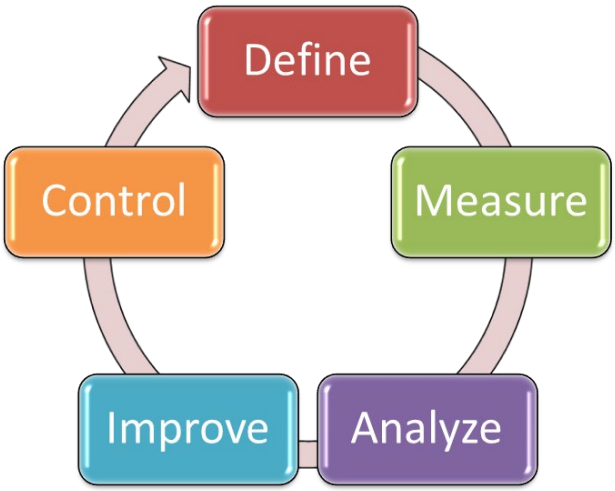
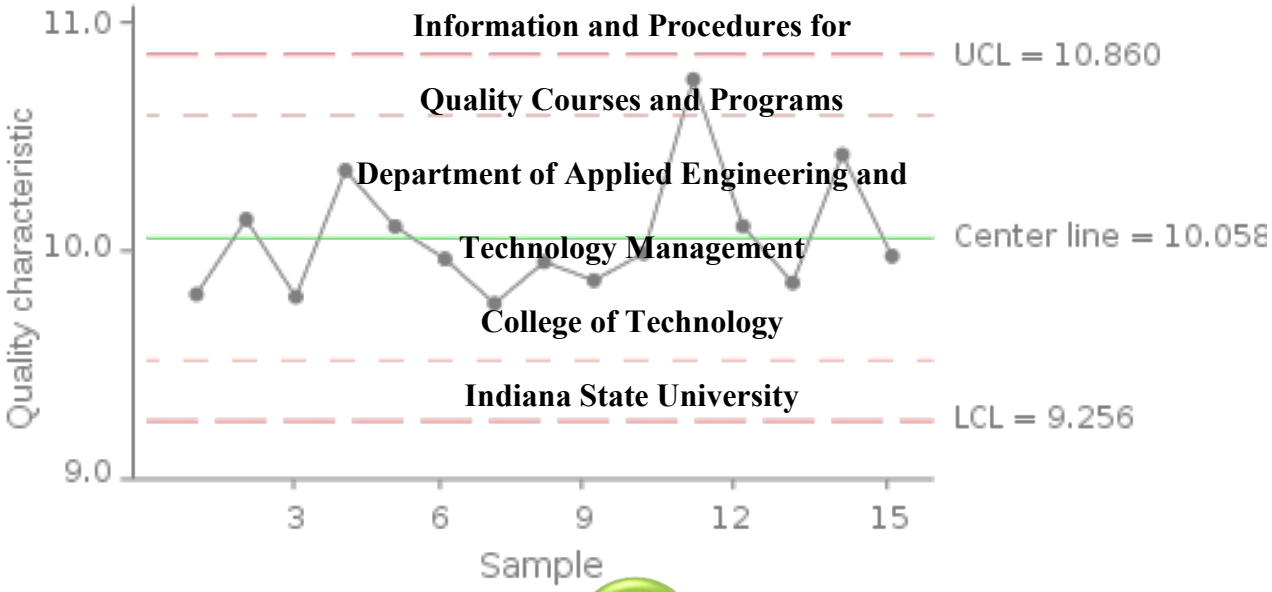

Define
Measure
Analyze
Improve
Control


Information and Procedures for
Quality Courses and Programs
Department of Applied Engineering and
Technology Management
College of Technology
Indiana State University
UCL = 10.860
Center line = 10.058
LCL = 9.256
Quality characteristic
11.0
10.0
9.0
3
6
9
12
15
Sample


Sort
Set
Sustain
Shine
Standardize

What is Quality?

Quality is not merely something we care about when we order a sandwich or get the oil changed in our car. Quality is an academic discipline and a profession. Quality is a vital function in every organization. Construction, manufacturing, banking, and healthcare industries; education; religious and social organizations; the government; and other institutions are all interested in quality. Large or small, product- or service-related, the supplier or the consumer, everyone is involved with quality.

Employment related to quality is growing faster than most other professions. The American Society for Quality (ASQ) has over 70,000 members. Approximately 18,000 individuals sit for an ASQ certification each year. There are numerous quality certifications, e.g., Manager of Quality, Quality Engineer, Quality Process Analyst, Reliability Engineer, and Six Sigma Black Belt. The Green Belt certification is the #1 quality certification in the world.

Quality managers, engineers, and trainers typically earn over $84K per year. Following is a list of average salaries for quality professionals with a BS degree.

- Process Analyst—$89K
- Green Belt—$107K
- Reliability Engineer—$111K
- Quality Engineer—$118K
- Master Black Belt—$131K
- Quality Manager—$131K

One of the most important areas of quality is the problem solving and improvement technique known as Six Sigma (SS). Using assertive martial arts metaphors, SS has Yellow Belts, Green Belts, Black Belts, and Master Black Belts to define (D) problems and opportunities. Measurement (M) and analysis (A) are then used to improve (I) and control (C) the product, service, or process. The DMAIC process is used in organizations world-wide to improve design, production, customer service, marketing, transportation, and many other functions.

What is Lean Six Sigma (LSS)?

Lean is a set of techniques to improve productivity and efficiency. One could say that *quality* is about doing things correctly. *Lean* is about doing the correct things. Obviously, doing correct things correctly helps satisfy customers while fulfilling an organizaton's mission with minimum cost.

Lean focuses on reducing costs, time, materials, and all sorts of waste, while being safe and adding value to products and services. Professions and salaries related to Lean are increasing. Daycares, contractors, physicians, restaurants, schools, and others want to increase value, quality, and safety while reducing costs, accidents, complaints, and waste.

The Society of Manufacturing Engineers (SME) awards the most highly recognized and valuable certifications in Lean (the Bronze, Silver, and Gold levels). Though focused on industry in general, SME's Lean certifications are applicable to every organization.

In essence, LSS is a partnering of Lean and Six Sigma. LSS principles and techniques are meant to ensure that necessary things (and only necessary things) are being done and being done correctly. Dr. Hayden says that LSS is about *doing right things right*.

Though Lean and quality have been historically pioneered and developed by production industries—other sectors, from education to entertainment, use LSS.

Quality Courses

Following is a list of courses offered by the Applied Engineering and Technology Management (AETM) Department which specifically focus on quality. Though certain quality courses are required by various programs, students take quality courses because knowing about quality is good for any profession.

Table 1. Quality Courses in the AETM Department.

Course	Closest[1] ASQ Certification	Prerequisites
ET 361 Quality Systems and Tools –Introductory philosophy, applications, and qualitative and quantitative methods for quality.	Process Analyst	MATH 115
ET 4/561 Lean Six Sigma – The integration of quality (especially the DMAIC process) and Lean. Includes a SS project.*	Yellow Belt	ET 361
ET 4/563 Six Sigma Green Belt - Includes a SS project. *Two projects are required for Black Belt Certification.	Green Belt	ET 361 **and** MATH 241 - Principles of Statistics
ET 665 Quality Standards Leadership - Management and leadership activities related to evaluating, creating, and promoting quality standards.	Quality Manager	One graduate-level course in quality
ET 669 Quality Seminar – Philosophy, current research, and trends in quality.	Quality Manager	Two graduate-level courses in quality
ET 611 Experimental Design and Analysis - Design and analysis of experiments (DOE) applied to quality.	Quality Engineeer	ET 607

[1] This does not imply and exact match. A credit-bearing university course goes beyond any ASQ certification and does not have the narrow focus of practice for an exam.

ET 612 Reliability, Maintainability, and Serviceability – Design and planning to determine and predict the reliability and availability of products, components, and systems.	Reliability Engineer	ET 607

Quality Programs

You can take alacart courses in quality. Minors, certificates, and specializations are especially prominent on transcripts and identify specific academic preperation.

Certificate in Lean Six Sigma (LSS). This is a 12-hour (four course) credit-bearing certificate open to any degree- or non-degree seeking student (at any level, BS through PhD). The certificate is a type of *degree* (similar to a BS, MS, or PhD diploma). The credits earned in this certificate can be transferred to other programs at ISU and other institutions. The certificate is available at a distance. Some of the courses can be taken as graduate courses if the student qualifies for graduate admission.

BS Minor in Lean Six Sigma. This is a 18-hour minor which can be paired with any major on campus. This minor is available at a distance. The College of Technology has BS majors in engineering technology and other fields, e.g., Automotive, Electronics, Manufacturing, Mechanical, Packaging, and many more. The LSS Certificate or Minor is a good pairing with those degrees and others across campus.

MS focus on Quality. The MS in Technology Management (MSTM) has a 3-course block of advisor-approved electives that can focus on quality. All MSTM quality courses are available at a distance.

PhD Specialization in Quality. The PhD in Technology Management (PhD TM) has a Quality specialization. For the Quality or other specializations (Construction, Digital Communications, Human Resource Development, and Manufacturing), one or more elective courses could be in quality. The coursework is offered by a consortium of faculty members from the College of Technology and peer institutions. Except for two one-week residency visits to ISU, the program is offered completely at a distance.

Table 2. Summary of Quality Program Courses and Scheduling.

Courses	LSS Certificate[2]	LSS BS Minor[1]	MSTM Quality Courses[3]	PhDTM Quality Specialization[4]	Typical Scheduling (check actual schedule)
ET 361 Quality Systems and Tools	X	X			Summer and Fall via web. Every Spring on campus.
MFG 374 Lean Manufacturing Systems	X	X			Fall via web.
MFG 4/571 Production Planning & Control	X	X			Spring via web and on campus.
ET 4/561 Lean Six Sigma	X	X	X		Every Fall via web.
MATH 241		X			Every Fall, Spring & Summer via web and on campus.
ET 4/563 Six Sigma Greenbelt		X	X		Every Spring via web.
ET 611 Experimental Design and Analysis			X	X	Spring, even years, via web.
ET 612 Reliability, Maintainability, and Serviceability			X	X	Fall, even years, via web.
ET 665 Quality Standards Leadership			X	X	Fall, odd years, via web.
ET 669 Quality Seminar			X	X	Spring, odd years, via web.

[2] All courses required.
[3] Advisor-approved elective courses.
[4] All courses required. Two additional quality courses required and provided by Consortium partner universities. See the PhD website.

Professionalism

Common characteristics of professionals include the following.

- Possession of specialized knowledge and skills.
- Recognition of expertise by licensure or certification.
- Allegiance to the profession and not merely to oneself, an employer, or clients.
- Adherence to a code of ethics.
- Participation in the applicable professional organization.
- Assisting the advancement and development of the profession.
- On-going development of expertise.
- Transferring expertise to others.
- Service to others based on professional expertise.

You may take a class in quality for many reasons. But let's face it, professors of quality hope you are taking a course or program in quality because you want to be a quality professional or want to further develop as a quality professional. (Why do you think professor, profession, and professional have the same root?) If you take a course and restrict yourself to *checking that class off the list*, it is possible to learn, retain that learning, and enjoy doing so—that is what good students do. However, if you take a course for professional reasons, with the attitude and goals of a professional, you will encompass and surpass what a good student does. If you take the course for professional reasons, the course will not be an item to check off but an integrated part of your professional growth. Even if you are taking your first course in quality, you can be a novice member of the profession. You are strongly encouraged to take a professional view.

Prescription for Professional Success

If you desire to be a professional and advance in your profession, you will engage in the activities bulleted above. Following is a prescription for professional growth. You will notice that most of the following are reinforced by assignments in various courses.

1. Join ASQ. Students can join for $31.
2. Go to professional meetings and participate. Being active in a professional organization leads to a higher starting salary and faster promotions.
3. Do an internship related to quality. Completing an internship leads to a higher starting salary and faster promotions.
4. Take advantage of any opportunity in every course to integrate a course activity with the above bullets and these prescriptions. A course may ask you to measure and analyze data. You should perform that analysis on data related to your job, professional organization, another course, or a project you are working on with a professor or employer. ENG 305T will have writing assignments: write about something that complements your professional activities. If you take the ET 421 R&D class, research and develop something that complements other coursework, the bullets above, and these prescriptions.
5. Form professional relationships; especially, collaborate with faculty members. Get a faculty mentor; maybe, mentor the faculty! Be a colleague and not merely a student. Get

involved with professors' research and service activities. If you are a quality professional in industry, have the professor and other students help you with a project. ISU encourages collaboration among students, faculty, and the community—especially research projects. Such collaboration directly supports professionalism and these prescriptions.

6. Gain more knowledge. Study more on your own. Go to workshops. The most valuable and recognized enhancements to your knowledge base will be college credit-bearing coursework, especially a formal program, e.g., certificate, minor, major, or specialization.
7. Obtain an ASQ certification. If you already have an ASQ certification, keep it current and obtain more certifications.

If you want to be a quality professional, take Dr. Hayden's prescription.

Declaring Your Program

A certification, minor, major, or specialization must be officially declared for it to be stated on your transcript. Declaring a minor or certificate should be done prior to junior standing so that you can schedule course work to graduate on time.

Transfer Course Work

For the LSS Certificate or Minor, one-half of the course work may be transferred from prior institutions or other programs on campus. A transferred course must be substantively the same as the AETM course. Transferred course work must be taken prior to declaring the certification or minor and must be approved by the AETM Department Chair before scheduling your remaining courses so that you can be properly advised.

Contacts

LSS Certificate and Minor
ASQ and SME Membership

Dr. Michael A. Hayden: teaches most of the quality, statistics, and research courses in the College, is an officer and Senior member of both ASQ and SME, and holds several ASQ and SME certifications.

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ISU Online Resources

- ISU home page: http://www.indstate.edu/
- Undergraduate Admissions: https://www.indstate.edu/admissions
- College of Graduate and Professional Studies: https://www.indstate.edu/cgps
- College of Technology: https://www.indstate.edu/technology/
- Department of Applied Engineering and Technology Management: https://www.indstate.edu/technology/aetm
- PhD in Technology Management: https://www.indstate.edu/technology/consortphd