

# **NEW COURSE PROPOSAL: Engineering Measurement Techniques and Statistics (ENSC 280)**

Prepared by B. Bahreyni, Assistant professor, M. Bahrami, Assistant Professor, and A. Rad, Professor, Mechatronics Systems Engineering, School of Engineering Science

## **Date:**

October 17, 2008

## **Course Number**

ENSC280

## **Course Title (long)**

Engineering Measurement Techniques and Statistics

## **Course Title (short)**

Eng Measurement and Stat

## **Weekly Hours**

Lect 3; Sem 0; Tut 1, Lab. 1

## **Keywords**

Engineering measurement, Data presentation, Random variables, Discrete probability distributions, Continuous probability distributions, Binomial, Poisson, and normal distributions, Mean, Variance, Error analysis, Propagation of error, Decision making, Design of experiments

## **Prerequisite**

MATH 150 or MATH 151

## **Co-requisite**

None

## **Special Instructions**

None

## **Course(s) to be replaced if this course is approved:**

PHYS 231

## **Rationale for Introduction of this Course**

This course will replace PHYS 231 in the MSE curriculum. Please see the attached

Justification Page for more information.

### **Scheduling and Registration Information**

This course will first be offered in Spring 2009, and annually thereafter.

#### **Will this be a required or elective course in the curriculum?**

Required

#### **What is the probable enrolment when offered?**

70

#### **Which of your present CFL faculty have the expertise to offer this course?**

Dr. Behraad Bahreyni

#### **Are there any proposed student fees associated with this course other than tuition fees?**

No

#### **Campus where course will be taught**

Surrey

#### **Library report status**

Pending

#### **Provide details on how existing instructional resources will be redistributed to accommodate this new course.**

New resources will be provided to accommodate this course.

### **Proposed Course Outline**

#### ***I. Introduction to probability***

- a) Random variables, discrete random variables, continuous random variables
- b) Mean and variance
- c) Cumulative distribution function, probability density function
- d) Binomial, Poisson, and Gaussian distributions
- e) Central limit theorem
- f) Distributions of two variable

#### ***II. Data representation***

- a) Univariate summaries: histograms, box plots, time series plots
- b) Bivariate summaries: scatter plots

### **III. Decision making**

- a) Point estimation
- b) Hypothesis testing
- c) Analysis of variance

### **IV. Regression**

- a) Linear regression
- b) Multiple regression

### **V. Design of experiments**

- a) Factorial experiments

### **VI. Engineering measurement**

- a) Sensitivity, accuracy, and resolution
- b) Quantization and noise

### **VII. Error analysis**

- a) Reporting and using uncertainties
- b) Error propagation
- c) Random and systematic errors

#### **Contact hours:**

3 lecture hours per week, 1 tutorial hours per week, 1 hour laboratory per week

#### **Recommended textbook**

*Engineering Statistics, Forth Edition.* By Montgomery, Runger, Hubele. John Wiley & Sons, Inc.

#### **Evaluation**

<b><i>Evaluation Component</i></b>	<b><i>Percentage of overall mark (out of 100)</i></b>
Assignments and Laboratories	20%
Midterm	30%
Final	50%

The midterm and final are closed book examinations of the course material. However, students are permitted to use a crib sheet consisting of one 8 1/2× 11 paper (double-sided). Weekly assignments will be given (and posted online).

There will be three labs throughout the term. Students are required to write laboratory reports as advised by teaching faculty.