MFE634: Quality and Productivity Engineering **Updated:**
Spring 2025 **III/26/25**
Course Syllabus (Optimal):
Weekly Class Outline (Approx)

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); Marix Tools: QFD;FEMA/FTA	4, 11
6	Lean Manufacturing/VSM/5Ss; Supply Chains; Outsourcing;	12, 13
7	Inspections, Testing and Metrology: MSA/Gage R&R;	15; ASQ
8	Artificial Intelligence; Quality Companion SW	Economist
9	**Spring Break; No classes in session**	
10	Design of Experiments (DOE) in Quality improvement	18, EcoSim
11	Advanced DOEs: Fractional Factorial & Screening	ASQ, RIAC
12	Acceptance Sampling; OC function; Review	15, START
13	Statistical Process Control/SPC Charts;	20, START
14	Reliability models & tools: Q in Time; data analysis	5, 19, ASQ
15	Reliability data analysis; Final Project Presentats	ASQ, RIAC

Weekly Readings:

Class #1:	**Intro; Basic Concepts; Company-wide Quality**
Textbook	**Chapters 0, 1 and 2 (to page 38) & RIAC**
MFE Projects	**http://web.cortland.edu/matresearch/NEQCPaperOct2018.pdf**
ASQ National	https://www.asq.org/
ASQ/CQE BOK	https://asq.org/cert/quality-engineer
QR&CI Institute	http://ecs.syr.edu/faculty/romeu/QR&CII.htm
Quality tools	https://asq.org/quality-resources
NIST EDA (1)	http://www.itl.nist.gov/div898/handbook/eda/section1/eda1.htm
NIST Hdbk	http://www.itl.nist.gov/div898/handbook/
About NIST	https://www.nist.gov/about-nist
Class #2:	**COPQ; Quality Assessments & Audits; ISO/Baldrige Standards**
Textbook	**Chapters 2 (fr. page 38 on) and Ch. 16**
Conduct Q. Aud.	http://www.engineers-international.com/quality-audits.html
Quality audits	https://enhancequality.com/auditing/?gclid=CjwKCAiAqY6tBhAtEiwAHeRopfgOObaqq6ZgX
ISO for Q Audits:	http://www.praxiom.com/iso-10011-1.htm
ISO Standards	https://www.iso.org/standards.html
Baldridge	https://www.nist.gov/baldrige
Class #3:	**Quality improvements: Gurus, Quality Tools & Process Capability**
Textbook	**Chapter 3 (to P. 67) and ASQ Quality Tools web tutorials**
Quality Resources	https://asq.org/quality-resources

Five Whys	Five Whys and Five Hows | ASQ
Score Cards	What is a Balanced Scorecard? BSC Quality Example | ASQ
Fishbone chart	What is a Fishbone Diagram? Ishikawa Cause & Effect Diagram | ASQ
Pareto chart:	What is a Pareto Chart? Analysis & Diagram | ASQ
Scatter Diagram:	What is a Scatter Diagram? Scatter Plot Graphs | ASQ
NIST ProcCapab-1	https://www.itl.nist.gov/div898/handbook/ppc/section4/ppc46.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	https://www.asq.org/learn-about-quality/six-sigma/overview/overview.html
SixSigma Cert.	Six Sigma Black Belt Certification - Get CSSBB Certified | ASQ
Six Sigma course	https://www.quanterion.com/products-services/training/introduction-to-lean-six-sigma-enter
NIST ProcCapab-2	https://www.itl.nist.gov/div898/handbook/pmc/section1/pmc16.htm

Class #5	**Design for Quality (DFSS); Marix Tools: QFD; FMEA & FTA**
Textbook	**Material fr. Chapters 4 and 11 (Quality Function Deployment/QFD)**
ASQ Q Tools	https://asq.org/quality-resources/quality-tools
FMEAs	What is FMEA? Failure Mode & Effects Analysis | ASQ
Total Qual Mgmt	https://www.asq.org/learn-about-quality/total-quality-management/overview/overview.html
Matrix Diagrams	What is a Matrix Diagram or Chart? Data Relationship Analysis | ASQ
Check Sheets	Check Sheet - Defect Concentration Diagram | ASQ
Gantt Charts	Gantt Chart - What is a Milestone Chart? | ASQ
NIST TstComps	https://www.itl.nist.gov/div898/handbook/prc/section3/prc3.htm

Class #6	**Lean Manufacturing; Supply Chains; Supplier Relations ; Outsourcing;**
Textbook	**Selected Material from Chs 12, 13, Class PPT and LP Example**
Lean	http://www.asq.org/learn-about-quality/lean/overview/overview.html
Ex ValStrMaps	http://www.google.com/images?hl=en&source=hp&q=value+stream+mapping&aq=0&aqi=g
Create VSM	http://office.microsoft.com/en-us/visio-help/create-a-value-stream-map-HA010113024.aspx
ASQ Supplier Q	http://www.asq.org/learn-about-quality/supplier-quality/overview/overview.html
Teams	http://www.asq.org/learn-about-quality/teams/overview/overview.html
LeanSixSigma	https://www.rmqsi.org/products-services/training/introduction-to-lean-six-sigma-enterprise-1
NIST GenStat	http://www.itl.nist.gov/div898/handbook/prc/section2/prc2.htm

Class #7	**Inspection, tests and measurements: Qualitative/Quantitative Gage R&R**
Textbook	**Material from Chs. 15; ASQ and NIST**
Proc. Control	http://www.itl.nist.gov/div898/handbook/toolaids/pff/6-pmc.pdf
ASQ PM/Metrics	https://asq.org/quality-resources/metrics/selecting-metrics-tutorial
Sample Size Start	http://web.cortland.edu/matresearch/ExperSampSizeQR&CII.pdf
Engage (QualComp)	https://www.minitab.com/en-us/products/engage/
ASQ PM/Metrics	http://www.itl.nist.gov/div898/handbook/mpc/section4/mpc4.htm

Class #8	**Artificial Intelligence, Companion SW**
Material	**The Economist magazine and Companion Projects**

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

Class #10	**Design of Experiments in Quality improvement**
Textbook	**Materials from Chs. 11 P (321), 18 (pp. 609-619) and the Handout**
RIAC/DOE	https://www.dsiac.org/resources/reference_documents/design-experiments-doe
DOE Overview	https://www.asq.org/learn-about-quality/data-collection-analysis-tools/overview/design-of-ex
Ecologic Sim PPT	http://web.cortland.edu/romeu/EcoSimIasiSubm2009.pdf
Ecologic Sim Pap.	http://ecs.syr.edu/faculty/romeu/DoeEnvironmentNSF2013.pdf
NIST DOE (5)	http://www.itl.nist.gov/div898/handbook/pri/section4/pri4.htm

Class #11	**Advanced Design of Experiments (Fract. Fact.)**
Textbook	**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	https://www.quanterion.com/design-of-experiments-for-reliability-improvement/
NIST DOE (5)	http://www.itl.nist.gov/div898/handbook/pri/section3/pri33.htm

Class #12	**Acceptance Sampling/OC Function; ANSI Tables; Rectifying Inspection**
Textbook	**Material from Chs. 15; RIAC Tutorial and NIST**
OC Functions	https://www.dsiac.org/sites/default/files/reference-documents/oc_curves.pdf
Select AOQL	http://www.itl.nist.gov/div898/handbook/pmc/section2/pmc232.htm
Accept.Sampl.	https://www.pnw.edu/wp-content/uploads/2020/03/Lecture-Notes-13-7.pdf
TutorialAccSamp	http://www.samplingplans.com/modern3.htm
Binomial Plans	http://www.samplingplans.com/outputbinomial.htm
NIST Acct. Samp.	https://www.itl.nist.gov/div898/handbook/pmc/section2/pmc21.htm
Lot Accpt. Samp.	http://www.itl.nist.gov/div898/handbook/pmc/section2/pmc2.htm
Glossary Terms	http://www.samplingplans.com/glossary.htm

Class #13	**Statistical Process Control: SPC Charts**
Textbook	**Material from Ch. 20; RIAC Tutorial and NIST**
SPC/QC Charts	https://www.dsiac.org/sites/default/files/reference-documents/qccharts.pdf
ASQ SPC	http://www.asq.org/learn-about-quality/statistical-process-control/overview/overview.h
Rel. Conf. Bds.	https://www.quanterion.com/confidence-bounds-on-the-mean-time-between-failure-m
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
Proc. Control	http://www.itl.nist.gov/div898/handbook/toolaids/pff/6-pmc.pdf

Class #14	**Reliability: Q in Time.- Models, Tools & Data analysis methods**
Textbook	**Material from Ch. 20; RIAC Tutorial and NIST**
NIST Rel. (8)	http://www.itl.nist.gov/div898/handbook/apr/section1/apr1.htm
START Reliab.	https://www.dsiac.org/sites/default/files/reference-documents/r_exp.pdf
START Exp. Ass.	https://www.dsiac.org/sites/default/files/reference-documents/e_assume.pdf
START Censored	https://www.dsiac.org/sites/default/files/reference-documents/censor.pdf
FMEAs & Rel.	https://asq.org/quality-resources/fmea
FMEA Applic	https://www.jamasoftware.com/requirements-management-guide/meeting-regulatory-c
Censored Data	https://www.dsiac.org/sites/default/files/reference-documents/censor.pdf
SW Reliability	https://www.dsiac.org/sites/default/files/journals/1ST_Q2000.pdf

Modeling R Data https://www.dsiac.org/sites/default/files/journals/4q2001.pdf

Class # 15 **Reliability End; Final Project Presentations.**
Material **From the Reliability Start sheets and Minitab**