Form: Course Syllabus		
	Form Number	EXC-01-02-02A
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	Number of Pages	06

1.	**Course Title**	**Linear Statistical Models**
2.	**Course Number**	0301734
3.	**Credit Hours (Theory, Practical)**	3
	Contact Hours (Theory, Practical)	3
4.	**Prerequisites/ Corequisites**	None
5.	**Program Title**	Master's Degree
6.	**Program Code**	
7.	**School/ Center**	Science
8.	**Department**	Mathematics
9.	**Course Level**	Elective
10.	**Year of Study and Semester (s)**	First or Second Year
11.	**Other Department(s) Involved in Teaching the Course**	None
12.	**Main Learning Language**	English
13.	**Learning Types**	✓Face to face learning ☐ Blended ☐Fully online
14.	**Online Platforms(s)**	✓Moodle ✓Microsoft Teams
15.	**Issuing Date**	9/11/2024
16.	**Revision Date**	

17. Course Coordinator:

Name: Amal Helu Contact hours: 10:30-11:30 am

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18. Other Instructors:

Name:
Office number:
Phone number:
Email:
Contact hours:
Name:
Office number:
Phone number:
Email:
Contact hours:

19. Course Description:

This course covers statistical theory and methodology underlying linear models, focusing on regression, analysis of variance, and covariance models. Topics include the multivariate normal distribution, non-central chi-square and F distributions, and distributional properties of linear and quadratic forms, parameter estimation, model fitting, selection, diagnostics, and hypothesis testing.

20. Program Student Outcomes (SO's):

(To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program)

SO2. Analyze and apply different mathematical algorithms and theories and use modern techniques.

SO4. Formulate mathematical and statistical problems by modeling real-life problems, and solve those theoretically and/or numerically using technological tools.

SO6. Apply knowledge and mathematical tools and think creatively to solve real life problems and then verify and interpret the results correctly.

SO8. Apply methodologies and ethics of scientific research in preparation of scientific research in mathematics field.

21. Course Intended Learning Outcomes (CLO's):

(Upon completion of the course, the student will be able to achieve the following intended learning outcomes)

- CLO1: Explain the statistical theory behind full and less-than-full rank linear models.
- CLO2: Fit linear models using statistical software and interpret outcomes.
- CLO3: Analyze data through linear regression and ANOVA models.
- CLO4: Apply diagnostics and model selection techniques.
- CLO5: Test linear hypotheses and evaluate model assumptions.

Course CLOs	The learning levels to be achieved					
	Remembering	Understanding	Applying	Analysing	evaluating	Creating
CLO (1)	✓	✓	✓			
CLO (2)		✓	✓	✓		
CLO (3)			✓	✓	✓	
CLO (4)				✓	✓	
CLO (5)		✓	✓	✓		

22. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:

Program SO's / Course CLO's	SO (1)	SO (2)	SO (3)	SO (4)	SO (5)	SO (6)	SO (7)	SO (8)
CLO (1)		✓		✓		✓		✓
CLO (2)		✓		✓		✓		✓
CLO (3)		✓		✓		✓		✓
CLO (4)		✓		✓		✓		✓
CLO (5)		✓		✓		✓		✓

23. Topic Outline and Schedule:

Week	Topic	CLO/s Linked to the Topic	Learning Types Face to Face (FF) Blended (BL) Fully Online (FO)	Platform Used	Synchronous (S) Asynchronous (A)	Evaluation Methods	Learning Resources
1	Matrix Algebra Review	CLO1	FF		S	Quiz, Discussion	Notes, Textbook Ch. 1, Articles
2	Solving Linear Systems	CLO1	FF		S	Quiz, Assignment	Quiz
3	Least Squares Estimation	CLO1 , CLO2	FF		S	Quiz, Exercise	Assignment
4	Random Vectors and Matrices	CLO1 , CLO2	FF		S	Quiz, Assignment	Class Participation
5-6	Multivariate Normal Distribution	CLO1 , CLO2	FF		S	Quiz, Assignment	Quiz
7	Linear and Quadratic Forms	CLO2	FF		S	Quiz, Exercise	First Midterm Exam
8-9	Linear Regression Models	CLO3 , CLO4	FF		S	Quiz, Assignment	Assignment
10-11	Gauss-Markov Theorem	CLO4	FF		S	Case study, Project	Second Midterm Exam
12-13	Analysis of Variance (ANOVA) Models	CLO3	FF		S	Quiz, Exercise	Class Participation
14-15	Variance Components and Mixed Models	CLO5	FF		S	Quiz, Assignment	Project Presentation
16						Final Exam	

24. Evaluation Methods:

Opportunities to demonstrate achievement of the CLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	CLO/s Linked to the Evaluation activity	Period (Week)	Platform
First Midterm Exam	15%	Matrix Algebra, Multivariate Distributions	CLO1, CLO2	Week 6	Classroom
Second Midterm Exam	20%	Regression Models, Diagnostics	CLO3, CLO4	Week 9	Classroom
Quizzes	10%	Various Topics	CLO1, CLO3	Random Weeks	Classroom
Project Presentation	25%	ANOVA and Mixed Models	CLO3, CLO5	Week 13	Classroom
Final Exam	30%	Comprehensive	All CLOs	End of Semester	Classroom

25. Course Requirements:

Account on Microsoft Teams.

26. Course Policies:

- Attendance: Attendance is essential. Missing more than 10% of classes without an excuse may result in a failing grade.
- Exams: Exams must be taken as scheduled; exceptions are allowed only in extreme cases.
- Academic Integrity: The university's cheating policy applies to all course assessments.
- Assignment Deadlines: All assignments must be submitted on time; late submissions may incur penalties.

27. References:

Required Textbook: Rencher, A. C., & Schaalje, G. B. (2008). Linear Models in Statistics, 2nd Edition, John Wiley & Sons. **Additional Resources:** Stapleton, J. H. (2009). Linear Statistical Models, 2nd Edition, John Wiley & Sons.

28. Additional information:

1. Do not miss any classes. **2.** Print out and review the lecture notes before each class. **3.** Take notes directly on the printed materials. **4.** Collaborate in groups of two or more. **5.** If you are experiencing significant difficulties, please see me or make an appointment right away.

Name of the Instructor or the Course Coordinator: **Prof. Amal Helu**	Signature: ……	Date: 31/10/2024
Name of the Head of Quality Assurance Committee/ Department: **Prof. Manal Ghanem**	Signature: ……	Date: ……
Name of the Head of Department: **Prof. Baha Alzalg**.	Signature: ……	Date: ……
Name of the Head of Quality Assurance Committee/ School of Science: **Prof. Emad A. Abuosba**	Signature: ……	Date: ……
Name of the Dean or the Director: **Prof. Mahmoud I. Jaghoub**	Signature: ……	Date: ……