DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COURSE SYLLABUS

EE 374: Experimentation and Data Analysis in Health Care

COURSE TITLE	*CODE & NUMBER*	*SUBJECT AREA*	Contact Hours			Credit Units
			Th.	*Pr.*	*Tr.*	
Experimentation and Data Analysis in Health Care	**EE374**	Engineering	3	1	0	3
Pre-requisites:	BIO321, STAT110					
Course Role in Curriculum *(Required/Elective):*	Required course					
Catalogue Description: Descriptive statistics; elementary probability; discrete and continuous random variables and their distributions; hypothesis testing involving continuous and categorical (nominal and ordinal) variables, two and more treatments; linear regression; analysis of survival data. Design of clinical trials; sample size and selection of samples; selection and preparation of apparatus and preparing experimental protocols. Clinical standards for data collection, organization, summarization and verification; medical sample handling, transporting and disposal; sterilization, cleansing and hygiene. Applications of essential statistical techniques for use in analyzing data from different types of engineering experiments, biological experiments and clinical studies. Term project.						

***Textbooks*:** Peebles P. Z., Probability, Random Variables, and Random Signal
(Author, Title, Pub., year) Principles, 4th ed., McGraw-Hill International, 2001.

***Supplemental Materials*:** Lecture Slides and Notes

***Course Learning Outcomes*:**

By the completion of the course the students should be able to:

1. Distinguish between categorical variables and continuous variables, and select the appropriate graphic presentation for a set of data and generate the graph.
2. Construct frequency distributions and compute measures of central tendency (mean, median, and mode) and variability (variance, standard deviation).
3. Use the Gaussian and binomial and other distributions to assess the probability and uncertainty of health outcomes.
4. Use the Gaussian and binomial and other distributions to assess the probability and uncertainty of health outcomes.
5. Identify one random variables and two random variables and their distribution.
6. Perform and interpret one-sample, two-sample, and paired t tests on means, the normal theory two-sample test of proportions, the F test to compare two variances, and chi square tests of independence.
7. Compute correlation and covariance.

8. Compute and interpret Pearson product moment correlation coefficients.
9. Construct graphs, charts and tables to communicate the results of statistical analyses.
10. Define the random process and biomedical signals.

Topics to be Covered:		***Duration in Weeks***
1.	Representation of data (graphs and tables), and descriptive statistics.	1
2.	Concepts of probability, estimation of parameters, hypothesis testing.	1
3.	Correlation, and the analysis of attribute data.	2
4.	Probability distribution and density functions.	2
5.	Expectation and moments for medical cases.	2
6.	Two random variables and joint probability distribution and density functions.	2
7.	Correlation, covariance and correlation coefficients, and the analysis of clinical trial data.	2
8.	Random process.	2

Key Student Outcomes addressed by the course: (Put a ✓ sign)

(1)	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	✓
(2)	An ability to apply the engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
(3)	An ability to communicate effectively with a range of audiences	
(4)	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
(5)	An ability to function effectively on a team whose members together provide leadership, creates a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
(6)	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	
(7)	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

Instructor or course coordinator: Dr. Khaled O. Daqrouq
Last updated: Spring 2020