Syllabus
Engineering Technology
University of North Texas
Course Title: Analytical Methods for Engineering Technology
Course Prefix and Course Number: MSET 5040
Semester: Spring, 2018

The Engineering Technology Department, in cooperation with the Office of Disability Accommodation, complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. Please present your written accommodation request to the instructor prior to the fourth day.

SAFETY CATEGORY: 1
DATE PREPARED:  January 9th, 2018  
PREPARED BY:  Dr. Hector R. Siller

COURSE NUMBER, TITLE, CREDIT HOURS:

MSET 5040, Analytical Methods for Engineering Technology, 3 hours

DESCRIPTION:

Study of mathematical methods and techniques typically used in solving engineering problems. Emphasis is placed on the applications of the various techniques and on the effective utilization of modern computer simulation tools.

PREREQUISITES:

None

RECOMMENDED TEXTBOOKS:


COURSE OBJECTIVES:

(TAC of ABET Criteria and Program Educational Objectives supported)

The goal of this course is to provide Graduate Engineering Technology students with additional analytical tools for modern applications in technology to include:

a. Understand of modelling and optimization techniques that can be applied in different contexts. (1,6)

b. Appreciate the use of different mathematical and statistical techniques in solving multivariate problems. (1,6)

c. Realize simplification of solutions to complicated problems through Mathematical techniques and Statistics. (1,6)

d. Understand the research methods and techniques to analyze qualitative and quantitative data. (1, 6)
STUDENT LEARNING OUTCOMES:
The expected learning outcomes are:

a. Apply optimization techniques to different contexts in the field of Engineering Technology.
b. Apply research methods and techniques to gathered qualitative and quantitative data.
c. Solve multivariate problems in both time and space by using matrices.
d. Use mathematical techniques to solve simultaneous equations to produce solutions to many engineering problems in different fields.
e. Use alternative numerical methods of solving and simplifying integral equations.

INSTRUCTIONAL OBJECTIVES
Conditions: Students can use pens, paper, calculator, and textbooks during lectures.

Criteria:

a. Students are required to attend lecture classes.
b. Homework and any take-home exams will be turned in on the due date.

Outcome Competencies:

a. Homework and random quizzes will be used to assess understanding of materials covered in lecture.
b. Examinations will be used to assess understanding of materials covered during the semester.

LEARNING STRATEGIES:

The instructor will present lectures on solving real world problems using mathematical techniques of certain types associated with Statistics and Heuristics. The course will focus on real world application of Engineering Management, Construction Engineering Technology, Electrical Engineering Technology and Mechanical Engineering Technology.

COURSE OUTLINE:

Note: The instructor reserves the right to substitute appropriate material for this class besides the topics covered in this outline.

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Introduction, Organization of Course, Course Policies, Modelling basic concepts.</td>
</tr>
<tr>
<td>2</td>
<td>Elements of Problem Formulation for Modelling and Optimization</td>
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<tr>
<td>3</td>
<td>Mathematical Statistics: Descriptive Statistics</td>
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<tr>
<td>4</td>
<td>Mathematical Statistics: Simple Linear Regression and Correlation</td>
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<tr>
<td>5</td>
<td>Mathematical Statistics: Multiple Regression Models</td>
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<tr>
<td>6</td>
<td>Mathematical Statistics: Multivariate ANOVA</td>
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</tbody>
</table>
Design of Experiments: Box-Behnken Design
Statistical Optimization: Response Surface Methodology (RSM)
Mathematical Optimization Techniques: Linear Programming
Mathematical Optimization Techniques: Non-linear Programming
Heuristic Optimization Techniques: Global Optimization
Heuristic Optimization Techniques: Genetic Algorithms
Heuristic Optimization Techniques: Simulated Annealing
Selected Topics in Modelling and Optimization
Selected Topics in Modelling and Optimization
Final Project Presentation

Optional Programming Techniques
a) Programming with MATLAB
b) Programming in Excel
c) Programming in SPSS

GRADING ELEMENTS AND WEIGHTS:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Individual Project</td>
<td>30%</td>
</tr>
<tr>
<td>Homework and Quizzes</td>
<td>25%</td>
</tr>
<tr>
<td>Midterm Examination</td>
<td>20%</td>
</tr>
<tr>
<td>Final Examination</td>
<td>25%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
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</tbody>
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GRADING POLICIES:

a. Quizzes and examinations are graded based on class performance.
b. Formal evaluations will consist of quizzes, two examinations and project presentation.
c. The instructor reserves the right to alter the syllabus.

<table>
<thead>
<tr>
<th>Grade Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>90% to 100%</td>
<td>A</td>
</tr>
<tr>
<td>80% to 89.99%</td>
<td>B</td>
</tr>
<tr>
<td>70% to 79.99%</td>
<td>C</td>
</tr>
<tr>
<td>60% to 69.99%</td>
<td>D</td>
</tr>
<tr>
<td>Below 60%</td>
<td>F</td>
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</table>

CLASS POLICIES:

a. All rules relating to academic dishonesty will be enforced in accordance with University policies. Cheating on quizzes, examinations and laboratory assignments, and plagiarism on various papers and reports are types of disciplinary misconduct for which penalties are assessed under the UNT Code of Student Conduct and Discipline. Major responsibility for implementing the University's policy on scholastic dishonesty rests with the faculty. Be advised that the instructor of this course supports and fully implements this policy. The following actions will be taken when evidence of such misconduct is observed. The student will be presented with the evidence of misconduct and
given an opportunity to explain same. Based on the outcome of this private conference, the matter will be either dropped or the student will be given a grade of "F" in the course and be referred to the Dean of Students for further counseling and/or disciplinary action.

b. During the course, handouts will be provided to enhance the presentation of certain concepts. These materials are provided strictly for instructional purposes and may otherwise be restricted. There is no authorization for further reproduction of distribution of handout materials beyond that intended to teach the course.

c. This syllabus is subject to change at any time during the semester with changes to be announced in class.

d. Each student should retain graded lecture notes, pop quizzes, homework, tests, software-generated files, and laboratory reports to document errors in recorded grades.

e. Requests for review of graded work must be submitted during the lecture in which such work is returned to the students. The request should be accompanied by a written justification of the request including any supporting data.

f. There is no limit to the use of calculators and computers for lecture, labs, pop quizzes, formal tests, or final examination. However, the use of cell phones during the class is not allowed, except in the case of an emergency.

g. Challenges to the course grade must be presented within 60 days of receipt of grade notices mailed by the university. This will insure that instructor’s records are still available to allow a review of the assigned grade. You should first discuss your complaint with the instructor. If you wish to carry it further, contact the Program Coordinator by calling (940) 565-2022. To further pursue your complaint, contact the Department Chair at (940) 565-2022, but ONLY after first discussing your concern with the previous two individuals.

h. An I (incomplete) grade is given only for extenuating circumstances and in accordance with University and Departmental Policies.