

ENTC 320 - QUALITY ASSURANCE – Spring 2009

- OBJECTIVES:** Study statistical tools and techniques required for solving industrial problems and for continuously improving processes so that the student is prepared to perform effectively as an engineer.
Prerequisite: STAT 211.
- INSTRUCTOR:** Louis McDaniels; 512-496-8768 (Mobile – NO TEXT MESSAGES) or 979-458-4509 (Campus office); mcdaniels@entc.tamu.edu. Office: THOM 118C.
- LAB INSTRUCTOR:** Mr. McDaniels assisted by Shahram Shahinpour
- MEETING TIME:** Lecture: MW from 12:40 p.m. – 1:30 p.m. in THOM 121.
- OFFICE HOURS:** M 2:30-3:30 p.m. or by appointment.
- TEXT:** Montgomery, D. C., *Introduction to Statistical Quality Control*, John Wiley & Sons, 2005, 6th Edition.
- ATTENDANCE:** Attendance is per University Regulations and is part of the course grade. Beginning with week 3, each unexcused absence more than three reduces your final course grade by one percentage point up to a maximum of five percentage points. See below for excused absence rules.

GRADING:

Required Exams (4x) ⁽¹⁾	60%
Optional Final Exam	
Laboratory ⁽¹⁾	20%
Attendance & Participation	5%
Quizzes	10%
Homework ⁽²⁾	5%

NOTES:

1. The four regular exams are required. The optional final exam may not replace a regular exam missed because of an unexcused absence. Makeup exams and late work in lecture and lab will not be accepted except for excused absences per TAMU regulations. Due dates will be set by Mr. McDaniels or the lab TA as appropriate.
2. Homework will be regularly assigned. Homework solutions will be posted at <http://etidweb.tamu.edu/ftp/entc320/>
3. All changes in attendance to lab sections must be approved in writing by the lab TA.

Plagiarism and Intellectual Property: The handouts used in this course are copyrighted. “Handouts” means all materials generated for this class, which include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless you are expressly granted permission by the copyright holder.

As commonly defined plagiarism consists of passing off as one’s own the ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

If you have any questions regarding plagiarism, please consult the latest issue of the *Texas A&M University Student Rules*, under the section “Scholastic Dishonesty.”

American with Disabilities (ADA) Policy Statement: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Cain Hall, Rm. B118, or call 845-1637. For additional information visit <http://disability.tamu.edu>.

Academic Integrity: “An Aggie does not lie, cheat or steal or tolerate those who do.” The Aggie Code of Honor is an effort to unify the aims of all Texas A&M men and women toward a high code of ethics and personal dignity. For most, living under this code will be no problem, as it asks nothing of a person that is beyond reason. It only calls for honesty and integrity, characteristics that Aggies have always exemplified. The Aggie Code of Honor functions as a symbol to all Aggies, promoting understanding and loyalty to truth and confidence in each other.

See <http://student-rules.tamu.edu/rules20.htm> and <http://www.tamu.edu/aggiehonor/> for more information about Student Rules and the Aggie Honor System.

Excused Absences

1. See Student Rule 7 (<http://student-rules.tamu.edu/rule7.htm>). In the event of illness, confirmation of visit to a health care professional affirming date and time of visit must be presented according to Section 7.1.6.2.b.
2. **Make-up of labs and scheduled exams will not be allowed except for an excused absence.** Due dates will be set by Mr. McDaniels or the lab TA as appropriate.

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Week		Estimated Schedule of Topics ¹	Readings
1 – 01/19	M	No class; Classes begin on Tuesday	
	W	INTRODUCTION – Quality Improvement and Statistical Thinking	1 & 2
	Lab	No Lab	
2 – 01/26	M	Pre-Course Survey; Modeling Process Quality; Sampling Distributions	3-1 & 3-2
	W	Hypothesis Testing	3-3
	Lab		
3 – 02/02	M	Hypothesis Testing	3-4.1 & 3-4.2
	W	Hypothesis Testing	
	Lab		
4 – 02/09	M	EXAM 1 (Chapters 1, 2 and 3)	
	W		4-1 thru 4-3
	Lab		
5 – 02/16	M	Control limits, Sample Size and Frequency	4-4 thru 4-7
	W	Control Charts for Variables Data	5 all
	Lab		
6 – 02/23	M	Control Charts for Attribute Data	6 all
	W	EWMA Charts	8-2
	Lab		
7 – 03/02	M	EXAM 2 (Chapters 4, 5 and 6)	
	W	PROCESS CAPABILITY ANALYSIS Introduction; Histograms; Probability Plots; Process Capability Ratios	7-1 thru 7-3.4
	Lab		
8 – 03/09	M	Confidence Intervals on Process Capability Ratios	7-3.5
	W	Tests on Process Capability Ratios	
	Lab		
03/16-20		Spring Break	
9 – 03/23	M	Process Capability Analysis: Control Charts and Designed Experiments	7-4 & 7-5
	W	Estimating Natural Tolerance Limits and Review	7-8
	Lab		
10 – 03/30	M	EXAM 3 (Chapter 7)	
	W	DESIGN OF EXPERIMENTS Introduction, Application Examples and Types of Designs	12-1 – 12-4
	Lab		
11 – 04/06	M	2 ^k Factorial Experiments – Definition, Data Collection & Randomization	12-5
	W	ANOVA Interpretation, Model Validation	12-6
	Lab		
12 – 04/13	M	Residual Analysis/Diagnostics; Take Home Exam 4 discussion	
	W	Models and Main Effects	
	Lab		
13 – 04/20	M	Interaction Effects	
	W	Fractional Factorial Experiments	
	Lab		
14 – 04/27	M	Course Evaluation and Survey	
	W	EXAM 4 (Chapter 12)	
	Lab		
15 – 05/04	M	Return Exam 4	
	T	Redefined Friday (04/10)	
05/11	M	Optional Final Exam: 10:30 – 12:30 p.m.	

¹ Notes on most lecture topics are available at <http://etidweb.tamu.edu/ftp/entc320/>. These notes contain material that may not be mentioned in lecture and should be reviewed in preparation for exams and quizzes.

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ABET Outcomes: The following areas will receive particular emphasis as a part of the ABET accreditation process.

- Mastery of the knowledge, techniques, skills, and modern tools of Quality Assurance.
- Ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology.
- Ability to conduct, analyze, and interpret experiments, and apply results to improve processes.
- Ability to identify, analyze, and solve technical problems.
- Commitment to quality, timeliness, and continuous improvement.

Relationship between ENTC 320 Course Objectives and MMET Program Outcomes

The Manufacturing and Mechanical ET program is designed to provide the student with several skills at the time of graduation. These skills and abilities are stated in the following MMET Program Outcomes:

A Manufacturing and Mechanical Engineering Technology graduate has the following abilities at the time of graduation:

- (a) *An appropriate mastery of the knowledge, techniques, skills and modern tools of manufacturing and mechanical systems and processes.*
- (b) *An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology.*
- (c) *An ability to conduct, analyze and interpret experiments and apply experimental results to improve processes.*
- (d) *An ability to apply creativity in the design of systems, components or processes appropriate to program objectives.*
- (e) *An ability to function effectively on teams.*
- (f) *An ability to identify, analyze and solve technical problems.*
- (g) *An ability to communicate effectively.*
- (h) *A recognition of the need for, and an ability to engage in lifelong learning.*
- (i) *An ability to understand professional, ethical and social responsibilities.*
- (j) *A respect for diversity and a knowledge of contemporary professional, societal and global issues.*
- (k) *A commitment to quality, timeliness, and continuous improvement.*
- (l) *An ability to apply the technologies of engineering materials, manufacturing processes, automation, production operations, quality, statics, dynamics, strength of materials, fluid power or fluid mechanics, thermodynamics, and either electrical power or electronics, and statistics to the solution of manufacturing problems.*
- (m) *An ability to apply with an added technical depth: manufacturing processes, mechanical design, electro-mechanical devices and controls (automation), and production operations.*
- (n) *An ability to apply physics having an emphasis in applied mechanics, plus added technical topics in physics and inorganic chemistry principles related to manufacturing and mechanical systems and processes.*
- (o) *An ability to successfully complete a comprehensive design project related to mechanical or manufacturing fields.*

The following table indicates how this course contributes to the achievement of the overall programmatic educational outcomes. Entries with an “H”, “M”, and “L”, refer to high, medium, and low relevancy, respectively.

COURSE OBJECTIVE	MMET Program Educational Outcome														
	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
Study statistical tools and techniques required for the continuous improvement of a process to further prepare the student to perform effectively as an engineer.	H	M	H		L	M	L					H			