participation Short Quizzes

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
3.0	**Values, autonomy, and responsibility**			
3.1	**To employ ethical concepts and rules to determine viable alternatives in any given situation.**	**V1, V2**	Personal questions	**Direct:** Participation
3.2	**To show findings and discuss the results with others.**	**V1, V3**	Teamwork and class discussions.	**Direct:** Homework Mini projects

C. Course Content

No	List of Topics	Contact Hours
1.	**Introduction to Regression Analysis:** Regression Models. Formal uses of regression analysis. The data base.	**10**
2.	**The Simple Linear Regression Model:** The model description; Assumption and interpretation of model parameters; Last square formulation; Partitioning total variability; Test of hypothesis on a slope and intercept; Quality of fitted model; Confidence interval on mean response and prediction intervals; A look at a residual.	**20**
3.	**The Multiple Linear Regression Model:** Model description and assumptions; Estimation; Properties of the least square estimators; Various hypotheses tests; Multicollinearity in multiple data; Quality of fit and prediction.	**18**
4.	**Selection of Variables:** Contribution of a variable in the model; Forward selection and backward elimination; Stepwise procedure; All possible subsets and other techniques of selection variables.	**14**
5.	**Statistical diagnostics:** Analysis of residual; Diagnostic plots; Detection of outliers; Influence diagnostics.	**13**
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Homeworks, Quizzes, Mini-projects**	**During the term**	**10%**
2.	**First Midterm**	**Week 5-6**	**25%**
3.	**Second Midterm (lab Exam)**	**Week 10-11**	**25%**
4.	**Final Exam**	**Week 16-17**	**40%**

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	• ***Classical and Modern Regression with Applications*;** 2nd Edition, Raymond H. Myers, Duxbury Classic, 2000. ISBN-13: 978-0534380168. **(Main Reference)** • ***Regression analysis by example,*** 5th Edition, Samprit Chatterjee and Alis S. Hadi, Wiley Series in Probability and Statistics, 2012.
Supportive References	1. ***Applied Regression,*** 4th Edition, Sanford Weisberg, Wiley Series in Probability and Statistics, 2013. 2. ***Applied Regression Analysis and Multivariable Methods*,** 5th Edition, D. G. Kleinbaum, L. L. Kupper, A. Nizam, and E. S. Rosenberg, Cengage Learning, 2013. 3. ***Introduction to Linear Regression Analysis*, 5th Edition;** Douglas C. Montgomery, Elizabeth A. Peck, and G. Geoffrey Vining, Wiley Series in Probability and Statistics, 2012. 4. ***Regression Analysis, Theory, Methods and Applications***, A Sen and M. Srivastava, Springer-Verlag, 1990.
Electronic Materials	**Course Website: Learning Management Systems (Blackboard)**
Other Learning Materials	**None**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	▪ **Each class room should be equipped with a whiteboard and a projector.** ▪ **Laboratories should be equipped with computers and an internet connection.**
Technology equipment (projector, smart board, software)	**The rooms should be equipped with data show and Smart Board.** **All computers should be equipped with the following software:** ▪ **Microsoft Excel** ▪ **IBM SPSS** ▪ **R-Project** ▪ **MATLAB**
Other equipment (depending on the nature of the specialty)	**See the attached file**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Student and teaching staff**	**Surveys and Questionnaires**
Effectiveness of Students assessment	**Course Coordinator**	**Peer Reviews**
Quality of learning resources	**Students and teaching staff**	**Classroom Observations**
The extent to which CLOs have been achieved	**Student Representatives**	**Student Performance Evaluations (exams, projects)**

Assessment Areas/Issues	Assessor	Assessment Methods
		CLOs Excel sheet.
Other	**None**	

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**MATHEMATICS AND STATISTICS DEPARTMENT COUNCIL**
REFERENCE NO.	**8/1446**
DATE	**(08/10/2024) 05/04/1446**