

# University of Louisiana at Lafayette

## Detailed Assessment Report 2015-2016 Systems Engineering PhD

As of: 11/18/2016 11:24 AM CENTRAL

(Includes those Action Plans with Budget Amounts marked *One-Time, Recurring, No Request.*)

### Mission / Purpose

Systems Engineering is geared toward the rapid design and development of large and complex systems. Systems Engineering integrates all the specialty and sub-specialty groups of engineering disciplines into a team whose efforts result in a structured development process that proceeds from concept to production to operation. Example systems include coastal ecosystems, water treatment facilities, computer networks, visualization platforms, deep-water drilling operations, highway safety systems, biofuels production facilities, robotic units, refineries, fiber optic networks, aircraft, vehicle control systems, biomass gasification units, management of utilities during disaster events, and power grids.

Each of the five engineering departments at UL Lafayette participates in the offering of the Systems Engineering Ph.D. degree with a discipline concentration within each department. This innovative program builds upon the research-based learning experience associated with most Engineering Ph.D. programs by adding the additional learned skill set of Systems Engineering principals. The graduate of this program is expected to be highly appealing to both industry and academic positions.

### Goals

#### **G 1: Systems Engineering**

The student is required to select a concentration (specialization) department from within the college – chemical engineering, civil engineering, electrical engineering, mechanical engineering, or petroleum engineering. The graduate exits the program with a strong specialized knowledge appropriate of a traditional engineering Ph.D. coupled with expertise in the application of systems theory toward solving complex problems within their specialty.

### Student Learning Outcomes/Objectives, with Any Associations and Related Measures, Targets, Findings, and Action Plans

#### **SLO 1: General Knowledge of Systems Engineering**

The student will understand the conceptual and theoretical frameworks of systems engineering.

#### Related Measures

#### **M 1: Comprehensive Examination - Written**

A comprehensive examination will be administered after all required courses are completed. This exam focuses on the student's use of the content obtained from the courses taken within the program and how it was used to structure a research proposal, implementation plans, and commercialization concept. The comprehensive exam requires a written component that presents a research proposal on a topic not closely aligned with the student's dissertation topic. This written proposal requires the student to prepare his/her proposal following the current National Science Foundation (NSF) proposal format. The topic of the comprehensive exam must be agreed upon by the student's graduate committee prior to the initiation of the exam. The student will be granted one semester to

prepare the exam materials and the defense (both component tests administered the following semester). The student must work independently and not utilize advice from faculty (they can utilize advice from student colleagues). The student's performance on each outcome is rated on a scale of 1 - 5, with 5 being the best score.

Source of Evidence: Writing exam to assure certain proficiency level

### **Connected Documents**

[PhD Program Evaluation Forms](#)  
[Sample Written Comprehensive Exam](#)

### **Target:**

The average score for all students will be 3.0 or higher.

### **Finding (2015-2016) - Target: Met**

Average 3.8

We had 5 students taking the exam. Two out of the 5 students did an excellent job with average around 4.0. The other three students received scores between 3.5 to 4.0.

### **Related Action Plans (by Established cycle, then alpha):**

#### **Meeting of PhD Student Advisors**

The program coordinator will meet with graduate faculty advising PhD students to identify ways to further improve the quality of the written exam

**Established in Cycle:** 2013-2014

**Implementation Status:** Finished

**Priority:** High

#### **Relationships (Measure | Outcome/Objective):**

**Measure:** Comprehensive Examination - Written |

**Outcome/Objective:** General Knowledge of Systems Engineering

**Implementation Description:** The program coordinator has met with several graduate faculty members advising PhD students in the first week of November . As a group we will: 1. set higher standard on the written exam 2. request stronger justification section of the written exam

**Projected Completion Date:** 12/2014

**Responsible Person/Group:** Graduate faculty working with PhD students

**Connected Document**

[Sample Written Comprehensive Exam](#)

#### **Meeting with student and committee**

We had one student failed the comprehensive exam. The program coordinator has met with the committee to identify the areas for improvement.

**Established in Cycle:** 2014-2015

**Implementation Status:** Finished

**Priority:** High

#### **Relationships (Measure | Outcome/Objective):**

**Measure:** Comprehensive Examination - Written |

**Outcome/Objective:** General Knowledge of Systems Engineering

**Implementation Description:** The major professor has met with the student to review the areas for potential improvement. We believe that the student can pass the exam on his second attempt.

**Projected Completion Date:** 05/2015

**Responsible Person/Group:** Program Coordinator (Dr. Jim Lee) Major professor of student (Dr. Boyun Guo) Advisory committee

**Connected Document**

[Sample Written Comprehensive Exam](#)

**Proposal writing skill**

Our comprehensive exam requires our students to develop a research proposal in NSF format without assistance from faculty members. After reviewing the quality of the proposals, we feel that our students can benefit if we cover proposal writing in one of our PhD level classes.

**Established in Cycle:** 2015-2016

**Implementation Status:** Finished

**Priority:** High

**Relationships (Measure | Outcome/Objective):**

**Measure:** Comprehensive Examination - Written |

**Outcome/Objective:** General Knowledge of Systems Engineering

**Implementation Description:** We have decided to cover the proposal writing skills in our ENGR 606, systems engineering II class.

**Projected Completion Date:** 08/2016

**Responsible Person/Group:** Dr. Sun in Civil Engineering has extensive experience in reviewing NSF proposals. She agrees to cover proposal writing skills in her ENGR 606 class in Fall 2016.

**Additional Resources:** None.

**M 2: Comprehensive Examination- Oral**

A second component of the comprehensive exam is a verbal presentation of the proposal to the graduate committee. The average score for all students will be 3.0 or higher.

Source of Evidence: Presentation, either individual or group

**Connected Document**

[PhD Program Evaluation Forms](#)

**Target:**

The average score for all students will be 3.0 or higher.

**Finding (2015-2016) - Target: Met**

Average 4.2.

We had 5 students taking the exam. Three out of the 5 students did an excellent job with average between 4.2-4.5. The other two students received scores between 3.5 to 4.0.

**SLO 2: Demonstration of Specialized Knowledge**

Student will identify current trends in the area of systems engineering in one concentration area.

**Related Measures**

**M 3: Dissertation Proposal Defense**

Prior to the initiation of the student's dissertation study, a verbal defense of the proposed dissertation topic must be made to the student's graduate committee. This proposal and defense will lay out the research hypotheses, goals, methods, and expected results. The student's performance on each outcome is rated on a scale of 1 - 5, with 5 being the best score.

Source of Evidence: Presentation, either individual or group

**Connected Document**

[PhD Program Evaluation Forms](#)

**Target:**

The average score for all students will be 3.0 or higher.

**Finding (2015-2016) - Target: Met**

Average 4.5.

We had three students presented the dissertation proposals. The specialized knowledge demonstrated in the presentations are very strong.

**M 4: Dissertation**

A comprehensive, written dissertation that summarizes all aspects of the original research performed by the candidate is required. To further entrench the learning of current state-of-the-art product development methodology, the dissertation research to be performed by the candidates must follow a generalized Six Sigma format. Additionally, each dissertation must have a significant "Commercialization" chapter that details how the discoveries and associated technology developments may be brought into the engineering marketplace. The student's performance on each outcome is rated on a scale of 1 - 5, with 5 being the best score.

Source of Evidence: Senior thesis or culminating major project

**Connected Document**

[PhD Program Evaluation Forms](#)

**Target:**

The average score for all students will be 3.0 or higher.

**Finding (2015-2016) - Target: Met**

Average score is 4.6.

We had three students completed their dissertations. The scores are between 4.4 - 4.7. The specialized knowledge demonstrated in the dissertation is very strong.

**M 5: Final Examination**

The final examination will be a dissertation defense administered after the dissertation is completed and reviewed by the student's dissertation committee. With this exam, a thorough review of the dissertation by the committee along with a stand-up defense is required. The student's performance on each outcome is rated on a scale of 1 - 5, with 5 being the best score.

Source of Evidence: Presentation, either individual or group

**Connected Document**

[PhD Program Evaluation Forms](#)

**Target:**

The average score for all students will be 3.0 or higher.

**Finding (2015-2016) - Target: Met**

Average 4.2.

We had three students completing the final exam with scores between 4.0 to 4.5.

**SLO 3: Practical Problem Solving Skills**

An ability to demonstrate competence in solving practical problems in systems technology.

**Related Measures****M 4: Dissertation**

A comprehensive, written dissertation that summarizes all aspects of the original research performed by the candidate is required. To further entrench the learning of current state-of-the-art product development methodology, the dissertation research to be performed by the candidates must follow a generalized Six Sigma format.

Additionally, each dissertation must have a significant "Commercialization" chapter that details how the discoveries and associated technology developments may be brought into the engineering marketplace. The student's performance on each outcome is rated on a scale of 1 - 5, with 5 being the best score.

Source of Evidence: Senior thesis or culminating major project

**Connected Document**

[PhD Program Evaluation Forms](#)

**Target:**

The average score for all students will be 3.0 or higher.

**Finding (2015-2016) - Target: Met**

Average is 4.0.

We had three students with scores between 3.5 to 4.5.

**Related Action Plans (by Established cycle, then alpha):**

**Six Sigma format**

We required our students to prepare dissertation based on six sigma format. This is a format suggested by industry. Some of our students need additional help in this area.

**Established in Cycle:** 2015-2016

**Implementation Status:** Finished

**Priority:** High

**Relationships (Measure | Outcome/Objective):**

**Measure:** Dissertation | **Outcome/Objective:** Practical Problem Solving Skills

**Implementation Description:** We decided to modified the materials covered in ENGR 640 Lean six Sigma class to strengthen the preparation of a research paper in six sigma format. It was done in Spring 2016.

**Projected Completion Date:** 01/2016

**Responsible Person/Group:** Dr. Jim Lee in Mechanical Engineering is instructor of ENGR 640 class.

**Additional Resources:** None.

**M 5: Final Examination**

The final examination will be a dissertation defense administered after the dissertation is completed and reviewed by the student's dissertation committee. With this exam, a thorough review of the dissertation by the committee along with a stand-up defense is required. The student's performance on each outcome is rated on a scale of 1 - 5, with 5 being the best score.

Source of Evidence: Presentation, either individual or group

**Connected Document**

[PhD Program Evaluation Forms](#)

**Target:**

The average score for all students will be 3.0 or higher.

**Finding (2015-2016) - Target: Met**

Average is 4.1.

Three students has completed the exam with scores between 3.5 to 4.5.

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## Analysis Questions and Analysis Answers

**How were assessment results shared and evaluated within the unit?**

We have five concentrations within our program. Each concentration has a graduate coordinator. The program coordinator shares the results with the five concentration coordinators and requests the concentration coordinators to share the results with the faculty in their area. The concentration coordinator evaluates the assessment results with the faculty and provides input to the program coordinator.

**Identify which action plans [created in prior cycle(s)] were implemented in this current cycle. For each of these implemented plans, were there any measurable or perceivable effects? How, if at all, did the findings appear to be affected by the implemented action plan?**

In our previous cycle, we had one student failed the comprehensive exam. The action plan was to call a meeting to review the purpose and the requirements of the comprehensive exam with the faculty and the students. This year, all our students taking the comprehensive exam passed the exam.

**What has the unit learned from the current assessment cycle? What is working well, and what is working less well in achieving desired outcomes?**

We continue to work as a team to build a strong PhD program in systems engineering. In this assessment cycle, we believed that the quality of the dissertation prepared by the students has improved. The number of students completed our program also increased. The communication between our faculty and students improved significantly, and this is one area that works well. We do not see anything as "working less well" .