هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Statistical Analysis of Environmental Data (1)**
Course Code:	**STA 1112**
Program:	**Bachelor of Science in Environmental Science**
Department:	**Biology**
College:	**Science**
Institution:	**Imam Mohammad Ibn Saud Islamic University**
Version:	**2024 – V1**
Last Revision Date:	**None**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: 3 (Lecture 2+ Lab 2+ Tutorial 0)					
2. Course type					
A.	☐University	☐ College	☒ Department	☐Track	Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: Level 2 / First Year					

4. Course general Description:

The course covers both descriptive statistics and hypothesis testing in the field of environmental science. The students acquire the skills to compute and analyze measurements of location and deviations, frequencies, and covariation. The course covers the use of sample data to estimate a population parameter. The course will focus on the application of univariate and multivariate statistical approaches, explaining statistical ideas without requiring intricate mathematical proofs.

5. Pre-requirements for this course (if any)**:**

6. Co-requisites for this course (if any)**:**

7. Course Main Objective(s):

- **Describe discrete data graphically and compute measures of centrality and dispersion.**
- **Design and implement effective data collection methods for environmental studies, including sampling techniques and experimental design.**
- **Introduce students to statistical modeling techniques that can be used to predict and understand complex environmental systems and phenomena.**
- **Apply statistical methods to real-world environmental problems, such as pollution assessment, biodiversity studies, and climate change impact analysis.**
- **Develop students' ability to effectively communicate statistical findings to both technical and non-technical audiences, emphasizing the importance of data visualization and clear reporting.**

2. Teaching mode (mark all that apply)

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

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**30**
2.	**Laboratory/Studio**	**30**
3.	**Field**	**0**
4.	**Tutorial**	**0**
5.	**Others (specify)**	**0**
Total		**60**

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

Code	*Course Learning Outcomes*	*Code of CLOs aligned with program*	*Teaching Strategies*	*Assessment Methods*
1.0	**Knowledge and understanding**			
1.1	**To state the various measures of central tendency and dispersion.**	**K1**	**Lectures, problem-solving, Classroom discussions**	**Regular Exams, Lab Assignments, Practical exam**
1.2	**To outline effective sampling strategies and data collection methods for environmental studies.**	**K1, K2**	**Lectures, problem-solving, Classroom discussions**	**Regular Exams, Lab Assignments, Practical exam**
1.3	**To define and reproduce the population and sample, sample size, parameter, and estimate.**	**K1**	**Lectures, problem-solving, Classroom discussions**	**Regular Exams, Lab Assignments, Practical exam**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.4	To memorize the use of computer programming to apply these concepts to environmental problems.	K1, K2	Lectures, problem-solving, Classroom discussions	Regular Exams, Lab Assignments, Practical exam
2.0	**Skills**			
2.1	To summarize data using tables and charts.	S1	Lectures, problem-solving, Classroom discussions	Regular Exams, Lab Assignments, Practical exam
2.2	To explain various statistical methods used in environmental statistics.	S2, S3	Lecturing, Interactive learning.	Assignments, Practical exam
2.3	To perform descriptive and inferential statistical analyses.	S3, S4	Lecturing, Interactive learning.	Assignments, Practical exam
2.4	To interpret the output obtained from a statistical software package.	S1	Lectures, problem-solving, Classroom discussions.	Regular Exams, Lab Assignments, Practical exam
3.0	**Values, autonomy, and responsibility**			
3.1	To show collaborative approaches in data analysis projects, valuing diverse perspectives and fostering an inclusive learning environment.	V1	Lectures, problem-solving, Classroom discussions	Regular Exams, Lab Assignments, Practical exam
3.2	To draw decisions based on data analysis and understand the broader environmental and social implications of their findings.	V2	Lectures, problem-solving, Classroom discussions	Regular Exams, Lab Assignments, Practical exam
3.3	Demonstrate a commitment to ethical standards in data collection, analysis, and reporting, ensuring transparency and integrity in	V4	Lectures, problem-solving, Classroom discussions	Regular Exams, Lab Assignments, Practical exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	environmental research.			

C. Course Content

No	List of Topics	Contact Hours
1	**Introduction:** The Meaning of Statistics, The Uses of Statistics, Descriptive and Inferential Statistics, Sources of Data: Surveys and Experiments, Retrospective and Prospective Studies, Demographic Data, Population and Sample, Qualitative and Quantitative Data, Scales of Measurement.	**10**
2	**Exploring Data with Tables and Graphs:** Frequency Distributions for Organizing and Summarizing Data; Histograms; Graphs That Enlighten and Graphs That Deceive; Scatterplots, Correlation, and Regression. ***Applications using statistical software.***	**12**
3	**Describing, Exploring, and Comparing Data:** Measures of Center; Measures of Variation; Measures of Relative Standing and Boxplots. ***Applications using statistical software.***	**12**
4	**Probability and Probability Distributions:** Basic Probability Concepts, Normal Probability Distribution, Discrete Probability, Distributions: Binomial and Poisson. ***Applications using statistical software.***	**10**
5	**Estimating Parameters and Determining Sample Sizes:** Sampling and Sampling Distribution; Estimation of mean, variance and proportion for a single population; Error of estimation; Sample size determination; Estimation of the difference between 2 means, ratio of 2 variances and difference of 2 proportions for two populations. ***Applications using statistical software.***	**16**
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Homework, Mini projects**	**During the semester**	**15%**
2.	**Midterm Exam**	**10thweek**	**25%**
3.	**Lab exam**	**14thweek**	**20%**
4.	**Final Exam**	**16th week**	**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	***Elementary Statistics***, 14th edition; Mario F. Triola, Pearson, 2022. **(Main Reference).** ***Statistics for Environmental Science and Management,*** 2nd Edition, Bryan F. J. Manly, CRC Press, 2009.
Supportive References	***Analyzing Environmental Data*****,** Walter W. Piegorsch, A. John Bailer, John Wiley & Sons, Ltd., 2005.
Electronic Materials	**None**
Other Learning Materials	**None**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	▪ **Each classroom 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 a data show and Smart Board.** **All computers should be equipped with the following software:** • **Microsoft Excel** • **IBM SPSS** • **R-Project**
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students**	**Each student will complete two evaluation forms during the semester and at the end of the course.**
Effectiveness of Students' assessment	**Instructor**	**At the end of each semester, the course instructor should complete the course report, which includes a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.**
Quality of learning resources	**Students**	**Each student will complete two evaluation forms during the semester and at the end of the course.**

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	**Instructor**	**At the end of each semester, the course instructor should complete the course report, which includes a summary of student questionnaire responses appraising progress and identifying changes that need to be made if necessary.**
Other	**None**	

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	**MATHEMATICS AND STATISTICS DEPARTMENT COUNCIL**
REFERENCE NO.	
DATE	