

**MFE634: Quality and Productivity Engineering
Spring 2014
Weekly Class Outline**

**Updated:
VII/15/2013**

Week	Topic	Chapter(s)
1	Intro; Juran, Basic Concepts; Company-wide Q; COPQ	1, 2, RIAC
2	Quality Assessments & Audits; ISO/Baldrige/Standards	2, 16
3	Quality improvements: Gurus, Quality Tools & Process Capability	3, RIAC
4	Six Sigma (DMAIC) improvement; More on Process Capability	20, 3, ASQ
5	Design for Quality (DFSS); Matrix Tools: QFD	4, 11
6	Design of Experiments (DOE) in Quality improvement	18, EcoSim
7	Fractional Factorial Design of Experiments	ASQ, RIAC
8	Midterm: Quality Assessment, Improvement, Lean, Inspections	All Above
9	Spring Break; no classes	
10	Lean Manufacturing/VSM/5Ss; Supply Chains; Outsourcing	12, 13
11	Inspections, Testing and Metrology: MSA/Gage R&R	15; ASQ
12	Acceptance Sampling; OC function;	15, START
13	Statistical Process Control/SPC; Charts	20, START
14	Reliability models: Q in Time; data analysis	5, 19, ASQ
15	Reliability Tools: FMEAs, Fault Trees; Cases	19, START

Course Materials:

Textbook:

Juran's Quality Planning & Analysis for Enterprise Quality (5th Ed.)
Authors: Frank Gryna, Richard Chua, Joseph DeFeo; McGrawHill

Additional/Support Material:

Probability and Statistics for Engineers and Scientists+B71 (Walpole, Myers et al.)
A Practical Guide to Statistical Analysis, (Romeu and Grethlein)
NIST Statistics Handbook (in the Web)
ASQ Quality Engineer Certification Exam Manual
ECS526 Readings (START Sheets: Web Site or SU booklet)
RAC Quality Toolbox (Manual)
RAC Reliability Toolbox (Manual)

Weekly Readings:

Class #1: **Intro; Juran, Basic Concepts; Company-wide Quality; COPQ**
Textbook **Chapters 0, 1 and 2 (to page 38)**
ASQ National <http://www.asq.org/>
ASQ SyrChptr <http://section206.asqquality.org/>
ASQ/CRE BOK <http://www.asq.org/certification/quality-engineer/bok.html>
RIAC STARTs <http://www.theriac.org/riacapps/startsheets/>
NIST EDA (1) <http://www.itl.nist.gov/div898/handbook/eda/section1/eda1.htm>
NIST GenStat <http://www.itl.nist.gov/div898/handbook/prc/section2/prc2.htm>
NIST Hdbk <http://www.itl.nist.gov/div898/handbook/>

Class #2: **ISO/Baldrige Standards, Quality Assessments and Audits**
Textbook **Chapters 2 (fr. page 38 on) and Ch. 16**
Baldrige <http://www.baldrige.nist.gov/>

ISO Standards	http://www.iso.org/iso/management_standards.htm
ISO 9000	http://www.asq.org/learn-about-quality/iso-9000/overview/overview.html
ISO/Balridge	http://www.asq.org/data/subscriptions/qp/2000/0800/qp0800tonk.pdf
NIST Balridge	http://www.baldrige.nist.gov/Issue_Sheet_Options.htm
Enrich ISO/Bal	http://www.asq.org/members/news/aqc/54_2000/14022.pdf
ISO for Q Audits:	http://www.praxiom.com/iso-10011-1.htm
Q. Sys. Audits:	http://elsmar.com/Audit/
Conduct Q Aud.	http://www.engineers-international.com/quality-audits.html
Internal Audits	http://www.tarrani.net/linda/docs/InternalQualityAudits.pdf
Assess Inst	http://iac.syr.edu/Assessment.html

Class #3:	Quality improvements, Gurus, Quality Tools & Process Capability
Textbook	Chapter 3 (to P. 67) and ASQ Quality Tools web tutorials
ASQ COQ	http://www.asq.org/learn-about-quality/cost-of-quality/overview/overview.html
Seven BasicTool	http://www.asq.org/learn-about-quality/seven-basic-quality-tools/overview/overview.html
Quality tools	http://www.asq.org/learn-about-quality/quality-tools.html
Five Why's	http://asq.org/healthcare-use/why-quality/five-whys.html
Five S's	http://asq.org/learn-about-quality/lean/overview/five-s-tutorial.html
Cont.Improvement	http://asq.org/data/subscriptions/qp/2000/0500/qp0500czarnecki.pdf
Benchmarking	http://www.asq.org/learn-about-quality/benchmarking/overview/overview.html
Score Cards	http://www.asq.org/learn-about-quality/balanced-scorecard/overview/example.html
Fishbone chart	http://www.asq.org/learn-about-quality/cause-analysis-tools/overview/
Pareto chart:	http://www.asq.org/learn-about-quality/cause-analysis-tools/overview/pareto.html
Scatter Diagram:	http://www.asq.org/learn-about-quality/cause-analysis-tools/overview
NIST ProcCapab	http://www.itl.nist.gov/div898/handbook/pmc/section1/pmc16.htm

Class #4	Six Sigma (DMAIC) and Process Capability Studies.
Textbook	Rest of Chapter 3 and Ch. 20 (Proc. Cap.)
Six Sigma Wiki	http://en.wikipedia.org/wiki/Six_Sigma
SixSigma	http://www.asq.org/learn-about-quality/six-sigma/overview/overview.html
SixSigma topics	http://www.asq.org/sixsigma
Six Sigma GE	http://www.ge.com/sixsigma
Six Sigma Mag	http://www.isixsigma.com/sixsigma/six_sigma.asp
RIAC START	http://www.theriac.org/pdfs/startsheets/six_sigma.pdf
NIST ProcCap	http://www.itl.nist.gov/div898/handbook/pmc/section1/pmc16.htm

Class #5	Design for Quality (DFSS); Matrix Tools: QFD
Textbook	Material fr. Chapters 4 and 11 (Quality Function Deployment/QFD)
RIAC/QFD	http://www.theriac.org/pdfs/startsheets/qfd.pdf
Benchmarking	http://www.asq.org/learn-about-quality/benchmarking/overview/overview.html
Total Qual Mgmt	http://www.asq.org/learn-about-quality/total-quality-management/overview/overview.html
Matrix Diagrams	http://www.asq.org/learn-about-quality/new-management-planning-tools/overview/
Decision Matrix	http://www.asq.org/learn-about-quality/decision-making-tools/overview/
Arrow Diagram	http://www.asq.org/learn-about-quality/new-management-planning-tools/overview/arrow-
Mistake Proofing	http://www.asq.org/learn-about-quality/process-analysis-tools/overview/mistake-
Check Sheets	http://www.asq.org/learn-about-quality/data-collection-analysis-tools/overview/check-
Pareto to correct	http://www.asq.org/pub/qualityprogress/past/1102/104backtobasics1102.html?
Gantt Charts	http://www.asq.org/learn-about-quality/project-planning-tools/overview/gantt-
NIST TstComps	http://www.itl.nist.gov/div898/handbook/prc/section3/prc3.htm

Class #6	Design of Experiments in Quality improvement
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Textbook
RIAC/DOE <http://www.theriac.org/pdfs/startsheets/start2001-3.pdf>
EcoSim/FCSM <http://www.fcsn.gov/03papers/Romeu.pdf>
EcoSim/Hobart http://fli.hws.edu/pdf/conference2005/Romeu_presentation.pdf
DOE Overview <http://www.asq.org/learn-about-quality/data-collection-analysis-tools/overview/design-of-ex>
NIST DOE (5) <http://www.itl.nist.gov/div898/handbook/pri/section4/pri4.htm>

Class #7
Textbook **Advanced Design of Experiments (Fract. Fact.)**
DOE/QSI **Material from Chs. 18 (pp. 609-619), NIST and QSI Report**
Fractional Fact. <http://www.itl.nist.gov/div898/handbook/pri/section4/pri472.htm>
Response Surf. <http://www.itl.nist.gov/div898/handbook/pri/section4/pri473.htm>
Riac/Strategy <http://www.theriac.org/DeskReference/viewDocument.php?id=76>
NIST DOE (5) <http://www.itl.nist.gov/div898/handbook/pri/section3/pri33.htm>
NIST Gauge (2) <http://www.itl.nist.gov/div898/handbook/mpc/section4/mpc4.htm>
Taguchi Designs <http://theriac.org/pdfs/startsheets/rbd.pdf>

8th Class **Midterm: Quality Assessment, Improvement, Lean, Inspections**

9th. Class **Spring Break; no classes**

Class #10
Textbook **Lean Manufacturing; Supply Chains; Supplier Relations**
Lean **Selected Material from Chs 12, 13, Class PPT and LP Example**
Lean Manufact. <http://www.asq.org/learn-about-quality/lean/overview/overview.html>
Five Ss <http://www.duralabel.com/ppc/free-5s-guide-gt.php?gclid=CLOHkru7nagCFYje4AodXz>
Eight Wastes <http://www.lmsi.ca/5s.htm>
ValStrMaps <http://www.1stcourses.com/8waste.html>
Create VSM <http://www.google.com/images?hl=en&source=hp&q=value+stream+mapp>
ASQ Supplier Q <http://office.microsoft.com/en-us/visio-help/create-a-value-stream-map-HA010113024.aspx>
Case Study <http://www.asq.org/learn-about-quality/supplier-quality/overview/overview.html>
Teams http://www.asq.org/members/news/aqc/59_2005/lean_ss_at_logan_alum.pdf
Lean QPBilling <http://www.asq.org/learn-about-quality/teams/overview/overview.html>
Lean QPEvolProc http://www.asq.org/java_members/portlets/kptest.jsp?url=http://www.asq.org/
ASQ/Maps <http://www.asq.org/qualityprogress/article-detail/index.html?content=079801>
<http://www.asq.org/media-room/news/2010/03/20100323-spaghetti->

Class #11
Textbook **Inspection, tests and measurements: Qualitative Gage R&R**
Proc. Control **Material from Chs. 15; ASQ and NIST**
ASQ Gage R&R <http://www.itl.nist.gov/div898/handbook/toolaims/pff/6-pmc.pdf>
ASQ Metrology <http://www.asq.org/learn-about-quality/gage-repeatability/overview/overview.html>
NIST Gauge (2) <http://www.asq.org/learn-about-quality/metrics/overview/overview.html>
Proc. Control <http://www.itl.nist.gov/div898/handbook/mpc/section4/mpc4.htm>
<http://www.itl.nist.gov/div898/handbook/toolaims/pff/6-pmc.pdf>

Class #12
Textbook **Acceptance Sampling/OC Function; Control Charts**
OC Functions **Material from Chs. 15; RIAC Tutorial and NIST**
NIST Accept. http://src.alionscience.com/pdf/OC_Curves.pdf
TutorialAccSamp <http://www.itl.nist.gov/div898/handbook/pmc/section2/pmc2.htm>
Binomial Plans <http://www.samplingplans.com/modern3.htm>
<http://www.samplingplans.com/outputbinomial.htm>

Glossary Terms <http://www.samplingplans.com/glossary.htm>
Accept. Sampl. <http://www.itl.nist.gov/div898/handbook/toolaims/pff/6-pmc.pdf>
SPC/QC Charts <http://src.alionscience.com/pdf/QCCHARTS.pdf>
Select AOQL <http://www.itl.nist.gov/div898/handbook/pmc/section2/pmc232.htm>
SPES/Q&P News <http://www.amstat.org/sections/qp/Q&PSPESApril2011.pdf>

Class #13

Textbook

SPC/QC Charts <http://src.alionscience.com/pdf/QCCHARTS.pdf>
ASQ SPC <http://www.asq.org/learn-about-quality/statistical-process-control/overview/overview.html>
NIST SPC (6) <http://www.itl.nist.gov/div898/handbook/pmc/section1/pmc1.htm>
NIST Charts (6) <http://www.itl.nist.gov/div898/handbook/pmc/section3/pmc3.htm>
Shewart p Chart <http://www.asq.org/learn-about-quality/statistical-process-control/overview/shewart-p-chart.pdf>
Proc. Control <http://www.itl.nist.gov/div898/handbook/toolaims/pff/6-pmc.pdf>

Statistical Process Control: SPC

Material from Ch. 20; RIAC Tutorial and NIST

Class #14

NIST Rel. (8) <http://www.itl.nist.gov/div898/handbook/apr/section1/apr1.htm>
START Rel. http://src.alionscience.com/pdf/R_EXP.pdf
Censored Data <http://src.alionscience.com/pdf/CENSOR.pdf>
SW Reliability http://src.alionscience.com/pdf/1ST_Q2000.pdf
Modeling R Data <http://src.alionscience.com/pdf/4q2001.pdf>

Reliability Models: Q in Time; Data analysis methods

Class #15

NIST Rel. (8) <http://www.itl.nist.gov/div898/handbook/apr/section1/apr1.htm>
FMEAs & Rel. http://www.asq.org/members/news/aqc/57_2003/19371.pdf
FMEA Applic <http://www.asq.org/data/subscriptions/qp/2006/0906/qp0906mccain.pdf>
In Health Care http://www.asq.org/members/news/aqc/56_2002/18193.pdf
Core Roles <http://www.asq.org/data/subscriptions/qp/2006/0606/qp0606imler.pdf>
Presentations Student Groups Final Project PPT Presentations

Reliability Tools: FMEAs & Fault Tree Analysis