Experimental Engineering & Quality Control (EGR–235)

Block 4 – 2019

General Information:

Instructor: Brian Johns

Office: West Science 105

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Office Hours: 11:00am – 12:00pm MWF or by appointment

Prerequisite:

EGR-131 and (MAT-121 or STA-201)

Course Meeting Times:

MTWThF 10:00am – 11:00am and 1:00pm – 3:00pm in WS 111/118

Required Textbook:

No required textbook. Documents will be provided for required reading.

Other Required Course Materials:

Engineering Computation Pad
Mechanical Pencils
Graphing Calculator

Course Description & Objectives:

Course Description:

Principles and procedures that working engineers use to guarantee the quality of designs and products. Topics include calibration, curve fitting, hypothesis testing, measurement uncertainty, and probability distributions. Furthermore, students will gain a basic understanding of engineering production management techniques, including economic analysis, lean manufacturing, and six sigma principles. Emphasis is placed on reporting and presenting results in impactful ways to both technical and non-technical audiences.

Course Objectives:

The course is designed to support the *Educational Priorities and Outcomes* of Cornell College. This course primarily emphasizes *knowledge* and *reasoning*. The following show the course objectives and their corresponding educational priority.

- Gain fundamental knowledge of engineering economics, including identifying fundamental costs, interest, and calculating the time value of money.
- Develop laboratory skills, including quantifying measurement uncertainty and performing calibration techniques.
- Use quantitative software to analyze collected data from experiments.
- Effectively design acceptance sampling procedures for manufacturing situations.
- Understand the basics of lean manufacturing and six sigma principles.
- Successfully work in engineering teams and communicate effectively (orally and written).

Performance Indicators for student outcomes:

3a. Written work and /or oral presentations are well organized
3c. Written work contains clear, detailed descriptions and is logically cohesive
4c. Understand and practice safety regulations in design, manufacturing, and assembly.
5a. Adopt leadership roles to accomplish team objectives.
5b. Perform delegated tasks and actively participate in group meetings.
5c. Encourage the participation of others.
5d. Respond objectively to conflict within a team.
5e. Foster constructive climate within and between teams.
6a. Determine data that are appropriate to collect, designs procedure, selects equipment, and carries out appropriate measurements.
6b. Analyze experimental data using simple statistics.
6c. Evaluate experimental data in light of relevant theory.
7a. Independently finds and evaluates engineering resources.
7b. Accurately self-evaluates work for future improvement.
7c. Takes personal initiative to learn independently.

Course Outline:

Topics will be briefly introduced in a lecture-type setting. The majority of the course will enable student to explore course topics through lab applications and projects. Students are required to work in both individual and group settings throughout the course.

Class Topics (subject to change):

- Calibration
- Compound Interest
- Curve Fitting
- Economic Analysis Techniques
- Engineering Costs
- Engineering Sensors
- Error/Measurement Uncertainty
- Hypothesis Testing
- Lean Manufacturing
- Probability Distributions
- Six Sigma
- Time Value of Money

Grading

Grading Criteria:

Component	Percentage
Homework/Quizzes	20%
Labs/Projects	40%
Exams	40%

Grading Scale:

A	95-100
A-	90-94
B+	87-89
B	84-86
B-	80-83
C+	77-79

C	74-76
C-	70-73
D+	67-69
D	64-66
D-	60-63
F	<60

Course Requirements & Policies:

Attendance:

As a student you are required to attend all sessions of class. Please inform me of any planned absences at the beginning of the block so we can make arrangements. Attendance will be taken at the beginning of each class session.

Quizzes:

Quizzes will occur intermittently throughout the course. The quizzes will assess comprehension and understanding of reading topics.

Exams:

There will be three (3) exams during the course.

Homework/Class Activities:

Expect to have homework every day. No late homework will be accepted.

Labs/Projects:

There will be multiple labs and projects through the duration of the course.

Academic Honesty Policy:

Cornell College expects all members of the Cornell community to act with academic integrity. An important aspect of academic integrity is respecting the work of others. A student is expected to explicitly acknowledge ideas, claims, observations, or data of others, unless generally known. When a piece of work is submitted for credit, a student is asserting that the submission is her or his work unless there is a citation of a specific source. If there is no appropriate acknowledgment of sources, whether intended or not, this may constitute a violation of the College's requirement for honesty in academic work and may be treated as a case of academic dishonesty. The procedures regarding how the College deals with cases of academic dishonesty appear in The Catalogue, under the heading “Academic Honesty."

DISABILITIES AND ACCOMODATIONS POLICY:

Cornell College makes reasonable accommodations for persons with disabilities. Students should notify the Office of Academic Support and Advising and their course instructor of any disability related accommodations within the first three days of the term for which the accommodations are required, due to the fast pace of the block format. For more information on the documentation required to establish the need for accommodations and the process of requesting the accommodations, see http://www.cornellcollege.edu/academic-support-and-advising/disabilities/index.shtml.