Strategic Plan
For the period 2005 – 2010

Systems Engineering Department

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Prepared by the Strategic Plan Task Force Committee of Systems Engineering Department

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Approved by the Systems Engineering Faculty in the Faculty Retreat held on February 2, 2007.
1 Introduction

This document describes the Strategic Plan envisioned by the Systems Engineering Department of UALR for the 5-year period 2005 – 2010. The plan is driven by the vision and mission statements set forth by the department, its constituents’ needs, and the needs of the State of Arkansas. Having been accredited by ABET in 2004 retroactive to 2002, the department responded to its constituents’ needs and introduced electrical and mechanical systems options into its bachelor’s degree program beginning Fall 2005.

During the academic year 2004 – 2005, the department revised its systems engineering core and option requirements and introduced significant changes to strengthen the program. Key accomplishments include:

- Introduction of 20 credit hours of new courses in each of the two newly introduced electrical and mechanical systems options
- Introduction of a variety of new electives in each of these two options
- Introduction of two new introductory courses at the freshman level to enable the faculty to introduce each of the four options to freshmen.

Among the core courses is a set of four introductory courses in each of the four telecom, computers, electrical, and mechanical options of which two in telecom (SYEN 1303) and electrical (SYEN 1304) are new courses; SYEN 1301 Introduction to computer systems is an existing course and SYEN 1305 Introduction to mechanical systems is a revised version of the course SYEN 1305 Engineering Analysis and Design

- Independent senior design courses SYEN 4385 and 4386 in the computer option and SYEN 4387 and 4388 in the telecom option were combined into a single set of two capstone design courses. The new set of courses will serve as capstone design courses for the two new electrical and mechanical systems options as well.

With regard to the graduate program, the department has formulated and approved a graduate certificate program in systems engineering, again in response to constituents’ needs. The department views the certificate program as a key step towards the introduction of a master’s program in systems engineering and followed by a PhD program.

The department has initiated efforts to recruit two new faculty to the department. To cater to the growing needs for teaching support required by the new programs, faculty to be recruited will have expertise in mechanical engineering and systems engineering. A faculty search committee is currently in place to facilitate the search process.

As the program evolves, one can envision introducing other engineering options based on constituents’ needs. The program can truly evolve to serve as a fertile ground for the ‘meeting of the minds,’ that can lead to stimulating and innovative interdisciplinary engineering programs and research.
This document describes the strategic plan encompassing the following areas:

- Undergraduate program
  - New options in electrical and mechanical
  - Advising, recruiting, and retention
  - Internships and co-op programs
- Graduate program
  - Certificate program, Master’s and PhD programs
  - Research and funding
- Faculty recruitment and development
- Centers of excellence
- Entrepreneurship program

Figure 1 below provides an overview of Systems Engineering Department's strategic plan for the next five years.

![Systems Engineering Department Strategic Plan](image)

Figure 1. Systems Engineering Department’s Strategic Plan.

2 Vision

The vision of Systems Engineering Department is to be recognized as one amongst the few leading institutions with systems engineering programs in the nation, imparting the highest quality education to undergraduate and graduate
students and conducting research in core areas of foci leading to national and international recognition.

Systems engineering is a relatively new engineering discipline that deals with the analysis and design of complex human-made systems. These systems are typically built by the application of pervasive and permeating technologies rather than “stove-piped” traditional technologies. The domain of systems engineering encompasses computers, communications, electrical, mechanical, defense, education, healthcare, manufacturing, transportation, and others. Systems engineering and analysis, when coupled with new and emerging technologies, reveals unexplored opportunities for bringing new and improved products and services into being that are more cost-effective, competitive and sustainable in the world marketplace.

The Systems Engineering Department will seek to introduce new and innovative approaches in the disciplines that Systems Engineering encompasses and educate a new breed of engineers well qualified to be the leaders and visionaries of the 21st century.

The graduates of Systems Engineering Department will be able to:

- Integrate multifaceted engineering disciplines to complete the 'big picture';
- Specialize in one of the few fastest growing disciplines of Engineering – Computer Systems, Telecommunications Systems, Electrical Systems, and Mechanical Systems;
- Model complex systems for optimizing system performance;
- Work in teams and with industry clients;
- Architect, design, develop, and deliver a completed project;
- Receive an educational background that offers excellent pre-med, pre-business, and pre-law preparation with its combination of technology, business and the liberal arts;
- Prepare for a career with leading industries or government, or for the pursuit of Master’s or Doctorate degree.

3 Mission

The mission of Systems Engineering Department is to be the source of a new breed of engineers, researchers, and entrepreneurs that can learn, and quickly adapt to, the dynamic and ever changing technological landscape and apply the knowledge to serve the stakeholders – the college, the society, the local and national industries and the educational institutions, the State of Arkansas, the nation, and the world.

The UALR Systems Engineering faculty consists of a group of outstanding individuals with national and international reputation. They are noted for their accomplishments in transportation, telecommunications, and control, among
other areas. Most importantly, they consist of a broad spectrum of background, spanning disciplines such as computers, telecommunications, electrical, mechanical, civil, and operations research. Besides possessing strong academic teaching and research experience, some of the faculty possess a strong industrial experience as well.

Based on their credentials, the Systems Engineering faculty will strive to:

- Recruit, mentor and advise, and retain our undergraduate and graduate students;
- Attract local, national, and international students of high caliber and potential;
- Attract and retain faculty with national and international reputation
- In collaboration with the stakeholders, continually seek to refine the curriculum and enhance the degree program;
- Enhance the departmental resources and acquire state-of-the-art equipment, resources, and facilities for the conduct of research and education;
- Impart state-of-the-art education of highest quality to undergraduate and graduate students;
- Impart entrepreneurial spirit to our undergraduate and graduate students as well as our own faculty and, with their entrepreneurial efforts, pave the way for increased job opportunities for the people of Arkansas and for improving the economy of the state;
- Engage in scholarly pursuit of research that will have the potential to gain national and international recognition; and
- Engage in service to the community and profession by undertaking responsibilities in organization of significance to the community and to the profession.

4 Strategic Plan

4.1 Goal 1: Provide an undergraduate program in Systems Engineering that will train the students to be 21st century engineers capable of adapting to the dynamic changes taking place in the technological areas of focus of the department.

4.1.1 Strategies

- Recruiting – In Fall 2005, freshman enrollment more than tripled compared to the previous year. Currently, the program has 90 students enrolled over all the four years. We plan to increase our undergraduate and graduate enrollment by 20 next year. Over the next five years, increase from the current enrollment to 200 students, on the average about 50 students in each of the four options.
  - In 2005, the department created a new position, the Director of Undergraduate Studies, to help in the recruiting process
Working with the college recruiting team, undertake aggressive campaigning and outreach activities, visit campuses and address potential students directly.

Curriculum – Provide state-of-the-art curriculum with periodic assessment and continuous improvement process.

- Work with industrial advisory council, alumni, and colleagues at other institutions and industries and seek their advice to improve the curriculum.

Laboratories – Ensure that the laboratory facilities are upgraded with technological advances; as new options are introduced, install state-of-the-art laboratory facilities in the new disciplines.

- Plans are currently underway to upgrade the existing Engineering Technology Department’s mechanical and electrical engineering laboratories to create facilities to be shared by both the Engineering Technology Department and Systems Engineering Department.
- Aggressively seek out funding from industries and government sources by writing proposals.

Advising – Provide best advising to students; train faculty members in the art of advising.

- Obtain periodic feedback from students on increasing the effectiveness of advising by Systems Engineering faculty members.

Cooperative Education – With a majority of our students working part time to support their education, the Coop program is one of the best ways to accommodate the needs of our students. Experience to date substantiates this observation. Yet more can be done to fully capitalize on this arm of our program, including reaching out to more industries.

4.2 Goal 2: Enhance the Systems Engineering program with new options that are synergistic with the demands of the local industries and that can lead to the economic development of the State of Arkansas.

4.2.1 Strategies

Mechanical Option: Based on prior assessment that there exists great scope and demand for mechanical engineers in Arkansas. The department has now introduced this program in 2005 Fall. This program has been designed to meet the dynamic needs of the industry. A mechanical engineering task force led by Mr. Jim Engstrom has now been assembled to advise the department on curriculum related to mechanical systems option.

Electrical Option: The systems engineering program has now been enhanced further with the addition of an electrical systems option. The first freshman introductory course in electrical engineering is scheduled to be offered in Spring 2006.

Biomedical Option: Seek feedback from constituents and assess the need for a biomedical option within systems engineering. Should such a need exist, undertake plans to introduce a biomedical option in 2007 by leveraging the strengths of the existing options and in collaboration with UAMS. This program introduction will be coordinated with the ongoing effort by UALR, UAMS, and UAF to introduce a master’s program in Biomedical.
4.3 Goal 3: Develop a high quality graduate program with national and international recognition

4.3.1 Objective 1: Institute a graduate certificate program

4.3.1.1 Strategies

- The department, the college, and the university council/committees have now approved a certificate program developed by the certificate task force.
- A letter of intent will be submitted to Arkansas Department of Higher Education by January 3, 2006.
- Aggressive advertisement of the program will follow.
- Efforts are underway to recruit one new faculty with expertise in systems engineering.

4.3.2 Objective 2: Institute graduate degree programs

4.3.2.1 Strategies

- MS degree program in 2007: Leveraging our current participation in the graduate program through Applied Science Department and the independent graduate certificate program to begin in 2006, the Systems Engineering Department will plan to offer a full-fledged Masters degree program in Systems Engineering and will plan to attract local, national, and international students to the program.
- Ph.D. Program by 2009: As a natural extension, the department will offer PhD degree in Systems Engineering by leveraging the ongoing graduate program in collaboration with Applied Science and the department's graduate certificate and Masters degree programs.

4.3.3 Objective 3: Grow the departmental funding and research to facilitate graduate program growth

4.3.3.1 Strategies

- Funding: Increase research funding to $500,000 per year by 2007 and to $1 million by 2010.
- Publications: Attain an average of two refereed publications per faculty member per year by 2010.
- Number of graduations: Graduate, on the average, one graduate student per faculty member per year by 2010.

4.4 Goal 4: Synergistic with increasing options and growth in graduate program, increase the number of full-time and adjunct faculty members

4.4.1 Strategies

- Recruit two additional faculty members in 2006 to support the mechanical and electrical options as well as the graduate certificate program.
- Recruit two additional faculty members in 2007 to support the growth of systems engineering program, especially those of the two new options.
- Recruit one or two additional faculty members in 2008 to support the growth of computers/telecom/electrical/mechanical options as well as the growth certificate and master's program.
4.5 **Goal 5: Synergistic with the growth in graduate program, establish centers of excellence in one or more core areas of research focus.**

4.5.1 **Objective 1: Establish a center of excellence by 2008.**

4.5.1.1 **Strategies**
- Aggressively seek out to establish one or two chaired positions by 2007
- Recruit one or two outstanding experts renowned worldwide.
- Aggressively seek out funding for the center from government, industry, and private sources.

4.5.2 **Objective 2: Establish a second center of excellence by 2010**

4.5.2.1 **Strategies**
- Similar strategies as for Objective 1 above.

4.6 **Goal 6: Develop an enterprise entrepreneurial program involving undergraduate and graduate students as well as students/faculty from the College of Business that has the potential to increase the growth of technology-based firms with consequent increase in employment and contribute to the economic development of the State of Arkansas**

4.6.1 **Objective 1: Introduce an enterprise entrepreneurial program.**

4.6.1.1 **Strategies**
- Explore the possibility of combining a group of undergraduate students with one or two graduate students as well as students and/or faculty from the College of Business so that jointly the team possesses the required expertise to address an enterprise problem. Informal discussions have been held with a couple of faculty members from the College of Business.
- Work with a team or two to create business plans that can be entered into the yearly Governor’s Entrepreneurship competition.
- Aggressively work with industries to seek out projects that the students can work on
- Work out intellectual property agreements with clients to support incubating startups should the enterprise project lead to a marketable and profitable product.

5 **Synergies with UALR’s Vision for a Decade**

The goals articulated in the Systems Engineering Department’s Strategic Plan are synergistic with those of UALR’s Vision for a Decade. The following table summarizes the synergies between the two.

<table>
<thead>
<tr>
<th>Systems Engineering Department Goals for the next half decade (2005 – 2010)</th>
<th>UALR’s Vision for a Decade</th>
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<tbody>
<tr>
<td><strong>Goal 1:</strong> Provide an undergraduate program in Systems Engineering that will train the students to be 21st century engineers capable of adapting to the dynamic changes</td>
<td><strong>Goal 1:</strong> UALR will provide programs of study that will educate students to live and work in the complex, technological, diverse world of the 21st century.</td>
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taking place in the technological areas of focus of the department.

**Goal 2:** Enhance the Systems Engineering program with new options that are synergistic with the demands of the local industries and that can lead to the economic development of the State of Arkansas.

**Goal 3:** Develop a high quality graduate program with national and international recognition.

**Goal 4:** Synergistic with increasing options and growth in graduate program, increase the number of full-time and adjunct faculty members.

**Goal 5:** Synergistic with the growth in graduate program, establish centers of excellence in one or more core areas of research focus.

**Goal 6:** Develop an enterprise entrepreneurial program involving undergraduate and graduate students that has the potential to increase the growth of high tech firms with consequent increase in employment and contribute to the economic development of the State of Arkansas.

**Goal 1**, Objective 3: The University will expand offerings in engineering as CyberCollege programs in Systems Engineering and in Information Science mature.

**Goal 3:** UALR will continue to expand its graduate offerings to address regional and state needs.

**Goal 6:** UALR will support and strengthen its human resources.

**Goal 4:** UALR will expand its research capabilities to support UALR’s academic mission and to strengthen regional and state economic development plans.

**Goal 1** and **Goal 4**.