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DEPARTMENT OF BIOMEDICAL ENGINEERING  
EXPERIMENTAL DESIGN AND BIostatISTICS – IBIO-3270

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**Credits and contact hours**

	Credits	Contact hours (per week)	Sessions per week	Offer frequency
Course	3	3	2	Yearly
Complementary class				
Laboratory	0	1.5	1	

Instructor's or course coordinator's name: Juan Carlos Briceño

**Main Textbooks:**

- *Design and analysis of experiments*, 8th Edition. John Wiley & Sons, Inc. Douglas C. Montgomery. 2013.

**Specific course information**

**a. Brief description of the content of the course (catalog description)**

The course aims to guide students in planning, design and execution of experiments efficiently and effectively, evaluating data statistically to make appropriate conclusions. With the development of knowledge in this area the student can apply the principles taught in the course in all phases of engineering and scientific work, including the study of clinical trials, the development of technologies, the design of new products and processes and the improving of manufacturing processes.

Based on the above, the student is expected to understand the methodology and logical steps in experimentation, which can be summarized as: planning, conduct and analysis.

In Biomedical Engineering, a well-designed clinical trial can lead to an effective analysis of medical problems, a reduction in the number of experiments, a reduction in the time to develop new processes and products and to an improved performance manufacturing processes and products that have superior functionality and reliability.

**b. Prerequisites**

IBIO-2240 Scientific Programming; IIND-2106 Probability and statistics

**c. Co-requisites**

IBIO-3271 Experimental Design and Biostatistics Lab

d. Indicate whether a required, elective or selective elective course in the program

Required	Elective	Selective
X		

**Specific goals for the course**

a. Specific outcomes of instruction

At the end of this course, students will be able to:

- Understand the methodology and logical steps in the development of experiments to solve research questions in Biomedical Engineering
- Apply the basic principles associated with planning experiments and the subsequent statistical analysis of data acquisition
- Develop criteria for the selection of an appropriate experimental design supported by a proper assessment and analysis of data
- Understand the utility, scope and limitations that may present statistical tools to analyze data

b. Explicitly indicate which of the student outcomes (listed in Criterion 3 or any other outcomes) are addressed by the course

OUTCOME B: An ability to design and conduct experiments as well as analyze and interpret data

OUTCOME E: An ability to define, formulate, and solve engineering problems

**Brief list of topics to be covered**

Topic	Suggested duration (weeks)
Introduction, statistics, confidence intervals	1
Hypothesis testing and ANOVA	1
Randomized Block design	2
Latino and graeco latin squares design	2
Introduction to factorial design	2
Factorial design 2k	2
Fractional factorial design	1
Big Data	1
Linear Regression	1
Clinical trials	2