Cairo University
Faculty of Engineering

Department of Systems and
Biomedical Engineering

Course Specifications

Program(s) on which this course is given:	Systems and Biomedical Engineering
Department offering the program:	Systems and Biomedical Engineering
Department offering the course:	Systems and Biomedical Engineering
Academic Level:	Third year
Date	2013-2014
Semester (based on final exam timing)	■ Fall □ Spring

A- Basic Information

1. Title:	Bio-Statistics			**Code:**	SBE 304			
2. Units/Credit hours per week:	Lectures	3	Tutorial	0	Practical	1	Total	4

B- Professional Information

1. Course description:	After completing the course the students are expected to have acquired basic knowledge in: ➢ Broad introduction to aspects of statistics. ➢ Learn the probability theory to be able to construct parametric models, then use statistics to estimate the parameters of these models based on available data to test specific hypotheses. ➢ Understand the principle behind a statistical analysis, which is critical to the interpretation of data. ➢ Practice computer tools such MatLab.
2. Intended Learning Outcomes of Course (ILOs):	**a) Knowledge and Understanding** **Having successfully completed this module a student should have Knowledge & Understanding of:**
	1- Learn the Concepts and theories of probability theory.
	2- Understand the Methodologies of solving bioengineering problems using bio-statistics.
	b) Intellectual Skills **Having successfully completed this module a student will have the ability to:**
	3- Select appropriate statistics methods for analyzing problems.
	4- Obtain, analyze, and interpret data from biological and medical systems by using statistics to estimate parameters of these systems' models and assess their limitations.
	5- Judge engineering hypotheses considering statistics analysis
	c) Professional and Practical Skills **Having successfully completed this module a student will have the ability to:**
	6- Apply the principles of statistics in problem solving scenarios in biomedical engineering.
	7- Analyze experimental results and determine their accuracy and validity.
	8- Use laboratory computer and related software packages.
	d) General and Transferable Skills **Having successfully completed this module a student will have the ability to:**
	9- Work in stressful environment and within constraints while communicating effectively.
	10- Demonstrate efficient IT capabilities and effectively manage tasks, time, and resources.
3. Contents	

Topic	Total hours	Lectures hours	Tutorial/ Practical hours
Part I: Basic probability theory 1. Sample space, outcome, sets/subsets, partitions, 2. Marginal, joint and conditional probabilities. 3. Bayes' theorem	8	6	2
Part II: Random Variables (RV) 1. Definition of RV and events. 2. Definition and properties of marginal density and distribution function. 3. Definition and properties of conditional density and distribution function. 4. Total probability theory and Bayes' theory. 5. Function of one RV. 6. Mean and variance of RV. 7. Definition and properties of joint density and distribution function. 8. Function of two RV. 9. Two functions of two RV.	16	12	4
Part III: Statistics (8 lectures) 1. Point estimator of mean and variance. 2. Confidence Intervals and p-values. 3. Tests of hypothesis a. Tests of means. b. Tests of variances. 4. Regression: a. Simple linear regression. b. Analysis of regression parameters.	32	24	8
Total	**56**	**42**	**14**
4. Teaching and Learning Methods	Lectures (*)	Practical Training/ Laboratory (*)	Seminar/Workshop ( )
	Class Activity (*)	Case Study ( )	Projects (*)

	E-learning ( )	Assignments/Homework (*)	Other:

5. Student Assessment Methods

• **Assessment Schedule**	**Week**
-Assessment 1; Class work	Every week
-Assessment 2; Project Assignment	13
-Assessment 3; Presentations	
-Assessment 3; Midterm Exam	8
-Assessment 4; Final Exam	16
• **Weighting of Assessments**	
-Mid-Term Examination	10%
-Final-term Examination	70%
-Project	10%
-Class work, Quizzes, and Assignments	10%
-Presentation	
-Total	100%

6. List of References

"Applied Statistics and Probability for Engineers" by Douglas C. Montgomery and George C. Runger, Third Edition, ISBN:0-471-20454-4, John Wiley & Sons, Inc., 2003

Recommended Textbooks:

"Mathematical Statistics with Applications" by Wackerly, D. D., Mendenhall, W., and Scheaffer, R. L., Seventh Edition, ISBN:0-49-511081-7, Duxbury Press; 2007

"Introduction to the PRACTICE of STATISTICS" by *David S. Moore and George P. McCABE,* Second Edition, ISBN:0-7167-2250-X, W. H. Freeman., 1993

Recommended Internet Resources

http://stattrek.com/ This web site provides training and tools to help student solve statistics problems quickly, easily, and accurately

7. Facilities Required for Teaching and Learning

- Classroom White board (*)
- Classroom Laptop and data-show (*)
- Electronics Laboratory ( )
- Computer Laboratory (*)
- Others ( )

Course Coordinator:	**Prof. Dr. Ayman M. Eldeib**
Head of Department:	**Prof. Dr. Ahmed Badawi**