Name & Contact Information

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Title of Module/Activity

Not Applicable (Not a single module or activity)

Course Name & Course Number

EMGT 901 – Total Quality Management Using 6 Sigma

Length of Module/Activity

Sustainability resources and activities are integrated throughout the 8-week course.

Primary Learning Outcomes

1. Recognize the role engineering plays in creating sustainable systems
2. Apply systems thinking and a collaborative team approach to explore interdependency of variables to draw a system diagram
3. Explain how Lean Green strategy in quality management helps sustainable development

Resilience and/or Sustainability Connections

The 2012 National Research Council definition of resilience is briefly included in an introductory PPT/video. The bulk of the emphasis and coverage is on sustainability and sustainable development as it relates to lean and green design of products, processes, and services. In module 1, the triple bottom line (Equity, Environment, Economy) is covered in a video by a mechanical engineering professor from University of Michigan, A TED talk video, and an article that students will watch and read. Other resources in remaining modules also reference the triple bottom line.

Identify One or More of the Key Sustainability Competencies Addressed

- Normative (Values thinking) competence is built as students are challenged to recognize the role that engineering and engineers are compelled to play in sustainable development.
  - ✓ The National Academy of Engineering (NAE) **Declaration** on the role of engineering in Sustainable Development (Module 1)
  - ✓ The 14 **Grand Challenges** proposed by NAE and consider relevance to sustainability (Module 2)
  - ✓ Article on the importance of building one's engineering career with sustainability in mind (Module 2)
  - ✓ Article on Engineering Sustainability (Module 1)
- Collaboration (Interpersonal) competence is built with emphasis on design thinking. An emphasis in the course is *concurrent engineering*: collaboration across all units and individuals in a product's life cycle, from design all the way to end-of-life strategies. There are 3 course activities that are done in teams or promote interpersonal skills.
  - ✓ A system diagram – team assignment

- ✓ A case analysis done in teams. Topic is not sustainability. It is statistical process control.
- ✓ Weekly discussion activity where students must post an original message and respond to at least two peers (civility, respect, open mind, and constructive comments, expected).

- System thinking Competence is incorporated in Module 3, in which Process Focus of quality management is covered. Students will read about system thinking, view a PPT/video, visit a website on system thinking, and will review an audio and a video file. Then they each will create a system diagram and share it in their small team. Consolidated product by each team is shared with the whole class.

Instructional Strategies

Remember this is a course in quality management and six sigma, yet I have infused sustainability into it. Therefore, the main emphasis is quality management, not sustainability! Also, remember this is a course that is 100% web-based and asynchronous. So, no F2F sessions. In addition to my EMGT 901 resources, I will use the following for sustainability:

- Narrated PPT/video: Using VidGrid technology I have prepared a couple of video files using PPT slide files from our Sustainability workshop.
- Resources found on the web: TED Talks, a video by a Michigan mechanical engineering professor, blogs/videos/podcasts from American Society of Mechanical engineers.
- Articles related to sustainability, engineering & sustainability, and lean-green and sustainable development.

Assessment Strategy

Goal	**Resources***	**Activities & Assessment****
Recognize the role engineering plays in creating sustainable systems	1. Video by U of Michigan Mechanical Engr. professor 2. NAE Declaration: Role of engineers in sustainability. 3. NAE Grand Challenges 4. Engr. Mgmt. Inst. Article: Design sustainability in your engineering career	**Discussion*****: Choose one Grand Challenge that is near to your heart. Explain why you chose that Challenge and its impact on, or relationship to, sustainability. Draw upon what you learned from the other two articles for this week related to sustainability to build your arguments. Cite those articles and other sources that you may have used to complete this assignment. Provide complete references for all sources.
Apply systems thinking and a collaborative team approach to explore interdependency of variables to draw a system diagram	1. System thinking video/PPT (instructional) 2. Systems thinking in action. Short video clip from ASME. 3. Article on systems thinking from the Systems Thinker.com	**Team**: Collaborate to develop system diagram 1. Watch a short podcast on wildfires 2. Watch a short video clip on wildfires 3. Draw a systems diagram 4. Share in your small group 5. Consolidate to expand the diagram 6. Each group share in all-class forum

Goal	Resources*	Activities & Assessment**
Explain how Lean Green strategy in quality management helps sustainable development	1. Readings from Textbook 2. Three articles: • Lean to Sustainability • Lean-Green • Tools of lean for Sustainability	**Course project** – Track1: Sustain. & Lean Green A. Research paper on sustainability as it relates to any of these: Engineering Management, or Lean & Green, or Sig-Sigma Lean B. Field study: Tour & interview sustainability office/director at a facility with sustain. plan

* These are a few of the items. Additional resources are available in various modules of Canvas, mostly related to relationship between quality management and sustainability.

** Module 4 has a HW containing 15-20 objective Qs over sustainability readings & resources.

*** Total of 4 discussions related to sustainability, in addition to project discussion in module 8.