



UNC CHARLOTTE

Department of Systems Engineering and Engineering Management PROPOSAL FOR GRADUATE CERTIFICATES

To: Dr. Ed Morse (Engineering Graduate Committee Chair)

From: Dr. Ertunga Ozelkan (SEEM Interim Chair and Graduate Director)

Date: 11/15/13

Re: Establishment of Graduate Certificates

- I. Graduate Certificate in Energy Systems Analytics
- II. Graduate Certificate in Lean Six Sigma
- III. Graduate Certificate in Logistics and Supply Chains

The following documentation is provided for the proposal of three graduate certificates following the published procedure: <http://provost.uncc.edu/sites/provost.uncc.edu/files/media/Graduate-Certificate-Proposal-Procedures.pdf>

Procedure for Certificate Program Approval:

Approval by the appropriate college committees and deans and the Graduate Council are forwarded to the Dean of the Graduate School (DGS). The DGS, having determined that all appropriate consultations have been conducted and that the home college has approved the proposal in wording consistent with that approved by the Graduate Council, forwards the recommendation to the Provost.

| DATE RECEIVED | DATE CONSIDERED | DATE FORWARDED | ACTION | SIGNATURES |
|---------------|-----------------|----------------|----------|---|
| 11/14/13 | 11/15/13 | 11/15/13 | Approved | <u>DEPARTMENT CHAIR</u> Dr. Ertunga C. Ozelkan |
| | | | | <u>COLLEGE GRADUATE CURRICULUM COMMITTEE CHAIR</u> Dr. Ed Morse |
| | | | | <u>COLLEGE FACULTY CHAIR (if applicable)</u> Arindam Mukherjee |
| | 11/25/13 | 11/25/13 | | <u>COLLEGE DEAN</u> Dr. Robert Johnson |
| 12-4-13 | 1-14-14 | 3-12-14 | Approved | <u>GRADUATE COUNCIL</u> Dr. Alan Freitag |

UNC CHARLOTTE
Department of Systems Engineering and Engineering Management
PROPOSAL FOR GRADUATE CERTIFICATE IN LEAN SIX SIGMA

Proposal Format (No New Courses Required or Proposed)

TITLE: Graduate Certificate in Lean Six Sigma

A. Summary/Catalog Copy

The Graduate Certificate in Lean Six Sigma provides graduate students and professionals with the opportunity to reach a demonstrated level of competence in the lean manufacturing and six sigma quality management techniques. Students learn techniques to identify and eliminate waste systematically to help companies improve their bottom-line. The graduate certificate may act as a standalone graduate option for post-baccalaureate and post-masters students, or may be pursued concurrently with a related graduate degree program at UNC Charlotte. The twelve credit hours in the certificate may be applied to the graduate programs in the Systems Engineering and Engineering Management (SEEM) department per approval of the department Program Director.

B. Program Requirements

The certificate will be awarded upon completion of four graduate level courses (12 credit hours) in the area of lean six sigma process design, planning and execution. The cumulative GPA must be at least 3.0 and at most one course with a grade of C may be allowed toward the certificate. Requests for related course substitutions may be approved at the discretion of the Program Director.

The students need to take the following three courses:

- EMGT6924 Lean Six Sigma Practice and Management (3)
- EMGT6926 Lean Supply Networks (3)
- EMGT 6905 Designed Experimentation (3)

Plus one of the following courses:

- EMGT 6901 Advanced Project Management (3)
- EMGT 6904 Product and Process Design (3)
- EMGT 6142 Quality & Manufacturing Mgmt (3)

C. Admission Requirements

In addition to the general requirements for admission to the Graduate School, the Systems Engineering and Engineering Management department seeks the following:

- Either a bachelor's degree in engineering or a closely related technical or scientific field, or a bachelor's degree in business, provided relevant technical course requirements have been met
- Undergraduate coursework in engineering economics, calculus, or statistics
- An average GPA of 3.0 (out of 4.0)
- Applicants should submit written description of any relevant and significant work experience
- Applicants whose native language is not English, will need to satisfy the UNC Charlotte Graduate School's English proficiency requirements.
- Early-Entry Program - Undergraduate students with a GPA of 3.2 or above and with at least 75 semester hours completed toward a baccalaureate degree in Engineering, or Engineering Technology at UNC Charlotte may be admitted as an early-entry student provided they meet all other requirements of admission except the earned bachelor's degree.

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D. Justification

1. Need for program

While started in the automotive sector, lean system design concepts have become widely popular, propagating into every industry sector, including services. Transforming into a lean enterprise is no longer a choice, but a necessity for businesses to stay competitive. Thus the proposed certificate will help the SEEM department align with the industry needs.

Lean System design is an important emphasis of the Systems Engineering and Engineering Management Program, which also hosts the Center for Lean Logistics and Engineered Systems (CLLES). The program and center faculty have been conducting research and training in this area for many years (please see related news on <http://clles.uncc.edu/about-clles/program-news> and press release on the UNC Charlotte web-site: <http://publicrelations.uncc.edu/news-events/news-releases/unc-charlotte-partners-local-law-firm-lean-six-sigma-training>). The faculty plays an active role in national societies such as the Institute of Industrial Engineers (IIE) Lean Division. Lean Supply Networks course has received IIE Lean Division Excellence in Teaching Award in 2006 from the Institute of Industrial Engineers (IIE).

2. Impact Statement (To include how the program affects the department's graduate program, any interdisciplinary programs (if applicable), and the Charlotte region.

Being the largest city in NC, Charlotte can be considered as the manufacturing center of Carolinas hosting over 4500 companies and a financial services powerhouse second in the nation after New York (<http://charlottechamber.com/eco-dev/charlotte-overview>). Thus, the proposed program will help professionals to have the right skills to help the manufacturing and services companies in the Greater Charlotte Region in their lean transformation journey.

The proposed certificate program is expected to have positive impact on the overall graduate enrollment in the SEEM department. Since it is a relatively short and focused program (doable within a year in a part-time mode) it is expected to attract more industry professionals, and provide them a means to get familiar with the SEEM, COE and UNC Charlotte as a whole. It is expected that some of the certificate graduates will eventually transition into a more comprehensive Masters of Science degree program (such as MS in Engineering Management) within and outside of the SEEM department. Since the proposed courses exist and already scheduled for ongoing concentrations, there will be minimal impact in terms of deployment.

E. Letters of support and consultation.

Please see the Appendix for letters of support from Dr. Jonathan Mayhorn (Lean Six Sigma Blackbelt, AT&T) and Mr. Alfred D'Ambrosio (Sr. Manager, Hess Corporation).

F. UNC General Administration Inventory Information

- CIP code: 15.1501
- Program title and description: Graduate Certificate in Lean Six Sigma

UNC CHARLOTTE

Department of Systems Engineering and Engineering Management

PROPOSAL FOR GRADUATE CERTIFICATE IN LEAN SIX SIGMA

- Required credit hours: 12 credit hours
- Program type and level: Graduate Certificate
- Date of initiation: May 2014
- Mode of delivery: Face-to-face and Online
- Site (indicate "Internet" if program is online): UNC Charlotte and Online
- County (indicate "Statewide" if program is online): Mecklenburg and Statewide
- Whether program is on-campus or distance education: On-campus and Online

G. Student Learning Outcomes (SLOs)

- SLO1: Students analyze and evaluate advanced topics related to lean six sigma.
- SLO2: Students effectively communicate technical information related to lean six sigma.

Please see the attached Student Learning Outcomes Assessment Plan and Report document (GCP-LSS-2014 SLOs Asst. Plan & Report Template.docx) for details on the assessment plan.

UNC CHARLOTTE
Department of Systems Engineering and Engineering Management
PROPOSAL FOR GRADUATE CERTIFICATE IN LEAN SIX SIGMA

Appendix: Support Letters and Consultations



AT&T Operations
Room 1
5708 Sustar Dr
Monroe, NC 28110
Jm2269@att.com

Jonathan Mayhorn
Lean Six Sigma Master Black Belt
Construction and Engineering
AT&T Operations
Ofc: 704.628.9022

November 14th, 2013

To: Dr. Ertunga Ozelkan
From: Jonathan Mayhorn – Lean Six Sigma Master Black Belt- AT&T Operations
Subject: Support Letter for Graduate Certificate in Lean Six Sigma

This letter formally serves as industry support for the proposed Graduate Certificate in Lean Six Sigma. As a Lean Six Sigma Master Black Belt for AT&T I believe this program will benefit students as well as the local Charlotte industry. Some of the benefits of such a program are listed below.

- Allow students to develop competitive skills for industry
 - As a manager within a Lean Six Sigma program at AT&T I have learned there are two major benefits for those who go through this type of training program. One is that they become better leaders for the organization because of the intensive focus on improving their skills in project management, presenting to leadership, and data analysis. The second major benefit is that they have a complete mindset change when it comes to solving major problems that plague the business. The Lean Six Sigma methodology teaches participants how to be more proactive and less reactive when it comes to designing new processes or improving existing processes. This mindset allows that participant to save on average \$1.5 million per year for an organization when they are working on projects full time.
- Allow local organizations to choose more highly skilled individuals
 - During the economic downturn over the last 5 years or so, many Engineers lost their positions at AT&T. The organization was looking to cut costs and Lean Six Sigma was one of the programs they started to do just that. Those Engineers who shifted over to the Lean Six Sigma program not only kept their jobs but were promoted after coming out of the program. The reason for this was because organizations want highly skilled individuals who can go back to their business units and make the processes more efficient while still being cost effective. Therefore graduates with a certificate in Lean Six Sigma will be more attractive to industries because of the efficient and cost effective mindset they bring to the organization from day one.

Thank you for allowing me to comment on the proposed Graduate Certificate in Lean Six Sigma. I highly recommend this certificate program for approval to benefit both the students and local industry.

Sincerely,

Dr. Jonathan Mayhorn

Dr. Jonathan Mayhorn
Lean Six Sigma Master Black Belt- AT&T

UNC CHARLOTTE
Department of Systems Engineering and Engineering Management
PROPOSAL FOR GRADUATE CERTIFICATE IN LEAN SIX SIGMA



HESS CORPORATION
1501 McKinney Street
Houston, TX 77010

ALFRED W. D'AMBROSIO, P.E.
Senior Manager, Commercial – Bakken Asset

18th November 2013

Dr. Ertunga C. Ozelkan, Ph.D.
Interim Chair & Associate Professor,
Systems Engineering and Engineering Management
Associate Director, Center for Lean Logistics and Engineered Systems
UNC Charlotte, Room: Cameron 204
9201 University City Blvd., Charlotte, NC 28223

Re: Support Letter of Support for Graduate Certificate Programs

Dear Dr. Ozelkan,

Having worked as a technical professional and a group manager in several aspects of the Energy Systems value chain; I applaud and whole heartily support the efforts you are making to provide programs which will enable individuals in industry to enhance their skills in this dynamic market. The explosion in technical advances, the globalization of business and the economic constraints that have occurred in last several years have brought changes to the market place well beyond anyone's expectations. The ability to keep up; much less get ahead is becoming ever more difficult.

Professionals and technicians need programs that will not only keep up with new innovations, but also provide those individuals with a credible recognition of having secured that knowledge. The Graduate Certificates you are proposing provide an excellent opportunity for full-time working professionals and technicians to secure timely and detailed training at a level greatly exceeding three to five day seminars without having to make the longer-term commitment to a graduate degree program.

As a group manager, I have found it most difficult to maintain a high level of broad technical awareness in my group through individual seminars or self-study programs. The certificate programs will fill that educational gap.

Please let me know if there is anything else I can do to help support your effort.

Sincerely,

Fred D'Ambrosia



**Spring 2014 and Fall 2014
Student Learning Outcomes Assessment Plan and Report**

(Document student learning outcomes assessment plans and assessment data for each undergraduate and graduate degree program and certificate program, stand alone minor, and distance education program offered online only.)

College: The William States Lee College of Engineering

Department: Systems Engineering and Engineering Management Program

Name of Degree or Certificate Program/Stand Alone Minor/Online Distance Education Program:
Graduate Certificate in Lean Six Sigma

Reflection on the Continuous Improvement of Student Learning

1. List the changes and improvements your program planned to implement as a result of last year's student learning outcomes assessment data.
2. Were all of the changes implemented? If not, please explain.
3. What impact did the changes have on student learning?

N/A - New Program

Student Learning Outcome 1
(knowledge, skill or ability to be assessed)

Students analyze and evaluate advanced topics related to lean six sigma.

Changes to the Student Learning Outcomes Assessment Plan: If any changes were made to the assessment plan (which includes the Student Learning Outcome, Effectiveness Measure, Methodology and Performance Outcome) for this student learning outcome since your last report was submitted, briefly summarize the changes made and the rationale for the changes.

N/A - New Program

Effectiveness Measure: Identify the data collection instrument, e.g., exam, project, paper, etc. that will be used to gauge acquisition of this student learning outcome and explain how it assesses the desired knowledge, skill or ability. A copy of the data collection instrument and any scoring rubrics associated with this student learning outcome are to be submitted electronically to the designated folder on the designated shared drive.

Project Written Report (WR), Project Oral Presentation (OP), and/or Exam (EX)

Methodology: Describe when, where and how the assessment of this student learning outcome will be administered and evaluated. Describe the process the department will use to collect, analyze and disseminate the assessment data to program faculty and to decide the changes/improvements to make on the basis of the assessment data.

Use developed rubric for evaluating graduating class projects.

Performance Outcome: Identify the percentage of students assessed that should be able to demonstrate proficiency in this student learning outcome and the level of proficiency expected. *Example: 80% of the students assessed will achieve a score of “acceptable” or higher on the Oral Presentation Scoring Rubric.* (Note: a copy of the scoring rubric, complete with cell descriptors for each level of performance, is to be submitted electronically to the designated folder on the designated shared drive.)

The rubric for written reports:

| GLO #1: Students analyze and evaluate advanced topics in lean six sigma. | | | | |
|---|---|---|--|--|
| Avg. Score (enter for each criteria) | Criteria | 1 Does Not Meet Expectations | 2 Meets Expectations | 3 Exceeds Expectations |
| | WR1a: Describes the scope and context of the defined problem | Does not adequately describe the scope and context of the problem; important details are missing | Adequately describes the scope and context of the problem; sufficient level of detail is provided | Comprehensively describes the scope and context of the problem; level of detail offers additional breadth, depth, and/or new insights |
| | WR1b: Demonstrates existing knowledge and emerging research on the topic | Does not adequately demonstrate knowledge of existing and emerging research on the topic; important details are missing | Adequately demonstrates knowledge of existing and emerging research on the topic; sufficient level of detail is provided | Comprehensively describes existing and emerging research on the topic; level of detail offers additional breadth, depth, and/or new insights |
| | WR1c: Compares and contrasts relevant aspects of the topic | Does not adequately compare/contrast relevant aspects of the topic; important similarities or | Adequately compares/contrasts relevant aspects of the topic; sufficient level of similarities and | Comprehensively compares/ contrasts relevant aspects of the topic; level of detail in similarities and |

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| | | distinctions are missing | distinctions are provided | distinctions offers additional breadth, depth, and/or new insights |
| | WR1d: <i>Evaluates scope of analytical methods/tools and selects the most appropriate one(s)</i> | Does not adequately evaluate the scope of analytical methods/tools and/or did not select the most appropriate one; some viable options were not considered or the best was not chosen | Adequately evaluates the scope of analytical methods/tools and selected the most appropriate one; all obvious options were considered and the best was chosen | Comprehensively evaluates the scope of analytical methods/tools and selected the most appropriate one; new or optional analytical tools were also considered and the best was chosen |
| | WR1e: <i>Identifies assumptions and constraints relevant to the analytical methods/tools selected</i> | Does not adequately identify assumptions and constraints relevant to the analytical method selected; important assumptions or constraints are missing | Adequately identifies assumptions and constraints relevant to the analytical method selected; all obvious assumptions and constraints are identified | Comprehensively identifies assumptions and constraints relevant to the analytical method selected; assumptions and constraints beyond the obvious offer additional breadth, depth, and/or new insights |
| | WR1f: <i>Develops an appropriate model for analysis</i> | Does not adequately develop an appropriate model for analysis; important aspects of the model are missing or extraneous aspects are included | Adequately develops an appropriate model for analysis; all obvious aspects of the model are included and justified | Comprehensively develops an appropriate model for analysis; new and relevant aspects of the model offer additional breadth, depth, and/or new insights |
| | WR1g: <i>Analyzes topic beyond the previous level of coursework (BS or MS)</i> | Does not adequately analyze topic at the Graduate Certificate Program level; important aspects of analysis/ evaluation is missing | Adequately analyzes topic at the Graduate Certificate Program level; sufficient level of analysis/evaluation is provided | Comprehensively analyzes topic at the Graduate Certificate Program level; level of analysis/evaluation offers additional breadth, depth, and/or new insights |
| | WR1h: <i>Evaluates topic beyond the previous level of coursework (BS or MS)</i> | Does not adequately evaluate topic at the Graduate Certificate Program level; important aspects of analysis/ evaluation is missing | Adequately evaluates topic at the Graduate Certificate Program level; sufficient level of analysis/evaluation is provided | Comprehensively evaluates topic at the Graduate Certificate Program level; level of analysis/evaluation offers additional breadth, depth, and/or new insights |

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| | WR1i: <i>Interprets results within the scope and context of the defined problem</i> | Does not adequately interpret results within the scope and context of the defined problem; interpretation is incomplete or lacks rationale | Adequately interprets results within the scope and context of the defined problem; interpretation is complete and rational | Comprehensively interprets results within the scope and context of the defined problem; interpretation is complete, rational, and offers additional breadth, depth, and/or new insights |
| | WR1j: <i>Makes appropriate recommendations and/or identifies next steps</i> | Does not make recommendations or identify next steps or recommendations and next steps are not justified based on results | Makes recommendations and identifies next steps that are commensurate with results | Makes recommendations and identifies next steps beyond the scope of the project but which have other relevance |

GLO #1
SCORE:

0

/30 PERFORMANCE TARGET: 80% of students with 20/30

Number of Students with a score of 20 or higher:

% of Students with a score of 20 or higher:

The target is 80% of students meet or exceed expectations.

The rubric for oral presentations:

GLO #1: Students analyze and evaluate advanced topics in lean six sigma.

| Avg. Score (enter for each criteria) | Criteria | 1 Does Not Meet Expectations | 2 Meets Expectations | 3 Exceeds Expectations |
|--------------------------------------|--|---|---|---|
| | OP1a: <i>Describes the scope and context of the defined problem</i> | Does not adequately describe the scope and context of the problem; important details are missing | Adequately describes the scope and context of the problem; sufficient level of detail is provided | Comprehensively describes the scope and context of the problem; level of detail offers additional breadth, depth, and/or new insights |
| | OP1b: <i>Demonstrates existing knowledge and emerging research on the topic</i> | Does not adequately demonstrate knowledge of existing and emerging research on the topic; important | Adequately demonstrates knowledge of existing and emerging research on the topic; sufficient | Comprehensively describes existing and emerging research on the topic; level of detail offers additional |

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| | | details are missing | level of detail is provided | breadth, depth, and/or new insights |
| | OP1c: <i>Compares and contrasts relevant aspects of the topic</i> | Does not adequately compare/contrast relevant aspects of the topic; important similarities or distinctions are missing | Adequately compares/contrasts relevant aspects of the topic; sufficient level of similarities and distinctions are provided | Comprehensively compares/ contrasts relevant aspects of the topic; level of detail in similarities and distinctions offers additional breadth, depth, and/or new insights |
| | OP1d: <i>Evaluates scope of analytical methods/tools and selects the most appropriate one(s)</i> | Does not adequately evaluate the scope of analytical methods/tools and/or did not select the most appropriate one; some viable options were not considered or the best was not chosen | Adequately evaluates the scope of analytical methods/tools and selected the most appropriate one; all obvious options were considered and the best was chosen | Comprehensively evaluates the scope of analytical methods/tools and selected the most appropriate one; new or optional analytical tools were also considered and the best was chosen |
| | OP1e: <i>Identifies assumptions and constraints relevant to the analytical methods/tools selected</i> | Does not adequately identify assumptions and constraints relevant to the analytical method selected; important assumptions or constraints are missing | Adequately identifies assumptions and constraints relevant to the analytical method selected; all obvious assumptions and constraints are identified | Comprehensively identifies assumptions and constraints relevant to the analytical method selected; assumptions and constraints beyond the obvious offer additional breadth, depth, and/or new insights |
| | OP1f: <i>Develops an appropriate model for analysis</i> | Does not adequately develop an appropriate model for analysis; important aspects of the model are missing or extraneous aspects are included | Adequately develops an appropriate model for analysis; all obvious aspects of the model are included and justified | Comprehensively develops an appropriate model for analysis; new and relevant aspects of the model offer additional breadth, depth, and/or new insights |
| | OP1g: <i>Analyzes topic beyond the previous level of coursework (BS or MS)</i> | Does not adequately analyze topic at the Graduate Certificate Program level; important aspects of analysis/ evaluation is missing | Adequately analyzes topic at the Graduate Certificate Program level; sufficient level of analysis/evaluation is provided | Comprehensively analyzes topic at the Graduate Certificate Program level; level of analysis/evaluation offers additional breadth, depth, and/or |

| | | | | |
|--|--|--|--|---|
| | | | | new insights |
| | OP1h: <i>Evaluates topic beyond the previous level of coursework (BS or MS)</i> | Does not adequately evaluate topic at the Graduate Certificate Program level; important aspects of analysis/ evaluation is missing | Adequately evaluates topic at the Graduate Certificate Program level; sufficient level of analysis/evaluation is provided | Comprehensively evaluates topic at the Graduate Certificate Program level; level of analysis/evaluation offers additional breadth, depth, and/or new insights |
| | OP1i: <i>Interprets results within the scope and context of the defined problem</i> | Does not adequately interpret results within the scope and context of the defined problem; interpretation is incomplete or lacks rationale | Adequately interprets results within the scope and context of the defined problem; interpretation is complete and rational | Comprehensively interprets results within the scope and context of the defined problem; interpretation is complete, rational, and offers additional breadth, depth, and/or new insights |
| | OP1j: <i>Makes appropriate recommendations and/or identifies next steps</i> | Does not make recommendations or identify next steps or recommendations and next steps are not justified based on results | Makes recommendations and identifies next steps that are commensurate with results | Makes recommendations and identifies next steps beyond the scope of the project but which have other relevance |

| | | | |
|---|---|--|---|
| GLO #1 SCORE: | 0 | /30 | PERFORMANCE TARGET: 80% of students with 20/30 |
| Number of Students with a score of 20 or higher: | | % of Students with a score of 20 or higher: | |

The target is 80% of students meet or exceed expectations.

| | |
|--|--|
| Spring 2013-Fall 2013 Assessment Data | Spring 2014-Fall 2014 Assessment Data |
| | |

Plans for 2015: Based upon the 2014 assessment data included in this annual report, what changes/improvements will the program implement during the next academic year to improve performance on this student learning outcome?

Office of Assessment and Accreditation (OAA) Comments on Student Learning Outcome 1:

Student Learning Outcome 2
(knowledge, skill or ability to be assessed)

Students effectively communicate technical information related to lean six sigma.

Changes to the Student Learning Outcomes Assessment Plan: If any changes were made to the assessment plan (which includes the Student Learning Outcome, Effectiveness Measure, Methodology and Performance Outcome) for this student learning outcome since your last report was submitted, briefly summarize the changes made and the rationale for the changes.

N/A - New Program

Effectiveness Measure: Identify the data collection instrument, e.g., exam, project, paper, etc. that will be used to gauge acquisition of this student learning outcome and explain how it assesses the desired knowledge, skill or ability. A copy of the data collection instrument and any scoring rubrics associated with this student learning outcome are to be submitted electronically to the designated folder on the designated shared drive.

Project Written Report (WR), Project Oral Presentation (OP), and/or Exam (EX)

Methodology: Describe when, where and how the assessment of this student learning outcome will be administered and evaluated. Describe the process the department will use to collect, analyze and disseminate the assessment data to program faculty and to decide the changes/improvements to make on the basis of the assessment data.

Use developed rubric for evaluating graduate class projects.

Performance Outcome: Identify the percentage of students assessed that should be able to demonstrate proficiency in this student learning outcome and the level of proficiency expected. *Example: 80% of the students assessed will achieve a score of “acceptable” or higher on the Oral Presentation Scoring Rubric.* (Note: a copy of the scoring rubric, complete with cell descriptors for each level of performance, is to be submitted electronically to the designated folder on the designated shared drive.)

The rubric for written reports:

| GLO #2: Students communicate technical information on lean six sigma. | | | | |
|---|--|---|---|---------------------------|
| Avg. Score (enter for each criteria) | Criteria | 1 Does Not Meet Expectations | 2 Meets Expectations | 3 Exceeds Expectations |
| | WR2a: Document conforms to format specified by the Graduate School (style, font size and type, margins, spacing, pagination, numbering, and organization) | Does not conform to format specified by the Graduate School | Conforms to format specified by the Graduate School | N/A |
| | WR2b: Referencing format conforms to discipline standards | Does not conform to referencing format of the discipline | Conforms to referencing format of the discipline | N/A |
| | WR2c: Quality of content, organization, and coherence of writing is at a level expected of professional publications | Is not at a level expected of professional publications; needs extensive revision | Is at a level expected of professional publications with minor or no revision | N/A |

GLO #2 SCORE: 0 /6 PERFORMANCE TARGET: 80% of students with 6/6

| | | | |
|---------------------------------------|--|----------------------------------|--|
| Number of Students with a score of 6: | | % of Students with a score of 6: | |
|---------------------------------------|--|----------------------------------|--|

The target is 80% of students meet or exceed expectations.

The rubric for oral presentations:

| GLO #2: Students communicate technical information on lean six sigma. | | | | |
|---|----------|---------------------------------|-------------------------|---------------------------|
| Avg. Score (enter for each criteria) | Criteria | 1 Does Not Meet Expectations | 2 Meets Expectations | 3 Exceeds Expectations |

| | | | | |
|--|--|--|---|-----|
| | OP2a: Delivery follows a logical sequence | Lacks a logical sequence; key aspects of the project are unclear and/or lack a unified rationale | Follows a logical sequence; key aspects of the project are understood and present a unified rationale | N/A |
| | OP2b: Delivery is appropriately paced | Does not engage audience; pace too fast or too slow | Engages the audience at an appropriate pace | N/A |
| | OP2c: Delivery presents a convincing argument | Does not offer a convincing case; lacks substance and rationale based on scientific method | Offers a convincing case; substantive and rational based on identified method | N/A |

GLO #2 SCORE:

0 /6

PERFORMANCE TARGET: 80% of students with 6/6

Number of Students with a score of 6:

% of Students with a score of 6:

The target is 80% of students meet or exceed expectations.

| Spring 2013-Fall 2013 Assessment Data | Spring 2014-Fall 2014 Assessment Data |
|---------------------------------------|---------------------------------------|
| | |

Plans for 2015: Based upon the 2014 assessment data included in this annual report, what changes/improvements will the program implement during the next academic year to improve performance on this student learning outcome?

Office of Assessment and Accreditation (OAA) Comments on Student Learning Outcome 2:

OAA Overall Comments