

IEE 581 Six Sigma Methodology – Syllabus

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Course description: The six sigma process improvement strategy of define, measure, analyze, improve, and control (DMAIC). Integrates and deploys statistical methods and other six sigma problem solving via the DMAIC framework. Requires background in undergraduate engineering statistics.

Enrollment requirements: Prerequisite(s): Engineering Graduate student

COURSE OBJECTIVES

In this course, we will cover the Six Sigma approach for achieving high quality processes, products, and services.

- Students will gain an understanding of Six Sigma, as philosophy, a performance goal, and a methodology.
- Students will study the DMAIC improvement and the DFSS design frameworks, including Lean.
- Students will understand the structure and leadership needed in a Six Sigma organization.

EXPECTED LEARNING OUTCOMES

At the completion of this course students will be able to:

- Describe the Six Sigma concept and the “process improvement triad”
- Apply the DMAIC approach to improvement projects
- Apply DFSS and lean product development concepts to product/process design projects
- Apply appropriate analytical, statistical, and lean methods throughout DMAIC and DFSS projects
- Describe the differences in applying Six Sigma methods to manufacturing and service industries
- Discuss the role of Six Sigma in achieving performance excellence
- Explain the importance of leadership in implementing Six Sigma

REQUIRED TEXTBOOK

Either one of these two books has the required content. The second is essentially a second edition of the first one, despite the title, with updated content. A cross-reference will be provided for reading assignments.

1. Snee, R.D. and Hoerl, R.W. (2003). *Leading Six Sigma: A Step-by-Step Guide Based on Experience with GE and Other Six Sigma Companies*. Financial Times Prentice Hall, Upper Saddle River, NJ.
2. Snee, R.D. and Hoerl, R.W. (2018). *Leading Holistic Improvement with Lean Six Sigma 2.0*. Pearson Education.

Recommended Book: George, M.L., Rowlands, D., Price, M., and Maxey, J. (2005). *The Lean Six Sigma Pocket Toolbook*. McGraw-Hill, New York.

REQUIRED READING

Required reading assignments supplement the textbook. The articles are on the schedule and are available either through the [ASU Library website](#) or at accessible websites. Be sure that you are logged on to “MyASU” when accessing the ASU Library website. Articles include materials available at ASQ.org. You will need to register as a visitor at asq.org to access some of the materials. As a registered visitor, you can access a wide variety of articles, including journal articles designated for “Open Access.”

COURSE SCHEDULE AND SYLLABUS CHANGES

The timeline for this course, including lecture topics, required reading, assignments, and exams, is posted separately on Canvas. The schedule and this syllabus may be subject to change with reasonable advance notice.

- **Online students:** Lectures were recorded in a prior semester. There are differences in assignments, exams, and due dates. Always refer to your schedule and assignment instructions to understand the work required of you.

COMMUNICATING WITH THE INSTRUCTOR

Discussion Boards

This course uses Canvas "Discussions," located on the left-hand navigation bar. These discussion boards are organized by topic and should be used for general questions and comments. Prior to posting a question or comment, check the syllabus, announcements, and existing posts to ensure it is not redundant. You are encouraged to respond to the questions of your classmates. Email questions of a personal nature to your instructor.

E-mail

ASU e-mail is an official means of communication among ASU's students, faculty, and staff (refer to [SSM 107-03](#)). Students are expected to ensure that e-mail is accessed, read, and acted upon in a timely fashion. Students bear the responsibility of missed messages and should check their ASU-assigned e-mail on a regular basis. All email correspondence must come from an official ASU email account. Messages sent through the Canvas messaging tool or from non-ASU email accounts will not be responded to.

CALCULATORS

You may not use a TI-Nspire or an internet-capable calculator during exams in this course. If you do, you will receive a score of “0” for that exam. Most students use a TI-83, -84, -89. Casio and HP make equivalently good models. You will need one that does probability and statistics functions.

IDENTITY VERIFICATION FOR EXAMS

Campus students: ASU requires all students to obtain an official ASU ID card (refer to [PUR-224](#)). You must use an official ASU ID card to verify your identity for exams.

Online students: Online students must have an approved photo on file with Sun Devil Card Services (additional information at [“ID photos for ASU Online students.”](#)) Online students must use either an official ASU ID card or a government-issued photo ID (but not military ID) to verify their identity for exams.

GRADING POLICY

Your work is weighted for your course average as follows:

| | |
|---|-----|
| Assignments | 30% |
| In-class Activities / Graded Discussions | 10% |
| Midterm Exam | 30% |
| Final Exam | 30% |

Extra credit work is not available in this class. If you dispute the grading of your work, you will have three calendar days after graded work is returned to request a review; instructions will be posted on Canvas.

You are guaranteed a final course grade per the following:

| | | | | | |
|-----------------------|---------------|----------------------|----------------------|----------------------|------------|
| Course Average | $X \geq 90\%$ | $80\% \leq X < 90\%$ | $70\% \leq X < 80\%$ | $60\% \leq X < 70\%$ | $X < 60\%$ |
| Course Grade | A | B | C | D | E |

MAKE-UP POLICY

Assignment due dates are on the schedule. Assignments are due by 8 pm-AZ (MST). Assignments are set up with an increasing late submission penalty and can be submitted up to two days late. After two days, late submissions will not be graded; you will receive a score of "0."

Exam dates are on the schedule. If you do not take the Final Exam, you will receive a course grade of "E." In order to pass this course, you must take the Final Exam.

The opportunity for a make-up exam or an extended assignment deadline is available in the following situations:

1. Required class absence due to university-sanctioned activities (refer to [ACD 304-02](#)). It is your responsibility to notify the Instructor *early in the semester* about the need to be absent from class due to participation in a university-sanctioned activity.
2. Religious observance (refer to [ACD 304-04](#)). It is your responsibility to notify the Instructor *at the beginning of the semester* about the need to be absent from class due to a religious observance.
3. Excused absence related to missed classes, graded assignments, or examinations due to military line-of-duty activities (refer to [ACD 304-11](#) and [SSM 201-18](#)). If the line-of-duty activity is known in advance, you must notify the Instructor early in the semester or as soon as possible, prior to the missed class, assignment, or examination. If the line-of-duty activity was not known in advance, you must notify the Instructor as soon as possible.
4. The death of an immediate family member, accident, or other emergency. Please work with Student Advocacy and Assistance (<https://eoss.asu.edu/dos/srr/StudentAdvocacyandAssistance>) for guidance. Once I receive notification from Student Advocacy and Assistance, you will have the opportunity for a make-up exam.

EXAMS – STUDENTS ENROLLED IN THE CAMPUS CLASS

Campus students only: There will be exam-specific instructions for each exam that address exam time, permissible materials, and other exam information.

EXAMS – STUDENTS ENROLLED IN THE ONLINE CLASS

Exam Proctoring

The online class will use online proctoring for online exams. Online proctoring records both your computer screen activity and the physical room environment in order to mimic in-person proctoring conditions. The recordings are captured to help ensure academic integrity.

To help ensure that everything is properly functioning, you must complete a practice exam before the first exam.

Additional information about the online proctoring service is posted with class materials. If you need assistance, contact the ASU Help Desk for assistance: access 24/7 live chat, create a case from your My ASU Service Center, or call 1-855-278-5080.

Exam Instructions

"ASU Online Exam Guidelines" apply to all exams. These guidelines address the testing area, your behavior, and getting support.

"Exam Instructions" are specific to an exam and address exam time, permissible materials, and other exam information.

EXPECTED CLASSROOM BEHAVIOR

Expectations for classroom behavior apply to in-person, on-line, and iCourse classes and encompass both virtual and in-person interactions. As a student in this class it is expected that you will

- Wear a face covering in the classroom. Until further notified, per ASU policy faculty, staff, students, and visitors are required to wear face coverings in classrooms, labs, offices, and community spaces.
- Keep laptop and phone volume off during lecture.
- Refrain from loud conversation during lecture.
- Refrain from activities that distract or disrupt other students.
- Be respectful to peers and faculty.

Students persistently neglecting to observe the above behaviors will be withdrawn from the course with grade of either "W" (Withdrawal) or "E" (Failing) per ASU policy ([SSM 201-10](#)).

POLICY AGAINST THREATENING BEHAVIOR

Students, faculty, staff, and other individuals do not have an unqualified right of access to university grounds, property, or services. Interfering with the peaceful conduct of university-related business or activities or remaining on campus grounds after a request to leave may be considered a crime. All incidents and allegations of violent or threatening conduct by an ASU student (whether on- or off-campus) must be reported to the ASU Police Department (ASU PD) and the Office of the Dean of Students, per ASU policy ([SSM 104-02](#)). Note that "conduct" encompasses both in-person and virtual interactions.

DISABILITY ACCOMMODATIONS

Suitable accommodations will be made for students having disabilities. Students needing accommodations must register with Student Accessibility and Inclusive Learning Services (SAILS) and provide documentation of that registration to the

Instructor. Students should communicate the need for an accommodation in sufficient time for it to be properly arranged. See [ACD 304-08 Classroom and Testing Accommodations for Students with Disabilities](#).

HARASSMENT AND SEXUAL DISCRIMINATION

Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits discrimination, harassment, and retaliation by employees, students, contractors, or agents of the university based on any protected status: race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information. Any occurrence of discrimination, harassment or retaliation will be reported, per ASU policy ([ACD 401](#)).

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at <https://sexualviolenceprevention.asu.edu/faqs>.

Mandated sexual harassment reporter: As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, <https://eoss.asu.edu/counseling>, is available if you wish to discuss any concerns confidentially and privately. Online students may also contact “360 Life Services” for counseling.

ACADEMIC INTEGRITY AND COPYRIGHT LAWS

Academic Integrity

Students in this class must adhere to ASU’s Academic Integrity Policy, which can be found at <https://provost.asu.edu/academic-integrity/policy>. Students are responsible for reviewing this policy and understanding each of the areas in which academic dishonesty can occur. In addition, all engineering students are expected to adhere to both the [ASU Student Honor Code](#) and the [Fulton Schools of Engineering Honor Code](#). All academic integrity violations will be reported to the Fulton Schools of Engineering Academic Integrity Office (AIO). The AIO maintains record of all violations and has access to academic integrity violations committed in all other ASU college/schools.

Examples of activities permitted in IEE 581:

- You may post questions about the assignments to a Canvas Discussion
- You must do your own work on all individual assignments

Examples of activities forbidden in IEE 581:

- You may not use Chegg.com, CourseHero.com or any other similar web site or resource to complete an assignment
- You may not have another person do any part of an individual assignment for you
- You may not work on any part of another student’s individual assignment
- You may not post class content to Chegg.com, CourseHero.com or any similar web site, ever.

If you do any of the forbidden activities above:

- You will be reported to the Dean's office for an academic integrity violation.
- The recommended sanctions will be a zero on the work item AND one full letter grade reduction for your final course grade.

The list of forbidden activities above is not comprehensive. If you are not sure whether something you are doing violates ASU's Academic Integrity Policy, ask the Instructor. Unless specifically permitted above, an activity or resource is forbidden until the Instructor says it is permitted.

Copyright

Course content, including lectures, are copyrighted materials and students may not share outside the class, upload to online websites not approved by the Instructor, sell, or distribute course content or notes taken during the conduct of the course (see [ACD 304-06](#), "Commercial Note Taking Services" and [ABOR Policy 5-308 F.14](#), "Student Code of Conduct" for more information). Course content includes, but is not limited to, lecture slides, written materials, assignments, homework, exercises, quizzes, and exams.

Students are prohibited from recording class sessions, unless the Instructor has been notified by the Disability Resource Center of an approved accommodation.

You must refrain from uploading to any course shell, discussion board, or website used by the course Instructor or other course forum, material that is not the student's original work, unless the students first comply with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.

RESOURCES

Minitab

I will use Minitab in class, and some assignments will require statistical software. Many (if not most) organizations hiring engineers have desktop statistical software, and it will be to your advantage to have this skill. I will demonstrate the functionality needed for course topics; Minitab also provides extensive support material at their web site.

You can access Minitab 18 through the "My Apps" on the My ASU Home page. Click on "My Apps" and search for "Minitab." Follow instructions to run Minitab virtually. You can also access Minitab from the CIDSE Virtual Lab, more information [here](#). Please note that you will not have access to Minitab for exams.

Writing Centers

Online graduate writing support is available for graduate students who are seeking assistance with writing assignments *in any 500, 600, or 700 course*, by appointment only. Online writing tutoring is also available for graduate students who are seeking assistance with writing assignments *in any course*, by appointment only. Refer to "Resources for this Course" in the Welcome module for more information on writing centers and resources.

ASU also has four Graduate Writing Centers to serve students enrolled in 500, 600, and 700 level classes. These centers offer assistance for graduate students at any stage of the writing process. More information can be found at [ASU Graduate Writing Services](#).